American Nuclear Society

MINUTES

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

Hyatt Regency Minneapolis • Minneapolis, MN
June 10, 2019

Members Present:
N. Prasad Kadambi, RP3C Chair, Individual
*Edward Wallace, Vice-Chair, GNBC Associates, Inc.
John Fabian, (Secretary Pro Tem), American Nuclear Society
*Patricia Schroeder (Secretary), American Nuclear Society
*James August, Southern Company
Donald Eggett, Individual
Margaret Harding, 4 Factor Consulting, LLC
*Dennis Henneke, General Electric
David Hillyer, Individual
*David Holcomb, Oak Ridge National Laboratory
*Earnestine Johnson-Turnipseed, Entergy
*Mark Linn, Oak Ridge National Laboratory
*James O'Brien, U.S. Department of Energy
*William Reckley, U.S. Nuclear Regulatory Commission
*Liang Shi, Exelon
*Kent Welter, NuScale
Robert Youngblood, Idaho National Laboratory

Guests:
Donald Eggett, Individual
John Nakoski, U.S. Nuclear Regulatory Commission
Gary Peet, Nawah Energy Company-UAE
Martin Plys, Fauske & Associates, LLC
Lui Tao, Tsinghua University, China

**participated by phone*

1. **Welcome, Roll Call & Introductions**
   RP3C Chair Prasad Kadambi called the meeting to order. Those physically in attendance and those on the phone introduced themselves.

2. **Approval of Meeting Agenda**
   Prasad Kadambi directed members to a presentation prepared to use as a guide throughout the meeting—See Attachment 1. He reviewed the agenda for the meeting, and the agenda was approved as presented.

3. **Status of Interaction with Standards Board**

- RP3C Actions on Standards Committee Strategic Plan Goals & Objectives
  SMART Matrix—See Attachment 2
  Prasad Kadambi reviewed RP3C goals and objectives directed by the SMART Matrix. Goal #1 (D) directs that risk-informed and performance-based (RIPB) methods be incorporated into ANS standards where appropriate. To aid in this goal, RP3C has been tasked with developing a plan, conducting two pilots, and preparing a training package for Standards Committee members. Ed Wallace informed members that he received clearance to use licensing modernization project (LMP) materials for the training package and is merging files for ANS use.

  David Hillyer stated that the Fuel, Waste, and Decommissioning Consensus Committee (FWDCC) reviewed current activities and feel that they do not have a present need to incorporate RIPB approaches but will likely in the future. Jodine Jansen-Vehec, a FWDCC members involved in risk activities on the ANS/ASME Joint Committee on Nuclear Risk Management (JCNRM), is developing a presentation for the committee. Hillyer offered to provide RP3C a copy when available.

  ACTION ITEM 6/2019-01: David Hillyer to provide RP3C a copy of FWDCC's RIPB presentation once developed for review.
  DUE DATE: September 1, 2019

- Outcome of Standards Board Meeting on November 13, 2018, Relative to RP3C
  - Draft RIPB Guidance Document and RP3C tasks as directed on the SMART Matrix were reviewed.
  - Consensus committee feedback on RP3C recommendations were reviewed [SB Action Item 11/2018-14].
  - Discussed incorporation of RIPB in ANS-2.26, "Categorization of Nuclear Facility Structures, Systems, and Components for Seismic Design," and ANS-30.1, "Integrating Risk and Performance Objectives into New Reactor Nuclear Safety Designs" [SB Action Item 11/2018-15]
  - Discussed possible formation of RIPB Community of Practice

4. RP3C Procedural Guidance Development and Implementation

Guidance Document—See Attachment 3

James O'Brien explained the difficulty in developing the guidance document and the challenge of incorporating Standards Board comments. The purpose of the guidance document is to identify roles and responsibilities and the process for using RIPB approaches. The guidance should help ANS working group chairs decide if their standard can incorporated RIPB methods. The most benefit is if the touch point with RP3C is early in the stage of a standards development. O'Brien believes that they are very close to issuing the guidance document for trial use. See slides 4 – 8 of the meeting presentation (Attachment 1) for more details.

John Nakoski thought that the guidance was at the right level for incorporation RIPB methods into ANS standards. He clarified that RIPB is two different concepts which do not need to be used together. His initial thought is that the essence of the concept at a high-level is captured. William Reckley added that the guidance document hits the mark. Kadambi thanked O'Brien for defining something nebulous.

5. Consensus Committee Feedback on RP3C Recommendations

RP3C Recommendation Tracking Spreadsheets—See Attachment 4

Prasad Kadambi recognized that RP3C interaction with consensus committees is growing. When asked, Pat Schroeder explained the steps she takes as conduit or facilitator to spread the word about RP3C and resources available.

Mark Linn stated that it has been an evolution of RP3C's role in how draft standard ANS-30.1, "Integrating Risk and Performance Objectives into New Reactor Nuclear Safety Designs," looks today. It's been a work in progress.

Wallace explained the challenge with using terminology consistently. He recommends that working groups check with RP3C about terminology. He believes that ANS can be more effective on this topic. Dennis Henneke expressed concern with duplicating the JCNRM's work in standardizing terminology. He feels the expertise resides in the JCNRM. John Nakoski agreed that the JCNRM has the expertise, and its work should not be duplicated. Kadambi stated that he is not looking for the RP3C to duplicate the work but that both committees need to work together. Donald Eggett reminded members that the ANS has just updated its glossary. Kent Welter stated that his working group is using the glossary in developing ANS-30.3, "Light-Water Reactor Risk-Informed Performance-Based Design," but found there to be several deficits. He would welcome help in defining some terms. Welter will initiate an email for further discussion.

ACTION ITEM 6/2019-02: Kent Welter to initiate an email to start discussion on defining terms not in the glossary.
DUE DATE: August 1, 2019

Wallace explained the evaluation process that was used to develop the short list of 23 standards and projects that were deemed to have high benefit to incorporating RIPB methods. Besides Wallace, the review group included James August and Alan Levin. The review was done a couple of years ago and may have changed. Wallace suggested that the list should be re-evaluated. If RP3C is in agreement, the task would be part of the recommendations to the Standards Board coming out of today's meetings. The re-evaluation would make use of the guidance document. Kadambi feels that if a re-evaluation is initiated, the review group would need support from each consensus committee. He would also recommend that the consensus committee chairs have a separate tracking requirement on their reports to the Standards Board.

Wallace suggested an open forum for commenting on the guidance document. He'll talk with Pat Schroeder offline.

ACTION ITEM 6/2019-03: Ed Wallace and Pat Schroeder to discuss opportunities for using ANS Collaborate as an open forum for commenting on the guidance document.
DUE DATE: August 1, 2019

Henneke questioned the action on the re-evaluation of the list of standards and projects that should consider incorporating RIPB methods. The following motion was made and seconded:

> **MOTION:** Re-review all ANS standards and projects using new criteria (guidance document) to confirm that we have the right list.

It was clarified that the re-evaluation does not affect those already identified by RP3C, but other may be added to the list. Those identified in the first review would not be part of the re-evaluation.

The motion was approved unanimously. Kadambi will inform the Standards Board at their meeting tomorrow.

Wallace invited the entire RP3C membership to help with the re-evaluation of ANS standards. Schroeder will need to update the list of ANS standards and projects for the review.

ACTION ITEM 6/2019-04: Pat Schroeder to update the list of ANS standards and projects for the re-review.
DUE DATE: August 1, 2019

Margaret Harding was introduced. She explained that a couple of years ago a proposed new standard similar to nuclear quality assurance on export control was suggested. The proposed standard was designated, ANS-60.1, with the title and scope to be defined. Harding agreed to chair ANS-60.1, but it has been a bit stuck due to lack of support. She hopes resources will be freed up soon to initiate work. An issue to consider is cybersecurity and managing data. We don't want to be too conservative and limit opportunities, but we want to be smart. Harding added that she recently received a call from a member of the Department of Homeland Security expressing interest in the proposed export control standard.

In closing of this discussion, Kadambi provided his observations. He stated that a cross-functional model for standards is emerging that better aligns with U.S. Nuclear Regulatory Commission's evolving practice. Traditional deterministic standards need to evolve. He sees RP3C helping to move ANS standards in this direction.

6. Moving to Next Level – Integrating Standards for Effective Design and Operations

Prasad Kadambi recognized a crossover between standards being developed by a number of ANS consensus committees. The consensus committee is responsible for the formal review and approval of draft standards. The RP3C reviews draft standards that incorporate RIPB methods but has no authority to approve. RP3C reviews a number of standards from different consensus committees and may see a gap. The earlier in the development process gaps are identified, the better. Below is a report of three standards currently being tracked by RP3C:

- ANS-30.1, "Integrating Risk and Performance Objectives into New Reactor Nuclear Safety Designs"
  Mark Linn provided an update on ANS-30.1 to RP3C members. He reiterated that ANS-30.1 is not a design criteria document and does not specify design criteria. It provides standards-based support to the design process. A proposal for an "Integrated Risk-Informed Decision Making Process" standard was made at the November 2018 meeting. The Standards Board assigned the RP3C an action item (SB ACTION ITEM: 11/2018-15) to consider the need for this proposed standard. Kadambi informed members that, besides him, the ad hoc group exploring this proposed standard includes Robert Budnitz, Mark Linn, George Flanagan, and Ed Wallace. Kadambi has also enlisted Robert Youngblood.

  Wallace questioned whether the backend process should be included in ANS-30.1. David Hillyer agreed that the facility life cycle should be considered.

  ACTION ITEM 6/2019-05: David Hillyer to give Mark Linn a call about adding the facility life cycle to ANS-30.1, "Integrating Risk and Performance Objectives into New Reactor Nuclear Safety Designs."
  DUE DATE: August 1, 2019

  Kadambi explained that the scope of ANS-30.1 is similar to NEI 18-04, "Risk-Informed Performance-Based Guidance for Non-Light Water Reactor Licensing Basis Development." So far, the NRC's White Paper on RIPB has not been involved in development of ANS-30.1. Right now we have multiple documents available all with some type of guidance and common ground that needs to be standardized. Youngblood added that the White Paper (SRM-SECY-98-0144) includes a definition for risk informed that he prefers.

  Linn confirmed that he read NEI 18-04 and thinks that it is very consistent with ANS-30.1. Linn clarified that ANS-30.1 takes a liberal view of "quantitative" defense-in-depth.

  See Slides 16-23 of the meeting presentation (Attachment 1) for more details about ANS-30.1.

- ANS-30.2, “Categorization and Classification of Structures, Systems, and Components for New Nuclear Power Plants”—See Attachment 5 for the ANS-30.2 PINS
  A Project Initiation Notification System (PINS) form was approved for ANS-30.2 a couple of years ago. The standard is meant to be technology neutral and should address various code assignment systems. The working group chair is currently Amir Afzali. Kadambi will be working with Afzali to insure coordination. See slides 25-27 of the meeting presentation (Attachment 1) for more details.

- ANS-3.13, “Nuclear Facility Reliability Assurance Program Development”—See Attachment 6 for the ANS-3.13 PINS)
  James August explained that a reliability assurance program (RAP) is inclusive of all systems, structures, and components (SSCs), not specific to safety SSCs. The key challenge is that reliability is an esoteric term. It needs to be operationalized. The standard is trying to put together a better framework of the concepts. August is soliciting new members. Hillyer explained that the challenge for decommissioning standards is that the process is continually changing. He sees benefit for including the entire facility cycle in ANS-3.13.

ACTION ITEM 6/2019-06: David Hillyer to provide name of potential working group members for ANS-3.13, “Nuclear Facility Reliability Assurance Program Development,” to James August. DUE DATE: October 1, 2019

  There was agreement that the standard needs to offer a way to prove good reliability through technical analysis. The standard needs to be performance based and to have monitoring related to the outcome. August agreed and clarified that these are the issues the working is considering along with reliability improvement. See Slides 28 – 29 of the meeting presentation (Attachment 1) for more details.

7. Changing Environment (See Slides 30 – 32 of Attachment 1 for more details)

- NRC Initiatives
  SECY-18-0060, “Achieving Modern Risk-Informed Regulation” is expected to have a big impact.

- Industry Initiatives
  Currently Draft Regulatory Guide-1353, “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 Reactor,” is out for public comment until July 2, 2019. This guide will be an informative step on RIPB applications and use. NEI 18-04 “Risk-Informed Performance-Based Guidance for Non-Light Water Reactor Licensing Basis Development,” was released with inaugural training sessions held in February 2019.

- SDO Initiatives (ANS and Others)/Community of Practice
  Kadambi asked members to socialize *the Nuclear News* article Risk-informed, Performance-based Safety: Past, Present, and Future published in the June 2019 issue. He encouraged any feedback to be provided to RP3C.

8. Review of Interaction with Other Standards Working Groups
Schedule of RIPB Standards in Development—See Attachment 7)

- Review work on specific standards and obtain feedback
  Prasad Kadambi reviewed draft standard ANS-58.8, “Time Response Design Criteria for Safety Related Operator Actions,” [revision of ANSI/ANS-58.8-1984 (R2017)] on behalf of RP3C. He feels the revised standard will be helpful for advanced reactors. Kadambi has

asked the working group to consider citing NUREG/BR-0303, "Guidance for Performance-Based Regulation," in the standard. See Slide 33 of Attachment 1 for feedback on the review.

Nilesh Chokshi and Robert Youngblood reviewed draft standard ANS-2.8, "Probabilistic Evaluation of External Flood Hazards for Nuclear Facilities," (revision of historical standard ANS-2.8-1992) on behalf of RP3C. Kadambi will provide their comments to the working group. See Slide 34 of Attachment 1 for feedback on the review.

9. RP3C Report to Standards Board

Prasad Kadambi will report the following to the Standards Board at their meeting tomorrow:

- Standards Board members' comments on the *Nuclear News* article Risk-informed, Performance-based Safety: Past, Present, and Future were incorporated and the article was published in the June 2019 issue. Topics for additional articles will be discussed with the Standards Board.
- The Standards Board will be informed of the proposal to organize a panel at 2019 ANS Winter Meeting based on the *Nuclear News* article. A paragraph needs to be prepared right away and the panelist needs to be recruited.
- Development continues on a uniform approach among consensus committees to evolving RIPB Guidance Procedures.
- A request will be made for the consensus committee chair reporting format to include RIPB considerations.
- Follow-on to Action Item 11/2018-14: Consensus committees to report back on actions to address RP3C recommendations. The Standards Board will be informed of further action recommended today to re-review ANS standards and projects. Kadambi will seek their support at tomorrow's meeting.
- Follow-up on SB Action Item 11/2018-15: Consideration of a standard on integrated decision making. Kadambi explained that he hasn't started on this because Robert Budnitz will be addressing the Standards Board tomorrow stating that it is premature to develop such a standard.

10. Review of Open Action Items

Time did not permit review of the action items at this meeting. A full list of action items can be found following these minutes.

11. Other Business

No other business was discussed.

12. Next Meeting

The RP3C will hold a physical meeting on Monday afternoon of the upcoming ANS meetings:

- ANS Winter Meeting at Marriott Wardman Park from November 17-21, 2019
- ANS Annual Meeting at Arizona Grant Resort from June 7-11, 2020

13. Adjournment

The meeting was adjourned.

RP3C Action Item Status Report from 6/10/19 Meeting

Action Item	Description	Responsibility	Status/Action
6/2019-01	David Hillyer to provide RP3C a copy of FWDCC's RIPB presentation once developed for review. DUE DATE: September 1, 2019	David Hillyer	OPEN
6/2019-02	Kent Welter to initiate an email to start discussion on defining terms not in the glossary. DUE DATE: August 1, 2019	Kent Welter	OPEN
6/2019-03	Ed Wallace and Pat Schroeder to discuss opportunities for using ANS Collaborate as an open forum for commenting on the guidance document. DUE DATE: August 1, 2019	Ed Wallace, Pat Schroeder	OPEN
6/2019-04	Pat Schroeder to update the list of ANS standards and projects for the re-review. DUE DATE: August 1, 2019	Pat Schroeder	OPEN
6/2019-05	David Hillyer to give Mark Linn a call about adding the facility life cycle to ANS-30.1, "Integrating Risk and Performance Objectives into New Reactor Nuclear Safety Designs." DUE DATE: August 1, 2019	David Hillyer	OPEN
6/2019-06	David Hillyer to provide name of potential working group members for ANS-3.13, "Nuclear Facility Reliability Assurance Program Development," to James August. DUE DATE: October 1, 2019	David Hillyer	OPEN
11/2018-01	Kathryn Hanson to provide Prasad Kadambi a copy of draft standard ANS-2.27, "Criteria for Investigations of Nuclear Facility Sites for Seismic Hazard Assessments," when available." DUE DATE: When Available	Kathryn Hanson	CLOSED Draft provided to Kadambi 1/4/19
11/2018-02	Ed Wallace to work with Mark Linn to revise bullet 2 of slide 20 (Should address early design when PRA not possible to prepare) of the meeting presentation (Attachment 1) to be consistent with LMP language. DUE DATE: March 1, 2019	Ed Wallace Mark Linn	OPEN
11/2018-03	Mark Linn to ask Robert Budnitz for a draft copy of the ALWR standard. DUE DATE: March 1, 2019	Mark Linn	OPEN
11/2018-04	James O'Brien to send Prasad Kadambi an email with his thoughts on formation of the CoP. DUE DATE: December 31, 2018	James O'Brien	OPEN
9/2018-03	Ed Wallace and Pat Schroeder to help establish routine teleconferences for working groups under the Advanced Initiatives Subcommittee. DUE DATE: October 15, 2018	Ed Wallace Pat Schroeder	OPEN Discussed recommendation to form CoP at SB 11/13/18 meeting. Response not positive.
6/2018-02	Prasad Kadambi to review the RP3C Bylaws and update the title of the operating plan or recommend updating the RP3C Bylaws accordingly. DUE DATE: February 28, 2019	Prasad Kadambi	OPEN
11/2016-11	RP3C to prepare a brief, five-slide presentation with a simple perspective explaining RIPB for use at consensus committee meetings.	Prasad Kadambi	OPEN

ATTACHMENT 1

ANS Standards Committee RP3C Meeting

Minneapolis MN

June 10, 2019

Agenda

- Welcome, Roll Call & Introductions
- Approval of Meeting Agenda
- Status and Follow-up from Standards Board (SB) Meeting
  - RP3C Actions on SC Strategic Plan Goal #1, Item D from SMART Matrix
  - RP3C Items from SB Meeting on November 13, 2018
    - RIPB Guidance Document and SMART Matrix
    - CC Feedback on RP3C Recommendations (SB Action Item 11/2018-14)
    - Discussion of ANS-2.26 and ANS-30.1 (SB Action Item 11/2018-15)
- Procedural Guidance Development – Jim O'Brien
- CC Feedback on RP3C Recommendations
- Moving to Next Level – Integrating Standards for Effective Design and Operations
  - ANS-30.1, "Integrating Risk and Performance Objectives into New Reactor Nuclear Safety Designs"
  - ANS-30.2, "SSC Classification for Nuclear Power Plants"
  - ANS-3.13, "Nuclear Facility Reliability Assurance Program Development"
- Changing Environment
  - NRC Initiatives
  - Industry Initiatives
  - SDO Initiatives (ANS and Others)/ Community of Practice
- Review of Interaction with Working Groups
  - Review of work with specific standards and obtain feedback
  - Inputs from Consensus Committees
- RP3C Report to SB
- Open Items & Action Items
- Other Business
- Next Meeting, Adjournment
  - ANS Winter Meeting, November 17-21, 2019, Washington DC

SB SMART Matrix

- SB SMART Matrix reflects Standards Committee Strategic Plan
- Goal#1(D)=incorporate RIPB methods in ANS standards
  - Desired outcome for Goal#1(D)(1) and (4) captured by Guidance Document
  - Desired outcome for Goal#1(D)(4) captured by SB Action Item 11/2018-14
  - Desired outcome for Goal#1(D)(2) and (6) will be based on LMP training package
  - Goal#1(D)(5) completed with NN article
  - Outcomes for Goal#1(D)(3) part of implementation and outreach

RIPB Guidance for Standards Development/Maintenance

Purpose:

- To identify roles and responsibilities and the process for using risk-informed and performance-based (RIPB) approaches
  - For some standards, the incorporation of a RIPB approach/attributes will make them more effective for the user community to achieve the standard's outcome(s)
  - This document also helps the Consensus Committees, Subcommittees and Working Groups (WG) decide if and how RIPB approaches can be incorporated into its standards

Background:

- RP3C formed in 2013—Procedure called for in RP3C Bylaws

Roles and Responsibilities *(Consensus Committee Chairs)*

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

RIPB Guidance Process

Working Group Formation and Project Initiation Notification System Stage

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

RIPB Guidance Process (continued)

Early Outlines/Draft

- Use this Guidance Document (particularly Section 5) to support incorporation of RIPB approaches into the standard

Pre-Sub-Committee Draft

- Send the draft standard to the RP3C for review by the RP3C
- Might be too late to implement any or all of the recommendations

RIPB Approaches/Attributes

Performance-Based Attributes

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

Risk-Informed Attributes

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

RIPB Guidance Examples

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

RP3C Interactions with CCs and Others

- Standards Manager keeps CCs and WGs informed about RP3C
  - Invite Standards Manager input
- CCs seem to consider RP3C role more
  - Invite CC Chairs' input (ESCC, LLWRCC, etc.)
- WGs are showing greater awareness of RP3C
  - Invite WG input (ANS-58.8, 30.1, etc.)
- RP3C outreach to developers may be working
  - Invite input from developers
- RP3C supports NRC's messaging on standards
  - Role of Standards Forum
  - Invite NRC input

ANS Standards Evaluation for RIPB Applications (Fall 2017)

(see "Action Item 11/2018-14")

- Preliminary screening results of 123 active standards or projects:
  - RIPB – 15
  - RI – 3
  - PB – 8
  - Leave as is – 42
  - Still under discussion – 55*
- Used for advanced reactor development:
  - Near term – TBD
  - Mid term – TBD
  - Long term – TBD

* Further task team consensus reconciliation needed

RIBP Opportunity Matrix

Categorization of ANS Standards								RP3C Opportunity				Applicability				
	CC Owner	DESIGNATION			TITLE	STATUS	Status Indicator	RIPB	RI	PB	D	Adv Rx focus	AR applicability	Likely Timing of Need*	NT- <3 yrs MT 3-5 yrs LT >5 yrs	
9	ESCC	ANS-	2	8	Determining Design Basis Flooding at Power Reactor Sites	withdrawn standard; active project	P		AEJ							3
27	ESCC	ANS-	2	26	Categorization of Nuclear Facility Structures, Systems, and Components For Seismic Design	current standard approved 2004 (R2010)	A	AE	J							2
28	ESCC	ANS-	2	27	Criteria for Investigations of Nuclear Facility Sites for Seismic Hazard Assessments	current standard approved 2008 (R2016)	A	AJE								3
35	LLWRCC	ANS-	3	1	Selection, Qualification, and Training of Personnel for Nuclear Power Plants	current standard approved 2014	A				AEJ					3
36	LLWRCC	ANS-	3	2	Administrative Controls and Quality Assurance for the Operational Phase of Nuclear Power Plants	current standard approved 2012	A	JE			A					2
62	LLWRCC	ANS-	3	13	Nuclear Facility Reliability Assurance Program (RAP) Development	active project	A	AEJ								3
63	NRNFCC	ANS-	3	14	Process for Aging Management and Life Extension for Nonreactor Nuclear Facilities	active project	A	AEJ								3
206	LLWRCC	ANS-	18	1	Radioactive Source Term for Normal Operation of Light Water Reactors	revision approved 2016	A				AEJ					3
280	LLWRCC	ANS-	51	10	Auxiliary Feedwater System for Pressurized Water Reactors	current standard approved in 1991 (R2008); revision in development	A	E		AJ						2
288	RARCC	ANS-	53	1	Nuclear Safety Design Process for Modular Helium-Cooled Reactor Plants	current standard approved 2011 (R2016)	A	AEJ								3
313	RARCC	ANS-	54	1	Nuclear Safety Criteria and Design Process for Liquid-Sodium-Cooled-Reactor NPPs	active project; historical revision	P	AEJ								3
318	RARCC	ANS-	54	6	LMFBR Safety Classification and Related Requirements	inactive project; draft issued for trial use only	I	J								3
334	LLWRCC	ANS-	56	1	Containment Hydrogen Control	active project	P	AE		J						2

RP3C Observations

- Does SB Action Item 11/2018-14 show need for SB review for optimizing RP3C's contribution to CCs' efforts?
  - Recommend CCs include RIPB considerations in SB reports
  - Need for uniform approach to evolve RIPB Guidance
- More than two years since RP3C review of ANS standards
  - How to update with CCs playing a more leading role?
- How can RP3C play a more effective cross-cutting role between silos?
  - Need to track experience and lessons-learned with using RIPB Guidance Procedures
- Trial use of guidance will result in need for changes
  - RP3C will explore technological capabilities available with ANS Collaborate (previously Workspace)
  - RP3C will pursue discussions with SB and CCs

RP3C Observations (Continued)

- A cross-functional model for standards is emerging that better aligns with NRC's evolving practice
  - NRC's Enhanced Safety Focused Review Approach
  - Consideration of design and operations as a continuum requiring interfaces for standards that link RIPB practices
  - Integration of RI and PB at appropriate junctures
  - Centrality of safety margins, DID, and operational programs
  - Examples of ANS-2.8 and 2.21
- Traditional deterministic, DBA-centric ANS consensus standards may need to evolve
  - RIPB approaches may better support regulatory review
  - Evolving CC and WG practices need to involve RIPB concepts at more detailed levels

Integrated Regulatory Review

Key Review Considerations

Safety-significance	Regulatory compliance	Novel design	Shared structures, systems, and components		Licensing approach
Safety margin	Defense-in-depth	Operational programs	Impact on safety functions	Additional risk insights	Other considerations

Review Tool

Output:

Scope and Depth of Review

- Provide supplemental approaches for implementation of NUREG-0800, Introduction - Part 2 and Design Specific Review Standard reviews
- Systematic thought process applicable to non-structure, system, or component and programmatic reviews

Moving to Next Level
Integrating Design & Operations Standards

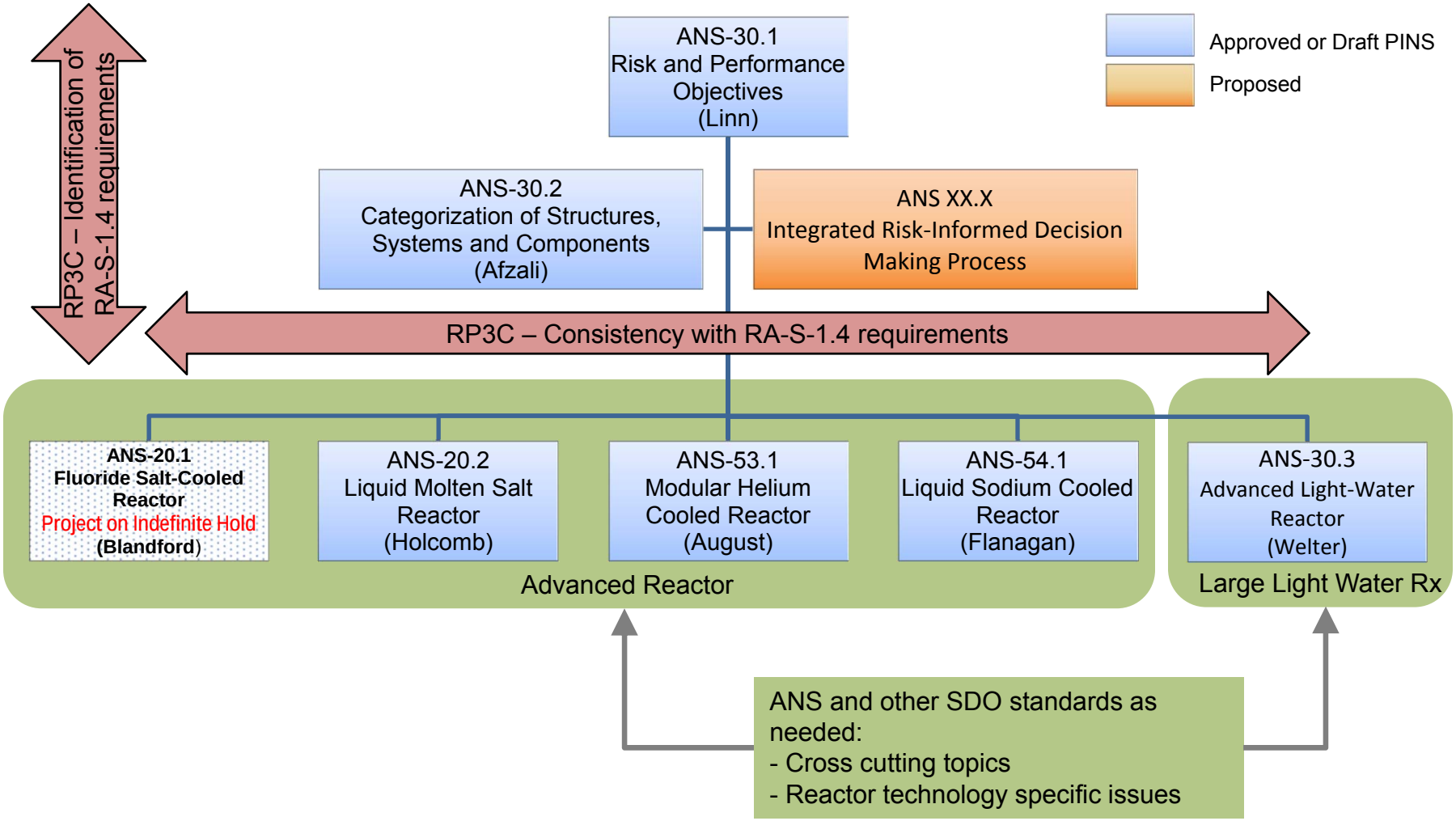
- Nuclear Energy Innovation and Modernization Act (NEIMA) offers opportunities and challenges
  - Explicitly defines “Technology-Inclusive Regulatory Framework” with mention of RIPB techniques
  - Mentions NRC collaboration with standards-setting organizations to identify areas for which new or updated standards are developed to provide predictability
- How should RP3C anticipate and support such activities?
- Improving effectiveness of ongoing ANS standards projects may be a place to start
  - ANS-30.1, ANS-30.2 and ANS-3.13 could be treated as a mutually supporting package
  - ANS-30.1 and 30.2 are under RARCC
  - ANS-3.13 is under LLWRCC

What is ANS-30.1?

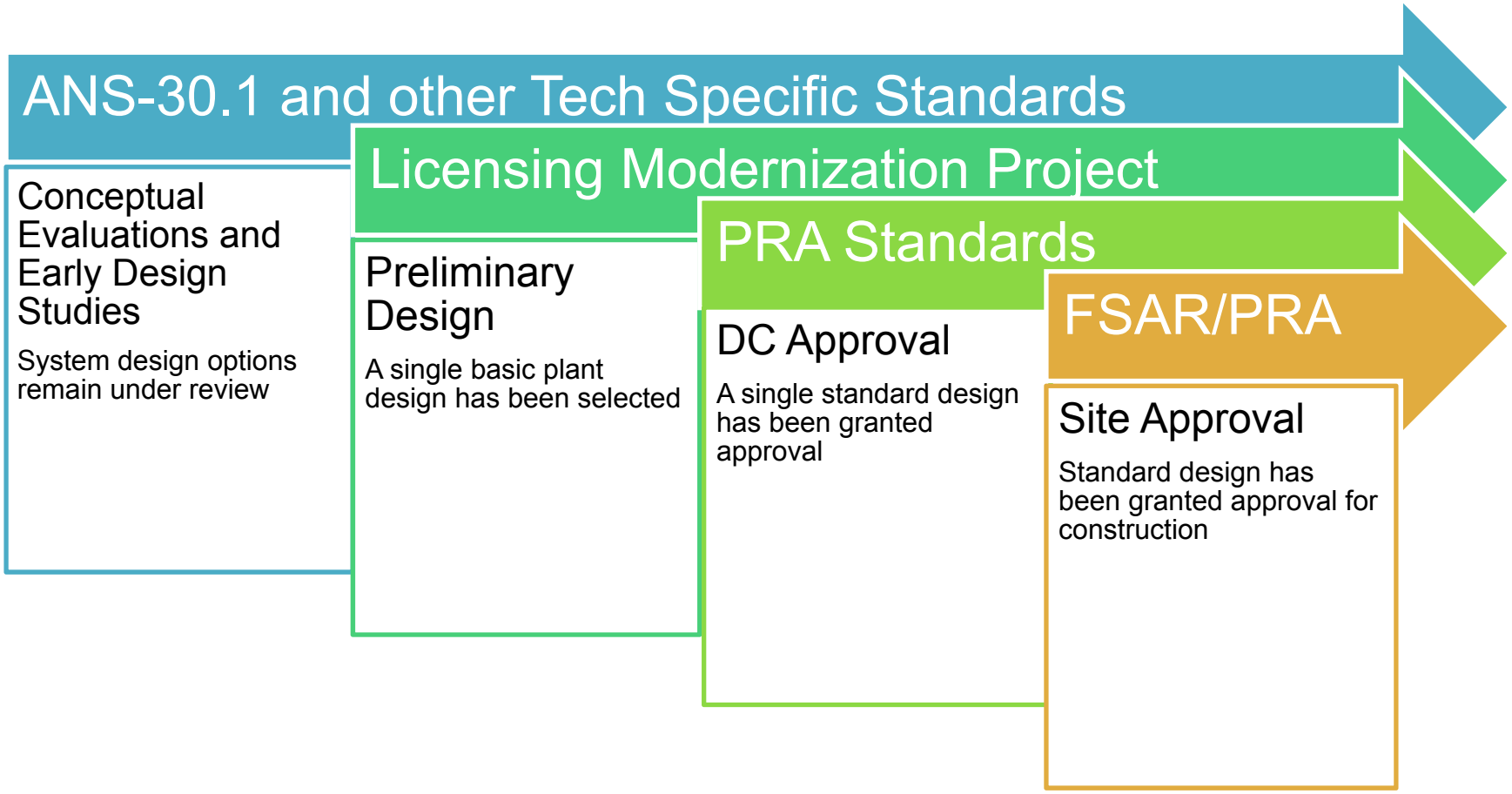
Integrating Risk and Performance Objectives into New Reactor Nuclear Safety Designs

- It is not a design criteria document and does not specify design criteria
- It provides standards-based support to any design process that
  - Serves a technology neutral, advanced reactor life cycle process
  - Provides constructive RIPB input to design decisions early in the design process
  - Provides design outcomes capable of transition and integration into advanced reactor licensing using industry accepted PRA methods
  - Serves as supplemental to traditional design functions
- It provides a consistent RIPB framework for lower tier technology-specific advanced reactor standards
- It supports the augmentation of deterministic design requirements using RIPB methods and results or the replacement of deterministic requirements with equivalent requirements based on RIPB methods
- It supports the early discussion of RIPB insights on design basis events, equipment safety classification, defense in depth, and high level safety criteria

ANS New Reactor RIPB Standards Structure



New Reactor Design Timeline



Role of ANS-30.1

ANS-30.1 integrates with other activities by

- Contributing to a more flexible, less prescriptive design process
- Influencing designs to be consistent with importance to safety and mission
- Promoting consistent and competent RIPB framework across all new reactor technologies
- Focusing at high level to enable results of RIPB methods to be consistently applied across entire life cycle
- Being consistent with ongoing efforts to incorporate RIPB information into the licensing of advanced reactor designs

Contents of ANS-30.1

ANS-30.1 currently addresses

- The definition of RIPB methods and how they are integrated into a design process
- General requirements that are sufficient and necessary for a process to develop a robust RIPB reactor design
  - Develop principal design criteria
  - Use a systems engineering process
  - Use a quantitative process to evaluate defense in depth
  - Evaluate design(s) using sequence-based assessments
- Currently undergoing WG final approval with external review by RP3C
- A representative of the LMP was provided a copy

RP3C Review of ANS-30.1

ANS-30.1 joins NEI 18-04 and RP3C Guidance Procedure pertaining to RIPB processes

- Benchmark for comparison should be NRC RIPB White Paper
- There is no “right” and “wrong” about RIPB criteria
- The “traditional” approach is not “wrong” and may be given appropriate consideration
- RP3C is looking for common ground and pointing out pros and cons from the perspective of the user community
- Users comprise ANS WGs, other SDOs, developers, designers, regulators, etc.
- Appearance of Draft Guide 1353 (out for public comment) must also be noted

ANS-30.1 vs. RIPB White Paper

- RI in ANS-30.1
  - RI considers frequency and consequence where radiological release is not always the end point of interest
- PB in ANS-30.1
  - PB is to “rely on process or equipment measurable outcomes as evidence of meeting a requirement or objective”
- ANS-30.1 is not inconsistent with RIPB White Paper
- ANS-30.1 does not address outcome attributes in RP3C guidance
  - Structuring of performance objectives (NUREG/BR-0303) does not appear explicitly
  - Trial use of guidance for ANS-30.1 may clarify whether ANS-30.1 should be a conventional standard or guidance to industry

ANS-30.1 vs. NEI 18-04

- ANS-30.1 begins with DBAs and adds risk insights into the structure
  - … in ANS-30.1, “traditional” methods are applied and then enhanced by risk / performance considerations
- NEI 18-04
  - Begins with LBE selection
  - Derives SSC performance requirements from the analysis
- Commonalities
  - Both emphasize defense-in-depth
  - Both incorporate risk insights into design
  - Both acknowledge “hazard” analysis
- Differences
  - NEI 18-04 goes into more detail
  - NEI 18-04 endorsed in DG-1353

Consideration of Non-Nuclear Methods

- Strengths of nuclear practice
  - Comparative rigor
  - Explicit scenario modeling
  - Functional dependence of front line systems
  - Quantification of human error probability
- Other industries
  - Emphasis on hazard analysis
  - May lend themselves to earlier life cycle phases
  - Appears to be less “stove-piped” than PRA practice

ANS-30.2
SSC Classification for Nuclear Power Plants

(See PINS Form, Attachment 4)

Formal Title: *Categorization and Classification of Structures, Systems, and Components for New Nuclear Power Plants*

- Need for Project
  - Inconsistencies in risk categorization and safety classification schemes and criteria
  - Technology neutral RIPB criteria addressing safety, environmental, and seismic
  - New plants need special treatment criteria based on SSC classification
  - Repeatable and logical process provides what is necessary and sufficient
  - Should address various code assignment systems

ANS-30.2 Outcome Attributes

- Hierarchical structure (similar to NUREG/BR-0303)
- Logical, updateable, repeatable process
- Facilitate iteration
- Rational, clearly explained (transparent)
- Interrelates and integrates classification categories and their ranking
- Simplicity (aim for minimal set)
- User friendly

ANS-30.2 Production

- PINS Form produced in 2016
- WG Chair has changed
- Sixteen WG members listed
- Covers multiple SDOs
- Path forward
  - Confirm participation of listed WG members
  - Expand participation relative to industry representatives as well as SDOs
  - Use LMP White Paper as technical basis
  - Set up kick-off meeting (conference call, webinar, or ANS conference)
  - Identify and obtain commitment from lead functional contributors (Chair, Vice-Chair, Secretary, Editor, etc.)
  - Prepare Project Plan

ANS-3.13 PINS Form

(See PINS Form, Attachment 5)

"Nuclear Facility Reliability Assurance Program Development"

- Need for Project
  - Assure that SSC reliabilities remain valid throughout life of the plant
  - Lack exists of what constitutes RAP and how to develop it
- Scope Summary
  - Provides criteria for RAP programs for scheduled maintenance and monitoring of operating conditions
  - Provides guidance on selecting SSC failure modes and defining maintenance requirements
- PINS submitted to ANSI in January 2014
  - PINS may need to be updated
  - Assembly of WG can proceed

High-Level Questions Re. RAP

- What is reliability and what assures it?
- How does RAP address risk to production?
- What are the outcome attributes of a successful RAP?
- What are reasonable expectations for a RAP standard?
- What should be the relationship between a RAP standard and defense-in-depth?
- What are the supporting elements of a RAP standard?

NRC's Transformation Program (SECY-18-0060)

- Transform review process
  - Use risk insights to scale scope and depth of review
  - Consider safety benefits when taking account of uncertainty of new technologies
  - Leverage operating experience, third-party approvals, and consensus standards
  - Use tools to facilitate timely decision making
- Advanced reactors
  - Initiate PB-TI rulemaking

Licensing Modernization Project

- Update on LMP and industry developments
  - ACRS Review of DG-1353 / NEI 18-04rN – Feb 6, 2019
    - Review Letter (ML19078A240) – Mar 19, 2019
  - NEI 18-04 inaugural training session – Feb 19, 2019
  - NEI 18-04 r0 – Apr 1, 2019
  - DG-1353 (ML18312A242) issued for public comment – May 2, 2019
    - FRN 2019-09089
    - Regulatory Analysis (ML18325A214)
    - Comments due July 2, 2019
  - LMP Table Top exercises – on-going Sept 2018 – Aug 2019
  - LMP White Paper (4) Updates July 2019
  - Post LMP activity:
    - Technology Inclusive Content of Application (TICAP) in proposal development

Socialization of RIPB in ANS and Beyond

- June issue of *Nuclear News* carries RP3C article on RIPB safety
  - The article was balloted with the Standards Board
  - Balloting revealed considerable variance among members regarding RIPB concepts and methods
  - What more should RP3C do to promote more consistent understanding of RIPB?
  - How to socialize the article with other SDOs?

ANS-58.8

"Time Response Design Criteria for Safety-Related Operator Actions"

- **Outcome:** Approved standard to justify operator actions to perform safety-related actions versus requirement for automatic action
- **Relevance:** Advanced reactors generally have plenty of **"margin"** so expensive safety-grade automatic action may be possible to avoid
- **Performance-based feature:** Parameters and decision thresholds affecting operator actions with specified **"margins"** could employ NUREG/BR-0303 method. Focus on functional success
- **Possible Risk-informed feature:** Could include estimate of radiological consequence if margin is violated. PRA may be used for hypothesis testing.
- **RP3C action:** Multiple rounds of comments and meetings. Continue to work toward convergence

ANS-2.8

"Determine External Flood Hazards for Nuclear Facilities"

RP3C Observations

- Standard establishes a probabilistic approach
- It is risk-informed because it follows the SSHAC process
- May be considered risk-informed and process-based
- It does not prescribe the design basis or acceptable level of risk
- It states that regulatory body sets criterion for acceptability
- Gap seems to exist between current and previous versions of the standard
- It is not clear how acceptable criteria (such as frequency of exceedance) will be established.

RP3C Report to SB

- Receive SB member comments on *NN* article content and process
- Development of uniform approach among CCs to evolving RIPB Guidance Procedure
- CC Chairs' reporting format to include RIPB considerations
- Follow-on to Action Item 11/2018-14
- Follow-up on Action Item 11/2018-15

Action Item Status

See Attachment 7

- Action Item 6/2013-01: Kadambi to update and distribute next draft of the Risk-Informed and Performance-Based (RIPB) Plan with member comments incorporated. (RIPB Plan renamed RP3C Vision Plan.)
- Action Item 6/13-05: Kadambi to prepare a note on weaving RIPB ideas into Tier 3 issues as defined by NRC.
- Action Item 6/13-07: Kadambi to prepare a note on how consensus standards activities can help address emerging issues regarding defense-in-depth (DID).
- Action Item 11/2013-01: George Flanagan for provide Mark Peres a copy of the current ANS-54.1 data plan example.
- Action Item 11/2013-02: Amir Afzali to provide George Flanagan the name of Southern Nuclear Company's technical expert to help on ANS-54.1.
- Action Item 11/2013-03: Amir Afzali to provide suggestions on how the RP3C Vision Plan can emphasize safety.

Closing

- **Other Business**
- **Next Meetings**
  - ANS Winter Meeting, November 17-21, 2019, Washington, D.C.
  - ANS Annual Meeting, June 7-11, 2020, Phoenix, AZ

Adjourn and Thank You!

ATTACHMENT 2

SMART Matrix for ANS SC Strategic Plan – Updated 5/6/2019

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

Initiative	Assigned Responsibility (Functional Title)	Specific Action Items Needed to Accomplish the Initiative	Status/ Comments	Scheduled Completion Date	Actual Completion Date
Completed	Near Term	Overdue			
Goal #1 Align Standards Development Priories with Current and Emerging Needs					
A. Evaluate the results of the initial industry priority survey	Standards Mgr	Executive summary issued.		1/2016	1/2016
B. Assign responsibilities to the appropriate consensus committees to address the top ten survey identified high priority standards	Standards Mgr	Issue list of high priority standards with assigned responsibilities. List discussed during 2/12/2016 conference call and published in minutes.		2/29/2016	2/29/2016
C. Develop and implement an approach to collect industry priority needs on an ongoing basis and integrate them into standards committee priorities.	Chair External Communications TG	ANS SC Policy drafted to specify this approach and approved by SB.	1/25/17: With no External TG Chair, there has been no action	2/1/2017	
D. Incorporate risk-informed and performance-based methods in ANS standards, where appropriate, by:					
1. Develop the Risk-Informed Performance-Based Principles and Policy Committee Standards Plan	RP3C Chair	Provide draft of Risk-Informed Performance-Based Principles and Policy Committee Operating Plan for SB approval.	A draft plan was provided for SB ballot. Although not approved the information that was developed during the review process provided valuable input into this matrix.. A separate Operating Plan is no longer required.		8/31/2018
	RP3C Chair	Provide draft ANS Risk Informed and Performance Based Standards Plan (which will provide the approaches and procedures to be used by ANS SC consensus committees, subcommittees and working groups to implement risk informed and performance based principles in a consistent manner) for review & comment prior to use in pilot applications	Jim O'Brien to lead effort; underway, should be complete by Dec 31, 2018. Balloted issued in April 2019. for proposed issue as draft	~~9/30/2017~~ ~~9/30/2018~~ 12/31/2018	

SMART Matrix for ANS SC Strategic Plan – Updated 5/6/2019

Initiative	Assigned Responsibility (Functional Title)	Specific Action Items Needed to Accomplish the Initiative	Status/ Comments	Scheduled Completion Date	Actual Completion Date
	RP3C Chair	Manage the resolution of comments and send resulting Draft Plan to Standards Manager for issuance for use on two pilot standards.	Jim O'Brien to lead effort	~~12/1/2017~~ 12/31/2018	
	RP3C Chair	Pilot Plan on two standards	Jim O'Brien to lead effort	3/31/2019	
	RP3C Chair	Incorporate lessons learned from pilots and send to Standards Board for ballot as a new policy or procedure.	Jim O'Brien to lead effort	5/10/2019	
	RP3C Chair	Manage the resolution of comments and send resulting document to Standards Manager for issuance as a policy or procedure.	Jim O'Brien to lead effort	6/30/2019	
2. Develop a Risk-Informed Performance-Based Principles training package for training of ANS Standards Committee members.	RP3C Chair	Develop Risk-Informed and Performance-Based Training Package for SC members and provide to SB for review.	Ed Wallace to lead. To be developed in parallel with procedure finalization	~~12/1/2017~~ 1/31/2019	
3. Conduct training of consensus committees and working groups.	CC Chairs	Schedule training for CC/WGs as needed, supported by RP3C training resources. CCs and RP3C to coordinate.	Ed Wallace to lead.	3/31/2019	
	RP3C Chair	Conduct Training for all applicable CCs.	??? to lead	6/30/2019	
4. The RP3C will work with each consensus committee to develop a prioritized list and schedule for incorporating risk-informed and performance-based principles into its standards. Collaboratively, they will Identify and define any new standards that are related to risk-informed and performance-based principles. Some of such work may already have been assigned to other standards working groups, and so it is important to work with the SB and CCs to identify an appropriate WG lead (and CC) for the standards development with the objective of avoiding duplication.	RP3C Chair CC Chairs	Review ANS standards and narrow the list to 23 potential RP3C standards "Initial Priority List" and send to applicable. CCs review the list and provide their inputs on applicability and schedule for each of the 23 standards.	Completed. Link to spreadsheet with CC evaluations and schedules—ACCESS HERE	9/30/2017	8/20/2018
	CC Chairs	*Requested CCs review and confirmation of actions on Phase 1 list of potential RIPB standards and RP3C feedback on insights*	CC Response status: ESCC – 3/22/18 FWDCC – Input provided pending LLWRCC – partial	9/30/2018	11/20/2018

SMART Matrix for ANS SC Strategic Plan – Updated 5/6/2019

Initiative	Assigned Responsibility (Functional Title)	Specific Action Items Needed to Accomplish the Initiative	Status/ Comments	Scheduled Completion Date	Actual Completion Date
			information provided 1/22/18; full details remain pending NCSCC – responded N/A 1/30/18 as no NCSCC standards are on the short list. NRNFCC – N/A standards part of RP3C pilot program RARCC – 7/9/18 SRACC – confirmed N/A 1/30/18 as no SRACC standards are on the short list.		
	RP3C Chair	Manage joint discussions of the actions and schedule for the Initial Priority List of approaches and schedule and provide the results to the Standards Board for discussion at a Standards Board meeting. Mange any required interfaces with CCs and WGs. WGs and CC Management are to give this effort priority.	Agreed approaches and schedules with CC chairs to be incorporated into spreadsheet (ACCESS HERE).	4/30/2019	
5. Publishing a Nuclear News Article to inform other members of the Society of the benefits of this risk-informed and performance-based effort	RP3C Chair	*Nuclear News* (*NN*) article drafted, approved by SB Chair, and forwarded to *NN* editor. Via Standards Manager	The article has been completed. Postponed until next issue due to staff transition at NN.	~~11/1/2017~~ 12/31/2018	
6. Developing presentation materials that can be used to inform other industry groups as to the benefits and use of the ANS Standards Committee risk-informed and performance based standards activities	RP3C Chair	Develop presentation package for use with other industry groups and submit to SB for approval.	To be developed in parallel with plan finalization	3/1/2019	
	RP3C Chair	Contact appropriate organizations to make presentations at NRC RIC, ANS UWC, and owners' groups.		~~7/1/2018~~ 4/30/2019	
	RP3C Chair	Make presentations at a minimum of 2 groups.		5/31/2019	

SMART Matrix for ANS SC Strategic Plan – Updated 5/6/2019

Initiative	Assigned Responsibility (Functional Title)	Specific Action Items Needed to Accomplish the Initiative	Status/ Comments	Scheduled Completion Date	Actual Completion Date
Goal #2: Develop and Maintain High Quality Standards					
A. Enhance the relationships with the ANS Professional Divisions and Technical Groups to assist in populating WGs with expert individuals. (also supports Goal 5)	Internal Communications TG Manager	Issue interface liaisons table between applicable divisions and group and the standards consensus committees.		8/1/2016	6/1/2016
	CC Chairs	Send requests for staffing assistance to ANS Professional Divisions and Technical Groups as needed.	11/2017: ESCC – Done FWDCC - Done LLWRCC - Done NCSCC - Done NRNFCC - Done RARCC - None identified SRACC - Done	Initial requests sent prior to Oct. 2017 meeting. Ongoing	11/1/2017
	Internal Communications TG Manager	Tabulate the summary of the requests made and the results and present to SB.	This item has been replaced by having the CC Chair report the results in their SB reports	NA	
B. Develop and Implement a standards training program for all Standards Committee members to ensure that standards development is consistent with current policies and procedures, thus, producing consistently better quality products in a timelier manner.	Internal Communications TG Manager	Develop initial presentations and post on Workspace.		3/1/2016	3/1/2016
	SB VChair	Assign training instructors.		3/1/2016	3/1/2016
	SB VChair	Prepare training plan.		2/1/2016	2/1/2016
	Standards Mgr	Send out training notices.		3/15/2016	3/15/2016
	Standards Mgr	Complete the initial rounds of training presentations.		6/2/2016	6/2/2016
	SB VChair	Select videos for use in future training presentations.		6/2/2016	6/2/2016
C. Assign a mentor to each new standards working group that is experienced in the use of ANS standard's procedures, policies, glossary and tool kit	CC Chair	Evaluate SubC Chairs for familiarity with toolkit/standards development.	11/2017: ESCC – Done FWDCC - Done LLWRCC - Done NCSCC - Done	5/1/17	5/31/2018

SMART Matrix for ANS SC Strategic Plan – Updated 5/6/2019

Initiative	Assigned Responsibility (Functional Title)	Specific Action Items Needed to Accomplish the Initiative	Status/ Comments	Scheduled Completion Date	Actual Completion Date
			NRNFCC - Done RARCC- Done SRACC - Done		
	CC Chair	Select SubC Chairs and other CC members with respect to their being well versed in toolkit contents and capable of being mentors. Provide mentor list to SB VChair.	11/2017: ESCC – Done FWDCC - Done LLWRCC - Done NCSCC - Done NRNFCC - Done RARCC - Done SRACC - Done	5/1/17	6/12/2018
	CC Chair	In cases where additional assistance is required beyond the SubC Chair, CC should request mentor from SB VChair.	None identified yet	Chairs have been advised.	11/1/2017
Goal #3: Improve Standards Development Production and Efficiency					
A. Expedite development of high-priority standards by improving Standards Board and consensus committee oversight using achievable project plans and definitive schedules with assigned milestones throughout the standards development cycle.	SB VChair	Draft project plan development policy.		10/1/2016	Approved by SB 9/6/16. Project plan w/b added to CC procedures as Appendix K.
	SB VChair	Draft project plan development policy.		10/1/2016	Approved by SB 9/6/16. Project plan w/b added to CC procedures as Appendix K.
	CC Chairs	Develop project plans for 6 total standards from all CCs and submit to consensus committees. This is the total goal for all CCs not 6 by each CC.	6 plans completed: 2.22,2.27, 54.1, 2.25, 2.29, 3.13 and the JCNRM milestone schedule	6/12/2018	Approved by SB 9/6/16. Project plan w/b added to CC procedures as

SMART Matrix for ANS SC Strategic Plan – Updated 5/6/2019

Initiative	Assigned Responsibility (Functional Title)	Specific Action Items Needed to Accomplish the Initiative	Status/ Comments	Scheduled Completion Date	Actual Completion Date
					Appendix K.
B. Complete the Standards Volunteer Database to facilitate recruiting personnel for Standards Committee activities (also supports Goal #5	ANS IT Dept.	ANS IT complete ANS SC Volunteer Database in accordance with the SB specification.	It will now not be able to start any work on the volunteer database until the redesign is completed which is planned for 12/2019. .	~~11/1/2017~~ ~~11/17/2018~~ ~~6/20/2019~~ 6/5/2020 12/20/2019	
	SB/ ANS IT Dept.	SB approves database submitted by ANS IT department.		~~2/1/2018~~ ~~2/1/2019~~ ~~9/20/2019~~ 9/30/2020	
C. Assist the consensus committees in obtaining required human resources using outreach initiatives	Standards Mgr	Develop staffing approach guideline and post to website toolkit.		12/1/2016	Completed by S. Stamm and posted to the toolkit on 8/22/16 here.
D. Maximize use of the ANS Standards Workspace and other communications vehicles to eliminate the need for travel and face-to-face meetings to the maximum extent possible	CC Chairs	Encourage WGs and SubCs to use Workspace and other online and electronic tools to eliminate face-to-face meetings	Procedure issued. CCs have discussed with SubC /Chairs	Done	April 2017
	CC Chairs	CC chairs to submit a confirmation email that this has been discussed with SubCs and WGs.	11/2017: ESCC – Done FWDCC – Done LL\WRCC – Done NCSCC – Done NRNFCC – Done RARCC – Done SRACC –- Done	5/1/2017	
E. Acquire funding (e.g., grants) to support the development of high-priority standards on an expedited basis.	CC Chairs/ Priority TG Chair	High priority standards list submitted by all CCs which identify high priority standards planned for near future. Priorities should be based on expected government and industry need.	11/2017: ESCC – ANS-2.8; ANS 2.26 (12/31/17) FWDCC –- ?? LWRCC –- ?? NCSCC –- None NRNFCC – None RARCC – ANS 20.1,	Ongoing Cyber Security	

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Initiative	Assigned Responsibility (Functional Title)	Specific Action Items Needed to Accomplish the Initiative	Status/ Comments	Scheduled Completion Date	Actual Completion Date
			20.2, 30.1 and 30.2 SRACC – None JCNRM – Done		
	SB VChair	Work with CCs to assess each effort, select most appropriate standards, prepare and submit proposals. Submit 1st proposal.	Nov 2017- Agreed to proactively coordinate with NRC and DOE for early identification of potential opportunities.	6/1/2017 Ongoing	
F. Streamline the reaffirmation process to reduce the number of delinquent standards by establishing a systematic review of delinquent standards to start no later than the 4-year mark. This can be accomplished through the following mechanisms: 1. Automatically sending out a Reaffirmation Form to the WG chair with copies to subcommittee chair and consensus committee chair 2. Automate subcommittee and consensus committee approvals of reaffirmation, withdrawal, and revision recommendations 3. Establishing an ANS Professional Division and Technical Group sponsorship program to aid in review of associated delinquent standards with and without active working groups	Standards Mgr	Submit Reaffirmation Forms to WG/SubC Chairs for all standards approaching the 4-year mark.		Ongoing Starting 4/1/2016	Ongoing
	Standards Mgr	Issue list of all standards over 4 year since issuance showing the issuance of Reaffirmation Forms to the WG chairs.		11/1/2016	Ongoing
	Standards Mgr	Action items for reaffirmation setup in Workspace with automatic reminders.		11/1/2016	The report was sent 9/15/16 and will be updated and resent 12/15/16
	Internal Communications Group Manager	Send list of delinquent standards to PDs.		12/1/2016	Completed
	Internal Communications Group Manager	Issue plan and approach to each Professional Division and Technical Group as applicable and obtain indication of acceptance.	COMPLETE	5/1/2017	11/2017
G. Develop subcommittee/consensus committee metrics to identify opportunities for improvements	Policy TG Chair	Identify CC metrics, review with CC Chairs.		10/1/2016	Changed to done!
	CC Chairs	Each CC fill in annual tabulated metric performance.	COMPLETE	5/1/2017	4/1/2017
	Policy TG Chair	Evaluate metric results.		3/1/2018	2/26/1/2018
	CC Chair & Policy TG Chair	Provide recommendations for changes to improve performance.	11/2017: ESCC – None	6/1/2018	

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Initiative	Assigned Responsibility (Functional Title)	Specific Action Items Needed to Accomplish the Initiative	Status/ Comments	Scheduled Completion Date	Actual Completion Date
			FWDCC – ?? LL\WRCC – ?? NCSCC – ?? NRNFCC – ?? RARCC – ?? SRACC –- ??		
Goal #4: Expand ANS Awareness and External Outreach					
A. Use periodic survey methods to gain feedback from industry, federal and state agencies; provide feedback to survey responders	SB VChair	Submit draft of survey comment responses to SB Chair for approval.		8/1/2016	7/26/16
	SB Chair	Send responses to commenters.		10/1/2016	Done
	SB Chair	Determine survey frequency for future ANS and industry surveys. (Work with NEI on developing recommendations)	1/25/17: Members recognized that the EC TG Chair position was open and no action has been taken.	10/1/2016	
B. Establish periodic leadership meetings with regulatory agencies, owner's groups and industry executives to align needs, and build support for development and greater use	Chair External Communications TG	Discuss communications approach with each of the applicable organizations (industry, federal. and state agencies). Setup regular schedule for discussions.		11/1/2018	
	Chair External Communications TG	Develop and issue master SC external communications plan.		5/1/2017	
C. Establish an ANS Professional Division sponsorship program to broaden input in setting standards priority	Chair Internal Communications TG	Issue plan and approach to each Professional Division and Technical Group as applicable and obtain indication of acceptance.	"Plan" was provided to liaisons. Confirmation pending	10/1/2016	6/2017
D. Seek liaison arrangements with relevant SDOs, where needed, to improve efficiency, effectiveness and consistency of standards across the industry where overlapping or interlocutory standards arise	Chair External Communications TG	Prepare a liaison list identifying each desired liaison interface, the liaison approach, and the implementation status.	1/25/17: Members recognized that the EC TG Chair position was open and no action has been taken.	10/1/2016	3/1/2017
	Chair External Communications TG	Implement all liaisons on the Liaison Interface List.	1/25/17: Members recognized that the EC TG Chair position was open and no action has been taken	10/1/2016	11/2017

SMART Matrix for ANS SC Strategic Plan – Updated 5/6/2019

Initiative	Assigned Responsibility (Functional Title)	Specific Action Items Needed to Accomplish the Initiative	Status/ Comments	Scheduled Completion Date	Actual Completion Date
E. Establish an approach to keep industry and trade groups advised of approved standards and in-progress standards in their areas of interest	Chair External Communications TG	Issue an Industry and Trade Group Interface Plan.	1/25/17: Members recognized that the EC TG Chair position was open and no action has been taken.	10/1/2016	
	Chair External Communications TG	Complete interface plan implementation.		6/1/2018	
F. Identify key international organizations that can contribute to specific ANS standards development projects, including work group participation, review of draft standards, and providing input into standards prioritization.	Chair External Communications TG	Develop listing of key international organization, key contacts, and the desired interfaces we would like to develop.		6/1/2017	
	Chair External Communications TG	Send invitation letter to each of the interface contacts. Follow-up as needed		10/1/2017	
	Chair External Communications TG	Provide completion report to SB.		10/1/2018	
G. Establish a standards educational program for non-Standards Committee members to increase their knowledge of: 1. what consensus standards are, and are not; 2. benefit of consensus standards to the industry; 3. advantages to companies, federal and state agencies, and individuals of supporting standards development	Chair External Communications TG	Develop presentation package.		6/1/2016	6/1/2016
	Chair External Communications TG	Develop invitation list for indoctrination sessions.		8/1/2016	All ANS members
	Chair External Communications TG	Send indoctrination session invitations.		10/1/2016	sent via Jan 2017 N&D, member blast, and ANS home page.
	Chair External Communications TG	Conduct 1st indoctrination session.		2/1/2017	1/31/2017
	Chair External Communications TG	Complete sessions.		11/1/2017	
H. Contact leading nuclear companies to determine if they issue regular newsletters and offer to provide standards updates for inclusion.	Chair External Communications TG	Develop list of companies and contacts.	1/25/17: Members recognized that the EC TG Chair position was	11/1/2016	

SMART Matrix for ANS SC Strategic Plan – Updated 5/6/2019

Initiative	Assigned Responsibility (Functional Title)	Specific Action Items Needed to Accomplish the Initiative	Status/ Comments	Scheduled Completion Date	Actual Completion Date
			open and no action has been taken.		
	Chair External Communications TG	Develop short form newsletter.	1/25/17: Members recognized that the EC TG Chair position was open and no action has been taken.	11/1/2016	
	Chair External Communications TG	Make contact with 30% and report to SB.	1/25/17: Members recognized that the EC TG Chair position was open and no action has been taken.	4/1/2017	
	Chair External Communications TG	Make contact with 100% and report to SB.		11/1/2017	
I. Evaluate the cost effectiveness of a fee based training program for newly issued/ revised standards.	SB VChair	Prepare draft evaluation plan.		8/1/2016	7/26/2106
	SB VChair	Meet with ANS Membership & Marketing Director and revise plan as appropriate.		8/3/2016	Several calls held; last one on 10/5/16.
	SB VChair	Complete evaluation and send report to SB Chair for discussion with BOD.		3/1/2017	Completed Jan 2017 – Recommended ANS-2.8 & ANS-3.5 once approved.
	Standards Mgr	Send owners' groups semi-annual updates on applicable standards activities	Industry newsletter created and provided to Jim Riley as POC for utilities on 10/18/16. Industry newsletter posted here.	Ongoing	

SMART Matrix for ANS SC Strategic Plan – Updated 5/6/2019

Initiative	Assigned Responsibility (Functional Title)	Specific Action Items Needed to Accomplish the Initiative	Status/ Comments	Scheduled Completion Date	Actual Completion Date
Goal #5: Improve Industry Representation and Sustainability of Working Groups, Subcommittees, and Consensus Committees					
A. Approach owners' groups and industry organizations soliciting member participation in ANS standards	Standards Mgr	Send owners' groups semi-annual updates on applicable standards activities	Industry newsletter created and provided to Jim Riley as POC for utilities on 10/18/16. Industry newsletter posted here.	Ongoing	
	Standards Mgr	Request staffing assistance for select standards.	An updated list of volunteer needs was prepared and posted to the ANS website 8-11/16, announced in Sept. 2016 N&D and distributed through ANS Collaborate to PDs.	Ongoing	
B. Send notices to ANS Student Section members, Young Member Group, Professional Division members, and North American-Young Generation Nuclear members to provide opportunities to participate in ANS standards	Standards Mgr	Send notices biannually.	Broadcast sent to ANS Student Section 9/15/16.	Ongoing Biannually	
		(See Goal #1)			
C. Enhance the relationships with the ANS Professional Divisions and Technical Groups to assist in populating WGs with expert individuals.(See Goal #1)	Standards Mgr	Advertise upcoming standards efforts with requests for support using *Nuclear News*, Nuclear Café, and ANS Linked-In Group.	Volunteer needs section added to *Nuclear News*. List of volunteer needs updated and posted to web and announced in N&D.	Ongoing	Standards Mgr
D. Advertise upcoming standards efforts with requests for support using Nuclear News, Nuclear Café, and ANS Linked-In Group		See goal # 3			
E. ANS IT Department to complete the Standards Volunteer Database, and make it available to subcommittee and consensus committee chairs (See Goal #3)	SB VChair	Develop standard report and provide to CC Chairs.	1/25/17: Stamm confirmed that this action will be completed shortly.	6/11/17	6/11/17
F. Monitor consensus committee and working group success in staffing and recruitment and share best practices across all consensus committees	CC Chairs	Changed to annual report based on performance data provided to the CC Chairs.		6/30/2018+ Ongoing	
	SB VChair	Evaluate results of CC reports at SB meeting		6/30/2018+ Ongoing	

Incorporating Risk-Informed and Performance-Based Approaches/Attributes in ANS Standards

FOR INTERIM TRIAL USE

1. PURPOSE

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

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

2. BACKGROUND

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

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

3. ROLES AND RESPONSIBILITIES

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

3.1 ANS Standards Board

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

3.2 RP3C Chair

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

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

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

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

3.3 RP3C Members

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

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

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

3.4 Consensus Committee Chairs

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

(b) Take training on this guidance document.

3.5 Working Group Chairs

(a) Take training on the guidance document.

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

4. PROCESS

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

4.1 Working Group Formation and Project Initiation Notification System Stage

4.1.1 WG Formation:

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

4.1.2 PINS Development:

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

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

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

Sections 5.1 and 5.2 of this document provides information on the types of standards where use of risk-informed insights/approaches or performance-based requirements/approaches may be appropriate (this document does not address when a graded approach may be appropriate). The WG chair can also consult with the RP3 Chair.

Note that s
~~The PINS form includes the following question for the WG Chair:~~

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

~~The WG Chair should evaluate the intent and structure of the standards project, consult with the RP3C Chair, and respond to this PINS question, as appropriate. S~~hould incorporating a risk-informed and/or performance-based approach(es) to the standard being developed or revised be deemed inappropriate or not effective, the remainder of this procedure is not applicable to that particular standard. The WG Chair should document this evaluation and assessment appropriately for consideration by future Working Groups.

4.2 Standards Development Stage

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

4.2.1 Early Outlines/Draft

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

4.2.2 Pre-Sub-Committee Draft

The WG Chair should send the draft standard to the RP3C for review by the RP3C Chair or designated members of RP3C. The WG should use his/judgment as to when the draft is mature

enough to benefit from the RP3C review. Details of the standard do not necessarily have to have been completed. The RP3C should schedule and perform the review to minimize any impact to the standard development schedule. The WG Chair has the authority to adopt any of the RP3C recommendations resulting from the review.

At this point in the standard development phase, it might be too late to implement any or all of the recommendations. This will be based upon the value added versus the difficulty in implementing the recommendations. The WG Chair should consult with the Subcommittee and Committee Chairs to factor in questions of schedule, volunteer resources (amount and appropriate skill sets), extensiveness of standard rework, etc. so as to chart most the appropriate path forward. The WG Chair should document appropriately whatever decisions are made in this regard for consideration by future Working Groups.

5. RISK-INFORMED, PERFORMANCE-BASED APPROACHES

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

5.1 Performance-Based Approaches

All standards prescribe what (the outcome) is to be obtained from using the standard and to different levels, how to obtain the outcome.

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

Alternatively, a standard outcome be a type where it may be appropriate to provide some high level expectations for what needs to be done to meet the outcome and allow flexibility (be less prescriptive) in how to achieve the outcome. For example, a standard might have “not exceeding an exposure limit” as an outcome. The user of the standard can be provided the flexibility on how to meet this outcome, but certain high level expectations (margin and reliability) might be specified. Generally, where there is more margin, there is room for more flexibility.

Note that a standard needs to provide some level of direction/prescription on what needs to be done to achieve the outcome. If it did not, then the standard would have no “shall” statements and would not be a standard. However, a performance-based standard would keep the direction provided at a high level and would allow flexibility in the specific steps that could be taken to achieve the outcome. The degree of flexibility manifests itself by permitting the standard user to determine what performance metrics are necessary (to ensure success) and what the desired values of such metrics should be to declare success, as well as how to measure those metrics. The degrees of “hows” would be up to the standard writer; he/she would determine any

constraints that would need to be placed on the standard user when determining performance-based metrics, how they will be measured, and what constitutes a success.

This is outlined in a step by step manner below.

5.1.1 Defining the Ultimate Outcome of the Standard

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

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

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

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

For some situations, there will only be one approach that will result in achieving the outcome (e.g., calculation of decay heat load). In that case, the standard is generally not considered suitable to being written in a performance-based manner.

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

5.2 Risk-Informed Approaches

Risk insights can be used to support decisions on the scope, focus, level of rigor or sophistication of the standard (and the program or process that is the subject of the standard). A "risk-informed" approach to decision-making represents a philosophy whereby risk insights are considered together with other factors to establish requirements that better focus attention on design and operational issues commensurate with their importance to health and safety. Decisions made in process described in a standard can be risk-based or risk-informed. Risk-based decisions are decisions made entirely on specified risk criteria, which could be qualitative or quantitative. While ~~it is not incorrect to include~~ it is acceptable to use risk-based steps in a process, broader decisions should be risk-informed. A risk-informed process sets up an integrated decision-making structure that allows consideration of a broad range of technical and stakeholder input uncertainties, imperfections in analysis and decision criteria and knowledge constraints. Regulatory Guide 1.174, *An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis*, is an example of a risk-informed process.

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

Risk insights can be used to define/~~identify~~narrow the ~~applicable~~ scope of standard, e.g., ~~, e.g.,~~ program elements or structures, systems, and components ~~(~~(SSCs)~~,)~~ to those which need to be addressed to meet the outcome. ~~which are included or excluded from the standard. Facilities with risk models may be able to consider quantitative measures, such as risk importance measures as part of the scoping decision. Further, the outcome of the standard can be based on risk insights and/or include risk elements (e.g., As Low As Reasonably Achievable) or even be risk-based (e.g., consequence at a given frequency).~~

~~5.2.2.~~ Facilities with risk models may be able to consider quantitative measures, such as risk importance measures as part of the scoping decision.

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

The outcome of the standard can be stated in terms of risk metrics such as "As Low As Reasonably Achievable" or "consequence at a given frequency."

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

Risk insights can be used in defining the rigor, sophistication, or level of effort to be used in meeting the standard's outcome. Examples include using risk-insights to help set requirements for testing, surveilling, or inspecting SSCs. For example, a standard that tests a number of similar components could require monthly tests for the high risk category, quarterly tests for the medium risk category, and annual tests for the low risk category. The industry has been successful in implement risk-informed in-service testing and inspection program that reduce the rigor and periodicity of tests/inspections, which provide both cost and exposure savings (RG 1.175, *An Approach for Plant-Specific, Risk-Informed Decision-making: In-service Testing* and

RG 1.178, *An Approach For Plant-Specific Risk-informed Decision-making In-service Inspection of Piping*.

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

Finally, the standard can allow different approaches to be made to achieve outcomes, but require that the approach used be justified to provide an appropriate level of confidence on the accuracy or repeatability of achieving the outcome. An example is where the margin of safety provided (or amount of conservatism) is based on the confidence (or uncertainty) associated with the data or the process used in achieving the outcome.

~~5.2.3. Using Risk Insights and Tools to Monitor the Outcome of a Standard~~

~~The user should be able to understand and evaluate that the outcome is consistent with the risk basis. The outcome should be traceable to the risk insights that were input into the decision process. If the process was a quantified, risk-based approach, this would be straightforward; however this risk-based approach is rarely the best decision-making tool. As stated in all of the above references, most decisions are risk-informed and integrated.~~

Table 1. Key RIPB Attributes

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

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

APPENDIX A

BACKGROUND ON RISK INFORMED AND PERFORMANCE BASED APPROACHES

A1. GENERAL BACKGROUND

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

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

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

Outcome Attributes of Risk-Informed Safety:

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

Outcome Attributes of Performance-Based Safety:

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

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

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

A2. EXAMPLE OF REGULATORY APPLICATION: MAINTENANCE RULE

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

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

A2.1. Outcome:

The rule states in (a)(1):

> *[liciensees] shall monitor the performance or condition of structures, systems, or components, against licensee-established goals, in a manner sufficient to provide reasonable assurance that these structures, systems, and components, as defined in paragraph (b) of this section, are capable of fulfilling their intended functions.*

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

A2.2. Method for Achieving Outcome

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

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

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

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

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

Example 3: *[t]he licensee shall assess and manage the increase in risk that may result from the proposed maintenance activities. The scope of the assessment may be limited to structures, systems, and components that a risk-informed evaluation process has shown to be significant to public health and safety.*

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

APPENDIX B

EXAMPLES OF RISK-INFORMED PERFORMANCE BASED ATTRIBUTES IN ANS STANDARDS

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

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

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

This "design basis event" type of standard.

B1.1 Performance-Based Attributes

B1.1.1 Attribute P1: Outcome

ANS 2.26 states in the SCOPE section that:

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

In simple terms, the outcome could be stated to be:

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

B1.1.2 Attribute P2: High Level Criteria

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

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

> *Following determination of the regulatory requirements applicable to the project or to the facility, a safety analysis or integrated safety analysis shall be performed. The guidelines provided in this standard and other applicable standards such as Refs. [4] and [5] should be used.*

> *To achieve the objectives of this standard, the safety analyses shall evaluate the uncertainties with determining failure and the consequences of failure. The depth and documentation of the uncertainty analyses should be sufficient to support the judgment that categorization based on Table 1 and the design requirements in ANSI/ASCE/SEI 43-05 produce a facility that is safe from earthquakes.* [Note that this is also an example of a risk-informed approach.]

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

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

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

> *The scope and comprehensiveness of the safety analysis will vary with the complexity of the facility, its operations, and the contained hazard. The assignment of an SDC to an SSC determined to have a safety function is based on the objective of achieving acceptable risk to the public, the environment, and workers resulting from the consequences of failure of the SSC.*

B1.2 Risk-Informed Attributes

B1.2.1 Attribute R1: Development of Risk Importance

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

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

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

B1.2.2 Attribute R2: Use of Risk Insights

An example of a criterion that has this attribute is;

> *The scope and comprehensiveness of the safety analysis will vary with the complexity of the facility, its operations, and the contained hazard. The assignment of an SDC to an SSC determined to have a safety function is based on the objective of achieving*

acceptable risk to the public, the environment, and workers resulting from the consequences of failure of the SSC.

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

This "design basis event" related standard.

B2.1 Performance Based Attributes

B2.1.1 Attribute P1: Outcome

ANS 2.3 states in the SCOPE section that:

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

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

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

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

B2.1.2 Attribute P2: High Level Criteria

An example of a criterion that has this attribute is

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

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

Another example of a criterion that has this attribute is

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

(2) a probabilistic assessment of the hazard.

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

B2.2 Risk-Informed Attributes

None identified.

The following is an example of a **non**-RIPB feature:

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

Note: this does not mean the standard or the criterion is not appropriate. There are times when it is very appropriate to be prescriptive.

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

This is a "design analysis" type standard.

B3.1 Performance Based Attributes

B3.1.1 Attribute P1: Outcome

ANS 2.21 states in the SCOPE section that:

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

The outcome could be stated to be:

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

This is a good performance-based outcome.

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

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

Another example of a criterion that has this attribute is:

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

This is a good performance-based statement.

B3.2 Risk-Informed Attributes

B3.2.1 Attribute R1: Development of Risk Importance

An example of a criterion that has this attribute is;

The results of the 10-year–or–longer simulation with several extreme events shall be used to perform extreme value statistical analyses that project the most extreme weather conditions for the expected license period of the power plant, which could be 60 years or more.

The U.S. Nuclear Regulatory Commission provides guidance in regard to the critical time period. In the case of a cooling lake, the lake temperature may reach a maximum in five days following a shutdown. Therefore, three critical time periods to be included in the assessment are five days, one day, and 30 days to ensure the availability of a 30-day cooling supply. The three periods need not occur contiguously but may be combined to produce a synthetic 36-day period that may be used as the design basis for the lake. In the case of a wet cooling tower, the meteorological conditions resulting in maximum evaporation and drift losses shall be the worst 30-day combination of the controlling parameters such as wet-bulb temperature and wind speed.

This does incorporate some risk-informed elements.

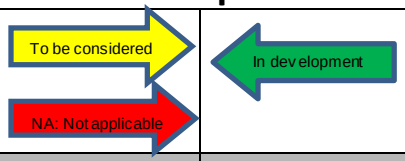
ATTACHMENT 4

Tracking Follow-Up of SB Action Item 11/2018-14

Consensus Committees in Collaboration with RP3C

RP3C Feedback to LLWRCC

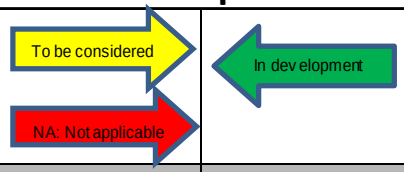
Tracking of RP3C Recommendation to Incorporate RIPB Methods



CC Owner (WGC)	DESIGNATION				Estimated Schedule for Drafts in Development Using RIPB Methods	Estimated Consideration Date to Incorporate RIPB Methods	RP3C Proposed Approach	CC Response to Proposed Approach
LLWRCC (WGC: J. Sickle)	ANS-	3	1			Believed to be NA for RIPB Maintenance to be considered by 11/20/2019	RP3C recommends PB approach with fitness-for-service considerations	LLWRCC is waiting until guidance document is issued to address.
LLWRCC (WGC: M. Smith)	ANS-	3	2			Maintenance to be considered by 4/4/2022	RP3C considers this a high priority standard for RIPB	LLWRCC is waiting until guidance document is issued to address.
LLWRCC (WGC. J. August)	ANS-	3	13		Project being re-evaluated; WG being reformed		RP3C considers this a high priority for advanced non-LWRs	LLWRCC is waiting until guidance document is issued to address.
LLWRCC (WGC: K. Geelhood)	ANS-	18	1			Maintenance to be considered by 11/1/21	LMP work in context of DG-1353 should be considered	LLWRCC is waiting until guidance document is issued to address.
LLWRCC (WGC. E. Johnson-Turnipseed)	ANS-	51	10			Revision currently in final stage was initiated before RP3C. Revision anticipated to be approved in 2019. Next maintenance to be considered in 2024.	RP3C has reported interactions with WG	LLWRCC is waiting until guidance document is issued to address.

RP3C Feedback to LLWRCC (continued)

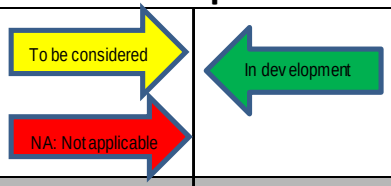
Tracking of RP3C Recommendation to Incorporate RIPB Methods



CC Owner (WGC)	DESIGNATION				Estimated Schedule for Drafts in Development Using RIPB Methods	Estimated Consideration Date to Incorporate RIPB Methods	RP3C Proposed Approach	CC Response to Proposed Approach
LLWRCC (WGC: J. Glover)	ANS-	56	1			Inactive project to be discussed at 11/14/18 LLWRCC meeting.	Work done with LMP on H2 control is relevant	LLWRCC is waiting until guidance document is issued to address.
LLWRCC (WGC: J. Glover)	ANS-	56	8			NA - a revision of this standard has been in development for some time; prior to formation of RP3C and is expected to be issued for ballot in 2019 with ANSI approval the following year. The next maintenance consideration in ~2024.	Part 50 App J is PB	LLWRCC is waiting until guidance document is issued to address.
LLWRCC (WGC: H. Liao)	ANS-	58	8		Draft issued to LLWRCC & RP3C with comment close date of 2/9/19. RP3C Chair comments pending resolution.			

RP3C Feedback to LLWRCC (continued)

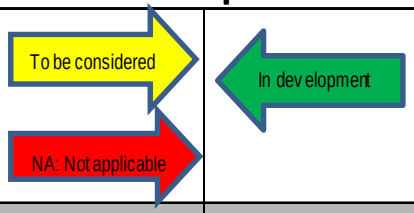
Tracking of RP3C Recommendation to Incorporate RIPB Methods



CC Owner (WGC)	DESIGNATION				Estimated Schedule for Drafts in Development Using RIPB Methods	Estimated Consideration Date to Incorporate RIPB Methods	RP3C Proposed Approach	CC Response to Proposed Approach
LLWRCC (WGC:OPEN)	ANS-	58	9		WGC needed for schedule to be estimated.		SFC may be one of the high priority standards for LMP guidance application	LLWRCC is waiting until guidance document is issued to address.
LLWRCC (WGC: M. Linn)	ANS-	58	14			Maintenance to be considered by 1/17/2022	LMP guidance definitely applicable	LLWRCC is waiting until guidance document is issued to address.
LLWRCC (WGC: M. Dooley)	ANS-	59	51		PINS in development		High likelihood of PB guidance being applicable	LLWRCC is waiting until guidance document is issued to address.
LLWRCC (WGC: M. Dooley)	ANS-	59	52		PINS in development		High likelihood of PB guidance being applicable	LLWRCC is waiting until guidance document is issued to address.

RP3C Feedback to RARCC

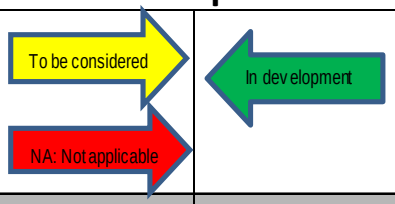
Tracking of RP3C Recommendation to Incorporate RIPB Methods



CC Owner (WGC)	DESIGNATION				Estimated Schedule for Drafts in Development Using RIPB Methods	Estimated Consideration Date to Incorporate RIPB Methods	RP3C Proposed Approach	CC Response to Proposed Approach
RARCC (WGC: J. August)	ANS-	53	1			Maintenance to be considered at 11/12/18 RARCC meeting	RP3C working with WG Chair	
RARCC (WGC: G. Flanagan)	ANS-	54	1		Recirculation ballot closed 4/20/19 with 1 objection; appeal in process.		RP3C's input will be provided to SB	
RARCC (WGC: OPEN)	ANS-	54	6			NA - no plans to ressurect this inactive project	Needs more consideration	

NRNFCC Feedback

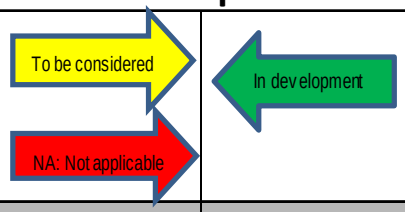
Tracking of RP3C Recommendation to Incorporate RIPB Methods



CC Owner (WGC)	DESIGNATION				Estimated Schedule for Drafts in Development Using RIPB Methods	Estimated Consideration Date to Incorporate RIPB Methods	RP3C Proposed Approach	CC Response to Proposed Approach
NRNFCC (WGCs: T. Anselmi & C. McMullin)	ANS-	3	14		Draft estimated to be completed for NRNFCC review in July 2019		RP3C working with CC Chair	Recognized during 5/21/19 call.
FWDCC (WGC: R. Eble)	ANS-	57	11		Draft issued to NRNFCC & RP3C with comment close date of 6/2/19.		RP3C is ready to help	Recognized during 5/21/19 call.
NRNFCC (WGC: P. Rogerson)	ANS-	58	16			Maintenance to be considered by 9/4/19	High likelihood of LMP guidance being applicable	Recognized during 5/21/19 call.

RP3C Feedback to FWDCC

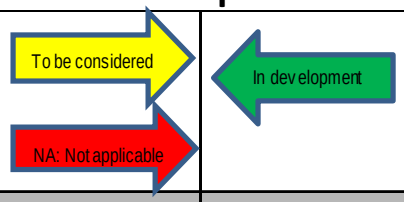
Tracking of RP3C Recommendation to Incorporate RIPB Methods



CC Owner (WGC)	DESIGNATION				Estimated Schedule for Drafts in Development Using RIPB Methods	Estimated Consideration Date to Incorporate RIPB Methods	RP3C Proposed Approach	CC Response to Proposed Approach
FWDCC (WGC: OPEN)	ANS-	57	1			Maintenance to be considered by 6/16/2021	LMP LBE approach may be applicable	
FWDCC (WGC: R. Browder)	ANS-	57	3			Maintenance to be considered by 2/27/2023	LMP guidance document may be applicable	

RP3C Feedback to ESCC

Tracking of RP3C Recommendation to Incorporate RIPB Methods



CC Owner (WGC)	DESIGNATION				Estimated Schedule for Drafts in Development Using RIPB Methods	Estimated Consideration Date to Incorporate RIPB Methods	RP3C Proposed Approach	CC Response to Proposed Approach
ESCC (WGC: Y. Gao/R. Schneider)	ANS-	2	8		Reballot scheduled to close 6/15/19.		RP3C interaction is ongoing. Awaiting WG Feedback	Draft being reviewed by Bob Youngblood and Nilesh Chokshi.
ESCC (WGCs: D. Clark)	ANS-	2	26		ESCC PINS ballot closed 4/26/19. ESCC comments being resolved.		Being addressed in 11-2018 RP3C Meeting	
ESCC (WGC: K. Hanson)	ANS-	2	27		Draft estimated to be completed for subcommittee review in September 2019		Needs coordination with ANS-2.26	Recognized during 3/20/19 call.

ATTACHMENT 5

Date:	January 9, 2016

PINS: PROJECT INITIATION NOTIFICATION SYSTEM FORM *(Rev. 2012)*

*NOTE: Adoptions of international standards require compliance with ANSI's Sales & Exploitation Policy.

1. Designation of Proposed Standard:	*ANS-30.2*	
2. Title of Standard:	Categorization and Classification of Structures, Systems, and Components for New Nuclear Power Plants	
3. Project Intent: (Check the applicable box below)	**Supersedes or Affects:** (Specify designation of approved ANSI standard(s) or international standard(s)* affected or superseded.)	
Create new standard	*X*	
*Adopt identical international standard (see Expedited Procedures, Section 1.2.9.2, Annex H: IDT and Annex I)		
*Adopt modified international standard (see Requirements Associated, Section 1.2.9.1, Annex H: MOD and Annex I)		
***AND** this adoption revises this current ANS		
Revise current standard		
Revise and Re-designate current standard		
Revise, Re-designate and Consolidate current standard		
Revise and Partition current standard		
Reaffirm current standard		
Reaffirm and Re-designate current standard		
Supplement to a current standard		
Withdraw current standard		
4. This standard contains excerpted text from an international standard, but is not an ISO or IEC adoption.	*X*	Check here if this standard may include excerpted text from ISO or IEC standards or IAEA Technical Documents but is not an identical or modified adoption of an international standard or TechDoc.
5. Provide an explanation of the need for the project: **(If revision, note need for revision due to new reports, tests, data, etc.)**	Current risk categorization and safety classification schemes and selection criteria for NPP Structures, Systems, and Components (SSCs) are inconsistent. Future nuclear power plants need a single, technology neutral system for plant and public safety, environmental, and seismic classification of SSCs that includes, where possible, risk informed and performance based criteria. This standard harmonizes several national consensus standards (NCS) and regulatory documents for new nuclear power plants regarding categorization and classification of SSCs and provides special treatment criteria based on SSC classification. This standard is written for new nuclear power plant designs. It may be applied to older nuclear power plant designs as the user desires.	
6. Identify the stakeholders (e.g., telecom, consumer, medical, environmental, etc.) **likely to be directly impacted by the standard:**	Nuclear power plant designers, architect engineers, plant operators, configuration control engineers, and nuclear industry regulators.	
7. Scope Summary: **(Provide a one paragraph description, not to exceed 650 characters <u>including spaces</u>. Should be written as it will appear in the published standard (present tense verb). If necessary, scope in the published standard may be longer provided that it is editorially the same.**	This standard provides a single technology neutral categorization and classification process for SSCs for new nuclear power plants that is, where possible, risk informed and performance based. This process will then be used to determine special treatment of SSCs to meet the safety basis. This standard applies only to those new design facilities (i.e. greater than Generation III) that must obtain an operating license from the proper regulatory authority. It provides a complete (e.g., necessary and sufficient) repeatable logical process based upon risk-informed, performance based objectives. Other voluntary consensus standards (VCS) may often be required in order to complete the entire process for all SSCs. Those standards are incorporated by reference.	
8. Consumer Product or Service:		Check here if standard covers Consumer or Service Product
9. Units of Measurement Used: (check one)		Metric ☐ US *X* Both ☐ NA
10. Accredited Standards Developer Acronym:	*ANS*	
11. Submitter	*Patricia Schroeder, ANS Standards Manager* *American Nuclear Society* *555 North Kensington Avenue* *La Grange Park, IL 60526* *Phone: 708-579-8269 Fax: 708-579-8248 Email: pschroeder@ans.org*	

The information on this page is not an official part of the ANSI PINS form. It was designed for ANS Standards Committee purposes to provide more background information about the standard. It is not required that this section be approved, and therefore, shall not be the basis for a not approved vote. Only the ANSI PINS form on page 1 requires approval.

Project #: ANS-30.2 Categorization and Classification of Structures, Systems, and Components for New Nuclear Power Plants

1. **Purpose:** To create a technology neutral SSC risk categorization and safety classification process and special treatment criteria of SSCs for new nuclear power plant designs (greater than Generation III)*. This standard is intended to incorporate risk-informed and performance based information where applicable and to harmonize the variety of existing plant and public safety, design criteria, and code assignment systems that have become disjointed over the years. The initial intent is to combine classification systems from ANS, ASME and IEEE, but development of the draft standard will dictate whether this is possible and whether additional SDOs requirements will be included.

   * Gen III reactors offered significant improvements in safety over Gen II reactor designs certified by the NRC through the 1990s (LWR-PWR, BWR, CANDU-6, ABWR, System 80+, AP 600, EPR).
   * Gen III+ reactors again offered significant improvements over the Gen III reactors in improved economics, enhanced safety, minimized waste, and proliferation resistance. (CANDU ACR-1000, AP-1000, advanced EPR, ESBWR, APR-1400, EU-ABWR).

   It addresses: functional classification to subsystems, components and their parts (downward categorization flow) and is:

   1. Complete and closed (necessary and sufficient for any part of the hierarchy)
   2. Connected – explaining how the classification carries down top-to-bottom, and why
   3. Process-oriented
   4. Logical
   5. Updateable, repeatable
   6. Facilitating iteration
   7. Rationale; clearly explained
   8. Clearly interrelated & integrates classification categories and their ranking
   9. Simple – a minimal set of classifications, well under 10-30 common now
   10. Ideally mnemonic, to be user-friendly

2. **Benefit to Users:** The provision of one single standard that can be used for ALL component risk and safety scenarios to avoid duplication, disagreement, random assignments not based on specific risks or performance criteria. Eventually, this process should significantly enhance the plants configuration management system and result in a more economically viable design and licensing process.

   One of the benefits of this standard is to clarify the difference between “categorization” and “classification” of SSCs. Categorization is completed through an iterative process during the facility design by completing appropriate analysis to determine the risks related to SSCs. Classification of SSCs is also an iterative process during the facility design to determine whether SSCs are safety related on non-safety related. The actual process for many of the SSCs may be completed by using other voluntary consensus standards that are incorporated by referenced in this standard.

3. **Will this standard use risk-informed insights, performance-based requirements, and/or a graded approach:** Yes

4. **Consensus Body:** Research and Advanced Reactors

5. **Subcommittee under which it is assigned:** ANS-29 “Advanced Initiatives”

6. **Working Group Chair (s):** Amir Afzali, Southern Company

7. **Working Group Members**

   Donald Spellman, Individual, ORNL - Retired.
   David Blanchard, Blanchard & Assoc.
   Bill Culp, Fluor

ATTACHMENT 6

Date:	1/17/2012 (RV 4/12/13; RV 8/20/13; RV 12/3/13)

PINS: PROJECT INITIATION NOTIFICATION SYSTEM FORM *(Rev. 2009-ps)*

*NOTE: Adoptions of international standards require compliance with ANSI's Sales & Exploitation Policy.

1. Designation of Proposed Standard:	*ANS-3.13-201x*	
2. Title of Standard:	*Nuclear Facility Reliability Assurance Program (RAP) Development*	
3. Project Intent: (Check the applicable box below)	Supersedes or Affects: (Specify designation of approved ANSI standard(s) or international standard(s)* affected or superseded.)	
Create new standard	*X*	
*Adopt identical international standard (see Expedited Procedures, Section 1.2.9.2, Annex H: IDT and Annex I)		
*Adopt modified international standard (see Requirements Associated, Section 1.2.9.1, Annex H: MOD and Annex I)		
*AND this adoption revises this current ANS		
Revise current standard		
Revise and Re-designate current standard		
Revise, Re-designate and Consolidate current standard		
Revise and Partition current standard		
Reaffirm current standard		
Reaffirm and Re-designate current standard		
Supplement to a current standard		
Withdraw current standard		
4. This standard contains excerpted text from an international standard, but is not an ISO or IEC adoption.		Check here if this standard includes excerpted text from an ISO or IEC standards but is not an identical or modified adoption of an international standard.
5. Provide an explanation of the need for the project: (If this is a revision, note the need for revision such as new reports, tests, data, etc.)	*The intent for a RAP is to assure that structures, systems and components (SSC) reliabilities remain valid for the life of the plant. There is currently no guidance that describes what constitutes a RAP or how to develop one. A systematic RAP development methodology based on similar industries' efforts and past nuclear experience would greatly benefit the nuclear industry. This standard provides technical guidance that will clarify, simplify, and integrate incomplete, complex RAP descriptions in multiple rules.* *A RAP is required for all nuclear power plant safety-significant structures, systems, and components (see NUREG 0800 Chapter 17.4 and SECY 95-132). This standard will be developed to apply to any or all plant components at the discretion of the user.*	
6. Identify the stakeholders (e.g., telecom, consumer, medical, environmental, etc.) likely to be directly impacted by the standard:	*NRC, DOE, NEI, U.S. nuclear facility industry (operators, architect engineers, consultants and contractors performing design assessment for scheduled maintenance and operations monitoring), IAEA, OECD/NEA, American Nuclear Insurers*	
7. Scope Summary: (Provide a one-paragraph description, not to exceed 650 characters including spaces written as it will appear in the published standard (use present tense verbs). If necessary, the scope in the standard may be longer provided that it is editorially the same.	*This standard provides criteria to describe nuclear facility reliability assurance programs and to perform scheduled maintenance and/or monitoring of operating conditions. This standard identifies and provides for scheduled maintenance based upon design principles. It provides guidance on how to select components' failure modes and maintenance requirements.*	
8. Consumer Product or Service:		Check here if standard covers Consumer or Service Product
9. Units of Measurement Used: (check one)		Metric [ ] US [X] Both [ ] NA
10. Accredited Standards Developer Acronym:	*ANS*	
11. Submitter	*Patricia Schroeder, ANS Standards Administrator* *American Nuclear Society* *555 North Kensington Avenue* *La Grange Park, IL 60526* *Phone: 708-579-8269 Fax: 708-579-8248* *Email: pschroeder@ans.org*	

The information on this page is not an official part of the ANSI PINS form. It was designed for ANS Standards Committee purposes to provide more background information about the standard. It is not required that this section be approved. Only the ANSI PINS form on page 1 requires approval.

Project #: ANS-3.13x-201x

1. **Purpose:**There is no guidance within the industry that tells how to develop, construct or implement an effective, efficient RAP. This standard will address how to fulfill the NUREG requirement to provide nuclear facility designs with an effective, efficient RAP. Specific criteria provided will identify, select, implement, and monitor planned nuclear plant activities. This will be accomplished by specifying their scheduled maintenance and condition monitoring plans to assure performance reliability in accordance with the plant's licensed design and its associate RAP requirement. This will be a process standard.

Some design principles presume certain types of scheduled maintenance will be performed as a part of selecting that specific equipment, so much so that they are embedded in the equipment selection assumptions. Many of these equipment requirements are documented in the design-controlled Vendor Technical Information (VTIP) program, which becomes part of the controlled design, under GL-83-28.

2. Benefit to Users: Industry consensus criteria will address RAP scope and content by identifying, selecting and applying scheduled maintenance and monitoring activities based on risk and performance-based assessments. These criteria will assist regulatory and industry business case considerations for the design, construction, operational and decommissioning requirements for nuclear facility RAPs.

3. Use of risk-informed insights, performance-based requirements, or a graded approach: This standard will translate risk-informed, performance-based design into actionable work activities based on the plant engineering design and risk.

4. Consensus Body: Non-Reactor Nuclear Facilities (NRNF)

5. Subcommittee under which it is assigned: N/A

6. Working Group Chair (s): J.K. August, Inc., interim chair

7. Working Group Members (including organizations**):**
J.K. August CORE, Inc.; Don Spellman, Oak Ridge National Laboratory; Todd Hilsmeier, U.S. Nuclear Regulatory Commission; Curtis Shiley, Southern Nuclear Operating Company; Jorge Hernandez, Bechtel; Al Paglia, South Carolina Electric & Gas Co., N. Prasad Kadambi, Individual; Henry Carlton Fuqua, Southern Co., Vogtle 3/4

8. Interests Represented in Development of Standard (in addition to members' organizations, other affiliations that may be represented important to the development of this standard)**:** Nuclear Energy Institute (NEI), Institute of Nuclear Power Operations (INPO), American Nuclear Insurers (ANI), IAEA, OECD/NEA, New Nuclear Plant Designers (AREVA, MHI, GE, Westinghouse), Architect Engineers (Bechtel/Shaw), Constructors (Fluor/Black & Veatch), Owners and Operators of nuclear power plants.

9. Coordination and Interfaces (Liaison): US Department of Energy (DOE), US Department of Defense (USDOD); NEI, INPO, EPRI

10. Related Standards or References, or Both: *(In order of significance)*

1. Standard Review Plan (SRP) – NUREG-0800, Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants
2. Design Control Document (DCD) 17.4, Reliability Assurance Program (RAP)
3. DC/COL-ISG-018, Interim Staff Guidance on Standard Review Plan, Section 17.4, Reliability Assurance Program
4. SECY-95-132, Policy and Technical Issues Associated with the Regulatory Treatment of Non-Safety Systems (RTNSS) in Passive Plant Designs
5. SECY -90-016, S90-016 304 Memorandum
6. SECY-89-013, Design Requirements Related to the Evolutionary Advanced Light Water Reactor
7. 10 CFR Part 50.65, Requirements for monitoring the effectiveness of maintenance at nuclear power plants
8. GL 83-28s1, GL 83-28, Supplement 1, REQUIRED ACTIONS BASED ON GENERIC IMPLICATIONS OF SALEM ATWS EVENTS
9. 10 CFR Part 21, Reporting of defects and noncompliance

10. 10 CFR Part 50, Domestic licensing of production and utilization facilities
11. 10 CFR Part 52, Licenses, Certifications, and Approvals for Nuclear Power Plants
12. 10 CFR Part 50.34, Contents of applications; technical information
13. NUREG/CR-5695, "A Process for Risk-Focused Maintenance," March 1991; APP-GW-GLR-117, “Incorporation of the Maintenance Rule,” Westinghouse Electric Company LLC/WESTINGHOUSE AP1000 STANDARD COMBINED LICENSE TECHNICAL REPORT 117, INCORPORATION OF THE MAINTENANCE RULE (APP-GWGLR-117), REVISION 0ML072420041
14. ANSI/ANS-3.2-201x, Managerial, Administrative, and Quality Assurance for the Operational Phase of Nuclear Power Plants
15. Reg Guide 1.206 (DG-1145), Combined License Applications for Nuclear Power Plants
16. ASME Boiler and Pressure Vessel Code, Section XI: Rules for In-service Inspection of Nuclear Power Plant Components (2010) 10CFR50.55a(g)
17. ASME OM Code, In-service Testing Requirements, 10CFR50.55a(f)
18. Part 50 Appendix B, Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants;
19. DCD 17.5, Combined License Items; Part 50.49, Environmental qualification of electric equipment important to safety for nuclear power plants
20. SECY-94-084, Policy and Technical Issues Associated with the Regulatory Treatment of Non-Safety Systems
21. Part 50.55a, Codes and standards, a and f; SECY-95-132, Policy and Technical Issues associated with the Regulatory Treatment of Non-safety Systems (RTNSS)
22. ANS 51.1, Nuclear Safety Criteria for the Design of Stationary Pressurized Water Reactor Plants (1983)
23. 10 CFR Part 50.2, Definitions
24. IAEA TECDOC-1264, Reliability Assurance Guidebook for Advanced Light Water Reactors
25. IAEA-TECDOC-1383, Guidance for optimizing nuclear power plant maintenance programs
26. IAEA-TECDOC-1551, Implementation Strategies and Tools for Condition Based Maintenance at Nuclear Power Plants
27. SECY -90-016, S90-016 304 Memorandum
28. INPO AP-913, Equipment Reliability Process
29. SECY-90-016, Evolutionary LWR Certification Issues and their Relationship to Current Regulatory Requirements
30. NEI-00-04, SSC Categorization
31. 10 CFR Part 50.69, Risk-informed categorization and treatment of structures, systems and components for nuclear power reactors
32. NEI 07-02A, Section 17.6,NEI 07-02A, Generic FSAR Template Guidance for Maintenance Rule Program Description for Plants Licensed Under 10 CFR Part 52
33. NQA-1, Quality Assurance Requirements for Nuclear Facility Applications (2008)
34. NUMARC-93-01, rev 2, Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants, NEI, 1996
35. NUREG/CR1860, Feasibility Study for a Risk-informed Performance-based Regulatory Structure for Future Plant Licensing
36. NEI 06-14A, “Quality Assurance Program Description,” Revision 7, July 2009
37. NUREG-CR-6002 BNL-NUREG-52332. Risk-Based Maintenance Modeling
38. NUREG-CR-6002, Risk-Based Maintenance Modeling/DOE 106641
39. ANSI/ANS-58.14-2011, Safety and pressure integrity classification criteria for light water reactors
40. Appendix B to Part 50—Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants
41. SAE JA-1011, Reliability Centered Maintenance Processes
42. ATA MSG-3 (2003), Processes for the Development of an Effective Maintenance Program

12. Project Initiation Date:

Once working group chair confirmed.

12: Key Words for use in facilitating web searches: Please (X) a limited number of key words that apply to this standard and add a couple of other key words if these are not sufficient:

_ Advanced Reactors _ ALWR _ Advanced Light Water Reactors _ BWR _ Boiling Water Reactor _ Decommissioning _ Environmental _ Gas Reactor _ HTGR _ High Temperature Gas Cooled Reactor	_ LWR _ Light Water Reactor **X Maintenance** _ Material Handling _ Natural Phenomenon _ Nuclear Safety _ Nuclear Criticality Safety **X Nuclear Power Plant Design** **X Nuclear Facility Design** _ Nuclear Facility Operations _ Probabilistic Analysis	_ PWR _ Pressurized Water Reactor _ Qualification and Training _ Radiological _ Reactor Physics _ Research Reactor _ Shielding _ Siting _ Small Modular Reactor _ SMR
Additional Keywords:	Surveillance Test	Reliability Assurance
New reactors	Condition Assessment	Reliability Assurance Program
New designs	Special Treatment	Quality Assurance
New reactor designs	Reliability	Quality Assurance Program
SRP	Standard Review Plan	PRA
PRA conversion	Operating requirements	

13. Probable Standards Users:

The working group is asked to identify key potential world-wide standards users in various organizations. The purpose is to use this information to keep potential standards users up-to-date on the developments of ANS standards that may be of interest to them. The ultimate goal is to increase awareness of the standards effort and increase sales. As the working group members are knowledgeable in the field of the proposed standard/revision, it is expected that they know of other persons in the industry that would be interested. It is recognized that this will not be a comprehensive industry list, but it is a start.

Standard Subcommittee	Standard Number	User Organization	User Department	User Name	User Country (Non U.S.)	User E-Mail
ANS-21	3.13	DOE	NE	Tom		
		DOE	Government	Tammy Way		Tammy.Way@nuclear.energy.gov
		NRC	Government	Tom Boyce		Tom.Boyce@nrc.gov
		NRC	Government	Todd Hilsmeieir		Todd.Hilsmeier@nrc.gov
		Industry		All new plant designers		
		Westinghouse	Industry			
		General Electric/Toshiba	Industry			
		MHI	Industry		Japan	
		NEI	Industry Liaison	Jim Riley		
		NEI	New Projects	Russ Bell		
		Doosan	Nuclear		Korea	
		AEs Bechtel	Bechtel	Jorge Hernandez		jehernan@bechtel.com
		AEs Fluor	Fluor			
		AEs Black Veatch	Black Veatch			
		AEs Burns Roe	Burns Roe			
		Teollisuuden Voima Oyj (TVO)	Utility		Finland	
		Areva	EPR		France	
		UK	EPR/Sizewell 3		UK	
		Scana	Summer	Al Paglia		apaglia@scana.com
		Southern Co	Vogtle	Curtis Shiley		CNSHILEY@southernco.com
		CORE		JK August		jkaugust@msn.com

ATTACHMENT 7

Schedule of ANS Standards in Development using RIPB Properties (June 2019)

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-2.8 (Y. Gao) / *ESCC (C. Mazzola)			Apr- Sept 2019	Sept - Dec 2019	Jan 2020	Jan 2020	May 2020
Determine External Flood Hazards for Nuclear Facilities	The draft was completely rewritten after the 2016 ballot and issued for another full ballot on 4/16/19. The current ballot closes 6/15/19.						
JCNRM Rep: V. Anderson, R. Schneider	The draft was provided to RP3C and SCoRA on 4/16/19. The schedule is dependent on the number of comments received.						
ANS-2.22 (T. Jannik)/*ESSC (C. Mazzola)	Nov 2019	Dec - Mar 2020	Apr - Sept 2020	Oct - Jan 2021	Feb 2021	Feb 2021	Jun 2021
Environmental Radiological Monitoring at Operating Nuclear Facilities							
JCNRM Rep:							
ANS-2.26 (D.Clark) /*ESCC (C. Mazzola)							
Categorization of Nuclear Facility SSCs for Seismic Design	The ESCC PINS ballot closed 4/26/19. Comments are being addressed. Schedule TBD.						
JCNRM Rep:							
ANS-2.27 (K. Hanson)/*ESCC (C. Mazzola)	June 2019	Jul - Oct 2019	Nov - Apr 2021	May - Aug 2021	Sept 2021	Sept 2021	Jan 2022
Criteria for Investigations of Nuclear Facility Sites for Seismic Hazard Assessments							
JCNRM Rep:	The WG ballot to approve the draft closed 5/31/19.						
ANS-2.29 (E. Gibson)/*ESCC (C. Mazzola)	Sept 2019	Oct - Jan 2020	Feb - July 2020	Aug - Nov 2020	Dec 2020	Dec 2020	Apr 2021
Probabilistic Seismic Hazard Analysis							
JCNRM Rep: A. Kammerer	The WG ballot to approve the draft closed 6/4/19. Comments will need to be addressed before the draft is ready for the ESCC.						
ANS-2.35 (D. Mussatti)/*ESCC (C. Mazzola)							
Guidelines for Estimating Present & Projecting Future Socioeconomic Impacts from Construction, Operations, and Decommissioning of Nuclear Facilities	PINS submitted to ANSI 5/20/19. Schedule TBD						
JCNRM Rep:							
ANS-3.8.7 (R. Markovich) / *LLWRCC (G. Carpenter)							
Properties of Planning, Development, Conduct, and Evaluation of Drills and Exercises for Emergency Preparedness at Nuclear Facilities	On hold -- consideration of redirection for new non-LWR reactors						
JCNRM Rep:							
ANS-3.13 (J. August) / *LLWRCC (G. Carpenter)							
Nuclear Facility Reliability Assurance Program (RAP) Development	Project plan in development to re-establish path forward.						
JCNRM Rep:							
ANS-3.14 (T. Anselmi & C. McMullin)/*NRNFCC (J. O'Brien)	June 2019	Jul - Oct 2019	Nov - Apr 2021	May - Aug 2021	Sept 2021	Sept 2021	Jan 2022
Process for Aging Management and Life Extension of NRNF							
JCNRM Rep: J. O'Brien	WG addressing last issue before submitting the draft to the NRNFCC for ballot.						
ANS-15.22 (D. Cronin/*RARCC (G. Flanagan)	Dec 2020	Jan - Apr 2021	May - Oct 2021	Nov - Feb 2022	Mar 2022	Mar 2022	Jul 2022
Classification of Structures, Systems and Components for Research Reactors							
JCNRM Rep:							
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	On hold due to NRC considering a SECY on functional containment which would have a substantial impact on the content of the standard.						
JCNRM Rep:							
ANS-30.1 (M. Linn) / *RARCC (G. Flanagan)	Jun 2019	Jul - Oct 2019	Nov - Apr 2020	May - Aug 2020	Sept 2020	Sept 2020	Jan 2021

Schedule of ANS Standards in Development using RIPB Properties (June 2019)

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
Risk-Informed & Performance-Based NPP Design Process JCNRM Rep: D. Johnson/K. Fleming/A. Maioli		Draft issued to WG for ballot. Schedule dependent on WG comments.					
ANS-30.2 (A. Afzali) / *RARCC (G. Flanagan) Categorization Classification of SSCs for New Nuclear Power Plants JCNRM Rep: R. Grantom		Project on hold awaiting determination of path forward with evaluation on the Licensing Modernization Project.					
ANS-30.3 (K. Welter)/*LLWRCC (G. Carpenter) Advanced LWR Risk-Informed Performance-Based Design Criteria and Methods JCNRM Rep:	Sept 2019	Oct - Jan 2020	Feb - July 2020	Aug - Nov 2020	Dec 2020	Dec 2020	Apr 2021
		WG resolving WG comments before releasing draft for subcommittee review.					
ANS-54.1 (G. Flanagan) / *RARCC (G. Flanagan) Nuclear Safety Criteria & Design Process for Liquid-Sodium-Cooled NPPs JCNRM Rep: R. Budnitz		Ballot Closed 8/5/17	Ballot Closed 4/9/18	Ballot Closed 4/20/19		Appeal in process	
		Draft provided to RP3C & SCoRA on 2/6/18. -- Comment responses to RARCC ballot issued for consideration.					
ANS-57.2 (R. Browder) / *FWDCC (D. Hillyer) Design Requirements for LWR Spent Fuel Storage Facilities at NPPs JCNRM Rep:	Mar 2020	Apr - Jul 2020	Aug - Jan 2021	Feb - May 2021	Jun 2021	Jun 2021	Oct 2021
ANS-57.11 (B. Eble) / *NRNFCC (J. O'Brien) ISAs for Nonreactor Nuclear Facilities JCNRM Rep:	Mar 2019	N/A	April - Sept 2019 Ballot Closed 6/2/19	Oct - Jan 2020	Feb 2020	Feb 2020	June 2020
		Draft provided to RP3C, SCoRA, and NCSCC on 4/3/19. A number of negataives and significant comments have been received. It is likely that comment resolution will take longer than scheduled period.					
ANS-58.8 (H. Liao)/*LLWRCC (G. Carpenter) Time Response Design Criteria for Safety-Related Operator Actions JCNRM Rep:	Oct 2018	Closed 11/22/18	Dec - June 2019 Ballot Closed 2/9/19	July - Oct 2019 May not be needed	Nov 2019	Nov 2019	Mar 2020
		Draft provided to RP3C & SCoRA 12/12/18; RP3C Chair comment currently being addressed.					

*= ANS responsible consensus committee

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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