

**American Nuclear Society  
Risk-Informed Standards Consensus (RISC) Committee  
Meeting Minutes  
June 27, 2007  
Boston Marriott Copley Place Hotel • Hyannis Room**

**Members Present:** William E. Burchill, *Texas A& M Univ. (RISC Chair)*; Robert Budnitz, *Lawrence Livermore National Laboratory*; Allen Camp, *Sandia National Lab*; David Finnicum, *Westinghouse*; John Gaertner, *EPRI*; Dennis Henneke, *General Electric*; Kenneth Kiper, *FPL*; Stanley Levinson, *AREVA NP*; Jean Savy, *Risk Management Solutions*; Pat Schroeder, *ANS*; Barry Sloane, *ERIN (for Rick Hill)*

**Members Present by Phone:** Mary Drouin, *US NRC*

**Members Absent:** Paul Amico, *SAIC*; Robert Bari, *Brookhaven National Laboratory*; Richard Black, *US DOE*; Biff Bradley, *NEI*; Gene Hughes, *ENTRANCO*; Frederick Emerson, *GE Nuclear Energy*; Rick Hill, *ERIN (alternate attended)*; Wayne Holmes, *HSB Professional Loss Control (NFPA Liaison)*; Yehia Khalil, *Yale University*; M. K. (Ravi) Ravindra; Mark Rubin, *NRC*; Daniel (Bill) Stillwell, *South Texas Project Nuclear Operating Company*

**Others Present:** Mary Beth Gardner, *ANS*; Mark Leonard, *dycoda LLC*; Chris Rochon, *Westinghouse*

### **1. Roll Call and Approval of Agenda**

Bill Burchill, RISC Chair, opened the meeting at 9:00 a.m., and the agenda was approved with no additional agenda items added. Burchill reviewed the meeting attendance record and noted that some members had repeated absences. He explained that the RISC Bylaws required the RISC Chair to review balloting and attendance records but did not have documented criteria for removal of delinquent members. Burchill asked the RISC members for input. The sense of RISC was that it was reasonable to set a specific number of missed ballots/meetings. Burchill took an action item to discuss this issue with the incoming RISC Chair.

Action Item 06/07-01: Bill Burchill to discuss attendance/balloting policy with incoming RISC Chair.
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### **2. Meeting Key Issues and Objectives**

Bill Burchill reviewed the agenda and highlighted key points. He stated that reports would be provided for all working group (WG) activities including an update on the ANS-58.21, Rev. 1 pilot project and the Level 1 Integrated PRA Standard. He said that Bob Budnitz and Mary Drouin would be providing a report on the NRC New Advanced Reactor Rule, and RISC would vote on a new committee chair.

### **3. Approval of November 15, 2006, Meeting Minutes**

The minutes of the November 15, 2006, RISC meeting were approved with the correction of Dan McLaughlin's company affiliation from NRC to Westinghouse on page 7 of the minutes.<sup>1</sup>

### **4. Status of Standards Writing Group Activities**

#### ANS-58.21, Rev. 1 External Events

John Gaertner reported on the status of ANS-58.21, Rev. 1 pilot project. He stated that the Dominion Surry plant had agreed to conduct the pilot project. It was noted that Surry will modify their current seismic PRA to meet ANS-58.21, Rev. 1 Category 2; and that it was felt the Surry seismic PRA already meet ANS-58.21, Rev. 3 Category 3 in the hazard analysis area which will drive a lot of reanalysis of fragilities. Hazards analysis, fragilities, and screening will be the three big activity areas for the pilot project.

John Gaertner reported that three potential funding sources had been identified to support the pilot project: (1) the EPRI Risk & Reliability (now called Risk/Safety Management) budget, (2) the EPRI Technology Innovation budget, and (3) Dominion in-kind support. NEI approval is required to use the EPRI Technology Innovation budget. Gaertner reported that Greg Hardy had been selected as the primary contractor for the pilot project. The project had started, was scheduled to last about two years,

<sup>1</sup> Approval of the minutes was initially postponed until a quorum was met.

and would be completed near the end of 2008 or early 2009. Mary Drouin requested that she be kept informed of results from the project because she was responsible for NRC Regulatory Guide 1.200.

Bob Budnitz stated that of the six initial WG members only three remain active: Ravi Ravindra, Niles Chokshi, and Bob Budnitz. Budnitz stated that all three had agreed to support the pilot project by providing clarifications as needed. Budnitz also encouraged that the pilot project refer to the LPSD standard, ANS-28.22, to determine if any new considerations would arise in using its seismic parts. John Gaertner clarified that the pilot project was a self-assessment, not a peer review.

#### ANS-58.22, Low-Power Shutdown (Budnitz for Wakefield)

See Attachment A, report outline, presented by Bob Budnitz during the discussion.

Bob Budnitz reported on the status of ANS-58.22 for Don Wakefield, ANS-58.22 WG Chair. Budnitz report that Edward Chow, NRC, had been added to the ANS-58.22 WG. John Gaertner questioned whether additional members were added to support the qualitative section. Budnitz explained that it had taken the WG a while to reorganize after the change in chairs but that the WG was back making progress. The WG held a conference call on June 20, 2007, and comment resolutions were expected to be completed soon. Bill Burchill estimated that a revised draft could be ready as soon as six months without the addition of a qualitative section. He estimated that the qualitative section would require an additional 12 – 18 months for an initial draft. Burchill stated that the current WG members were committed to finishing the quantitative portion and would support the qualitative piece as liaisons. Burchill recommended that the current WG be allowed to focus on completing the quantitative section while plans were being made to appoint three or four new members to concentrate on the qualitative portions for subsequent inclusion. John Gaertner asked that the new members for the qualitative section be appointed immediately.

Budnitz reported that the initial ballot had approximately half negatives that resulted in nearly 300 comments. WG members agreed to complete the comment responses within the next month. Responses would be distributed to the WG for review with personal calls to those commenters whose comments were not accepted by the WG explaining why their suggestion(s) were not accepted. Once comments were resolved, Budnitz anticipated an additional month before the draft would be sent back to RISC for ballot.

Budnitz reported that the WG intended to write the standard for the average shutdown risk end point with a separate section with requirements for an analysis of an outage-specific configuration. He stated that Don Wakefield had gone through the entire draft and believed the number of requirement changes for outage-specific configurations were about one to two dozen with approximately 200 requirements needing no change. It's possible that a whole new chapter would be added if necessary. Gaertner stated that he had a consultant review the draft ANS-58.21 to determine whether requirements must change to support an outage-specific configuration; the consultant agreed with Wakefield's conclusion that only a small number of requirements would need to be modified. RISC agreed with this approach to outage-specific plant configurations.

Budnitz presented the WG recommendation that ANS-58.22 be initially balloted/published with only quantitative requirements and that a WG sub-group be appointed to prepare qualitative requirements to be included in a future revision of ANS-58.22. He said that he estimated this revision would require about a year to prepare. Gaertner said that he had always felt the LPSD Standard needed a qualitative section and was glad that the WG agreed, but reiterated that it should be included in the initial standard. He stated that if we waited to include qualitative aspects, it could be two or more years when it was needed now. Gaertner asked if there was some way to delay the standard for a few months and get the qualitative section included. He suggested that if work started promptly, there would be a chance that the qualitative section could be completed a few months after the quantitative section. It was Gaertner's opinion that it would be worth holding the LPSD Standard a few months so that the qualitative section could be completed.

RISC discussed the possibility of holding up ANS-58.22 to include the qualitative section. Some RISC members expressed doubt that the qualitative section could be completed quick enough to warrant holding up the standard. Minutes from the November 2006 RISC meeting were reviewed, and Burchill

reminded RISC that previous discussions had concluded the qualitative aspects should be included in the initial version of the LPSD PRA Standard only if it did not adversely affect timely completion of the standard.

With conclusion of further discussion on inclusion of a qualitative aspect to the LPSD Standard, Burchill offered the following sense of the RISC committee:

1. There is an urgency to get a qualitative section going;
2. There is also an urgency to complete the quantitative sections and have them balloted by RISC; the WG is encouraged to move forward expeditiously; and
3. The situation should be evaluated again at the November 2007 RISC meeting at which time it should be decided whether to interrupt the RISC ballot process.

Gaertner agreed with Burchill's summary of the RISC discussion.

#### ANS-58.23 Fire PRA (Henneke)

See Attachment B for slides presented by Dennis Henneke during the discussion.

Dennis Henneke reported that the re-ballot of ANS-58.23 closed May 14, 2007, and that 123 comments from that ballot had already been incorporated into the draft. He acknowledged the incredible job that the WG members had done considering 180 plus comments were made. Henneke informed RISC that the comment responses had been issued and that the revised draft had already been forwarded to ANS headquarters. Henneke informed RISC that Wayne Holmes had maintained his negative ballot, and he provided a summary of the issue – Attachment C. Henneke explained that Holmes felt Requirement IF-A1 should allow, if not require, the use of fire data from outside of the U.S. nuclear power industry where that data was reasonably applicable and improved the quality of the analysis. He explained that the working group rejected the comment for the following reasons:

- Types and size of possible fires include consideration of non-nuclear fires.
- Existing nuclear data is extensive and of high quality.
- Non-nuclear fire data is allowed when nuclear fire data not available.
- Most extensive non-nuclear data is proprietary.
- Some non-nuclear data is available but difficult to get both the numerator and denominator of the Ignition Frequencies. (Reporting is voluntary so data is lower fidelity.)
- Would take a major research project to develop non-nuclear data and did not want to require this of utilities performing Fire PRA.
- Factors affecting nuclear fire data are unique to nuclear plants.

Henneke further stated that the WG considered the standard a living document subject to updating and revision. Should future research efforts yield fire frequency values of sufficient pedigree that they would be considered acceptable for regulatory applications, the standard would be updated to reflect the methodological advances.

RISC discussed the issue and brainstormed ways to resolve it. Several members agreed that utilities should be able to use new data if it was deemed superior and could be justified; however, RISC was unified that they should rely on the expert judgment of the WG. Burchill stated that he would declare consensus with the one negative ballot but that a negative ballot required a recirculation ballot to meet ANSI requirements. Burchill recommended that the RISC members at the meeting take with them an understanding of the issue since a formal recirculation ballot would be distributed shortly to RISC. Burchill and Henneke agreed to add a summary of the RISC discussion to the prepared statement that would accompany the recirculation ballot.

Henneke informed RISC that he felt there were no substantive changes to the draft that would require another ballot. While the WG did not add any new HLRs or SRs, several SRs were deleted as they were considered redundant. As RISC Chair, Burchill would have to review the changes and provide a final

determination of whether there had been substantive changes.<sup>2</sup> Burchill stated that if there were no substantive changes, he would feel confident enough with consensus that he would release ANS-58.23 to ASME/CNRM for the Level 1 Integrated PRA Standard.

Henneke stated that draft peer review guidance for BWR and PWR owner groups had been developed. He hoped to get the peer review guidance to them in the September/October 2007 time frame. Henneke anticipated that piloting of the standard would occur December 2007. Dave Finnicum said that he arranged for the first pilot at Diablo Canyon to be done the second week of December 2007. He added that Diablo Canyon would pilot both the standard and peer review process to make sure it worked together. The review would be independent of the NRC. Henneke said that he hoped to arrange for two more pilots early in 2008. Mary Drouin stated that NEI wanted to do a pilot once the standard was completed. Finnicum explained that they wanted to pilot this as an industry activity. Henneke stated that the WG expected to learn a lot from the pilot(s), and ANS-58.23 will likely need to be quickly updated in order to support NFPA 805.

Allen Camp questioned who would be responsible for maintenance of the independent standards. Burchill explained that the ANS Standards Board was unanimous that ANS would continue to update the three ANS individual standards (ANS-58.21, ANS-58.22, and ANS-58.23) and that a document would be prepared to capture this intent. Burchill further explained that the ANS Standards Board intended that substantive revisions to the Level 1 Integrated PRA Standard would depend on the respective revisions of the individual ANS standards, i.e., the Level 1 Integrated PRA Standard would not be substantively revised independently.

Henneke reported that all but one of the ANS-58.23 WG members would continue to support the effort to incorporate ANS-58.23 into the Level 1 Integrated PRA Standard. Henneke said that some of the verbiage in the foreword would need to be incorporated. Mary Drouin confirmed that the Level 1 Integrated PRA Standard integration team<sup>3</sup> had accounted for that, and it would be done. Henneke expressed concern that there may be some materials difficult to fit in. Drouin acknowledged the contribution of John Hyslop as NRC representative on the WG responsible for coordinating all the different NRC views. Burchill complimented all WG members for having done an excellent job.

#### RISC Quorum Met

At this time in the meeting, a quorum of RISC members were in attendance.

A motion was made and passed to approve the minutes of the November 15, 2006, meeting.

A motion was made and passed to approve the approach to the negative ballot on ANS-58.23 that was presented earlier in the meeting by Dennis Henneke (see Attachment C).

#### ANS-58.24 Level 2 PRA Standard (Leonard)

See Attachment D for slides presented by Mark Leonard during the discussion.

Mark Leonard provided an update on the status of ANS-58.24 since the November 2006 RISC meeting. Leonard reported that there had been some membership losses due to lack of financial support and job changes. Ray Schneider (Westinghouse), Bob Prior, and Jason Petti were added to the WG. A few months ago the NRC representative was reassigned and a replacement had not been made. Mary Drouin stated that the NRC would be providing a representative soon and that the NRC had provided funding to John Lehner to support the effort.

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<sup>2</sup> Subsequent to the RISC meeting, Burchill's review determined that there had been substantive changes to ANS-58.23. Thus, RISC conducted in parallel both a rebalot of the substantive changes and a recirculation ballot relative to the standing negative vote. Both ballots closed 8/15/07. RISC reached consensus on both ballots. The rebalot was unanimous in accepting the substantive changes to ANS-58.23 made since the previous ballot, and the recirculation ballot was unanimous in recommending that ANS-58.23 be published even with the single standing negative vote.

<sup>3</sup> The Level 1 Integrated PRA Standard integration team is a subgroup of the ASME CNRM. The intent is to have members of the respective ANS WGs for the ANS standards being integrated appointed to this team.

Leonard reported that the WG met for the first time May 2007 at ANS Headquarters. The WG addressed the technical outline of the standard and interfaces with the Level 1 PRA standards (including LERF) and alternatives for handling requirements for containment structure analysis. Requirements were being written in nine topical areas with a lead author for each area. Leonard stated that there was no existing standard for defining containment failure, and he questioned whether it was the role of a PRA standard to provide this definition. He stated that the WG would contact ASME to determine how to determine a containment failure criterion. Options for consideration include leak-before-break, a specified overpressure, a specified break area or type, a catastrophic break, or a magnitude of radiological release. RISC discussed the similarities between defining core damage and containment failure. Some felt that the definition of failure was insufficiently defined and may not be ready for a standard. Leonard added that the WG might not be able to answer as its members are not structural engineers.

Allen Camp suggested that considerable thought needed to be given to the table of capability categories shown in Leonard's slides (Attachment D). Bob Budnitz added that it could be made a recommendation instead of a requirement. He further stated that the ANS-58.21 WG went out of its way to point out compromise and felt that the commentary provided in the standard was valuable for that. Leonard said that the WG's goal in the Level 2 Standard was to be more descriptive in each topical area. RISC agreed that the Level 2 Capability Category 1 requirements must go beyond the frequency associated with the Level 1 PRA LERF requirements. Leonard explained that the first draft of ANS-58.24 would be written for full power only.

Leonard was asked to refine the table of capability categories shown in his presentation as discussed at the meeting and distribute the result to RISC for review. Camp suggested that the table include output for each Capability Category. Stanley Levinson recommended that Leonard connect with Keith Woodard, the ANS-58.25 WG Chair, to keep him informed of how capability categories were being defined.

Leonard said that the lack of financial support for travel and meeting expenses continued to limit the WG. Burchill stated that he would work with Mary Beth Gardner and Mary Drouin to establish funding. Burchill also requested that Leonard define with his WG a draft schedule for completion of ANS-58.24 to be presented to RISC at its meeting in November 2007.

Action Item 06/07-02: Bill Burchill to work with Mary Beth Gardner to revise the scope of the current grant to include the Level 2 and Level 3 PRA standards effort and get the funding increased.

Action Item 06/07-03: Mary Drouin to look into adding \$50,000 each (\$100,000) total to the existing fire grant to cover the Level 2 and Level 3 PRA standards effort.

Action Item 06/07-04: Mark Leonard to provide a schedule for completion of a draft for ANS-58.24 to RISC at its November, 2007 meeting.

#### ANS-58.25 Level 3 PRA Standard (Levinson for Woodard)

See Attachment E for slides presented by Stanley Levinson during the discussion.

Stanley Levinson provided a brief report on the status of ANS-58.25 for WG Chair Keith Woodard. Levinson reported that the WG had initial difficulties getting together but that assignments had now been made. Joselyn Mitchell joined the WG as NRC representative. Jan Van der Steen retired and resigned from the WG. The expertise Van der Steen brought to the WG was very important, and the WG was currently looking for a replacement. Levinson informed RISC that the ANS-58.25 WG was meeting at the Massachusetts Institute of Technology concurrently with the RISC meeting. Although funding for travel expenses remained an issue, good attendance was expected at the meeting. The meeting's agenda included a review of draft materials.

Bill Burchill asked that Levinson carry back to the Level 3 WG a request for a schedule for completion of a draft to be presented to RISC at its November 2007 meeting.

Action Item 06/07-05: Stanley Levinson to ask Keith Woodard to provide a schedule for completion of a draft for the Level 3 PRA Standard to RISC at its November, 2007 meeting.

## **5. NRC New Advanced Reactor Rule (Drouin)**

Mary Drouin reported that Combined Operating License (COL) applications were required under Part 50 to include Level 1 and Level 2 PRAs for both internal and external events in all operating modes. Reg. Guide 1.206 provided details on what was expected in a submittal. Bill Burchill stated that he was disappointed that the aggregation question remains on the table. Drouin felt that it should not be an issue and opined that combining risk contributors was simply a matter of adding the individual results. Dave Finnicum questioned whether applicants for COLs would need to have a living PRA. Drouin replied that Reg. Guide 1.206 required that the PRA must be upgraded every four years.

Action Item 06/07-06: Bill Burchill suggested that all RISC members become familiar with Reg. Guide 1.206.

## **6. RISC Report to ANS Standards Board (Burchill)**

Bill Burchill reported that he attended the Standards Board (SB) meeting; as RISC Chair he is automatically part of the SB. He stated that the SB is very interested in RISC activities and, in particular, with the interface with ASME through the NRMCC and the Level 1 Integrated PRA Standard. Burchill provided a report to the SB updating them on the progress of all five RISC projects (Attachment F).

## **7. Nuclear Risk Management Coordinating Committee (NRMCC) Topics**

Bill Burchill provided a brief update on the NRMCC activities. He stated that there had been no letters to the NRC since the RISC November 15, 2006 meeting. Burchill reported that he was a member of the nominating committee to replace current co-chairs, Jim Mallay and Ray Weidler. NFSC Vice Chair Donald Spellman was nominated for ANS, and Wes Rowley was nominated for ASME. Both were approved. Burchill expressed his optimism that the NRMCC would provide a beneficial interface between the two societies.

### Integrated PRA Standard Status (Burchill)

Burchill stated that he released ANS-58.21, Rev. 1 to the integration team November 20, 2006. Burchill also reported that on March 16, 2007, he had nominated to Rick Grantom, ASME/CNRM Chair, the names of the following RISC members to participate on the CNRM and WG members to participate on the integration team:

Steven P. Nowlen (Sandia Natl. Labs) - 58.23 working group member - FIRE

Yehia Khalil (Yale Univ.) - 58.22 working group member - LPSD

Dennis Henneke (GE) - 58.23 working group chair - FIRE

David Finnicum (Westinghouse) - RISC - GENERAL

Ravi Ravindra (ABS Consulting) - 58.21 working group chair - EXTERNAL EVENTS

Rick Hill (Erin Engineering) - RISC (expressed interest, but not sure of time available) - GENERAL

However, Grantom had not yet acted on these nominations.

At the direction of the NRMCC, Burchill met with CNRM Chair Rick Grantom in March 2007 to determine RISC/CNRM members who would be cross-assigned and responsible for carrying the input of the other consensus committee. Six mutual members were found on the two committees. Bob Budnitz and Rick Hill were initially chosen to represent RISC on CNRM while Stanley Levinson and Biff Bradley were chosen to represent ASME on RISC. The representatives were not finalized as it was later determined that the CNRM Chair did not have a current roster. In addition to assigned representatives, both consensus bodies would be given the opportunity to comment on any integrated PRA standard prepared by the other consensus body.

Burchill confirmed that the ANS-58.21 WG and ANS-58.23 WG would be able to support the integration team. Burchill stated that he felt that ANS-58.21, Rev. 1 had not been incorporated by the integration team, because it was more difficult than originally thought. Mary Drouin said that they had difficulty with Chapter 1 only and that emails were sent to Ravi Ravindra (ANS-58.21 Chair) to resolve these difficulties.

Burchill reported on an action item from the NRMCC to consider merging RISC and CNRM into one joint committee. ANS staff completed a white paper for the ANS SB. Burchill stated that the SB was not in favor of the merge and would communicate this decision to the NRMCC. Also at the request of the NRMCC, ANS staff prepared a draft process for the approval of a joint standard. Burchill stated that the process included mutual approval of comment resolutions by both societies. If the ANS Standards

Board agreed that there was sufficient effort to resolve the ANS RISC comments/objections, the ANS SB would vote to approve moving forward with publication. Burchill explained that the SB discussed the remote possibility of the other society being a renegade and publishing the standard without approval and without the joint logo. While felt unlikely to occur, the SB requested that an additional stipulation forbidding the publication of the joint standard without approval of both societies. Once the process was approved by the SB, signatures of both societies would be added. (See Draft Process – Attachment G)

Action Item 06/07-07: RISC Committee to review the draft process for developing a joint standard and send comments to Pat Schroeder.

Burchill reported that he received questions from the SB on the maintenance of the individual standards and the Level 1 Integrated PRA Standard as well as questions on clarifications of the Level 1 Integrated PRA Standard. Drouin explained that the Level 1 Integrated PRA Standard would be maintained by ASME over time. She felt that it was ANS' decision whether they chose to maintain their independent standards exactly like the Level 1 Integrated PRA Standard. Henneke expressed concern with the possibility of having to maintain both the FPRA Standard and the Level 1 Integrated PRA Standard. Bob Budnitz stated that he was unaware ANS WG members would be expected to become ASME WG members. He thought that he'd continue working under the ANS "hat" so to speak. Other members questioned the duplicate effort to review both the independent ANS standards and the Level 1 Integrated PRA Standard. A few members stated that they were unaware ANS intended to maintain the individual standards. Some members expressed concern that ANS would lose their ownership of the individual standards and voice in balloting if ANS did not maintain the independent standards. Burchill explained that he felt NRMCC discussions had not gotten to maintenance and clarifications. There was general agreement that previous discussions had not been sufficiently detailed.

At the suggestion of Allen Camp, Burchill asked members to document their thoughts on maintaining both the independent ANS standards and the Level 1 Integrated PRA Standard.

Action Item 06/07-08: RISC Committee to provide constructive observations regarding the implications of ANS & ASME duplicating maintenance of the independent ANS standards and the Level 1 Integrated PRA Standard.

### **8. Succession of RISC Chair**

Bill Burchill stated that he had hoped to conduct an election for the next RISC Chair at this meeting; however, the RISC Bylaws require at least 2/3 of the RISC membership vote for elected officials which could not be satisfied with the current meeting attendance. Burchill informed the committee that he received affirmation from two members that they would be willing to accept the RISC Chair position. Both Bob Budnitz and Allen Camp accepted and received approval from their companies to accept the nomination. Burchill opened the floor to other nominations. No other nominations were received. RISC members asked if the runner up would be willing to take on the role of vice chair. Both Budnitz and Camp agreed. To fulfill the RISC Bylaws requirement, the election was postponed to be completed through electronic means.

### **9. Other Business**

No other business was discussed.

### **10. Next RISC Meeting**

Burchill stated that the CNRM planned a meeting in September 2007 in Chicago. While many RISC members felt there was value in meeting with the CNRM, they felt that it would be more beneficial to meet in November during the ANS Winter Meeting in Washington, DC.

### **11. Adjourn**

The meeting was adjourned at 4:00pm

## 58.22 LPSD Status

- O New Chairman (D. Wakefield), new NRC member (E. Chow)
- O Conference. Call held on Wednesday the 20th
- O "Qualitative analysis" section .
- O Comment resolution
- O Next Working Group meeting
- O New schedule
- O Contacting dissenting commenters
- O Issue of 2 different applications: "average shutdown risk" vs. "analysis of a specific outage configuration"

# *ANS Fire PRA Standard Update – 6/27/07*

Dennis Henneke  
FPRA Writing Group Chair  
General Electric

## *Fire Standard Group*

- Writing Members (8):
  - Dennis Henneke (GE)
  - Bijan Najafi (SAIC)
  - Steve Nowlen (Sandia)
  - Francisco Joglar (SAIC)
  - Mardy Kazarians (Kazarians and Associates)
  - Alan Kolaczowski (SAIC)
  - Nathan Siu (NRC)
  - Kiang Zee (ERIN Engineering)

## *FPRA Standard Status*

- Final Version of the Standard is now ready for RISC Approval:
  - Simultaneous Public comment and RISC committee review completed in May
  - 180+ comments plus typos (thanks Stanley) received:
    - Over half are considered editorial
  - All comments responded to and incorporated
    - Comment responses available and sent to most individual commenters.
    - New version available for ANS Tech. Editing
  - ~12 comments rejected.
- 1 Negative Ballot with 2 comments (see next pages):
  - 1 rejected.

6/27/2007

FPRA Standard - Henneke  
Update

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## *Negative Ballot*

- 1<sup>st</sup> Comment Paraphrase: Remove exception in IF-8 (now IGN-8) that allows FPRAs analyzing Inert Containments to screen without calculation (low likelihood of simultaneous failure to inert and a fire).
- Committee struggled with the comment, but incorporated the comment due to low amount of work to show low risk for Inert Containments.

6/27/2007

FPRA Standard - Henneke  
Update

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## *Negative Ballot*

- Second Comment: IF-A1 should allow, if not require, the use of fire data from outside of the U.S. nuclear power industry where that data are reasonably applicable and could improve the quality of the analysis.
- Comment Rejected by writing group (See separate handout):
  - Types and size of possible fires includes consideration on non-nuclear fires.
  - Existing Nuclear Data is extensive (> 1500 fires in 2000 reactor years), and of high quality.
  - Non-Nuclear Fire Data allowed, when Nuclear Fire Data not available.
  - Most extensive non-Nuclear Data is proprietary.
  - Some non-Nuclear data is available, but difficult to get both the numerator and denominator of the Ignition Frequencies. Reporting is voluntary, so data is lower fidelity.
  - Would take a major research project to develop non-Nuclear data. Did not want to require this of utilities performing Fire PRA.
  - Factors affecting Nuclear fire data are unique to Nuclear Plants.

6/27/2007

FPRA Standard - Henneke  
Update

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## *Changes in FPRA Standard*

- No new HLRS or SRs added as a result of the comment incorporation:
  - Several SRs deleted – considered redundant
  - Combined 1 set of SRs into a single SR.
  - Remove exclusion (above) for Inert Containments.
  - Re-worded lots of discussion items
- No Substantive changes made.

6/27/2007

FPRA Standard - Henneke  
Update

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## *What's next?*

- RISC Committee Approval?
  - Consideration of Response to Negative Ballot
  - Consideration of changes
- ANS Staff Technical Editing.
- Provide to ASME Integration Committee?
- One Key Member of Fire PRA Writing Group is retiring (HRA Expert):
  - Need to replace.

6/27/2007

FPRA Standard - Henneke  
Update

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## *FPRA Standard Pilot*

- Draft Peer Review Guidance developed for NEI by BWR and PWR Owner's Groups:
  - Guidance in review by NEI Fire PRA working Group.
- Fire Standard and Peer Review Guidance will be piloted starting in December 2007 through Spring 2008 by the PWR and BWR Owner's Group.
- Expect feedback on both documents in the Spring of 2008:
  - Should consider the schedule for revision to the Fire Standard when looking at the Integrated Standard Schedule.

6/27/2007

FPRA Standard - Henneke  
Update

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## *Conclusions*

- Tremendous effort by the Fire PRA Writing Group to quickly respond to public and RISC comments on the FPRA Standard.
- Public and RISC comments have helped provide a high-quality, well developed and consistent FPRA standard.
- Standard is ready to be issued, given approval.

**Fire PRA Writing Group**  
**Comment Response, Negative Ballot Comment on Non-Nuclear Data**  
**June 25, 2007**

**Negative Ballot Comment:** It is stated that “Fire ignition frequency is a key factor contributing to fire risk quantification.” It is therefore extremely important that the input data be based on sound information. Errors in quantifying this key element could greatly skew any results.

An analyst is limited to generic U.S. nuclear power plant experience when developing plant-specific fire frequencies. However, fire is a very basic reaction. Ignition of combustible materials and self-sustaining fire propagation characteristics are not unique to nuclear power plants.

Further, nuclear power plant ignition history data are an extremely small sample of a huge population of ignition information. The fact that a particular ignition event is not manifest by past occurrences in the nuclear power industry does not mean that a particular event does not have a very real and significant potential for future occurrence. Limiting ignition data to the nuclear power industry could result in significant under-estimation or exclusion of significant fire events.

The Team Response indicates that presently accepted FPRA methods allow for the use of ignition frequency data for nuclear power fires only, without any technical justification indicating why it is proper to use limited data which might not be realistic for something as globally fundamental and generic as fire ignition. Just because a present method is widely used is not justification for continuing a flawed method.

IF-A1 should allow, if not require, the use of fire data from outside of the U.S. nuclear power industry where that data are reasonably applicable and could improve the quality of the analysis.

**ANS Fire PRA Writing Group Team Response:** The writing team recognizes, and is in fact sympathetic to, the concern expressed in this comment. Insights derived from non-nuclear industry fire events *are* incorporated into current fire PRA methods in many ways including insights relative to: fire detection/suppression system unavailability; fire source types and characteristics; fire growth and spread behavior; and fire fighting challenges. We also use non-NPP events as a resource for specific types of fire events such as the High Energy Arc Fault fire events currently being explored by NRC through an international collaboration involving the evaluation of general industry insights.

However, there are serious challenges to the development of *fire frequency* estimates based on data drawn from sources outside the nuclear power industry. In fact, both EPRI and NRC/RES have attempted to develop fire frequency estimates from general industry data in the past without success. Of the challenges faced, the following are considered key:

1. The most fundamental challenge arises because fire frequency requires quantification of two values; namely, an incident count (the numerator) *and* the number of operational years of experience covered by event set (the denominator). The incident count is easily attained, but the denominator can be a serious challenge. Given the NPP experience base, the denominator is the number

of reactor years of operation over the time period covered by the events; a value readily calculated based on public resources. We also refine the facility-wide fire frequencies to specific locations based on the total population of a particular type of fire source at a specific plant. In order to make use of other data sources we *must* be able to characterize the equivalent years of facility operating experience represented. In turn, we would also need to establish the relative fire source population sizes for each type of fire source represented within the database for the various facilities represented in the database versus a typical NPP. Such information has never been developed and the feasibility of developing such information is questionable.

2. The “best” sources of non-nuclear fire event data (i.e., those that are most consistently documented and of the highest fidelity) are proprietary; namely, the insurance industry sources (e.g., FM Global). Given the regulatory environment, the underlying basis for fire frequencies applied in the FPRA must be available for independent review and confirmation. For these data sources this is simply not possible.
3. The non-proprietary databases (e.g., NFPA) are generally of lower fidelity because reporting is voluntary and therefore inherently less complete and less consistent. Characterizing the represented population becomes fundamentally more difficult.
4. There are factors that are unique to the nuclear industry that would need to be accounted for, and methods for this are also lacking. The most significant of these is the much higher level of regulatory monitoring, surveillance and performance observed in the nuclear industry.

It would take a major research study to develop fire frequencies from non-NPP sources for use in FPRA. Clearly, to *require* the use of non-NPP data is inappropriate given the current state of the art in FPRA. Further, it is the consensus of the team that to *allow* the use of such data on an individual practitioner basis opens the process to a degree of variability that is highly undesirable. It would also place an inordinate burden on the reviewer to verify the acceptability of any such analysis.

The writing team also disagrees with the commenter’s premise that the NPP data set is somehow inadequate to the need. NPP experience represents over 2000 years of reactor operation and the fire event database contains over 1500 documented events. This is an *enviable* data set in comparison to many other aspects of PRA. The standard does allow for the use of non-nuclear data when NPP data is not available.

As a final point, the standard itself is a living document subject to updating and revision. Should future research efforts yield fire frequency values of sufficient pedigree that they would be considered acceptable for regulatory applications, the standard can be updated to reflect the methodological advances.

### **Negative Ballot Feedback on Response**

Thank you and the team for your consideration of my ballot comments on proposed ANS 58.23 o Fire PRA and your thoughtful response. Unfortunately, I will be unable to attend the RISC meeting to discuss my comments.

My concern about limiting fire ignition frequency data to only historical data from within the U. S. nuclear power industry remains a valid concern and should be considered by the entire RISC committee. The concerns expressed in my ballot comments, combined with the team response comments regarding the serious challenges to the development of fire frequency estimates, underscore the need for a much broader view of fire data.

Fire ignition frequency is a key factor contributing to fire risk quantification. The facts that it is difficult to account for fire data in the "real world" and that "the 'best' sources of non-nuclear fire event data" are not available for independent review and verification are not particularly compelling technical reasons for relying on smaller, less complete, data samples which might not be representative of the entire population of fire ignition frequency. The 1500 reported fire events in nuclear power plants do not account for those possible (if not probable) fire events that are very real and of discrete likelihood of occurrence but which have not yet occurred in a nuclear power plant. To base very important conclusions on potentially high consequence events on incomplete or suspect fire incident frequency data, undermines the credibility of the conclusions of the fire PRA.

You've done a great job in putting together the draft standard. The results of a fire PRA for a nuclear power plant are just too important for the results to be flawed due to a standard that allows or promotes the use of weak fundamental data.

# ANS 58.24 Level 2 PRA Standard

## -- Status Report

RISC Meeting - Boston  
June 27, 2007

Mark T. Leonard  
58.24 WG Chair

**dycoda**  
LLC

## Some Recent Changes in WG Membership

### ◆ Reasons --

- Some losses due to lack of financial support (travel grants) or job change
- Boost representation from reactor vendors
- Add technical expertise on containment structural analysis
- NRC representative changing ?

### ◆ Writing Group

Mark Leonard - chair

Mike Barrett (Duke), Paul Boneham (Jacobsen – U.K.), Ed Burns (ERIN), Randy Gauntt (Sandia), Bob Henry, (FAI), John Lehner (BNL), Bill Mims (TVA), Jason Petti (Sandia), Bob Prior (AREVA), Ray Schneider (Westinghouse)

NRC member ?

# Status – June 2007

- ◆ WG met in May 2007 at ANS HQ
  - Addressed technical outline of standard, interfaces with Level 1 PSAs (including LERF), and alternatives for handling requirements for containment structure analysis
- ◆ Basic structure of Capability Categories adapted from Level 1 PSA Standards
  - Some adjustments to handle topics dominated by epistemic uncertainty (phenomenological events)
  - “Scope” currently limited to full-power PSA
- ◆ Requirements being written in 9 topical areas
  - Lead author for each area
  - Format parallels other PSA standards
    - ◆ High Level requirements proposed in draft Standard outline
    - ◆ Supporting requirements for each Capability Category in preparation

L2 PRA Std – status 6/07

**dycoda**  
LLC

# Level 2 Category Structure (tentative)

ATTRIBUTES OF LEVEL 2 PRA	CAPABILITY CATEGORY I	CAPABILITY CATEGORY II	CAPABILITY CATEGORY III
1. <i>Scope and level of detail:</i> The degree to which the scope and level of detail of the analysis are sufficient to capture the important physical phenomena relevant to the plant design	Resolution and specificity sufficient to identify the important initiating events and operating modes contributing to the Large Early Release Frequency	Resolution and specificity sufficient to identify the important initiating events and operating modes contributing to the full range of containment end states and release characteristics	Resolution and specificity sufficient to identify the important initiating events and operating modes contributing to the full range of containment end states and release characteristics and characterize the uncertainty in the results
2. <i>Plant-specificity:</i> The degree to which plant-specific information is incorporated such that the as-built and as-operated plant is addressed	Use of generic data/ models acceptable except for the need to account for the unique design and operational features of the plant	Use of plant-specific data/models for the significant containment integrity challenges and fission product release characteristics	Use of plant-specific data/models for all containment integrity challenges and fission product release characteristics, where available
3. <i>Realism:</i> The degree to which realism is incorporated such that the expected responses of the plant and containment are addressed	Departures from realism will have moderate impact on the conclusions and risk insights as supported by good practices [see Note (1)]	Departures from realism will have small impact on the conclusions and risk insights as supported by good practices [see Note (1)]	Departures from realism will have negligible impact on the conclusions and risk insights as supported by good practices [see Note (1)]
<p><b>NOTES:</b> (1) Differentiation from moderate, to small, to negligible is determined by the extent to which the impact on the conclusions and risk insights could affect a decision under consideration. This differentiation recognizes that the PRA would generally not be the sole input to a decision. A moderate impact implies that the impact (of the departure from realism) is of sufficient size that it is likely that a decision could be affected; a small impact implies that it is unlikely that a decision could be affected, and a negligible impact implies that a decision would not be affected.</p>			

L2 PRA Std – status 6/07

**dycoda**  
LLC

# Problems

- ◆ Technical: No current standard defining acceptable methods to evaluate containment structural failure
  - ASME standards focus on design not failure
  - Level 2 PSA should address the technical requirements for defining “failure” and deriving failure criteria
  - Possible interface with ASME Section III standard WG
- ◆ Lack of financial support for travel grants a continuing problem
  - Hinders WG meeting attendance
  - Particular burden on independent consultants

## **ANS 58.25**

### **Standard for Radiological Accident Offsite Consequence Analysis (Level 3 PRA) to Support Nuclear Installation Applications**

- **PINS Form Approved by ANS Standards Board in February 2006**
- **Most Comments were Related to the Title not Being Specific to Nuclear Power Plants.**
- **Our Group Feels that it Could Have a Broader Application than Just Power Plants.**

## **MEETINGS**

- **ANS San Diego June 2005—Preliminary Organization Meeting**
- **ANS Washington, DC Nov 2005—First Full Meeting, Made Assignments for Section Content. Scheduled To be Prepared for June 2006 Reno ANS Meeting.**
- **Meeting Was Cancelled due to Insufficient Availability of Members**
- **Now Scheduled for Boston ANS June 2007**

## **MEMBERSHIP**

- **Jocelyn Mitchell of NRC has joined the Group**
- **Jan van der Steen Resigned, so Currently Have 12 Members—Some will participate as Reviewers.**
- **More than Half Have Expressed Concern about Funding to Attend Meetings**
- **Well Rounded Group**

## **Working Group Assignments**

- **Overview---(Woodard\*, O’Kula, Levinson, Mitchell)**
- **Level 1/2 Interface--- (Paul\*, Leaver)**
- **Probabilistic Framework/Uncertainty ---(Johnson\*, Kaiser, Brewer, Levinson)**
- **Site/Plant Input Data---(Teagarden\*, Woodard)**
- **Dispersion---(Kaiser\*, Woodard)**
- **Dosimetry---(O’Kula\*)**
- **Health Effects---(Mubayi\*)**
- **Economic Factors (Mubayi\*)**
- **Reporting of Results (Teagarden\*)**
- **Models (Codes)----(Bixler\*, O’Kula, Mitchell)**

*\* Indicates Lead Author*

## **EXPENSE COMPENSATION ISSUES**

- **We Expect to Have 70% Representation in Boston!**
- **Meeting to be Held at MIT Due to Insufficient Number of Meeting Rooms at Marriott**
- **Employers Have Agreed to WG Members Participation But Not Travel Expenses in Some Cases**
- **Government Contractors Need Continued Support**
- **Consequently, Cannot Always Expect Meeting Participation to be Above 50%.**
- **It is almost Impossible to Relate Meeting Content in Notes.**

RISC Report to ANS Standards Board  
6/26/07

1. Meetings: 11/15/06 all day in Albuquerque, NM during ANS Winter Meeting  
6/27/07 all day in Boston, MA during ANS Annual Meeting

2. Status of Standards under Development

ANS 58.21, Rev. 1 External Events PRA Standard

- Ad hoc Resolution Committee (RC) appointed 4/5/06 to recommend resolution of 4 negative ballots (closed 1/4/06)
- 11/15/06 RC presented recommendations to RISC; recommendations accepted
- 11/21/06 Draft ANS 58.21, Rev. 1 submitted to ASME/CNRM for integrated PRA standard
- 2/9/07 all negative ballots had been converted to positive ballots
- 2/11/07 RISC Chair declared consensus based on vote of
  - ⇒ 15 approved
  - ⇒ 2 approved with comments
  - ⇒ 3 no response
  - ⇒ 20 total votes (85% response with 100% approval)
- 3/1/07 ANSI/ANS-58.21-2007 approved by ANSI
- 3/28/07 ANSI/ANS-58.21-2007 published

ANS 58.22, LPSD PRA Standard

- 10/6/06 Don Wakefield appointed to be WG Chair
- Standard is being restructured per RISC 11/15/05 direction
- 6/20/07 WG has responded to 253 of 298 comments; to complete by July 15
- New WG members being appointed
  - ⇒ Edward Chow new member from NRC
  - ⇒ New WG subgroup (or WG) to prepare qualitative requirements
- WG to meet late July or early August
- Reballot in 3Q07 or 4Q07
- Submit ANS 58.22 to ASME/CNRM for integrated PRA standard if reballot indicates consensus

ANS 58.23, Fire PRA Standard

- 5/14/07 consensus re-ballot closed (9 months after initial consensus ballot closed)
  - ⇒ 11 approved
  - ⇒ 6 approved with comments
  - ⇒ 1 not approved
  - ⇒ 2 no response
  - ⇒ 20 total ballots (90% response with 94% approval)
- NRC commented *This latest version of the Fire PRA Standard is a substantial improvement over the first version released for public review and comment, and*

*the writing group is to be commended for addressing the comments provided by NRC and others.*

- 6/15/06 WG met in Denver, CO to resolve comments
- RISC Chair to interpret whether resolutions involve substantive changes
- Response to negative ballot are likely to reject associated comments
- Target schedule to submit to Standards Board for approval is mid-July
- Submit ANS 58.23 to ASME/CNRM for integrated PRA standard shortly after RISC meeting

#### ANS 58.24, Level 2 PRA Standard

- WG meeting today at ANS Annual Meeting
- Basic structure of Capability Categories adapted from Level 1 PRA Standards
- Requirements being written in 9 topical areas
  - ⇒ Lead author for each area is assigned
  - ⇒ Format parallels other PRA standards
- Issues to be resolved
  - ⇒ Technical: defining requirements to evaluate containment structural failure
  - ⇒ Administrative: funding for WG members' travel to meetings
- Presently no schedule for completion

#### ANS 58.25, Level 3 PRA Standard

- WG meeting tomorrow during ANS Annual Meeting at MIT
- WG has prepared technical outline and assigned lead authors
- Lead authors are preparing first draft of HLRs
- Issue of funding WG members' travel to meetings
- Presently no schedule for completion

### 3. Interface with NRMCC

#### Co-authored ASME/ANS joint letters to NRC on standards development

- Letters dated 3/14/06, 8/9/06, & 11/7/06 state development schedules
- Respond to NRC priority on integrated PRA standards

#### Represented ANS on NRMCC

- Member of nominating committee for new NRMCC co-chairs
- 3/16/07 meeting and 6/1/07 telecon

#### Provided support to integrated PRA standards development

- Released ANSI/ANS-58.21-2007 to ASME/CNRM integration team
- Nominated RISC and WG members to ASME/CNRM integration team
- Assigned two RISC members to be integration liaisons to CNRM
- Assigned two CNRM members to be integration liaisons to RISC
- Commented on draft ANS/ASME integration process documentation

### 4. RISC Chair succession – new Chair to be voted by RISC tomorrow, 6/27/07

**DRAFT**

**ANS PROCESS FOR RELEASING A JOINT PRA STANDARD**  
(Level 1 Integrated Standard – ASME Lead)

1. ANS identifies 2-4 individuals who would be the RISC champions on ASME CNRM.
2. The RISC Secretary will coordinate the development and communication of RISC comments.
3. The RISC champions will be the point person for the ANS comments on CNRM.
4. After resolution of comments, the comments and CNRM responses will be submitted to the ANS SB for review and approval.
5. If ANS Standards Board agrees that there was sufficient effort to resolve the ANS RISC comments/objections, then ANS SB would vote to approve moving forward with publication.
6. With ANS SB approval, a letter would be issued to ASME granting permission for ASME to use the ANS logo on the Level 1 integrated standard.

**DRAFT**

**ANS DUE PROCESS FOR RELEASING A JOINT PRA STANDARD  
(PRA Level 2 & 3 – ANS Lead)**

When the working group determines that a draft standard is ready for balloting, the following steps are taken:

1. ANS staff issues the draft standard to the RISC Committee for ballot with concurrent public review. (RISC Committee would now include 2-4 members from ASME CNRM as full members.)
2. ANS also provides draft to CNRM for distribution.
3. Ballot votes and comments are coordinated by the RISC Secretary.
4. The responsible working group responds to all comments and attempts to resolve all negative ballots.
5. After all comments have been responded to, the RISC Chair determines whether a re-ballot (or possibly recirculation ballot in the case of standing negatives) is necessary.
6. Responses provided from CNRM comments to ASME BNCS. With satisfaction of comment responses, BNCS to provide letter of permission to use their logo on the joint standard.
7. With determination of consensus and no substantive changes, the RISC Chair issues a release to the secretary permitting a letter ballot to be issued to the Standards Board for certification.
8. The consensus process is reviewed by ANSI's Board of Standards Review, and if satisfied, certifies that due process has been completed, permitting the standard to be issued as ANSI-certified.
9. Upon ANSI certification, the standard is published\*.

\*With the exception of the timing of public review, a near identical procedure would be required for the joint standard produced by ASME.