

April 9, 2005

MEMORANDUM TO: ACRS Members

FROM: Michael Snodderly, Senior ACRS Staff Engineer */RA/*

SUBJECT: CERTIFICATION OF THE MINUTES OF THE MEETING OF THE
ACRS SUBCOMMITTEE ON RELIABILITY AND PROBABILISTIC
RISK ASSESSMENT, NOVEMBER 16, 2004 - ROCKVILLE,
MARYLAND

The minutes of the subject meeting, issued April 7, 2005, have been certified as the official record of the proceedings of that meeting. A copy of the certified minutes is attached.

Attachment: As stated

electronic cc: J. Larkins
S. Duraiswamy

April 7, 2005

MEMORANDUM TO: G. E. Apostolakis, Chairman
Reliability and Probabilistic Risk Assessment Subcommittee

FROM: M. R. Snodderly, Senior ACRS Staff Engineer */RA/*

SUBJECT: WORKING COPY OF THE MINUTES OF THE MEETING OF THE
ACRS SUBCOMMITTEE ON RELIABILITY AND PROBABILISTIC
RISK ASSESSMENT, NOVEMBER 16, 2004 - ROCKVILLE,
MARYLAND

A working copy of the minutes for the subject meeting is attached for your review. Please review and comment on them. If you are satisfied with these minutes please sign, date, and return the attached certification letter.

Attachment: Minutes (DRAFT)

cc: Reliability and Probabilistic Risk Assessment Subcommittee Members
J. Sieber
S. Duraiswamy
J. Larkins

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
MEETING OF THE ACRS SUBCOMMITTEE ON
RELIABILITY AND PROBABILISTIC RISK ASSESSMENT
MEETING MINUTES - NOVEMBER 16, 2004
ROCKVILLE, MARYLAND

INTRODUCTION

The ACRS Subcommittee on Reliability and Probabilistic Risk Assessment held a meeting on November 16, 2004, in Room T-2B1, 11545 Rockville Pike, Rockville, MD. The purpose of this meeting was to discuss the development of guidance on the treatment of uncertainties. The meeting was open to public attendance. Mike Snodderly was the Designated Federal Official for this meeting. There were no written comments or requests for time to make oral statements. The meeting was convened by the Subcommittee Chairman at 12:14 p.m. on November 16, 2004 and adjourned at 2:42 p.m..

ATTENDEES

ACRS Members

G. Apostolakis, Subcommittee Chairman	V. Ransom, Member
M. Bonaca, Member	W. Shack, Member
R. Denning, Member	W. Sieber, Member
T. Kress, Member	M. Snodderly, Designated Federal Official
G. Leitch, Member	

Principal NRC Speakers

M. Drouin, RES	D. Lew, RES
J. Hyslop, RES	G. Parry, NRR

Other Principal Speakers

K. Canavan, EPRI	D. True, ERIN
J. Lehner, BNL	

There were approximately two members of the public in attendance at this meeting. A complete list of attendees is in the ACRS Office File and will be made available upon request. The presentation slides and handouts used during the meeting are attached to the office copy of these minutes.

OPENING REMARKS BY CHAIRMAN APOSTOLAKIS

George Apostolakis, Chairman of the ACRS Subcommittee on Reliability and Probabilistic Risk Assessment convened the meeting at 12:14 p.m. Dr. Apostolakis stated that the purpose of this meeting was to gather information on the development of guidance on the treatment of uncertainties. He mentioned the Committee's conclusion from its September 22, 2003 report that inadequate theory, scope and quality may significantly affect regulatory decision-making. The EDO stated in his November 7, 2003 response that the staff agreed with the Committee's concern regarding the potential impact of model uncertainties. Dr. Apostolakis said the Subcommittee would gather information, analyze relevant issues and facts, and formulate proposed positions and actions, as appropriate, for deliberation by the full Committee. The rules for participation in the meeting were announced as part of the notice of the meeting published in the Federal Register on November 2, 2004. Dr. Apostolakis acknowledged that no written comments or requests for time to make oral statements had been received.

DISCUSSION OF AGENDA ITEMS

Development of Guidance on Treatment of Uncertainties

Mary Drouin, RES, began by introducing Gareth Parry, NRR, and John Lehner, BNL. She said they were before the Subcommittee to share what had been done to date. She also wanted feedback on the following issues: (1) how should model uncertainties be addressed, (2) when and how should the uncertainty distribution be treated in the decision-making process, (3) should there be guidance to reduce uncertainties by specifying acceptable methods using criteria, (4) if acceptable methods/models are provided, does this mean that in using these models, the specific model uncertainty is already addressed, (5) what are the problems/issues in using bounding analyses with respect to generating risk insights that can be used in the decision-making, (6) what difficulties/issues need to be addressed in attempting to modify FIVE and EPRI SMA as an alternate to perform a fire or seismic risk, and (7) should the guidance for alternative approaches include guidance on the use of expert panels. Ms. Drouin said that she would like the Subcommittee's feedback at the end of the meeting before they discussed future interactions. The Subcommittee's feedback is summarized in the General Comments and Observations Section.

Ms. Drouin then discussed the upcoming schedule. She said that a preliminary draft of the NUREG for internal review and comment was to be completed by January 2005. The complete draft was due by June 2005. The staff planned to hold a public workshop during the Summer of 2005. The final draft for formal public review and comment is expected by October 2005.

General Comments and Observations From the Subcommittee Members

- Dr. Apostolakis asked if anybody has proven that FIVE is a conservative approach for fire risk analysis. Mr. Hyslop said that he had not seen something definitive. Dr. Apostolakis warned that if the staff is going to allow the use of bounding approaches than they should have some evidence that these approaches are bounding. Mr. Lew, PRA Branch, RES, added that they were in the process of creating a fire model that includes FIVE. He said they were looking at what the limitations of FIVE are as part of the implementation of 50.8©).

- Dr. Apostolakis said that the staff should not only look at the 1150 approach to addressing uncertainties but also consider the open literature. Ms. Drouin didn't think the 1150 approach was practical for individual licensees. She thought sensitivity studies were more practical. Dr. Apostolakis said that what was important is how it affects decisionmaking. He didn't think it had to be as extensive as 1150 but one should make an argument that the model used was correct. Dr. Apostolakis used the different seal LOCA models as an example. He said that a graded approach could be used. He suggested bringing the different modelers together to assess the uncertainties in the different models.
- Dr. Kress suggested that confidence levels be assigned to acceptance criteria used in risk-informed decisionmaking. He went on to say that a conservative model could be used to develop success criteria but just because it's an acceptable model doesn't give one the probability that you're going to achieve that success criteria.
- Dr. Denning cautioned that you can be overly conservative and distort the actual risk.
- Dr. Apostolakis thought that existing guidance on performing an expert elicitation could be used by expert panels for addressing uncertainty.

Industry Initiative on Treatment of Uncertainties

Ken Canavan, Project Manager for EPRI's PRA scope and quality efforts, and Doug True, ERIN Engineering were the main presenters. Mr. Canavan said the goal of the project was to create a pragmatic process that can identify when point estimate solutions are not suitable in light of parametric uncertainties, assist the utilities in identifying and addressing key sources of uncertainty, provide a technical basis for using that in risk-informed decisionmaking for a variety of applications. He said there is a need to develop guidance on deciding what causes or sources of uncertainty are key and then what to do with those key sources. Mr. Canavan thought that PRA standards and the associated peer reviews addressed known completeness uncertainty. He felt unknown completeness uncertainty is addressed by Regulatory Guide 1.174, defense-in-depth, safety margins and performance monitoring. Mr. Canavan described two guidelines EPRI was developing for characterization of uncertainty in risk-informed applications. The first guide is the technical basis document and the second guide is an applications guide. Mr. Canavan said that the schedule for publishing was December 2004 for the technical basis document and January 2005 for the applications guide.

General Comments and Observations From the Subcommittee Members

- Dr. Denning asked Dr. True if was going to describe formulated logical combinations. Dr. True said a formulated logical combination was the combination of two topics that could cause one's results to be skewed by synergism. The combination is not additive but it is multiplicative.
- Dr. Apostolakis asked whether phenomenology is part of deterministic modeling. Dr. True said that he had a separate bin for phenomenology for things like induced steam generator tube ruptures, direct containment heating, and ATWS which are really more phenomena.

- Dr. Apostolakis suggested that something may not be a significant contributor to uncertainty in the base case but may be a significant contributor to a specific application. Dr. True agreed and thought it was because applications often only deal with portions of the model allowing one to focus in on just those pieces inherent to the decision. Whereas, if one tries to identify everything that ever possibly could be key in the base model, one can be overwhelmed. Dr. Apostolakis thought this raised the importance of the base case.
- Dr. Denning asked why a factor of 2 was used for determining key sources of uncertainty. Dr. True said that the majority of parametric uncertainties are represented by log normal distributions. The mean value is always more than a factor of 2 below the 95th percentile for the range of error factors normally represented in a PRA. Also some of the uncertainty analyses or importance measures that were done in support of NUREG-1150 found that there were basic events in the model that had more than a factor of 2 risk change at the 95th percentile level. There were individual basic events in the model that, just given their parametric distribution at the 95th percentile, would change the answer by more than a factor of 2. Dr. True felt that if one is willing to live with that kind of parametric uncertainty where individual basic events can change the answer by a factor of 2 within the nominal bands, than why wouldn't one be willing to live with modeling uncertainties that are within a factor of 2.
- Dr. Apostolakis questioned the use of point values to do sensitivity analysis. Dr. True used the example of grid reliability. He said there is a lot of variation in a conditional probability that the grid is lost following a plant trip that may or may not be well represented in a distribution for those point estimate values. Dr. True expects that the analyst would go back and look at their plant design and say based on what I know, it couldn't be any worse than this.
- Dr. Sieber challenged Dr. True's battery charger sensitivity study example. Mr. Sieber felt that the uncertainty could be addressed by working with the manufacturer to determine the actual specifications and performance of the battery charger.
- Dr. Apostolakis asked if Dr. True would mind changing the nomenclature from state of knowledge correlation to epistemic correlation. Dr. True said that state of knowledge was used in the EPRI guidance to link to an ASME standard requirement that talks about state of knowledge correlation.
- Dr. Ransom suggested that a parametric statistical approach to evaluating uncertainties and thermal-hydraulic codes could be used to address uncertainty issues associated with risk-informing 50.46.

SUBCOMMITTEE DECISIONS AND ACTIONS

The Subcommittee will review the staff's guidance on the treatment of uncertainties in the form of a draft NUREG. The complete draft is due by June 2005. The staff plans to hold a public workshop during the Summer of 2005. The final draft for formal public review and comment is expected by October 2005.

BACKGROUND MATERIALS PROVIDED TO THE SUBCOMMITTEE PRIOR TO THIS MEETING

1. Subcommittee status report, including agenda.
2. Report dated September 22, 2003, from Mario V. Bonaca, Chairman, ACRS, to Nils J. Diaz, Chairman, NRC, Subject: Draft Final Regulatory Guide X.XXX, ““An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities” (Formerly DG-1122)
3. Letter dated November 7, 2003, from William D. Travers, EDO, NRC, to Mario V. Bonaca, Chairman, NRC, Subject: Draft Final Regulatory Guide X.XXX, ““An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities” (Formerly DG-1122)
4. Slides presented by NRC Staff at public meeting on August 27, 2004, Subject: Guidance on the use of Alternative Approaches in PRAs and the Treatment of Uncertainties in Risk-Informed Decisionmaking

Note: Additional details of this meeting can be obtained from a transcript of this meeting available for downloading or viewing on the Internet at "<http://www.nrc.gov/ACRSACNW>" or can be purchased from Neal R. Gross and Co., Inc., (Court Reporters and Transcribers) 1323 Rhode Island Avenue, NW., Washington, DC 20005 (202) 234-4433.