

## Peer Review of State-of-the-Art Reactor Consequence Analysis

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## Outline

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- SOARCA Peer Review Charter
- SOARCA Topics by Committee Members' Areas of Expertise
- Peer Review Scope
- Peer Review Methodology
- Peer Review Status
- Key Findings
- Conclusions

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## SOARCA Peer Review Charter

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- The Peer Review Committee's charter is to:
  - Provide independent reviews of the technical work conducted by the NRC and Sandia National Laboratories for the SOARCA project;
  - Assure that the SOARCA study is technically accurate;
  - Assess whether the conclusions are supported by the technical work presented in the SOARCA NUREG report.

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## SOARCA Peer Review Charter

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- *Guidance with respect to presentation within the SOARCA NUREG documents of the results to the general public may also be offered.*
- *The final deliverable is a technical report documenting the findings of individual Committee members.*
- *The Committee began its work in July 2009 and will submit the final version of its report in 2011.*

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## SOARCA Topics by Committee Members' Areas of Expertise

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- *Accident sequence selection*
  - *Ken Canavan (EPRI)*
  - *Bruce Mrowca (ISL)*
- *Accident progression*
  - *Ken Canavan (EPRI)*
  - *Bernard Clément (IRSN, France)*
  - *Jeff Gabor (ERIN Engineering)*
  - *Robert Henry (Fauske and Associates)*
- *Mitigation measures*
  - *Jeff Gabor (ERIN Engineering)*
  - *Robert Henry (Fauske and Associates)*
  - *Bruce Mrowca (ISL)*

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## SOARCA Topics by Committee Members' Areas of Expertise

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- *Radiological release*
  - *Bernard Clément (IRSN)*
  - *Jeff Gabor (ERIN Engineering)*
  - *Robert Henry (Fauske and Associates)*
  - *David Leaver (WorleyParsons Polestar)*
- *Off-site emergency planning and response*
  - *Roger Kowieski (Natural and Technological Hazards Management Consulting, Inc.)*
  - *David Leaver (WorleyParsons Polestar)*
- *Off-site radiological consequences*
  - *David Leaver (WorleyParsons Polestar)*
  - *Kevin O'Kula (Washington Safety Management Solutions)*
  - *Jacquelyn Yanch (Massachusetts Institute of Technology)*

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## SOARCA Topics by Committee Members' Areas of Expertise

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- *Seismic issues*
  - John Stevenson (JD Stevenson Consulting Engineering Co.)
- *Structural issues*
  - John Stevenson (JD Stevenson Consulting Engineering Co.)
- *Probabilistic Risk Assessment applications*
  - Ken Canavan (EPRI)
  - Bruce Mrowca (ISL)
- *Severe accident modeling*
  - Jeff Gabor (ERIN Engineering)
  - Robert Henry (Fauske and Associates)
  - Karen Vierow (Texas A&M University)

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## Peer Review Scope

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- *Assessment of the methodological approach, underlying assumptions, results and conclusions obtained for Peach Bottom and Surry reactors.*
- *Comment on the presentation of the SOARCA evaluations within the SOARCA NUREG documents.*

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## Peer Review Scope

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- *The documents reviewed included*
  - Draft SOARCA NUREG documents
  - Presentation materials provided at Peer Review Committee meetings
  - Comment resolution documents and supporting documents that were supplied at the Committee's request.

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## Peer Review Scope

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- *The Peer Review Committee has conducted this review effort in an advisory capacity.*
- *The Committee has not had access to SOARCA results obtained after Feb. 14, 2010, or to the Uncertainty Analysis beyond the proposed approach which was presented on Oct. 26-27, 2010.*
- *The current intention is for the peer reviewers to review the final SOARCA results and conclusions.*

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## Peer Review Methodology

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- *Four meetings were conducted between the Peer Review Committee members and the SOARCA team.*
- *Prior to each meeting, SOARCA documentation was transmitted to the Committee for review.*

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## Peer Review Methodology

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- *The first meeting (July 28-29, 2009)*
  - *The SOARCA team presented the project to the Committee members.*
  - *Initial comments and questions were discussed verbally.*
  - *Committee action item*
    - *Provide written comments on the two-day meeting.*
- *The second meeting (September 15-16, 2009)*
  - *The SOARCA team presented the latest results.*
  - *Comments and questions were discussed verbally.*
  - *Committee action item*
    - *Provide written comments on the two-day meeting.*

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## Peer Review Methodology

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- *The third meeting (March 2-3, 2010)*
  - *Presentations by the SOARCA team focused on comment resolution and plans for Uncertainty Quantification and Sensitivity Analysis.*
  - *Committee action items*
    - *Offer written comments on the description of the SOARCA in the draft NUREG.*
    - *Provide a guidance memo on specific issues that arose for which the SOARCA team requested input on a time scale shorter than that for the Committee's final report.*
    - *Offer insights into the Uncertainty Quantification and Sensitivity Analysis, although this was determined at the meeting to be outside of the review scope.*

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## Peer Review Methodology

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- *The fourth meeting (October 26-27, 2010)*
  - *The SOARCA team discussed the June 2010 ACRS meeting, the proposed Uncertainty Analysis technical approach and resolution of peer review comments from earlier meetings.*
  - *The peer reviewers discussed completion of the final report.*
  - *Committee action items*
    - *Prepare a list of unresolved review comments.*
    - *Draft a guidance memo on the proposed Uncertainty Analysis approach.*
    - *Complete the Committee's final report.*

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## Peer Review Status

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- *The Committee has submitted all of the previously mentioned documentation to the SOARCA point of contact.*
- *The final report has been drafted.*
  - *Per NRC request, report submittal is on hold.*
  - *A final Committee meeting may be called in 2011.*

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## Key Findings

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- *SOARCA objectives are being pursued in a manner that is receiving general agreement from most Peer Review Committee members.*
  - *Perform a state-of-the-art, more realistic evaluation of severe accident progression, radiological releases, and offsite consequences;*
  - *Address two operating plants (Surry and Peach Bottom) in an integrated, consistent manner for important (high risk) sequences (e.g., SBO, ISLOCA);*
  - *Account for plant-specific design and operational improvements, credit existing and newly developed mitigative measures, and site specific emergency plans.*

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## Key Findings

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- *Many reviewer comments have been satisfactorily resolved.*
  - *Some comments are currently being considered by the SOARCA team.*
- *The Committee has not had an opportunity to review the final SOARCA analysis results or conclusions.*
  - *A meeting with the SOARCA team may be held in the near future to discuss final SOARCA results, conclusions and documents.*
- *The Committee has provided guidance on the proposed Uncertainty Analysis approach.*

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## Conclusions

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- *A peer review of the SOARCA project by independent experts has been conducted.*
- *Review results were generally favorable to the SOARCA methodology, with some unresolved issues remaining.*
  - *The Committee members have not reviewed the final SOARCA results, conclusions or documents.*
  - *The Uncertainty Analysis is currently considered beyond the scope of Committee's review.*
- *A final Committee report is near completion.*
  - *A final Committee meeting may be called in 2011 by the NRC.*
  - *Per NRC request, report submittal is on hold.*

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## Acronyms

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- *ACRS – Advisory Committee on Reactor Safeguards*
- *EPRI – Electric Power Research Institute*
- *IRSN - Institut de Radioprotection et de Sûreté Nucléaire (France)*
- *ISL – Information Systems Laboratories*
- *ISLOCA - Interfacing Systems Loss-of-Coolant Accident*
- *SBO – Station Blackout*
- *SOARCA – State of the Art Reactor Consequence Analysis*

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