RES

Clark, Theresa

From: M.T. Leonard [mtl@dycoda.com]
Sent: Tuesday, July 07, 2009 3:53 PM
To: Helton, Donald; Schaperow, Jason; Tinkler, Charles; Drouin, Mary; Mitchell, Jocelyn; Siu, Nathan; Stutzke, Martin; Clark, Theresa; Fuller, Edward; Dube, Donald; Cooper, Susan; Palla, Robert; Ghosh, Tina
Subject: RE: Input for a paper on international Level 2 PRA and AM activities
Attachments: NRC AM Activities for IRSN paper_MTL.doc

Don,

Attached is a slightly edited version of the synopsis you prepared. My primary concern was that the topics of SOARCA and Level 2/3 PRA Standard development appeared to have no connection whatsoever. Although the disconnect might be valid from a programmatic point of view, there are certainly some technical links, which are worth pursuing in my view. With that in mind, consider these comments thoughts for internal discussion.

Mark

From: Helton, Donald [mailto:Donald.Helton@nrc.gov]
Sent: Monday, June 29, 2009 1:56 PM
To: Schaperow, Jason; Tinkler, Charles; Drouin, Mary; Mark Leonard; Mitchell, Jocelyn; Siu, Nathan; Stutzke, Martin; Clark, Theresa; Fuller, Edward; Dube, Donald; Cooper, Susan; Palla, Robert; Ghosh, Tina
Subject: Input for a paper on international Level 2 PRA and AM activities

All,

As some of you are aware, there is an OECD workshop on Severe Accident Management in October. One of the NRC's suggestions for this workshop was that there be a jointly authored paper discussing the broad set of international activities ongoing in the area of Level 2 PRA, and as practicable, point to relationships between these efforts to the extent they exist. The organizing committee for the workshop elected to ask IRSN to expand a previously submitted paper on their European best practices effort to accomplish this, using input from NRC, IAEA, and OECD/NEA contributors. The paper will be presented in a workshop session entitled, "PRA Modeling Issues." To that end, I've put together a brief synopsis of relevant NRC activities. The excerpt covers:

- introduction (1st paragraph)
- SOARCA (2nd and 3rd paragraphs)
- ASME and ANS Level 2 standards (4th paragraph)
- new reactor activities (5th paragraph)
- other (6h paragraph)

Please let me know if you take exception to anything in your area, or have specific suggestions for making it more useful. I'm planning to forward the input on to IRSN no later than July 31st.

Thanks,
Don

Don Helton

T/36

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Ongoing NRC Activities of Interest to the International Accident Management Community

6/28/09 – Un-reviewed

Excerpt for a joint IRSN, OECD/NEA, IAEA, and NRC paper addressing international activities in Level 2 PSA

The US Nuclear Regulatory Commission has a number of ongoing activities related to Level 2 Probabilistic Safety Assessment and Accident Management which are either performed in collaboration with the international community or are of interest to the international community. Each of these activities is highlighted below, along with any relevant links to other international activities.

The State-of-the-Art Reactor Consequence Analyses (SOARCA) project involves the reanalysis of severe accident consequences to develop a body of knowledge regarding the realistic outcomes of severe reactor accidents. In addition to incorporating the results of more than 25 years of research, the objective of this updated plant analysis is to include the significant plant safety improvements and updates, which have been made by plant owners but were not reflected in earlier assessments by the US NRC. In particular, these plant safety improvements include system enhancements, training and emergency procedures, and offsite emergency response. In addition, these improvements include the recent enhancements in connection with security-related events.

The goal of SOARCA is to ~~determine best~~generate realistic estimates of the offsite radiological consequences for severe accidents at U.S. operating reactors using a methodology based on state-of-the-art analytical tools. ~~In particular, those factors~~These estimates account for ~~include~~ the full extent and value of defense-in-depth features of plant design and operation, as well as mitigation strategies implemented in the form of Severe Accident Management Guidelines or other procedures. This project is expected to lead to new opportunities for collaboration with international organizations on the topic of best-estimate consequence assessment, both through the existing Cooperative Severe Accident Research Program (CSARP) and more broadly.

Results of the SOARCA project could also impact the application of deterministic calculations of severe accident behavior and offsite consequences in Level 2 and Level 3 PRA. For example, insights gained from comparisons of radiological release estimates from SOARCA to those from past analyses that were based on older modelling technology, or incorporated selected conservatisms, illustrate the extent to which these results impact numerical estimates of risk or revise our understanding of the characteristics of accident sequences that impact offsite radiological consequences.

In the US, a consensus standard exists for the application of Level 1 probabilistic risk assessment, including large early release frequency[1] for internal and external events at-power. The US NRC's position on this standard is articulated in Regulatory Guide 1.200[2]. There are three additional standards that are under development that are of interest to the Accident Management community. These involve low power shutdown PRA, Level 2 PRA, and Level 3 PRA. The second item is the

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[1] ASME/ANS RA-Sa-2009, "Addenda to ASME/ANS RA-S-2008 : Standard for Level 1/Large Early Release Frequency Probabilistic Risk Assessment for Nuclear Power Plant Applications," American Society of Mechanical Engineers, February 2009.

[2] Regulatory Guide 1.200, "An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities," US Nuclear Regulatory Commission, March 2009.

focus of the discussion here. This standard is being developed to provide requirements for a full (as opposed to a limited, e.g., LERF) Level 2 PRA. The standard is intended to integrate well with the existing Level 1/LERF standard as well as the Level 3 standard under development. This means that Level 1/2 and Level 2/3 interface issues are being addressed. The standard is also intended to be applicable to both existing and advanced light-water reactors, and will accommodate the differences in the Level 2 PRA risk surrogates used for each type. Non-light water reactor PRA requirements are being addressed as part of a separate standard that is under development. The target date for issuance of the new Level 2 standard is ???2010. Subsequent to its issuance, the US NRC will issue supporting implementation guidance. This activity shares some commonalities with other recent and ongoing international activities such as the European Commission ASAMPSA2 project and the IAEA Draft Safety Guide 393, "Development and Application of Level 2 Probabilistic Safety Assessment for Nuclear Power Plants."

The US NRC is also reviewing a number of applications for design certification and combined license for advanced light-water reactors. These reviews include deterministic severe accident management analysis, probabilistic severe accident mitigation design alternative (SAMDA) analysis, and Level 2 PRA development. These review activities are discussed further in a separate US NRC submittal to this same workshop. In addition, the US NRC is developing the necessary guidance for operational oversight of these new reactors, including the risk metrics (e.g., large release frequency) and target values to be used. In the initial stages of developing this guidance, consideration has been given to the risk metrics used in other countries. Interaction with external stakeholders has been a focus of this effort. The US NRC is also interacting with the international community on new reactor issues through the Multinational Design Evaluation Program (MDEP), such as the series of meetings being conducted by the EPR probabilistic risk assessment and severe accident evaluation sub-groups.

The other ongoing activities for the NRC in the area of accident management concern (i) accident management issues for operating reactors, such as severe accident management alternatives (SAMA) analyses for license renewal, *(ii)* development of advanced Level 2/3 PRA methods, and *(iii)* investigation of specific technical considerations for Level 2 PRA such as human reliability analysis and seismic events. Each of these items is covered by a separate US NRC submittal to this workshop.