From: John Froats [mailto:John.Froats@uoit.ca]
Sent: Wednesday, January 07, 2015 11:39 AM
To: Consultation
Subject: Feedback on Discussion Paper DIS-14-01 - Design Extension Conditions for Nuclear Power Plants

Thank you for the opportunity to provide comments on the Discussion Paper. Rather than provide detailed comment, I thought I'd provide some higher level comments based on my experience in the design and operation of nuclear facilities.

1. Historically the criteria for separation of design basis and beyond design basis has been clear and well defined based on a probabilistic threshold. Evaluation methodology has been well defined for each domain. In the post Fukushima review and evaluation period the concept of `stress testing' emerged as a way to probe for cliff edge effects and opportunities to enhance the ability to mitigate highly unlikely events. If I understand the intent of the discussion paper, it seems that there is some idea of changing the clear delineation of the design basis domain and the beyond design basis domain that has existed and expand the probabilistic envelope to include additional event sequences – in essence expanding the design basis. This direction seems counter to the thinking and work done in the aftermath of the Fukushima event. Although the document in the beginning states that DECs do NOT represent an extension of the design basis, the content of the paper seem to lay out requirements that are in essence a design basis extension. System classification as an example appears to point to classical design basis methodology as the approach intended. It does not seem to me that this is in line with post Fukushima action plan basis.
2. The document as is, does not appear to capture the principle that once we are beyond the design basis the ability to predict event sequences and related consequences is very much reduced. In the response to the event in Japan, the philosophy adopted was to move to an emphasis on consequence mitigation and emergency response recognizing that with the uncertainties involved, analytical work for extreme events would contain a high degree of assumption and speculation making the effort of marginal value. I could not see from the document that this idea has been transferred from the strategic approach that emerged post Fukushima into the framework.
3. The inclusion of a section on R&D suggests a belief that there is significant benefit in the costly work of simulation and or experimentation to better understand the extremely unlikely . Any such work would be highly dependent on the assumptions made and the alignment of a plant, should an extreme event happen to the assumptions made in the R&D work. Again this seems counter intuitive if the starting point is that it is highly unlikely that the sequence of interest will occur and at least equally unlikely, that an event will unfold in a manner that is congruent with a stylized model. My experience in events like the 1994 LOCA and the 2003 blackout are data points that support the idea that an actual event that is unlikely in nature will not unfold exactly as scripted. Diverting resources to work in this area has the potential to detract from work in other areas such as preparing emergency response capability to better deal with event sequences that are not exactly as predicted and hence may contribute to resource deployment in a manner that fails to optimize safety benefit.

4. The statement at the bottom of page 9, for example, perhaps illustrates the key point. It states "Deterministic analysis should be performed for an event leading to the highest challenge to maintaining the containment function." This is true today for design basis events. For events outside the design basis, established by probabilistic assessment, it is clear that the practicality of this for BDBA sequences is questionable.

To summarize, while I commend the effort to put together an approach in this area, I remain of the view that capturing the requirements of the work done in the post Fukushima efforts in Canada and the philosophy of a shift to emphasis on mitigation and emergency response when there is high uncertainty in event sequence prediction, is a fundamentally stronger approach to enhance overall safety.

Simple models and clear criteria lead to less likelihood of misunderstanding or misinterpretation and can enhance the design effort. Human error and culture have been the center of all of the major events to date in the industry. It is my humble opinion that creating another degree of complexity for the design teams building these facilities isn't aligned with the biggest safety gains that can be made.

I appreciate the opportunity to provide input and hope the thoughts provided above contribute to the achievement of the best possible path forward for enhancing nuclear safety.

Best regards,

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