## HLWYM HEmails

**From:** Albert Wong
**Sent:** Wednesday, June 07, 2006 12:03 PM
**To:** Amitava Ghosh; Michael Waters; fferrante@swri.org
**Cc:** Biswajit Dasgupta; George Adams; Andy Campbell; Robert Johnson (NMSS); Mahendra Shah; Christopher Ryder; Rosemary Reeves
**Subject:** Re: Appendix C of the ISG_Canister Example (Draft)

Mike - Thank you for your suggestions, Andy and I will call you this afternoon to discuss the ISG integration issues.

As far as the questions you raised: here are my personal views:
1. Following the format of Seismic ISG Appendix A&B for the canister example - The Seismic ISG Appendices A&B format is great. It's easy to follow and I would love to adopt to that format if I have the equivalent information on the canister to plug into the format. The greatest challenge I encountered so far is I have yet to find any study/papers that attempted to correlate the design methodology (e.g., loadings and stresses, etc.) called out in ASME B&PV Sections III/VIII to the reliability of vessels built to such code. I talked to people in SFPO/NRR/RES/INL/ASME/UMD/consulting biz to see if anyone is aware of such study in the past. So far I have not found any direct hits yet. The only reference that's marginally useful is an ASME Task Force report on the development of Reliability-based Load and Resistance Factor Design (LRFD) Methods for Nuclear Piping. Piping and vessels are designed to different parts of the B&PV codes; the loading factors and stresses (and other parameters) used are different between the piping and vessels.

I talked to the PI (Dr. Ayyub of UMD Civil Eng.) of the task force. He told me the work is not being funded and no progress is being made at this stage. Their original thought was after they developed a methodology to estimate the reliability of piping using the LRFD method, they could expand the work to include pressure vessels if there was enough interest to fund the work.

(2) No range of reliability can be demonstrated with the steps thus far - You're absolutely correct in that regard. I purposely left out any numerical values in the discussion because I don't have any firm basis to attach a number (or a range of values) if the steps in the canister example are followed. The reason is explained in the previous paragraph. Personally I'm willing to accept 1E-5 failure probability if the steps are followed. This range was given to me by Dr. John Stevenson. He said this was based on his experience with designing piping using the code. He estimated the reliability value of a well-designed piping system was in the neighborhood of 1E-4. He was willing to go down another order of magnitude for vessels if they are designed properly (e.g., meeting all the associated requirements in QA, NDE, welding, etc.). It should be pointed that this is his personal estimate, not the ASME committee view. Dr. Stevenson is a well recognized ASME B&PV expert. He is on the B&PV Section III committee. He did some consulting for NRR and RES in the past. I knew him from my previous life and I am willing to accept his numbers at face value. No one else I talked to was willing to give me a reliability estimate.

Anyway, I can put the number in the canister example if the PCSA team agrees to go that way. Just recognize the fact that, if we get challenged on the value, I don't have any firm report I can reference to.

I'll call you shortly to set up a time for the telephone call with Andy. Have a good afternoon,

Albert

>>> Michael Waters 06/06/2006 7:07 PM >>>
Gentlemen and ladies,

I am still alive and plan to be back to work, part time, this week. I would like to help out on the ISG to the extent I can. It was the last thing I was working on, before getting a major stomach ache and going in for emergency surgery.....then again...

With that said, I have a few high level comments:

1. Please note for the first part of the PCSA ISG, I initially tried to use the exact language from the draft Seismic ISG that is pubically available in the Federal Register. I did enhance somewhat to tailor towards the PCSA-specific issues. We need to avoid radically changing the Intro and Discussion on general PCSA concepts. It could cause two different positions on the PCSA to be out on the street. We would look disorganized. I think the seimsic version is good enough.

2. Chris I note your comments in Albert's previous emails. I can call you to go over some of them. There are a few sentences you propose to strikeout, but which I think are important key messages that must be captured for future technical reviewers.

Also, I think the ISG should really focus on SSCs ITS. Bottomline, it is still not clear to me why we would make DOE analyze and provide reliability estimates for non ITS SSCs, that they DO NOT RELY ON to prevent or mitigate?? I'm not going to review or ask any RAIs on such a SSC, because it is not important to safety. Why should this ISG focus on non-ITS issues??

3. For the canister example, I would reccomend looking at Appendix A & B of the seismic ISG for ideas on format and specitivity. Two things: It should discuss the level of design and operation detail that could be acceptable, in conjunction with appropriate reliability techniques. For example, would the type of licensing drawings in Part 71 and Part 72 be acceptable for the canister review?

Second, I have no sense of what range of reliability that can be demonstrated with the suggested steps thus far. If for example, the cansiter meets codes and standards, and a FE or more simple analyses shows that drop stresses are well-below failure stresses, can a reliability of 10-6, 10-5, or 10-4/drop be acceptable? If a physical drop test is performed by DOE, and the canister survives, can a 10-6/drop be assigned?

We need to be a little more specific, and have a path towards what are acceptable reliability range numbers for the types of analyses and codes and standards that can be applied to the canister.

>>> Albert Wong 06/06/06 4:49 PM >>>
Amit/Fernado -

Attached is the first cut of the draft canister example. I recognize it still need a lot work. For example, I looked at several places and have not been able find any study that attempted to correlate the loading conditions and stresses a vessel experiences to it reliability in service. If you will, please talk to people on your side to see how the example can be beefed up more.

I will continue working with people on my side to link the examples to the ISG itself. Stay in touch and thank you very much,

Albert

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