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Dr. Melvin Silberberg
Accident Source Term Program Office
Office of Nuclear Regulatory Research
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Mel:

I have reviewed the handouts and have read the material given to us at the Peer Review on May 24 and 25th and have the following comments.

1. Time, location and mode of containment failure still appears to be as important as fission product chemistry in determining a source term for many of the sequences. At the first Peer Review we saw the importance of "containment attenuation" in moving from the early δ containment failure mode to the late δ containment failure mode for the PWR large dry (Surry) containment.

It was only through questioning at this meeting did it become clear that failure pressure and location differences between this work and WASH-1400 were the two dominant factors. For the AE sequence in Peach bottom, the failure pressure and location were changed from 178 psia in the wet well (WASH-1400) to 125 psia in the drywell, and this apparently overshadowed all the other "improvements" in models, phenomenology and computation.

For the July meeting some parametrics on containment failure location and pressure (for the Mark I) should be completed. Furthermore, I believe the Project's (and its Contractor's) efforts on containment analysis should be integrated into the program as soon as possible, and should become part of the peer review.

2. For BWRs the suppression pool plays a key role in the determination of the source term. I raised the question as to whether or not in a Mark-III, there were sequences which could bypass the suppression pool. The answer, "that they would be of such small frequency or be incredulous", doesn't sit

right in view of the comment we heard from Bill Hopkins of Bechtel, regarding a flow path back to the dry well from above the suppression pool, for re-circulation of steam. I believe he called it an opportunity for a "re-rinse". Looking at it in reverse, a valve failure would imply a pool by-pass. Although this apparently is unique to Grand Gulf, the standard Mark III might have other subtle flow paths for by-pass. Moreover, only transient events are being considered in the study for Mark III's. There may be some bypass sequences with pipe breaks which are potential risk contributors if they lead to early failure. In any event, Battelle, with its vast PRA experience should not only rely solely on the industry for the definition of its sequences; it should use some initiative and decide for itself whether or not the pool can be bypassed.

3. In reading over the draft material for the Mark III containment (Vol. III), it states that for the TC sequence, the suppression pool will boil (pg. 4-7). What does this imply? Will the release be to a saturated mixture or saturated pool; or will steam evolve. If the pool is saturated, it will re-release any scrubbed fission products when it boils or vaporizes. On page 6-7, it states, "after leaving the vessel, fission products are carried down the steam line and relief line to the suppression pool". If it has boiled, will there be water present? Or will it be merely a saturated pool?

At the July meeting, I would like to see a better definition of the thermodynamics of the pool. Perhaps on a P-V or T-S diagram. Other questions arise. Under what conditions could the pool flash? And, for example, could it flash at containment failure?

4. The addition of the Zion Plant to the Element 2 Work Scope raises a whole host of new issues. Although it was shown that seismic events were not a major contributor to core melt frequency, seismic events did dominate risk at Zion because of concurrent seismic containment faulure. Will the study focus on internal initiating events only; or on both? All of the sequences studied so far (for SURRY, Peach bottom, Grand Gulf, and soon Sequoyah) are based on internal initiators. In determining dominant sequences, Battelle has looked at frequency and consequences, which is appropriate. But at Zion, the presence of an external initiator changed the consequences for some sequences dramatically. For Grand-Gulf, only transients are being considered. If external events were considered, or if an ATWS fix were made, pipe breaks might become the risk dominant sequences. More than likely the time and location of failure would change for a seismic initiator. Other initiators, might also have similar effects (e.g. fires, missiles etc.).

Before initiating the Zion study, several ground rules should be developed by the Project and presented at the July or August meeting.

5. There appears to be some prejudging with respect to dominance, vis a vis the sequences and with respect to the risk itself, i.e., "end of spectrum" events. Estimates of core-melt frequency for some plants is calculated to vary between 10^{-3} and 10^{-4} per reactor year. While all core-melts may not lead to public health risks, this project is supposed to assess the sorce term, not pre-determine this. Element #4 should resolve the risk question, after frequency and consequence have been determined, not before them.

All in all the meeting was informative and interesting. I hope to see more of BCLs initiative and innovativeness with respect to BWRs at the July meeting. Battelle is doing an excellent job in model and phenomenological improvement given the time and financial constraints. I would like to push them a little into some global thinking.

I hope these comments prove useful.

Sincerely,

Bill

W.E. Kastenberg,
Professor

WEK/shm

P.S. Thanks to the pipe smoke, I ended up with an upper respiratory infection and spent the Memorial Weekend in bed. I would appreciate your banning pipe and cigar smoke at the next meeting.

cc: M. Jankowski
R. Benero