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M. N. Jankowski
Office of Nuclear Regulatory Research
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Mike:

The following are my comments about the material presented at the Source Term Peer Review meetings of October 12 and 13, 1983.

1. The new gradual core slumping is in the right direction, but, in its present form, it raises considerable questions about the calculated results. Some of the concerns are:
 - As material moves from one node to the next, there is no check that it can be physically accommodated (i.e., is there any volume for it?).
 - During the slumping, no geometrical changes are assumed, even though surface and flow areas are expected to change considerably. The fuel and gas temperatures calculated from this model appear too low.
2. The amount of radioactivity retained in the core is excessive for two reasons. First, the temperature in a melting core will force some re-emission. Also, because no changes in geometry are postulated, substantial areas are employed for retention when, in fact, most will disappear with time during the melt process.
3. The use of homogeneous mixture in the upper plenum needs to be looked at, especially as we break it down in more and more axial nodes. There will not be complete temperature mixing and some high temperature streams may exist which will transport fission products without their deposition. Some parallel noding for sensitivity purposes may be worthwhile here.

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4. As the amounts of radioactivity retained in piping and containment increase, as in the recent calculations, there is an urgent need to take into account their location and heat production. The concern, here, is that they might lead to bypass of containment. For instance, during TMLB, enough fission products reach the steam generators to possibly produce steam generator tube failure and release to the secondary side and the environment. It is important to recognize that during this sequence of events, primary pressure is very high and, if we can agglomerate fission products at crevices, dents, U-bends, we might bypass containment if the tubes fail. The same might be true for isolation valves, containment penetrations, etc. This needs a much closer look, especially as containment overpressure failure probability decreases.
5. It was not clear what the impact was of the fog model addition in the containment. I have some serious reservations about its validity. It might be preferable to just look at carryover of water with steam. Even with extremely well engineered separator-dryer systems, one can still carry 0.1 percent water with steam, and this should provide a more physical basis for including water drops in the containment.
6. The model developed by D. Powers for a water pool above the concrete may be optimistic. If there is no crust, as postulated in the model, there will be film boiling at the interface with the water pool. This pool boiling will be enhanced by the gas being generated in the corium-concrete reaction. Bubble sizes should be prescribed from Taylor instability, recognizing the impact of present impurities upon surface tension. Heat generation in such bubbles may become important, especially as the water depth increases, and thus limit the scrubbing of fission products. Another note of caution is that the scrubbing efficiency proposed by Powers is considerably larger than that employed in the Peach Bottom or Grand Gulf suppression pool when, in fact, it should be the other way.
7. The quantitative uncertainty estimation will produce considerable debate. At this time, it should be viewed only as an experiment.
8. The UKAEA speaker referred to preliminary tests of molten fuel in boric acid which released iodine. It is worth noting that boric acid was present at TMI-2, and we need to reconcile UKAEA results with the TMI-2 accident.

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Let me finally add that if another meeting is to be held, it is important that all reports and results be in their final form and be provided to the peer reviewers for advance review prior to the meeting.

Sincerely yours,

Sal Levy (rc)
Salomon Levy

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cc: M. Silberberg, US NRC