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March 16, 1981

M. Silberberg, Chief
Experimental Advanced Safety
Technology Research Branch,
Chairman of Peer Review
United States Nuclear
Regulatory Commission
Washington, D.C. 20555

Subject: Draft Report on Technical Bases
for Estimating Fission Product
Behavior During LWR Accidents

Dear Mr. Silberberg,

I am herewith submitting the following initial comments on the subject draft report.

1. The report coordinator, chapter leads and other contributors are to be commended for the scope, detail of presentation and extensive references.

2. The reviewer, at this point in time, agrees that the assumed (or actual) form of iodine does not appear to have a major influence on iodine release in postulated accidents where there is a substanial or complete core melt down accompanied by containment failure . On the other hand, the effect of the chemical form of iodine and its behavior in the primary system and containment including aerosol behavior, will, in general, have an important and salutory effect in regards to predicted iodine release to the environment in the case of lower risk accidents - such as ones with partial core melting without containment failure.

3. The above (2.) reinforces the notion that every thing possible

should be done (through regulation, design, engineering, quality control and a high quality of operation) to make high risk accidents to be of very low probability. The predicted consequences of higher probability accidents (with containment integrity maintained) may well be substantially lower than previously thought due to Nature (chemistry and physics) and the use of effective engineered safety features.

4. The reviewer agrees that a variety of large scale, integral experiments with real, highly irradiated fuel and structural material doing melting, aerosol formation, liquid and gas-phase transport tests need to be carried out to obtain data for accident analysis. The reviewer, however, makes a plea that gaps be closed in basic high temperature chemistry data, surface sorption data and aerosol formation and behavior relative to fission product source attenuation phenomena.

5. It is the reviewer's experience that basic thermodynamic and kinetics data can assist one in the separation of right (reasonable) from wrong (unreasonable) data obtained in complex integral experiments by common sense reasoning. Thus one should be quite suspicious of data from integral experiments that are at odds with results expected from basic data - assuming an adequate data base. This approach can be used in sorting out some of the conflicting fission product release data or to indicate additional experiments that are necessary. This has been done to some extent in the Report but merits further use and attention.

6. The reviewer must confess that due to the extensive and multifaceted nature of the Report he has not had time to do the review as thoroughly as he would have preferred to at this juncture. He has tended to concentrate on areas of his expertise such as fission product release and fission product chemistry and sorption behavior. Even in these areas substantially more time is needed to review the references and indeed, to obtain some of the references which are not readily available.

7. Considering the short time available to produce the Report it is well assembled and contains relatively few errors. A number of errors of a typographical nature, and very few apparent errors or omissions in the references and one missing pages of references was noted. Three or four pages were found to be out of order but this caused no problem.

Sincerely yours,

Lloyd R. Zumwalt

Lloyd R. Zumwalt,
Professor Emeritus
of Nuclear Engineering