E. I. DU PONT DE NEMOURS & COMPANY
INCORPORATED
ATOMIC ENERGY DIVISION
SAVANNAH RIVER LABORATORY
AIKEN, SOUTH CAROLINA 29801
(TWX 810-771-2670 TEL 803-725-6211 WU AUGUSTA GA)

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March 23, 1981

Mr. M. Silberberg
United States Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Silberberg:

SUBJECT: DRAFT REPORT ON THE TECHNICAL BASIS FOR ESTIMATING FISSION PRODUCT BEHAVIOR DURING LWR ACCIDENTS

I believe this report makes a valuable contribution to the analysis of safety in reactors because it attempts to treat the chemistry of the fission products during a reactor accident in a realistic manner. The evidence is convincing, for the conclusion that cesium iodide is the predominant form of iodine released from the reactor vessel under most accident conditions. Other aspects of the chemistry of iodine, except for its radiation chemistry, have been treated thoroughly so that knowledge of the behavior of that element during various phases of a reactor accident should be fairly complete. I am uncertain, however, about the effects of radiation on iodine in aqueous systems. The results of the literature survey reports in Chapter 5 and in Appendix C seem to imply that iodine will exist as a mixture of iodide and iodate in a radiation field while the work of Devillers, reported to the peer review group, indicates that a volatile iodine species is generated by gamma radiation. This matter deserves further investigation.

Knowledge of the behavior of other fission products under accident conditions is clearly not as extensive as that of iodine and cesium. Additional work needs to be done on the high temperature chemistry of other volatile fission products such as Te, Sb and Ru.

I believe the abstract and the conclusions section of Chapter 1 would be strengthened if some explanation were given of the physical basis for the conclusions. It is stated in these sections that the assumed form of iodine (either cesium iodide or elemental iodine) does not have a major influence on the estimated release during severe accidents. It would make matters clearer if it were pointed out that elemental iodine is released from the reactor vessel as a gas while cesium iodide is released as an aerosol under severe accident conditions and that aerosols are at least as difficult to remove from the air in the containment building as is molecular iodine. I think this fact is not fully appreciated by many people which tends to make them skeptical of computer codes that predict things contrary to their preconceived ideas.

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The section on the melt/concrete interactions in Appendix B would be clearer if it told what that interaction was. As it stands all we learn is that large volumes of gas are generated but not what kind of gas or by what reaction it is generated.

Sincerely yours,

R. M. Wallace

R. M. Wallace
Senior Research Associate
Chemical Technology Division

RMW:lmn