

November 2, 1976

Mr. G. R. Quittschreiber
Senior Staff Assistant
United States Nuclear Regulatory Commission
Advisory Committee on Reactor Safeguards
Washington, D. C. 20555

Dear Mr. Quittschreiber:

As a follow-up to the request of the subcommittee chairman, Dr. S. Lawroski, I am writing to summarize my comments pertaining to the Liquid Pathway Study meeting held at the Los Angeles Airport on the 27th and 28th of October. Clearly, the Floating Nuclear Plant Concept has many attractive features, but there are a number of real uncertainties regarding some of the technical assumptions utilized in making the analyses contained in the draft reports and described at the meeting. It is imperative that these assumptions be justified, and revised where necessary, before definitive conclusions are reached regarding the safety of the overall FNP Concept.

Numerous points were raised during the discussions, and I am taking this opportunity to reiterate those, most closely related to my area of expertise, which I believe warrant further attention. My comments and questions are as follows:

- 1) The degree of UO_2 fragmentation upon contacting water must depend, among other things, upon the rate of cooling and the stresses which develop within the UO_2 phase. These will, in turn be related to the temperature difference and the mass of the two phases involved. The data utilized in estimating the extent of fragmentation and particle size distribution were for very small masses of UO_2 and totally inadequate for this purpose.
- 2) The related assumption of 20% fragmentation of the UO_2 is not justified.
- 3) No account was taken of the fact that the UO_2 particles would probably have substantial cracks propagating throughout the structure. Based on this, and on item #2, no confidence can be placed on the estimated extent of fission products being leached.
- 4) In view of the fact that the UO_2 probably is highly stressed, one wonders whether further fragmentation might result of sea-sand action along a coast line.
- 5) The entire problem of a steam explosion under water has not been adequately assessed. The extent to which this could contribute to the dispersal of aerosols and fission products in the atmosphere warrants attention

6) The chemistry of certain fission products such as Ru are not well understood, and conflicting data are available concerning their release into a steam environment.

7) In view of items #5 and 6, it is not obvious that the atmospheric releases from a FNP and a land based plant would be identical.

8) Several times during the meeting, data pertaining to underwater weapon device tests were quoted to establish the potential significance of fission product release from an underwater steam explosion. The relative amount of the fission products which remain airborne will depend on the sizes of the droplets (or particles) with which they become associated, and this may be totally different in the two situations. More droplets could become suspended in the cloud of a weapon test, and the condensable vapor concentrations might be totally different. Therefore, the rates of nucleation, droplet and particle growth, and the extent of settling must be taken into consideration in making a proper analysis.

Please let me know if you require any additional information or comments on the above items.