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1. SIMMER is an ambitious long-term effort to describe, in considerable detail, the course of a core disruptive accident (CDA) in a very complex system. The work is progressing satisfactorily, but I am not convinced that it will soon converge on a validated ability sufficient for use in licensing analyses. Under present LMFBR program and budget circumstances, continuing the SIMMER effort at its current level is a program luxury.

   Perhaps further development should be left to organizations, principally abroad, having more immediate needs for SIMMER. The use of the program for Z/1P and Class 9 accident studies is reassuring about its value, however, and support for these purposes is justified.

   Since SIMMER dwells so strongly on the CDA, it reflects a more deep-seated problem of safety research resource allocation. I will return to this point later.

2. The Sandia Laboratory program is generally productive and illuminating. I have more confidence in the validity and utility of experimental programs than in the complex computer codes which are so difficult and ambiguous to validate. I would encourage continued, and increased, support for the SNL experimental program, especially in view of their unusual large-scale facilities. In particular, I recommend special emphasis on investigations of the fuel-coolant interaction (FCI), an issue which remains controversial.

3. The small program on elevated temperature design methods and materials properties is at too modest a level to be much of a contributor to the field, nor to provide NRC with a back-up consultative staff for LMFBR licensing analyses. I believe the resources allocated here could be used more effectively elsewhere in the overall program.

4. The Sandia programs on LMFBR accident delineation and the CONTAIN code are patterned, methodologically, on WASH-1400 adapted to LMFBR characteristics. So far as it goes, it is a necessary part of the LMFBR safety assessment program. WASH-1400, and in fact all similar reactor safety analyses, largely are limited to determining the radiological hazard to the public health and safety resulting from a reactor accident. There appear to be other real hazards which have not been considered explicitly in accident consequence analyses. This omission may distort research program priorities and resource allocations.

In these Sandia programs, as in SIMMER, most of the effort focuses on the CDA since it is this which results in the greatest release of radioactivity and challenge to the containment. The questions are: how badly is the core disrupted, how energetic is the event, what happens to the debris, does the reactor vessel survive, how well does the containment prevent undue exposure of the public to radiological hazards? The CDA in the LMFBR and the LWR Class 9 accident are similar situations.

The TMI accident has demonstrated that an LWR core can suffer severe damage, but the containment protects the public from radiological harm. However, TMI reveals the possibility for other hazards to the public health than radioactive releases alone.

Continued mental stress, unresolvable by the person subjected to it, is becoming recognized as a factor in the health of an individual. It can lead to personality difficulties, somatic illnesses, alcoholism, loss of productivity, even suicide. These effects are far more difficult to identify and measure compared to man-rem exposures, but they are not negligible.

Thus a reactor safety analysis logic which assesses the probability of a CDA, how energetic it might be, how well the containment will mitigate the release of radioactivity, and finally the readiological hazard to the public is necessary but not sufficient. It ignores what may be the major challenge to public health if indeed the radioactive release is negligible. The grave concerns that some individuals will continue to have if they are living in a community or near a reactor building containing a mass of core debris may be a significant hazard.

5. In the light of these thoughts, I have the following recommendations regarding allocation of reactor safety research and analysis resource allocations.

A. Principal priority and emphasis be placed on prevention as compared with mitigation.

B. An effort be initiated to put on quantitative terms the hazards to public health arising from mental stress and its consequences, comparable to what we now know about assessing radiological hazards.

C. A comprehensive study of relevant institutional problems be undertaken by the Congress, or by some agency it selects, but probably not by either NRC or industry. The NRC traditionally has limited its reactor safety studies to technology alone. TMI was not so much a failure of technology as it was a failure of institutions and people. Unless we do better in these areas, the family of improved reactors with better prevention and mitigation features, may still encounter similar difficulties.