OPTIONAL FORM NO. 10
MAY 1962 EDITION
GSA GEN. REG. NO. 27

5010-107

UNITED STATES GOVERNMENT

Memorandum

TO : Files
THRU: Roger S. Boyd, Chief
Research & Power Reactor Safety Branch
Division of Reactor Licensing

DATE: FEB

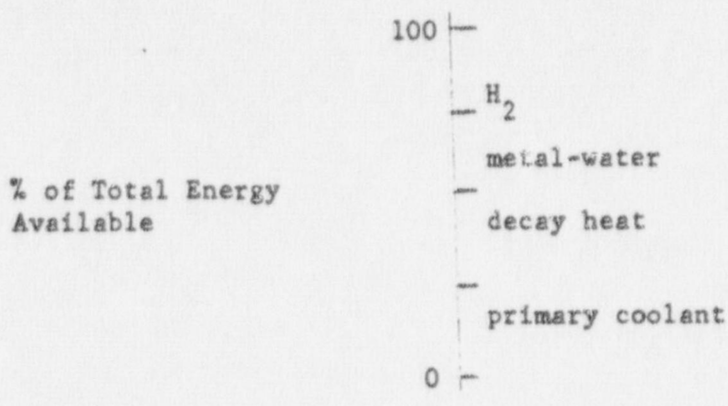
FROM : M. Rosen
Research & Power Reactor Safety Branch
Division of Reactor Licensing

SUBJECT: LOSS-OF-COOLANT ACCIDENT QUESTIONS

The safety aspects of a loss-of-coolant accident are associated with a complex inter-relation of many phenomena for which it is extremely difficult to predict the exact influence or importance of any one. There are numerous analytical models, not verified by experimentation, which are now incorporated into computer codes and are being used to predict results. However, because of the various assumptions made at different points in the analysis it is difficult to determine the conservatism or relative importance of the various parameters. Given the amount of energy, and water, and zirconium available in reactors and combining them at the appropriate time, it is not difficult to envision serious containment problems. Combining them at other times can obviously lessen the problem.

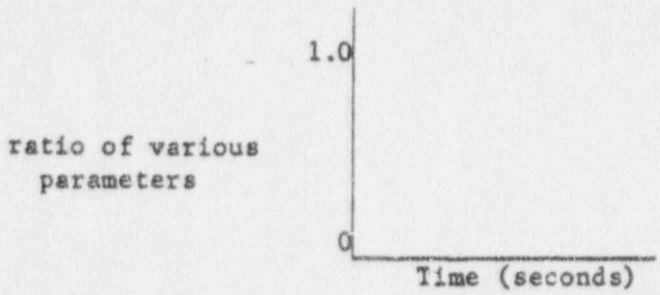
The following set of questions can be submitted to applicants in order to ascertain the relative importance of various parameters associated with the assumed loss of coolant accident with the purpose of trying to measure the conservatism that may be present in the analysis.

(1) Relate the available energy sources by line charts, as indicated below, showing the total energy that could be provided by the primary coolant, a 100% metal-water reaction, the hydrogen-air reaction, and also the decay heat at 15 and 30 minutes after blowdown.



RD-13 WATER

(2) Supply in graphical form, as shown below, the ratio of decay heat energy in the containment atmosphere to primary coolant energy, the ratio of metal-water energy in the containment atmosphere to primary coolant energy, the ratio of H_2 energy in the containment atmosphere to primary coolant energy and the ratio of total energy in the containment atmosphere to total available energy.



(3) As a result of your analysis indicate in graphical form the percent of zirconium in the core available for reaction (using temperature considerations), and the zirconium reacted, as a function of time with (1) no safety injection and (2) with full safety injection.

The next questions will be used to measure the containment response to the available energy sources and sinks.

(4) Provide the containment pressure curves following the MCA, assuming no further energy is added to the containment after the initial blowdown, for the cases wherein all and none of the engineered safeguards function and the containment acts as the only heat sink. Also, show the result as a percentage of total primary system energy lost as a function of time.

(5) Provide the information in question 4 showing the increase in containment pressure resulting by (1) adding additional energy by the mechanism of steam generation equal to 50% and 100% of the original primary coolant energy, linearly with time in 1000 seconds, and (2) adding additional energy stepwise equivalent to 20% of the primary coolant energy at 500 and 1000 seconds by superheating the atmosphere.

cc: E. G. Case
M. Rosen