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Mr. James M. Taylor
Executive Director for Operations
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Taylor:

SUBJECT: NRC COMPUTER CODES AND THEIR DOCUMENTATION

During the 366th meeting of the Advisory Committee on Reactor Safeguards, October 4-6, 1990, we continued our deliberations on the subject of the development of NRC's computer codes and their associated documentation. This topic was previously discussed during our 365th meeting, September 6-7, 1990. It was also discussed during a joint meeting of the Decay Heat Removal Systems and Thermal Hydraulic Phenomena Subcommittees held on August 28, 1990, in Idaho Falls, Idaho.

A portion of the regulatory process depends heavily on the results of calculations done for the NRC by the national laboratories or other contractors. The codes used for these calculations range from thermal hydraulic codes like RELAP5 or TRAC to severe accident codes like SCDAP or MELCOR. Many of these codes are poorly documented, thus leaving one unable to determine either their capabilities, or perhaps more importantly, their limitations. In some cases, it appears that even the cognizant NRC staff representatives are not sufficiently knowledgeable of a given code's content.

The NRC has a responsibility to make the basis for its computer codes as scrutable as it requires of the industry. Many code developers consider the documentation phase of the code development process distasteful. Nevertheless, the RES program managers should see that adequate documentation is provided, particularly for models and correlations and for developmental assessment. We have seen evidence that they have not done so. One of the central problems is the tendency to defer the preparation of such documentation until the end of the program. Although such a deferral may be understandable, given the natural progression of the development program, it is essential that program management ensures that documentation is provided in a timely manner and within budget.

The August 28, 1990 Subcommittee meeting was held to review the nearly completed work related to the development of the RELAP5/MOD3 thermal hydraulic code. Discussions during this meeting provided

evidence that the associated documentation was incomplete. The contractor personnel were new to the program and not well enough acquainted with the code's details to respond to questions from the Subcommittee. The potential exists for similar problems with the completion of the development program for the TRAC-PF1/MOD2 code. Deliberate attention by RES program managers is needed to ensure the documentation for these codes is adequate.

Another example that illustrates our concern involves the thermal hydraulic code known as REMIX, which has been used by the NRC to evaluate the potential for pressurized thermal shock given certain accident scenarios. Relevant experimental data were generated as part of the cooperative 2D/3D program, among the United States, Germany, and Japan, and these data were compared with REMIX code calculations. Although a Research Information Letter citing this work was issued in 1988, a report documenting these comparisons has never been issued by the NRC. Recent review of the Yankee Rowe pressurized thermal shock issue would have been well served by knowing how well the downcomer fluid temperature can be predicted, using a code such as REMIX, at the beltline welds following a small break loss of coolant accident.

Many millions of dollars have been spent on the development of the computer codes used by the NRC, nearly $20 million for RELAP5 alone. The NRC should make sufficient funding and resources available to ensure that the documentation associated with the development of the agency's codes is adequate.

Sincerely,

Carlyle Michelson
Chairman

Reference:
Memorandum dated August 24, 1988, from Eric S. Beckjord, Office of Nuclear Regulatory Research, for Thomas E. Murley, Office of Nuclear Reactor Regulation, Subject: "Research Information Letter No. 155, Full Scale Fluid Mixing Test Results in Support of Pressurized Thermal Shock Resolution."