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COLLEGE OF ENGINEERING
DEPARTMENT OF NUCLEAR ENGINEERING

BERKELEY, CALIFORNIA 94720

July 25, 1980

Dr. Novak Zuber
Chairman, Advanced Code Review Group
Division of Reactor Safety Research
U.S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Novak:

This letter is to provide my reaction to the Advanced Code Review Group and Code Assessment Review Group Joint Meeting held at Silver Spring, MD on June 26 and 27, 1980. In general, the meeting was well organized and represented a comprehensive review of the problems and status of the code assessment program. The documentation of the various presentations was exceptionally good.

The philosophical approach to code assessment is extremely complex and therefore, I think it will be impossible to define acceptance criteria that will satisfy every critic. My own preference is to focus on criteria that assure that the prediction of transient evolution of systems states is accomplished with sufficiently well based representations of the physical phenomena so that the predicted state of the fuel and cladding is "credible" over the entire accident event being analyzed. Quantification of "credibility" must have a component of judgement, e.g., related to the number standard deviations in a statistical error analysis, for the major variables. But whatever choice is made in this regard there remains a very complicated interaction between the calculated global response and the adequacy of individual physical modelling details contained in the codes which have to be assessed in order to judge the acceptability of the code. I think that Stan Fabic's guidelines for assessment recognize these facts by using extensive testing of global results against well qualified experimental data from large systems tests and also many detailed comparisons against high quality separate effects tests involving important individual phenomena. There are, however, several aspects on which I would differ with the suggested approach.

I appreciate the point that "acceptability" has to be viewed in terms of regulatory needs. However, I do not think that the present (or future) regulatory limits should be incorporated into any acceptance criterion for the code. The latter should aim at assuring that the B.E. code will "reliably" predict the system response for the full spectrum of possible accident circumstances. The criteria selected should ensure that the calculation is "correct" independent of whether the particular accident under consideration results in violation of regulatory limits.

Too much time was devoted to the discussion of DOX. This integral parameter is a "necessary" condition, i.e., the code must predict "measured" DOX but DOX is not a "sufficient" measure of whether the code has adequately predicted the time dependence of the cladding temperature. This is because greatly different temperature histories could produce the same DOX. On the other hand, the "acceptance" based on DOX would be only conditional pending examination of other criteria having to do with the details of temperature history. If this is the correct interpretation, then DOX will be a useful criterion.

I think it is necessary to have criteria that will examine the susceptability of the code to "threshhold" effects that are unreal. For example, Figures 44 and 77 in the LASL TRAC P1A Independent Assessment document showed sudden changes or discontinuities in mass flowrate that appear to be unrealistic. The cause of such predictions should be understood. Their occurrence may be unacceptable.

In general, the past tendency to make principally global comparisons needs to be overcome. Closer examination of available detailed data may show compensating errors that give the global result the appearance of acceptability. The question would then be: can we expect such compensation always to occur? This concern leads me to feel that detailed comparisons may need greater emphasis than they are getting.

The problem of comparing point measurements with calculated average properties within a calculational node is a very difficult aspect of assessment and it looks to me like more work is needed to develop a consistent methodology in this regard.

In the small break accident, the effect of oxidation on core heat transfer is a problem the codes should be able to handle. Zuber's discussion of the Problems of Modelling of Small Break LOCA was very interesting and shows clearly that there are some new code developments necessary to handle some of the phenomena. The scaling considerations are based on incompressible flow correlations and may be further complicated by the effects of compressibility.

The meeting was very useful, but it is evident that acceptance criteria need further development, discussion, and review.

Sincerely,

Virgil E. Schrock
Professor

VES:mm