PDR

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

CHAIRMAN

November 21, 1985

Mr. Milton Levenson
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Dear Mr. Levenson: Milt

Thank you for your letter of September 18, 1985 concerning new data on the nature of source terms and their impact in the regulatory arena, and concerning what may be called hidden assumptions in computer codes.

To treat your first point first, we agree that the emerging understanding of the nature of the physical source terms warrants review and, where justified by sound science, revision of many regulatory rules and practices. During recent months the staff has been reviewing the several areas of regulatory practice that could be impacted by changes in the perceptions of source terms and has already presented its preliminary assessment of which areas are involved to the Advisory Committee on Reactor Safeguards in a public meeting with an IDCOR representative present. When the staff's review has reached a more mature stage, a report of progress and a schedule for consideration of recommended changes will be submitted to the Commission. No changes will be considered, however, without Commission belief that they are based on sound science.

The staff is considering all of the potential containment responses following a severe accident, including the two that you mentioned, failure caused by a large scale steam explosion and design basis leakage. These two are unrelated because the steam explosion represents an early containment failure, while the design basis leakage case assumes containment integrity. Two that are related, however, are the design basis leakage and the so-called failure to isolate. Although risk is not the only consideration in evaluation of design features, the same risk evaluations which show that design basis leakage is likely to be less important to overall severe accident risk than previously thought, also highlight the significance of containment bypass. Therefore, the agency will review its position on assurance of containment integrity following a severe accident as well as its position on design basis leakage. I should mention that the assumptions that govern the choice of design basis leakage involve many other considerations than the cloud of elemental iodine that you postulate. They are given in Regulatory Guides 1.3 and 1.4.

With respect to your second point, I think it is safe to say that there are no codes of the complexity of those that deal with the severe accident regime that are, or could be made, foolproof. I believe the ingenuity of potential users far exceeds the clairvoyance of modelers and programmers. However, the federal government has issued guidance for programming practice which tries to deal with the indiscriminate user (FIPS-38, Documentation Standards). This is easier for codes that are used in a production mode, such as those developed over a number of years for nuclear design, than for the research codes being developed for the staff. Indeed, Draft NUREG-0956, "Reassessment of the Technical Bases for Estimating Source Terms," recognizes the several fields of expertise and the attention to quality assurance necessary for successful application of the severe accident code suite (Conclusion 5). Similar conclusions could be drawn about most codes.

To address the first of your specific points, it is true that CRAC II changes input wind speeds between zero and 0.5 meter/sec to 0.5 meter/sec. We do not feel this presents a problem severe enough to call the calculated results into question with an eye to revising regulatory practice. We base this belief on a number of considerations: First, the CRAC code was originally designed only to assess mean values of consequences and to investigate variability about the mean. For several years it has been used consistently for only this purpose in the regulatory arena. CRAC II will have the same application and consequently will not need or use micrometeorlogical inputs. It is inappropriate to use the code to evaluate a single weather sequence or a small number of sequences for comparison with measured results. Second, it is impossible to guess whether mean doses are larger or smaller because of the data change since in addition to the weather sequence I surmise you assumed in your simplified calculation (where the low wind speed applied to the time the plume left the plant), there is also the slowdown weather sequence where the low wind speed only occurs following transport of the plume to populated areas. This latter sequence would result in a greater calculated dose for lowered wind speed. Third, the impact on the mean value of consequences because of changes in wind speed input should be small. The frequency of these low wind speeds (those below the sensitivity of the anemometers installed at operating plants) is low in the U.S., below 10 percent for virtually all plants and below 5 percent for most plants. Were these low wind speeds more frequent events, they could impact the mean values.

In regard to your second point, we find no way that code calculations could, as implied in your letter, yield a value of 50 pounds per cubic foot for the aerosol mass concentration. The staff informs me that the mass concentration of aerosols in-vessel in the station blackout sequence (TMLB') for the Surry plant is 0.3 pound per cubic foot. This is a sequence for which such aerosol mass concentration is expected to be close to the maximum.

If on the other hand, the 50 pounds per cubic foot refers to material densities of individual particles, this value is an input quantity to the code calculation subject to modification by condensation of water onto particles. (The German containment code NAUA has been adapted for use in our source term code package.) The equations in the aerosol codes are believed to be applicable to a very wide range of material densities of individual particles. Fifty pounds per cubic foot (slightly less than the density of water) is well within this range and thus the code should not abort such a run.

In summary, the staff is considering what modifications could or should be made to regulatory practices based on the improved source term analytical procedures. No changes will be made without the assurance that they are based on sound science. The staff is in agreement with your general suggestion that codes used by NRC be as foolproof as possible and has issued guidance on that subject but notes that codes of this type must always be used with caution and with careful attention to their ranges of applicability.

Again, thank you for your letter. I urge you to continue to bring any specific concerns on this developing technology to the attention of the appropriate members of the staff.

Sincerely,

Nunzio J. Palladino