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Dear Mike:

At the recent BMI-2104 peer review meeting, it was exciting, as always, to see the progress which has been made toward improving the state-of-the-art of source term estimation. However, some significant problems still remain to be solved before better source terms can be estimated. Among those problems are the following:

1. The VANESA computer code for estimating releases due to core-concrete interactions has not been adequately documented or reviewed. No independent technical review of that code has been performed.
2. The verification-validation studies for CORSOR AND MARCH, as well as for VANESA, were performed by individuals participating in their development. This might be acceptable for a code such as MARCH which has received so much attention, including extensive independent peer review, but it certainly is not for the others. For example, see the enclosure for some review comments on the adequacy of the associated verification-validation report which was written by one of the proponents of those models.
3. The effects of steam explosions are not addressable with the BMI-2104 methods as they currently exist. For example, the release rates in CORSOR are not applicable to steam explosion releases. Inasmuch as the possibility of steam explosions has not been ruled out, this neglect seems inappropriate.
4. Important chemical issues are completely untreated. For example, the boron issue has still not been included in the BMI-2104 analysis. For boron, at least the following important questions need to be addressed:

"Can the boron present in some control rods significantly affect the aerosol source terms in

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some accidents in certain plants, e.g., in severe accidents in BWR's?";

"Can the boron present in emergency shut down water significantly affect the aerosol source terms in some accident sequences in some plants, e.g., in sequence TC in a Mark I BWR?";

"Can any released boron significantly affect the chemical forms, and thus ultimate releases, of certain species such as iodine?"

Although such questions for boron, as well as similar questions for other elements, have been raised many times during the peer review, they have not been adequately addressed. At a minimum, questions such as these should be dealt with in uncertainty analyses.

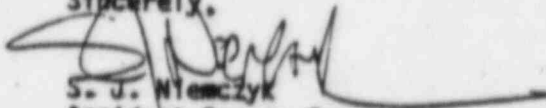
5. The adequacy of the BMI-2104 methods for describing accidents involving external events has not been demonstrated. Indeed, one can think of a number of reasons why they would not be applicable. Inasmuch as accidents involving external events may dominate the risk at certain plants, the potential inadequacy of the BMI-2104 methods for describing such accidents warrants further investigation.
6. The assertion in (Vol. IV of draft BMI-2104) that the effects of hydrogen igniters have been taken into account is misleading as only a few limited effects of those igniters have been considered in the analyses. Other potentially important effects such as possible substandard operation of, or even failure of, the igniters due to aerosol plugging; altered hydrogen ignition and/or combustion due to concentrated aerosol environments in the containment; failure of other equipment such as electrical equipment due to localized burning; evaporation of fission products from aerosols due to localized heating; and altered chemical forms, and therefore altered release of some radionuclides to the environment, due to combustion have not been taken into account.
7. The descriptions of the appropriateness of some of the codes as used in BMI-2104 are inconsistent with the descriptions of the appropriateness of the same codes as used in ASTPO's closely-related containment performance work. For example, in the most recent BMI-2104 review meeting, BCL staff stated that INTER predicts energy and mass balances relatively accurately and therefore can be used to predict the rate of gas generation from core-concrete interactions; however, in a recent IDCOR/NRC information exchange meeting in Knoxville (12/21/1983), BNL staff stated that INTER predicts energy balances very poorly and therefore cannot be used to predict the rate of gas generation from core-concrete interactions. Consistent arguments should be used throughout NRC's source term program.

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8. Scoping sensitivity and uncertainty analyses, if performed correctly, could provide an invaluable wealth of information both for defining important research directions and for facilitating various regulatory needs. However, as those analyses have been performed for BMI-2104, they seem to fall short of being able to provide much information for either purpose. The work, as presented at the most recent review meeting, involved very limited sensitivity analyses for just some of the computer codes used for BMI-2104. The uncertainty analyses were even more restricted. Yet they should have been more extensive due to the number of as-yet uninvestigated, although potentially important, sources of uncertainty.

The goal of the reviewed work is stated to be realistic source term estimates, or at least a set of methods and procedures for generating such estimates. However this is currently not an attainable goal as the available methods are so far from being able to provide truly realistic estimates. If the goal remains as stated, then issues such as the ones indicated in Items 3, 4 and 6 must be thoroughly addressed. If the goal is changed to providing some type of bounding estimates, e.g., conservatively realistic estimates, then sensitivity and uncertainty analyses must form the cornerstone of the effort. The Sandia sensitivity-uncertainty analyses appear to be inadequate for such purposes.

Sincerely,



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Enclosures: Review of CORSOR Code Validation Report