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Dear Mr. Rasin:

The NRC staff has completed a review of the draft NUMARC document, "Guidelines for Evaluating Accident Management Capabilities," provided in your August 18, 1989 letter to R. Houston. Recognizing the importance of this utility initiative we have obtained the views of a broad audience in reviewing the document. This included staff from the offices of Nuclear Reactor Regulation, Nuclear Regulatory Research, and Analysis and Evaluation of Operational Data, as well as three NRC contractors. It is the general consensus of the reviewers that the guideline document presents a logical and structured approach to the development of plant-specific accident management plans, and is a good starting point of NUMARC's effort to provide more definitive guidance to the industry on accident management. NUMARC and industry are to be commended on this effort. We trust this dedication will continue through the significant remaining activities to develop a final product which meets the needs and expectations of both industry and NRC.

Although accident management is not new, it is an area in which concepts and definitions continue to mature, wide ranges of views persist, and "acceptability" and "adequacy" remain to be defined. Thus, the NUMARC document, which represents a first attempt to systematically address the topic, has elicited many comments. Our comments and recommendations on the document are provided in Enclosure 1 to this letter. These comments are grouped by the general area of the accident management evaluation process to which they pertain and have not been arranged in any order of priority.

We view the planned demonstrations of the accident management guidelines as providing many of the "answers" to the questions raised through industry and NRC review of the guideline document. The importance of the demonstrations can be illustrated by consideration of "standards" for an acceptable accident management plan. The NUMARC method contains no such standards at present. Although absolute standards may not be appropriate because of differences in plant design and operating philosophies, the NRC and NUMARC should develop, and the final guidelines should reflect, a consensus on general features of an acceptable program. The demonstration projects may provide us an opportunity for dialogue in this regard. As we observe the guideline applications in progress and evaluate

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the results, we will get a first-hand understanding of which aspects of accident management are crucial to accident management success and which aspects are optional. In this regard we consider that close interactions with NUMARC in the conduct of the demonstration project are of utmost importance.

While initiation of the demonstration project in a timely manner is important to maintaining our overall schedule for accident management, we do not believe that it would be prudent to rely on the demonstrations as the mechanism for resolving all outstanding comments, or to defer addressing these comments until the demonstrations are underway. A revision to the guideline document to reflect NRC and industry comments is recommended prior to initiation of the demonstration project, even if it results in a delay of this activity.

We propose a meeting in November/December timeframe to discuss the comments on the accident management guidelines document, and plans for the demonstration project. Once again we commend you on this effort to tackle a difficult topic, and look forward to further staff-industry interactions as we proceed toward resolution.

Sincerely,



Frank J. Congel, Director
Division of Radiation Protection
and Emergency Preparedness
Office of Nuclear Reactor Regulation

Enclosure:
As stated

COMMENTS ON NUMARC GUIDELINES FOR EVALUATING
ACCIDENT MANAGEMENT CAPABILITIES

GENERAL APPROACH

The guidelines appear to be based on a consensus decision to avoid being prescriptive, with a stated objective "to retain flexibility for individual utilities to perform the evaluation and to implement findings in a manner that best fits their needs." We think that this flexibility may result in inconsistent development of the accident management (A/M) programs by individual utilities.

The approach used in the NUMARC Guidelines is markedly different from that used to develop the EOP Guidelines. In the case of the EOP development, Owners Groups developed very specific guidance which, while recognizing differences among the plants, laid out specific guidelines that were to be followed. The guidelines were based on generic plant features and recognized that accommodations had to be made to account for individual plant differences. We recommend that in the development of a revised document, NUMARC consider a process more akin to the development of the Emergency Operating Procedures (EOPs). Without more specific guidance the accident management programs may be very different from utility to utility, both in terms of the scope and the quality of the program.

ROLE OF ACCIDENT MANAGEMENT STRATEGIES IN THE EVALUATION

The role of accident management strategies in the evaluation process and the relationship to the IPE results and to ongoing work by industry and NRC should be clarified. For example, the document indicates that the guidelines do not attempt to address the development of accident management strategies for controlling an accident after there has been melting of the reactor fuel (page 4). However, the process described includes identifying the capabilities of the existing equipment for situations well beyond core melt and selecting and using this equipment for the management of accidents. Although the word strategies is not used, the identification and use of non-safety grade equipment would constitute development of accident management strategies and contradicts the statement on page 4. It is not clear how the accident management evaluation can be properly conducted without an explicit consideration of accident management strategies and their effects.

On pages 4 and 5 the guidance or strategies for best controlling an accident after there has been melting of the reactor fuel are said to be plant-specific. As core damage progresses and accident severity increases, the options available to plant staff for terminating the accident and mitigating its consequences become more limited and the issues in dealing with the event become more fundamental and generic in nature, for example, whether or not to reflood a degraded core, whether or not to flood the reactor cavity, and priorities of injection to the core versus injection via sprays. Strategies to deal with these aspects of an accident can be argued to be generic rather than plant-specific in nature, even though the manner in which the strategy would be implemented at a particular site would be plant-specific. We recommend establishing a dialog with the various owners groups to identify and further develop these "generic" strategies.

SELECTION OF SEQUENCES FOR EVALUATION

The A/M evaluation process appears to place too much emphasis on the numerical results of the IPE and shortchange the role of other key inputs, such as recent industry- and NRC-sponsored PRAs and studies/analyses of severe accident phenomena and containment challenges. A sufficient body of knowledge exists on which a basic set of sequences and containment challenges can be developed. The NRC recommends that such a set of information be considered for inclusion in the A/M guidelines to serve as a "core" for the evaluation process. The "core" information would be supplemented or supplanted by IPE results and insights. Consideration of this "core" information in the evaluation would provide assurance that potentially important sequences and containment challenges are not overlooked due to undetected deficiencies in the IPE analysis.

The guideline document should take a stronger position that a wide range of events should be considered in the evaluation process. We believe that good accident management practices would include both defense in depth and a probabilistic approach based on the IPE analysis. Also, the evaluation process should emphasize consideration of low probability, high consequence accidents such as interfacing systems LOCA. The approach of using a "core" set of sequences and containment challenges could minimize this concern.

An additional concern with grouping and screening sequences for evaluation is that if a recovery action was credited in the IPE analysis and caused a sequence to fall below the screening value, then that sequence would be dropped from consideration. Thus, one of the objectives of A/M -- to focus on such recovery actions -- would not be served. It is recommended that the grouping/screening process in the guidelines be modified to assure that important human actions (operator recovery actions as well as errors) be captured for further analysis. This might be accomplished by adding a sixth grouping element (page 21) which would address human actions that have been factored into the IPE analysis, and by performing accident sequence screening prior to incorporating recovery actions (if a quantitative screening approach is utilized).

Finally, the guidelines allude to a first report which "outlines appropriate approaches for examining the results of Individual Plant Examinations to identify measures that should be taken to address important risk contributors." We understand that this first report does not yet exist in a reviewable form. When it becomes available, the staff would like to review the document for technical content and to understand the role of the document in the IPE and accident management process. Of particular interest are the approaches presented for dealing with operator recovery actions.

GUIDANCE IN RESPONDING TO QUESTIONS

The success of the evaluation process relies on the quality of answers given to the set of questions posed. The lack of background information and "acceptance criteria" for the questions may cause personnel involved in answering the questions to provide answers that are too limited in scope or based on their opinions rather than on factual information. We recommend that a short discussion be developed to accompany each of the structured questions posed in Step 2. The discussion could identify items that utilities should consider in addressing the question, provide acceptance criteria, where possible, and cite good practices and potential pitfalls/weaknesses.

TRAINING

The types of personnel for which training would be assessed need to be more explicitly stated. It is recommended that personnel covered include control room operators, all staff assigned to positions in the Technical Support Center, the Operations Support Center, and the Emergency Operations Facility, and selected equipment operators, maintenance supervisors, and utility managers who would be faced with making important decisions during the course of an accident.

The document does not provide sufficient guidance to utilities regarding which areas merit emphasis in training. A recommended scope of accident management training and applicability to the various Emergency Response Organization positions should be formulated and presented in the guidelines. The document should more clearly identify the role of classroom training, emergency preparedness exercises and drills (such as INPO casualty control drills), exercise/drill followups and critiques and simulator training as training tools. The guidelines should also stress the use of a systems approach to training for emergency response personnel to assure that these personnel are adequately prepared to deal with a potential severe accident. Interaction with INPO in the development of this guidance should be considered.

COMPLETENESS OF QUESTIONS

1. The question set that is proposed for Training does not include the following important questions which would provide a greater range of training options:
 - A. Is training adequate for recognizing that this scenario is in progress?
 - B. what actions or decisions are involved in this scenario?
 - C. what knowledge/skill/ability (KSA) is needed to accomplish each of these actions/decisions?
 - D. are these KSAs covered by learning objectives and lesson plans in the existing training program?
 - E. if so, is the context of that training similar enough to assure that these learned skills are readily transferable to the severe accident context?
 - F. what measures of effectiveness are used to ascertain that trainees have learned the appropriate KSAs?
 - G. how frequently are these actions/decisions performed or trained upon?
2. The text and structured questions related to Organization and Communication would benefit from additional discussion of capabilities that may be in place already in response to emergency preparedness and what aspects of these capabilities may require further consideration as part of the A/M evaluation. Unless some distinctions between emergency preparedness and accident management can be made, these aspects of the evaluation process

may receive only cursory treatment by utilities. For example, overriding plant procedures and use of equipment for innovative applications can be extremely important and desirable under certain situations as identified in INPO casualty control drills. Some key questions which should be included are:

- A. what decisions must be made during this scenario?
 - B. who has the knowledge and authority to make each of these decisions?
 - C. is there an adequate "triage" decisionmaking capability?
 - D. has the timing of decisions been taken into account in assigning responsibilities?
3. The use of alternative systems and equipment to fill the role of a lost safety function is a key part of accident management. Several additional questions should be included and discussed in the guidelines to ensure that this topic receives appropriate attention. These are:
- A. is the use of alternatives adequately covered by procedures for operators or guidance for technical support staff?
 - B. is adequate training, including walkthroughs, provided to staff on the use of alternatives?
 - C. do exercises and drills provide an adequate opportunity for emergency response staff to identify and to implement (simulate) as realistically as possible the use of alternatives?
 - D. do exercise/drill critiques provide for an adequate assessment of the effectiveness and potential negative impacts of alternatives identified during the exercise/drill?
4. The section on Procedures and Guidance does not apply some of the important lessons learned from our EOP inspections, e.g.:
- A. are existing procedures written in accordance with applicable plant standards?
 - B. are the procedures independently reviewed for correctness?
 - C. are the procedures/guidance exercised in some way (walk-through, simulation, etc.) to confirm that they can be accomplished and will work as intended?
5. Additional questions and/or clarifications should be added to address important severe accident phenomena. The objective would be to assure that important phenomena and uncertainties are recognized (e.g., debris bed cooling, direct containment heating) and that A/M measures and alternatives to deal with or avert such phenomena are considered as part of the A/M evaluation.

TRANSITION FROM EOPs TO ACCIDENT MANAGEMENT GUIDANCE

Application of the guidelines may result in the development of new procedures and guidance for control room operators and technical support staff which could have complex interfaces with existing emergency operating procedures (EOPs). As part of evaluating Procedures and Guidances, the guideline document correctly raises the question concerning the point of transition from the EOPs to the accident management guidance, but does not provide guidance on how the newly developed severe accident procedures and guidance should be interfaced with existing EOPs or how operations and technical support personnel should interact to maximize their effectiveness. Additional guidance to utilities is needed on this matter to avoid the proliferation within the industry of a wide range of different approaches for handling this transition. However, additional work by industry and NRC is needed first to develop some consensus or understanding regarding the transition. We recommend that the support of the various Owners Groups be obtained for the purpose of developing a formalized structure for generic aspects of the accident management guidance and an approach for orderly transition from the EOPs to this guidance. Involvement of the Owners Group in this endeavor would help assure compatibility between accident management guidance and the EOPs. The guideline document should stress that the point of transition and the roles of the operators and technical support staff before and after the transition be explicitly considered and defined for each accident management strategy.

COMPUTATIONAL AIDS

The capability of operations or technical support personnel to understand the progression of an accident and to project its potential future progress is not recognized in the guidelines. The process for assessing the need for computational aids for this purpose should be addressed in the guidelines. The guideline document should also provide some guidance on the types of basic computational capabilities a utility should consider having for potential severe accidents. This could be provided in a list format, with references to published or otherwise available computational models or tools.

INTEGRATING CANDIDATE OPTIONS

The process involving the integration of candidate options may be more complex than described. Development of a matrix or a series of matrices may not identify potential negative effects that are important for proper integration. For example, one plant capability may call for the addition of water to the RCS for an extended period of time; use of another capability may also rely on this same water source at a later time. It is not clear that the matrix approach proposed would identify the competing demands on one plant resource since an assessment of potential negative effects is not discussed as part of this integration process. We propose a more detailed discussion of the analysis of the consequences (dependencies) from the use of alternative systems (e.g., the use of fire water for core injection may deplete the sources for a fire later in the accident - what is the tradeoff, other alternatives, etc.). This aspect of the evaluation process should be highlighted in the planned demonstration applications of the guidelines.

TESTING PROPOSED CHANGES

In testing the enhancements it is not clear what the analysts would look for, and how they would know they are done. For example, would each of the sequences impacted by an enhancement be reassessed at each branch point in the event tree? Also, we have not found any guidance as to whether an evaluation of the risk reduction (in core damage and/or release frequency) from accident management enhancements should be performed. We propose that if such an evaluation has not been performed by the utility for cost-benefit calculations, at least a qualitative discussion of the potential risk reduction be included for each enhancement and why each enhancement is superior/inferior to other enhancements.

SELECTING ENHANCEMENTS

Having produced this caliber of guidance on how to determine what needs to be done to enhance accident management capabilities, it seems that the guidelines should include some discussion of the nature and the scope of the end product (e.g., a comprehensive accident management plan, A/M strategies, training plan), and how to implement A/M enhancements, as well as some implementation "standards." This would make it clear that application of the guidelines is not an end in itself.

PERSONNEL FOR CONDUCTING EVALUATION

In several places the document mentions the advantage of utilizing IPE personnel in the evaluation process. We believe that the quality of an accident management evaluation will be better and have increased credibility when not only IPE personnel participates in the analysis process but also control room operators and Technical Support Center personnel. We recommend that these analysis team aspects be considered and emphasized in the document.

DOCUMENTATION

Because the development of options for enhancing accident management capabilities will be iterative in nature, documentation of the process leading to the various options and the disposition of these options is an important element of the evaluation process. Although the guideline report discusses documentation, it gives no guidance for content and format. It would be useful to NRC in the long run if we had some set format that we could expect to see when we audit A/M programs. It would also be useful to the utilities to know what is expected. It should also be made clear that the documentation developed by the utility as part of the evaluation process is identified as the "utility's accident management plan."

VERIFICATION/VALIDATION

The accident management evaluation performed by a utility should be subjected to reasonable review in accordance with accepted engineering practice. This does not mean that it must meet the QA requirements of 10 CFR 50 Appendix B

except for those aspects of the accident management plan which might effect the design basis of the plant. Independent oversight or peer review are two options we propose be explored.

MAINTAINING A "LIVING" PROCESS

The evaluation and maintenance of accident management capabilities should be an ongoing effort. The A/M guidelines provide a mechanism for initial evaluation and enhancement of A/M capabilities, but give little attention to the long term commitment of a utility to updating and maintaining the plan as a living capability. As part of applying the guidelines, changes to the utility administrative procedures and processes should also be made to assure that capabilities are maintained and updated. This could involve reassessment of A/M capabilities periodically or for certain events identified through further research or operational experience, but should be broader so as to establish or enhance administrative processes to promote, on a continuing basis, such factors as: communication of IPE and A/M information within the organization, incorporation of such insights into training programs and exercises, and feedback from training and exercises. The guidelines do not go far enough in describing the nature of these organizational/administrative changes which would provide added assurance that enhanced A/M capabilities become a way of doing business, and which, in effect constitute the A/M "framework."

EDITORIAL COMMENTS

1. In the Foreward the document leaves an incorrect impression that evaluation of accident management procedures would be limited to the review of the strategies identified in SECY-89-12. It is the staff's intent that utilities develop a broader set of strategies than this, based on consideration of such things as plant-specific insights developed thru the IPE (e.g., dominant accident sequences, important components and equipment failures, and important human actions), and operational events, as well as the example strategies in SECY-89-012.
2. The statement in the Foreward that the "evaluation process, together with the actual implementation of the enhancements selected, comprise a program adequate to satisfy that envisioned by the NRC in SECY-89-012" inaccurately reflects the status of the guidelines document and is premature.
3. The document states in the Foreward that NUMARC is presently discussing with EPRI et al. what technical guidance may be necessary or useful. An additional statement is needed to place such guidance in perspective, e.g., "The implementation of this technical guidance would be accomplished as part of a utility's implementation and periodic reassessment of accident management capabilities."
4. The end states in Figure 2 in which debris is not cooled are not stable states as indicated on page 9.

5. In the discussion of the importance of assembling plant data (page 12), it should be recognized that assembling plant data, putting it into an easily accessible and usable form, and placing the data at appropriate plant locations is necessary not only to support the planning stages of accident management but to support the response to a potential severe accident as well. If the use of information for response purposes is not recognized when the data is assembled, it may not be in an easily accessible format or placed at proper locations to support accident responses.
6. The Grouping Categories in Tables 1 thru 4 (pages 22-23) may be confusing since they are by groups of systems rather than by traditional plant safety functions (core heat removal, RCS heat removal, etc.). Also, the Groupings are not complete. This lack of completeness should be clearly identified in the document.
7. On pages 24 and 25 the guidelines document improperly characterizes IPE sequence reporting criteria as screening criteria. The criteria reproduced in Table 5 (page 25) were proposed by the NRC for the purpose of identifying those sequences which should be described in the utility IPE documentation, not "for the purpose of identifying those sequences for which actions to limit risk further should be considered."
8. The document understates the importance of assessing how and to what extent insights from the IPE are related back to training of operators and support staff (page 35). This is a key aspect of accident management and should be given greater emphasis.
9. In several places in the document there is an implication that providing water is equivalent to cooling the core debris. There remains some uncertainty regarding whether this is always the case. The document should recognize that under some circumstances debris may not be quenched even though water is supplied.