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Chief, Rules and Procedures Branch  
Division of Rules and Records  
Office of Administration  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Subject: Reactor Risk Reference Document  
NUREG-1150, Draft Report  
52 Federal Register 7950

Dear Sir:

Duke Power Company hereby submits the following comments on the captioned draft document. NUREG-1150 is intended to provide a resource that can be used to address many present-day regulatory considerations that exist within the NRC's licensing, inspection, and research responsibilities. The main report states that NUREG-1150 provides "estimates of risk and the frequency of core-damage accidents" and "much of the technical basis needed to support regulatory initiatives." We support the intent of the effort; however, we are concerned that the objectives have not been achieved despite the substantial effort devoted to NUREG-1150. The document focuses on uncertainty only and provides no mean estimate of risk. In addition, the methods used to arrive at the uncertainties are questionable.

However, even considering the questionable treatment of uncertainties, it is important to note some significant findings. The fact that all plants studied satisfy the published NRC Safety Goals by a significant margin, even with the large uncertainty bands included, is an important finding. Also of significance is the finding that plant design changes, particularly those of a mitigative nature, are not effective in achieving a significant reduction in overall risk levels.

These findings indicate that the path to a sustained or improved level of safety is through excellence in operations, maintenance, and training and not through additional regulatory requirements and plant modifications. The extensive work that Duke has done in performing full scope PRA's for our nuclear stations leads us to the same conclusion.

NUREG-1150 should not be interpreted to justify a large government and industry research program aimed at arbitrary reduction of uncertainty. NUREG-1150 leaves the impression, with which we disagree, that the many millions of dollars spent on nuclear safety research since the TMI-2 accident have not been effective. Future research efforts should have a very clear purpose and focus such as providing a sound technical basis for more rational emergency planning regulation or the Technical Specification Improvement Program.

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letter sent 8/20/87

The following specific comments are based on a limited review of NUREG-1150. Failure to comment on any aspect should not be taken to imply agreement.

- o The document does not significantly alter the previous state of knowledge regarding reactor risk. Its conclusions are similar to those of WASH-1400 and to the policy conclusions reached in the Severe Accident Policy Statement. The presentation of the large uncertainty bounds without any indication of the "central estimates" or "best estimates" leads to the conclusion that little is known about the risk of nuclear power plant accidents. The focus is on the uncertainty without sufficient emphasis on the improvements in modeling and understanding, implying that the many millions of dollars spent on experimentation, research and study have done nothing to improve the understanding of severe accident analysis.
- o As structured, the document has not fulfilled the purposes stated in the opening paragraph of its Executive Summary. That purpose is "to provide a data base and insights to be used in a number of regulatory applications," including:
  - (1) implementation of the NRC Severe Accident Policy Statement,
  - (2) implementation of NRC safety goal policy,
  - (3) consideration of the NRC Backfit Rule,
  - (4) evaluation and possible revision of regulations or regulatory requirements for emergency preparedness, plant siting, and equipment qualifications, and
  - (5) establishment of risk-oriented priorities for allocation of agency resources.

For each of these purposes, a central estimate of risk is needed, not merely a statement of the breadth of possible uncertainties.

- o The level of detail of the risk analyses and models used in performing these studies for the five reference plants appears to be inconsistent. It is not clear whether differences in results for each plant are attributed to the plant design and operation or to the differences in the methods used to determine the risks.
- o Appropriate credit is not given for equipment not governed by technical specifications.
- o Treatment of common-cause failures appears to ignore the number of components beyond the first two. Thus, it implies that increasing redundancy has no effect on the common-cause-failure probability.
- o The composition of the expert review teams did not encompass the large body of knowledge outside the NRC and its contractors. Important issues should receive a thorough review by competent reviewers.

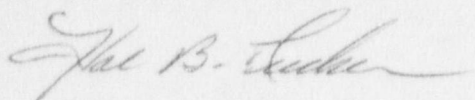


- o It is our understanding from the NUREG-1150 workshop that some or all of the review members were requested to render their opinion on issues outside their area(s) of expertise. Expert judgement should be limited to those individuals knowledgeable in a given area. In addition, the reviewers should be required to provide supporting reasons for their judgements.
- o The assignment of Containment Event Tree (CET) branchpoint probabilities relied heavily on expert judgement, with a limited amount of computer analysis. This approach does not appear to be consistent with the high level of detail included in the CET itself. Either the CETs should be simplified or more computer analysis should be performed in order to have a consistent approach to the containment failure analysis.
- o The process of using a few Source Term Code Package runs combined with expert judgement and simple parametric codes is questionable. It appears that in some cases the source terms were "force fit" with the containment failure modes. In addition, uncertainties in the source term appear to be driven by issues not encompassed by the Source Term Code Package. This overall procedure relies on less than state-of-the-art methods.
- o The MACCS computer code has not been thoroughly documented and has not been subjected to peer review. MACCS contains many differences from CRAC2 and has produced higher risk results. Since MACCS is new and was developed for use in the NUREG-1150 study, the implication is that MACCS is more accurate than CRAC2. Until MACCS has been through a substantial "shake down" period and has had significant peer review, MACCS results should be viewed as preliminary.
- o The integration of project results (integration of core damage sequence analysis with consequence analysis) is a key step in risk assessment. It is not clear that the plant damage states and release categories adequately represent the dominant accident sequences.
- o Although the draft NUREG-1150 was published in 1987, a large portion of its technical basis is represented by BMI-2104, which was published in 1984 and had deficiencies which were recognized at that time.
- o When performing cost-benefit analyses for evaluation of proposed changes intended to reduce public-health risk, averted on-site costs should not be included. Avoiding or incurring costs related to damage of a plant is an issue of economic importance to a utility; it is not related to health and safety of the public. It is significant to note that even including averted on-site costs, proposed modifications are not cost effective in reducing plant risk.

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In summary, NUREG-1150 indicates the high level of safety that has been attained by prudent nuclear plant design and stringent nuclear regulation. Yet this message is obscured by highlighting uncertainties arrived at by questionable measures. This picture of uncertainty should not lead us into an unfocused research program.

Very truly yours,

A handwritten signature in cursive script, appearing to read "Hal B. Tucker".

Hal B. Tucker

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