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ACRS MEETING MINUTES ON THE
SAFETY PHILOSOPHY, TECHNOLOGY AND CRITERIA
MAY 8, 1985
WASHINGTON, DC

- CLOSED MEETING -

The ACRS Subcommittee on Safety Philosophy, Technology and Criteria met on May 8, 1985 at 1717 H Street, N.W., Washington, D.C. The purpose of this meeting was to discuss the draft report of the NRC Task Force whose responsibility to evaluate the two year trial implementation of the proposed Commission Safety Goal Policy. At the time of this Subcommittee meeting, the NRC Task Force Report was under review by the EDO and senior NRC Staff and was held by the NRC Staff to be pre-decisional. The Subcommittee was closed at the request of the NRC Staff for this reason. The NRC request for closing this meeting is included as Attachment A. ACRS action on the matters discussed here is planned for the June 6-8, 1985 ACRS meeting. The Subcommittee heard presentations from representatives of the NRC Task Force. The meeting began at 3:00 p.m. and was adjourned at approximately 6:45 p.m. and was held entirely in closed session. The principle attendees were as follows:

D. Okrent, Subcommittee Chairman
J. Ebersole, Member
W. Kerr, Member
C. Michelson, Member
F. Remick, Member
G. Reed, Member
D. Ward, Member
C. Wylie, Member
R. Savio, ACRS Staff
T. Murley, NRC Staff
F. Rowsome, NRC Staff

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Highlights

1. T. Murley discussed the currently anticipated schedule for the review of the Task Force recommendations for reviewing the proposed Commission Safety Goal Policy. The Task Force report has been transmitted to the EDO for review by the EDO and senior NRC Staff. It is expected that this review will be complete by mid to late June and that NRC Staff recommendations will be transmitted to the Commission at that time. ACRS comment may have to be provided as early as the June 6-8, 1985 ACRS meeting under this schedule. Consideration is being given to ~~assuming~~^{issuing} the revised Safety Goal Policy without first seeking additional public comment.

2. The proposed Safety Goal, as originally issued, contained three design objectives and a cost benefit guideline for use in the regulatory decision making process. In the Commission's words, these were stated as follows:

° Design Objective on "Individual Risk."

"The risk to an average individual in the vicinity of a nuclear power plant of prompt fatalities might result from reactor accidents should not exceed one-tenth of one percent (0.1%) of the sum of prompt fatality risks resulting from other accidents to which members of the U.S. population are generally exposed."

° Design Objective on "Societal Mortality Risk."

"The risk to the population the area near a nuclear power plant of cancer fatalities that might result from nuclear power plant operation should not exceed one-tenth of one percent (0.1%) of the sum of cancer fatality risks resulting from all other causes."

° Design Objective on "Plant Performance."

"The likelihood of a nuclear reactor accident that results in a large-scale core melt should normally be less than one in 10,000 per year of reactor operation."

° Cost-Benefit Guideline.

"The benefit of an incremental reduction of societal mortality risks should be compared with the associated costs on the basis of \$1,000 per person-rem averted."

The Task Force has recommended some changes, the most significant of which is that the Cost-Benefit Guideline be changed to include consideration of onsite property loss and replacement power costs. The revised Cost-Benefit Guideline would read as follows:

"The benefit of a incremental reduction of societal mortality risks should be compared with the associated costs on the basis of \$1,000 per person-rem averted plus, for core melt accidents, the on-site radiological, including economic, costs averted."

This position counts a reduction in the risk of economic loss as a benefit to the utility. The NRC Staff also notes that experience has shown the economic losses by utilities are often paid ~~ed~~ by the ratepayer. This change is consistent with past ACRS recommendations to include total costs as well as \$1,000/person rem. The ACRS has also recommended that the loss of societal resources should be considered. This is not done beyond what comes along with the \$1,000/person rem guideline. (The Task Force believes that the \$1,000/person rem averted guideline includes the

simple economic value of public and offsite private property but not a consideration of resources which cannot be replaced).

The Task Force intends that this change will give what they believe is an appropriate weight to a "defense in depth" philosophy and noted that this is not an attempt to regulate the economics of nuclear power. The Task Force's recommendation is not to apply this cost-benefit principle to accidents which have a small likelihood of leading to core melt. In addition, they noted that this objective could be achieved in other ways if the counting of averted property loss and replacement power cost provide too controversial.

3. The Task Force has also recommended that the "0.1%" design objective in the "Societal Mortality Risk" design objective be computed on the basis of the population within a radius of 10 miles from the plant. (The Safety Goal Policy currently specifies a radius of 50 miles). The Task Force estimates that this would increase the protection provided by this design objective (if it were the limiting design objective), by a factor of 10. Core melt and individual fatalities are expected to be the more critical design objectives, with core melt being expected to take on a greater importance if the calculated source terms are reduced. The degree to which plant modifications will be required if a plant does not meet the core melt (plant performance), individual risk, or societal mortality risk design objectives is dependent on the type of cost benefit guidelines adopted. Under the present cost benefit guidelines (\$1,000 per person rem averted) very little money would be available except for the very worst and least probable accidents. Plants would, under this proposal be allowed to have high core melt probabilities and not have to be changed if adequate (to limit exposure) siting or containment performance could be demonstrated.

4. There was some discussion as to how safety goals should be used in regulation. The Task Force recommends that the emphasis is on the use of the safety goal as design objective guides (through not in the sense of a Regulatory Guide) rather than as requirements. The Task Force recommendations for thresholds for the NRC Staff consideration of potential safety improvements are when the core melt frequency for all (considered) accident sequences exceeds 10^{-3} /reactor year or when the core melt frequency associated with a single accident sequence exceeds 10^{-5} /reactor year. They further recommend that core melt frequencies between 3×10^{-5} and 10^{-3} /reactor year result in additional analysis to determine if the individual (early fatality) and societal (latent cancer) design objectives have been met. If these are not met, potential safety improvements will be considered. The Cost-Benefit Guideline will be used to determine if safety improvements will be implemented. The threshold above which safety improvements will be rejected as being too costly will be dependent on the final form of the Cost-Benefit Guideline.
5. The Task Force recommends that the NRC continue to evaluate the need for a containment performance guidelines but that no guidelines be included in the Safety Goal Policy at this time. In developing its position, the Task Force appears to use the rapidly evolving state-of-the-art of containment performance analysis as the basis for not including a containment performance goals in the Safety Goal Policy. The Subcommittee appeared to favor the use of containment performance guidelines. It is expected that this will be discussed in the future.
6. There was some discussion as to whether median or mean values should be used in measuring compliance with the safety goal design objectives. The Task Force recommends that the median be used. This was discussed to some extent. It was noted that median values

do not reflect uncertainty as to mean values and that the use of mean values has an advantage from this perspective.

7. The Task Force reviewed the results of 16 PRAs and made comparisons against the proposed safety goal design objectives. It was noted that a variety of methods and data were used in performing these PRAs and that risk contributors were excluded in all of these PRAs. It was noted that:

- a. Most of the core melt (median) estimates were in the proposed screening range of 3×10^{-5} to 1×10^{-3} /reactor year.
- b. All of the plants met the societal mortality (lateral cancer) design objective by a wide margin.
- c. About half of the plants had median prompt fatality estimates that were near or exceeded the prompt fatality goal.

The plant improvements made (or planned but not completed) after the performance of the PRAs would reduce these estimates. The Task Force was of the opinion that Safety Goal considerations would not have lead to additional safety improvements beyond those already taken by the Licensees.

The NRC Task Force has considered as to how the Safety Goal Policy should be implemented in the future. Their recommendations, in the Task Force's own words, are as follows:

- a. The vehicle for implementing safety goals should be a Commission Policy Statement, not a regulation.
- b. There should be a phased implementation of the safety goals into the regulatory process. This is, the Staff should begin

using the safety goals in those areas that are ripe for such usage, such as evaluating new generic requirements. In other areas of regulatory activity where the use of safety goals is not yet ready, such as setting priorities for using Staff resources on the Standard Review Plan, the Staff will develop the procedures to expand the use of safety goals and will implement their use at that time.

- c. For those areas of regulation where the Staff uses safety goals, the safety goals will be used in conjunction with, but will not supplant, traditional safety review methods for making regulatory decisions. Nuclear power plant licensees will still be expected to meet NRC's regulations.
- d. In using the results of PRAs the Staff will ensure that each PRA receives a peer review and will allow for estimated uncertainties by using judgment in applying the results in regulatory decisions.
- e. The use of PRA results and safety goals should not diminish the importance of the defense-in-depth safety philosophy or the traditional safety review methods used by the Staff in making regulatory decisions, nor should they diminish NRC diligence in assuring licensee management attention to safe construction and operation of nuclear power plants.
- f. The Staff recognizes the significant uncertainties inherent in PRAs in determining whether the core melt guideline of 1 to 10,000 per reactor-year has been met. Accordingly, when an estimated core melt frequency for all accident sequences is greater than 3 in 100,000 per reactor-year but smaller than 1 in 1,000 per reactor-year, the Staff proposes that additional analysis be undertaken to determine whether the individual and

societal quantitative design objectives have been met. For those cases where one of these two objectives is not met with reasonable assurance, the Staff may consider safety improvements where there are cost-effective ways to implement the safety improvements.

- g. The Staff judges that a core melt frequency for all accident sequences small than 3 in 100,000 per reactor-year is sufficiently remote as to pose minimal risk to public health and safety. Accordingly, the Staff proposes not to consider further safety improvements when an estimated melt frequency is smaller than this number, unless warranted by large uncertainties in the estimated core melt frequency or high potential radiological consequences.
- h. The Staff judges that a core melt frequency for all accident sequences larger than 1 in 1,000 per reactor-year poses a risk to public health and safety. Accordingly, the Staff proposes to consider safety improvements when an estimated core melt frequency exceeds this number, unless clearly not warranted because of the small potential radiological consequences in the event of an accident (such as for low power reactors or very remote sites). One element of this consideration may be the cost-effectiveness of the proposed safety improvements.
- i. The Staff judges that an individual core melt accident sequences whose frequency is greater than 1 in 100,000 per reactor-year may contribute excessively to the overall core melt frequency and, hence, could pose a threat to public health and safety. The Staff, therefore, proposes that additional analyses be undertaken when the estimate of the frequency of an individual accident sequence exceeds this number. Analyses may also be undertaken if warranted by large

uncertainties in the estimated core melt frequency or high potential radiological consequences. The Staff's analysis may include determining whether the individual and societal quantitative design objectives likely would be met considering the potential contributions from other sequences, and it may include a benefit-cost analysis of additional safety improvements.

NOTE:

Additional meeting details can be obtained from a transcript of this meeting available in the NRC Public Document Room, 1717 H Street, N.W., Washington, D.C., or can be purchased from ACE-Federal Reporters, 444 North Capitol Street, Washington, D.C. 20001, (202) 347-3700.