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MEETING MINUTES FOR THE SAFETY PHILOSOPHY, TECHNOLOGY AND CRITERIA SUBCOMMITTEE DECEMBER 12, 1984 - WASHINGTON, D.C.

The ACRS Subcommittee on Safety Philosophy, Technology and Criteria held a meeting on December 12, 1984. The purpose of this meeting was to discuss the status of the NRC's evaluation of the two year trial implementation of the Commission's proposed Safety Goal Policy. The Subcommittee heard presentations from members of the Safety Goal Evaluation Plan Steering Group. The agenda for the meeting is included as Attachment A. A list of attendees is included as Attachment B. Selected handouts are included as Attachment C. The meeting began at 4:00 p.m. and was adjourned at 6:00 pm, and was held entirely in open session.

Presentations from the Safety Goal Evaluation Task Force

Summary of Preliminary Conclusions, T. Murley, Task Force Chairman Dr. Murley summarized the history of NRC's involvement in the Safety Goal development. Dr. Murley noted that the Kemeny Commission had recommended that the NRC be required "to establish and explain safety-cost trade offs" and that the Rogovin Report had recommended that the NRC establish a risk objective for nuclear power plants. The NRC subsequently committed to establish and move forward with a policy statement on its overall safety philosophy and the role of safety costs

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trade-offs in NRC decisions. The NRC published a plan for developing a safety goal in October 1980 and subsequently published NUREG-0880 "Safety Goals for Nuclear Power Plants" for comment in February 1982. The Commission's policy statement on safety goals was published in May 1983. Comments on the Staff's proposed plan for evaluating a trial implementation of this safety goal policy was issued at that time for comment.

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A list of the individual elements involved in the safety goal evaluation plan and schedules for their completion are given on page 1 of Attachment C. Dr. Muriey indicated that there were three major questions which were examined in the safety goal evaluation. These were:

- To what extent is it practical to use safety goals in the regulatory process?
- 2. Should the quantitative design objectives expressed in the safety goal policy be modified or supplemented, and if so, how?
- 3. How should the safety goals as established at the end of the evaluation period be implemented?

Dr. Murley noted that the Commission had instructed the Staff not to use the proposed safety goals or design objectives in the licensing process during the evaluation period and not to require applicants or licensees to perform probabilistic assessments as a result of safety goal activities during the evaluation period.

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Dr. Murley noted that the Task Force had concluded that PRA methods and insights have proven to be extremely valuable in the priorization and organization of regulatory activities, the development of regulatory positions on generic safety issues, and the assessment of plant specific safety issues. They have also concluded that the PRA methodology has limitations which must be understood before its results are to be used and that the results of PRAs should normally be used in conjunction with traditional safety review methods in making regulatory decisions.

The Task Force has concluded that probabilistic risk assessment and safety goals can be used in the regulatory process to strengthen the defense in depth safety philosophy and to augment the more traditional safety assessment methods. The Task Force believes that the safety goals should not be used within a regulatory framework of rigid acceptance or non acceptance criteria, but that, they should be used in conjunction with traditional safety review methods in making regulatory decisions.

With regard to the conclusions on the overall adequacy of the Commission's proposed safety goal, the Task Frace has recommended that no changes be made in the qualitative goals, that minor changes be made to the individual (prompt fatality) and societal (latent cancer), goals, and that a change be made in the manner in which the societal goal is computed. No changes were made in the core melt guidelines. Cost benefit guidelines were changed to include the benefits of averted onsite radiological and economic costs.

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In more detail:

 Qualitative Safety Goals - These goals are as stated in the original safety goal policy statement and no changes are recommended by the Task Force. The quantitative goals remain as was stated in the original proposed policy statement and are as follows:

"Individual members of the public should be provided a level of protection from the consequences of nuclear power plant operation such that individual bear no significant additional risk to life and health"

and

"Societal risks to life and health from against nuclear power plant operation should be comparable to or less than

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generating electricity by viable competing technologies and should not be a significant addition to other societal risks."

 Individual Prompt Fatality Safety Goal - The Task Force recommended that the goal be changed in that the word "normally" be added as follows:

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

The Task Force views this as clarification of the original intent of the goal and not as a significant change.

 Societal Latent Cancer Safety Goal - The Task Force recommends that the goal be stated as:

> "The risk of the population in the areas near a nuclear power plant of cancer fatalities that might result from nuclear power plant operation should not <u>normally</u> exceed

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one-tenth of one percent (0.1%) of the sum of cancer fatality risks resulting from other causes."

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The Task Force again, for the same reasons as for the prompt fatality goal recommends that the word "normally" be added to the original statement of this goal. They again do not view this as being a significant change. They do, however, recommend that the population within 10 miles of the plant site should be considered in establishing compliance with this goal rather than the population within 50 miles as was proposed within the original statement of the safety goal. They believe that this will result in a increase in the degree of protection provided by this goal (when it is limiting) in that the bulk of the exposures occur within 10 miles of the plant for virtually all sites. For an average site this change would lower the allowable latent cancer risks to individuals in this zone by roughly a factor of 10. The Task Force noted however, that the prompt fatality goal (and core melt guideline) would be expected to be more limiting that the latent cancer goal.

 Core Melt Guideline - The Task Force recommends that this not be changed. This goal is still as originally as stated:

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

5. Benefit-Cost Guidelines - The Task Force has recommended here that the on-site radiological clean-up cost, on-site property loss, and replacement power cost be included in the computation of cost. The benefit-cost guideline is now stated as:

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"The benefit of an incremental reduction of societal mortality risks should be compared with the associated costs on the basis of on-site radiological and economic costs averted plus \$1000 per person rem averted."

They have noted that for virtually ail core melt accidents (as currently envisioned) the onsite radiological clean up cost, property loss cost, and replacement power cost are much larger than offsite property damage and health effects cost.

It is also the Task Force's conclusion that the benefit-cost guideline of a \$1000 per person rem is inadequate in that it has not proven to be representative of the on-site accident costs. It does however seem to be reasonably representative

of off-site cost of the more serious (but Tess probable) core melt accidents. The Task Force also recommends that ALARA guidelines not be included in the Safety Goals Policy and that Commissioner Asselstine's statement of a "Principal Regulatory Objective" not be included in the Safety Goal Policy. The Task Force recommends that the use of containment performance guidelines and the consideration of the impact of the loss of societal resources (i.e., are there societal resources which cannot be put at risk) not be included as this time but that the use of such guidelines be studied further.

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The Task Force has also reached some conclusions as to how the Safety Goal Policy should be implemented in the future. With regard to the general implementation of the Safety Goal Policy, they recommend that:

- The vehicle for implementing safety goals should be a Commission Policy Statement, not a regulation.
- There should be a phased implementation of the safety goals into the regulatory process.
- 3. For those areas of regulation where the Staff uses safety

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goals, the safety goals should be used in conjunction with, but not instead of, traditional safety review methods for making regulatory decisions.

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- 4. In using the results of PRAs the Staff should ensure that each PRA receives a peer review and then should allow for estimated uncertainties by using judgment in applying the results in regulatory decisions.
- 5. 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 operation of the plants.

With regard to the implementation of the core melt guidelines, the Task Force recommends that the following statements of intent be used:

1. When the median estimate of core melt frequency for internal accident sequences is 10^{-5} per reactor-year or less, the Staff will normally not consider proposing further safety improvements. Where a single accident sequence has an estimated median frequency close to 10^{-5} per reactor-year, the

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Staff may elect to study further whether there may be cost-effective ways to reduce the probability of that sequence.

- 2. When the median estimate of core melt frequency for internal accident sequences is 10⁻³ per reactor-year or greater, the Staff will normally require that some actions be taken to reduce the estimated core melt frequency. It is not necessary to specify guidelines for how soon the actions must be taken, since that will depend on the nature of the required actions and many other factors. Here, the Staff will use its judgment as it has in the past when deciding the urgency of safety improvements.
- 3. When the median estimate of core melt frequency for internal accident sequences is in the range 10^{-5} to 10^{-3} per reactor-year, the Staff will examine carefully the individual accident sequences and the underlying reasons for their contribution to the overall core melt frequency. Where individual core melt accident sequences have an estimated frequency of 10^{-4} per reactor-year or greater, the Staff will normally require that some actions be taken to reduce their "requency. Here again, the time of such actions will be a matter of Staff judgment.

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4. Some PRA results have shown that external events, such as earthquakes and flooding, are major contributors to the estimated core melt frequency. External event sequences typically have a greater uncertainty associated with their frequency estimates than do internal events, and for this reason the Staff does not propose to use the guidelines above. Nonetheless, the Staff will examine carefully the underlying reasons for their contribution where individual external event core melt frequencies are 10⁻⁵ per reactor-year or greater, and the Staff may decide to recommend safety improvements where there are cost-effective ways to reduce the probability of those sequences.

Lastly, the Task Force have recommended that the following statement of intent be used to implement the individual and societal safety goals:

The prompt fatality and the latent cancer fatality safety goals will be used in conjunction with the core melt guideline. As a general rule, the Staff will compare the estimated risk against these goals when the median estimate of core melt frequency for internal and external accident sequences is in the range 10^{-5} to 10^{-3} per reactor-year. For those cases where one of the safety goals above is not met, the Staff will normally recommend safety

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improvements where there are cost-effective ways to reduce the risk.

The NSF is presently conducting a peer review of the PRA Reference document. It is expected that this review will be completed in March 1985. The Staff is scheduled to go to the Commission in January 1985 with a draft report from the Task Force and the Task Force recommendations. Commission review is expected to be completed by March 1985. At this time the final Task Force report will be published and a revised Safety Goal Policy statement will be issued for public comment. The final issuance of a Commission policy statement on a Safety Goal Policy is expected to occur in September 1985. There was some discussion as to the ACRS involvement in this process. The Tas' Force draft report should be available to the Committee by mid to late January. It was decided that the Subcommittee should meet again before the February ACRS meeting and bring the matter to the full Committee for consideration at the February ACRS Meeting.

There was some discussion as to the use of median versus mean estimates in making safety goal compliance computations. It was noted that significant differences did occur and that this subject should be given more consideration. The extent to which ALARA principles should be applied to future plants and the extent to which safety goals should be

modified for future plants was discussed. The topic was left unresolved and will be discussed to greater extent at future Subcommittee meetings.

Safety Goal Implementation Principles and Guidelines - F. Rowsome, NRR Dr. Rowsome reiterated the conclusions that Dr. Murley had presented. He noted that, in the use of safety goals, the weight accorded the insights and risk estimates obtained from PRA's should be viewed recognizing the need to access carefully the overall reliability of the evaluation and the trustworthiness of the safety goal calculations. He stated that, in addition to this, one has to carefully consider the appropriateness using safety goals and PRA to address a particular issue, noting that some aspects of decision making are influenced by other considerations. Mr. Rowsome emphasized that the consideration of the need for containment performance guidelines has not been completed and expressed an opinion that the a safety goal policy should not be used in any fashion to undercut the "defense in-depth" principles of the NRC's regulations.

Highlights of the Evaluation Studies - M. Ernst and T. Margolias

Mr. Margolias and Mr. Ernst discussed some of the hightlights from the studies that have been done during the Safety Goal Policy implementation period. They noted that one of the Task Force recommendation was to change the distance over which latent cancer fatality risk was computed from 50 miles from the plant to 10 miles from the plant. Sensitivity





IMAGE EVALUATION TEST TARGET (MT-3)



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studies and computations performed for some trial sites have demonstrated that the latent cancer fatality risks is normally at least a factor of 100 below the safety goal if the core melt guideline is met. Changing the dose-averaging distance from 50 miles to 10 miles reduces the latent cancer risks specified by the criteria of more than a factor of 10 for a typical site. It was noted, however, that since latent cancers are not limiting that there is no overall reduction in the maximum acceptable risk specified by the goal. Mr. Ernst and Mr. Margolis reiterated the arguments that Dr. Murley had made for the inclusion of onsite and replacement power costs in the cost benefit guidelines, and noted that such modifications to the cost benefit guidelines would appropriately enhance accident prevention and the concepts of defense in depth. They noted that the Task Force studies and the TMI-2 experience indicates that the cost of a core melt would approach 10 billion dollars even with limited offsite radiological consequences.

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Meeting Adjourned.

NOTE: Additional meeting details can be obtained from a transcript of this meeting published and available in the NRC Public Document Room, 1717 H Street, N.W., Washgington, D.C. 20555,

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or can be purchased from ACE Federal Reporters, Inc., 444-North Capitol Street, N.W., Washington, D.C. 20001, (202) 347-3700.

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