~~ACTION~~ PLAN TO ~~IMPLEMENT~~ EVALUATE THE

COMMISSION'S SAFETY GOAL POLICY STATEMENT

~~DECEMBER~~ 1982 JANUARY 1983

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I. Purpose

This document provides the ~~action~~ plan to ~~implement~~ evaluate the Commission's safety goal policy statement. ~~that has been issued for trial use~~ The purpose of the plan is to outline (1) the scope of regulatory issues that may be assessed using the safety goals, (2) the general approach to be used in developing the data and information needed to make the assessments and to improve the usefulness of the safety goals in regulation and licensing in the future, (3) a description of how the safety goals will be ~~used~~ evaluated as a factor in arriving at regulatory decisions, and (4) how the results of using the safety goals will be assessed at the end of the ~~trial~~ evaluation period.

The first phase of the evaluation period will begin with the publication of the proposed evaluation plan for public comment for a 90-day period. During this period, it is expected that preliminary information on new radiological source terms will become available and the staff will examine the effects that this information will have on comparison of risk estimates with the proposed design objectives for individual and societal mortality risks. At the end of the public comment period the staff will assess the comments received on the evaluation plan, as well as the impact of the new source term information, and will prepare a report to the Commission. The overall time for the first phase is expected to be about 6 months. During the second phase of the evaluation period expected to be about 18 months, the staff will conduct a limited evaluation of the safety goals and design objectives and their potential use in the regulatory process. It is anticipated that additional information on radiological source terms will become available during this second phase, and this new information will be factored into the staff's evaluations.

II. Scope

The qualitative safety goals and quantitative design objectives contained in the Commission's Policy Statement will not be used in ~~the~~ any individual plant licensing process during the ~~trial~~ evaluation period. However, the NRC has used and plans to continue using probabilistic risk assessments (PRA) to better understand the risks of various safety issues. The quantitative safety goals will be ~~used~~ evaluated, where the PRA methodology is generally accepted, ~~to examine~~ with regard to existing regulatory requirements, ~~evaluate~~ proposed new regulatory requirements, ~~establish~~ research priorities, ~~prioritize~~ prioritization and ~~resolve~~ resolution of generic safety issues, and ~~evaluate~~ the relative safety importance of issues as they arise. These analyses will also provide information regarding the timing of implementation of any new requirements and the relative merits of alternative approaches.

Certain proposed new generic requirements to be reviewed by the Committee to Review Generic Requirements (CRGR) will be ~~assessed using~~ evaluated relative to the safety goals design objectives as one perspective for decision making. These issues will include the following:

(1) ATWS rule (RES)

(2) Pressurized thermal shock of pressure vessels (USI A-49) (NRR)

(3) Siting policy or rulemaking, after new radiological source terms are available (RES)

(4) Severe accident policy or rulemaking (RES/NRR)

(5) Station Blackout (USI A-44) (NRR)

(6) Decay Heat Removal (USI A-45) (NRR)

(7) Reconsideration of Emergency Response (RES)

The safety goal design objectives will also be ~~used~~ evaluated during the ~~trial~~ evaluation period as one factor in reassessing selected existing requirements. Examples of such issues which may be re-examined are the reliability criteria for the auxiliary feedwater system of PWRs and the requirement to combine seismic and LOCA loads in the design of structural and mechanical components and their supports. ~~Also, when new information on the radiological source terms from severe accidents becomes available in 1983, the impact on safety goal comparisons will be assessed.~~

In order to address that aspect of the safety goal concerning a comparison of the operation of nuclear power plants to the risks of generating electricity by viable competing technologies, the staff will initiate discussions with other organizations and government agencies to determine their interest in conducting such a comparative study. The staff will report the results of this survey to the Commission at the end of the first phase of the evaluation period.

III. General Approach to Be Used

The design objectives in the policy statement include the risks from routine emissions, normally expected transients and low consequence accidents, design basis accidents, and accidents which might melt the core. Compliance with Appendix I to Part 50 assures that the risks from routine emissions are small; therefore, they need not be analyzed either generically or on a plant-specific basis to demonstrate conformance with the safety goals. Also, compliance with current regulations (principally Parts 20, 50, and 100) generally provides adequate protection against the risks from anticipated transients and low consequence accidents as well as design basis accidents; therefore, these need not be analyzed to demonstrate conformance with the safety

goals. Thus, to ~~implement~~ evaluate the safety goal policy statement during the ~~trial~~ evaluation period, this action plan will focus on the risks from accidents involving potential core-melt.

An early step in ~~implementing~~ evaluating the policy statement will be for the Office of Nuclear Regulatory Research (RES) to collect available information on PRA studies and prepare a reference document that describes the current status of knowledge concerning the risks of plants licensed in the U.S.. It is essential that a reference document be prepared and receive peer review so that the staff, licensees, and public have a common base of information on the dominant contributors to the probability of core-melt and to the public risk due to radiation from serious nuclear accidents, the strengths and weaknesses of current plant designs and operations, and the usefulness of PRA and the safety goals in assessing such strengths and weaknesses.

This reference document will assess the uncertainties associated with estimates of core-melt probabilities and radiological consequences and will attempt to provide guidelines on how these uncertainties should be treated. It will also assess the uncertainties associated with making relative risk assessments compared to absolute risk assessments; and it will address the uncertainties in assessing the risks from external events (seismic and flood), and from fire, compared to the uncertainties of assessing risks from internal accident initiators (equipment failure and operator errors).

The reference document will include an assessment of procedures used for these PRA studies and their impact on the validity of the results, as well as a discussion of when it is appropriate to consider the risks from external events such as earthquakes and floods, the likely magnitude of such risks, and how one should evaluate such risks in light of the large uncertainties involved. It will also identify those areas of plant design that appear to be most amenable to possible improvement,

including insights that have been gained with regard to the desired and achievable reliability of systems and components important to safety.

In parallel with the development of this reference document, the staff will begin ~~using~~ evaluating the safety goals quantitative design objectives in some of the areas identified in Section II to begin developing a base of hands-on experience. In ~~implementing~~ evaluating the benefit-cost guideline, the $1,000 per person-rem averted will be in 1983 dollars, and it will be modified to reflect general inflation in the future. Both the benefits (reduction in estimated public exposure) and the costs will be assessed for the remaining lifetime of the plants.

The staff will continue assessing the reliability of systems and components important to safety. Reliability criteria have already been specified for auxiliary feedwater systems and diesel generators for plants in the licensing process, but these will have to be tested against the safety goal design objectives and perhaps adjusted. Reliability allocations to systems or components affecting core-melt probability will have to be measured against the design objectives with due consideration given to the differences between designs that utilize similar components or systems but which may have differing risk importance. Implementation of such reliability criteria typically will make use of simplified reliability or probabilistic risk analyses. They will consider reliabilities that are technically achievable in a cost-effective manner. The reliability criteria will be single-valued aiming points that are accompanied by upper and lower bounds of acceptability. This approach will permit safety tradeoffs between systems, depending on their risk importance in specific plant designs.

Because of the present uncertainties in analyzing the risk from external events, care will have to be taken with regard to any apportionment of the design objectives between external and all other (internal) accident initiators. This subject will be addressed in the reference document. Substantial research is now underway to develop more effective

techniques to analyze the probability of core-melt and the risk from external events. When this is completed, PRA will be used to determine generically whether the risk attributable to external hazards is large enough to warrant routine consideration in safety goal decisions.

PRAs will be performed using realistic assumptions, and the estimates normally will be based on median values after propagating uncertainty distributions. Also, the analyses will include as good an estimate as is feasible of the magnitude and nature of uncertainties, including differences between median and mean estimates, together with sensitivity analyses for certain parameters important to risk. It is the intention that conservatisms will be explicitly expressed in the decision rationale, rather than be buried in the risk analyses.

One way to improve the consistency of PRA results is to provide some reasonable assurance that analysts follow equivalent procedures, make similar assumptions, treat phenomena consistently, and utilize a common data base. NRC has developed reasonably prescriptive guidance on how to conduct a PRA, drawing upon the Integrated Reliability Evaluation Program (IREP) and the work of the ANS/IEEE. Such standardization is highly desirable for effective use of the safety goal design objectives.

IV. Proposed Use in Relation to Regulatory Decision Process

In evaluating proposed new regulatory requirements and assessing the need for regulatory action on safety issues that arise, the staff will evaluate the use ~~the~~ of safety goals as one of the factors in the decision process. The weight to be given the safety goal will depend on many considerations. One important consideration will be the quality of the PRA information, including the source of the analysis, the methods and data used, and the extent of peer review it has received. Insofar as possible, the staff members most familiar with the PRA and its limitations will be consulted in the decision process. This staff input

will provide an essential perspective to those who must consider the PRA information and weigh its importance in making a decision.

Other factors in making decisions will include the uncertainties surrounding the PRA analyses, engineering judgment, the acceptability of safety tradeoffs implicit in the decision, and the applicable regulatory requirements. The staff believes that the above, coupled with the scrutiny given PRAs by the industry, the NRC staff, NRC management, the ACRS, and other experts will provide sufficient controls to avoid abuse of the use of PRAs and safety goals in regulation; but this judgment will have to be further evaluated during the ~~trial-use~~ evaluation period.

Because of the uncertainties inherent in PRAs one must be cautious in making absolute comparisons between a risk estimate for a plant and one of the safety goal design objectives. If, for example, such a comparison indicates that a design objective is not met, one would expect the next step would be to examine the underlying technical reasons. It could be that such an examination would reveal that an existing regulatory requirement is not met, in which case the appropriate regulatory action would be to focus on the improvements in the plant needed to meet the regulatory requirement. In other cases it may reveal a gap in our requirements, in which case appropriate actions may be needed to amend the regulations, depending on the safety benefits and the costs of the proposed actions. The timing of any corrective actions, if needed, would depend on factors such as the estimated magnitude of the risks involved, the need for power, the number of plants involved, the cost of replacement power, and the available industry and NRC resources.

It is expected that the initial focus in using the safety goal in the near future will be on the design objective on core-melt frequency~~;~~. and Estimates of public risk ~~would normally only~~ will be performed if the core-melt design objective is exceeded, or a risk-important accident

sequence is dominant. ~~However,~~ The importance of mitigating the consequences of a core-melt accident is fully recognized, and the staff will continue to emphasize features such as containment and emergency planning as integral parts of the defense-in-depth concept.

Where there is a reasonable judgment that the public risk and core-melt frequency design objectives actually are met for current plants, benefit-cost evaluations should not be performed to justify plant design modifications that further reduce risk. This judgment will include consideration of the quality of the PRA analyses used in the assessments.

Where significant, occupational exposures would also be a consideration in any decision whether to make safety improvements. Such considerations would include any increased exposures accrued during plant modifications and any incremental increases (or decreases) subsequently required to maintain the plant. However, it is not clear whether occupational exposures would be given the same weight in decisions as would public exposures. One consideration that is important is that the occupational exposure incurred as a result of any imposed new requirement is a real impact with a small uncertainty band, whereas averted public exposures are calculated probabilistic numbers with large uncertainty bands.

~~The~~ A paramount ~~thought in making decisions using~~ consideration in evaluating the use of PRAs and the safety goals is that one must be sensitive to the "bottom-line risk" syndrome. The principal benefit of PRA, considering the present state-of-the-art, is to identify strengths and weaknesses in plant design and operation, not to calculate accurate, absolute risk numbers. Therefore, the primary application of PRA information in ~~deciding~~ evaluating generic safety issues during the ~~trial~~ evaluation period will be to use the results and insights gained from the spectrum of PRA analyses done to date, which will be summarized in the reference document.

V. Assessment of Results at End of ~~Trial-Use~~ Evaluation Period

At the end of the ~~trial-use~~ evaluation period the staff will assess the information gathered on PRAs contained in the reference document, together with the hands-on experience gained in ~~implementing~~ evaluating the safety goals, to make recommendations to the Commission regarding any changes in the safety goals and their use in regulation or licensing. This assessment will include:

1. A comparison of existing plant-specific PRAs with the design objectives.

2. A discussion of situations where PRAs and the design objectives provided a useful perspective for decisions, and where their use was not very beneficial.

3. The impact of any changes in source term assumptions on the safety goals, including whether the design objectives should be changed.

4. An evaluation of the need for proposed guidelines as to actions to be taken when one or more plants are estimated to exceed one or both of the public risk design objectives and/or the core-melt design objective. For example, should operating levels or limits be established; and, if so, what should they be?

5. Judgments regarding the methodology for containment performance assessment and whether a containment performance design objective would be useful. If so, what should be the recommended design objective(s)?

6. The influence of occupational exposures or other factors on decisions made during the ~~trial-use~~ evaluation period.

7. Judgments regarding the methodology that should be used to perform PRAs to enhance their use in the regulatory process.

8. For any future plant-specific applications, an evaluation of alternatives as to how conformance with the individual risk guideline should be assessed for situations where no one lives within one mile of the site boundary.

9. Whether a single monetary value of averted person-rem is an appropriate and useful way to implement the benefit-cost guideline. If not, what might be more appropriate?

Careful attention will be paid to management of the various activities during the ~~trial-use~~ evaluation period. Toward this end the staff will do the following:

- Establish appropriate tasks and milestones (Ref. Appendix A) in the FY83-85 EDO and Commission Program Planning and Guidance documents and in office Operating Plans.

- Establish a Steering Group which will include, as a minimum, management level representatives from the EDO, NRR, RES, IE, ELD, and OPE.

- Provide appropriate reports to the Commission including the reference document, an assessment of substantive public comments received, and recommendations on any mid-course corrections that appear warranted.

APPENDIX A

Highlights of Future Staff Actions

The following summarizes the action items required to ~~implement~~ evaluate the safety goals and develop improved technical implementation guidance during the ~~trial~~ use evaluation period. Information gathered during the ~~trial~~ use evaluation period will be evaluated by the staff to assist in any subsequent recommendations to the Commission regarding the future role of PRA or the safety goals in regulation or licensing.

1.	Prepare a report to the Commission that summarizes and evaluates the public comments received on the proposed evaluation plan. This report will also include a recommended approach for sponsoring a study of the comparative risk of nuclear power and other competing technologies.	Mid-1983
2.	Prepare a reference document that evaluates existing PRAs to: assess the dominant accident sequences; identify and rank safety systems and components as to their risk importance; evaluate how the risks from external events should be weighed in the decision process; estimate the magnitude, direction, and risk significance of uncertainties; and assess lessons learned with regard to strengths and weaknesses of various methodologies and procedures. (RES)	Early ~~FY-84~~ 1984
3.	Provide appropriate reports to the Commission regarding ~~implementation~~ evaluation of the safety goal, such as the reference document, evaluation of public comments, and any recommended mid-course corrections that might appear to be warranted. (EDO)	~~FY-83-85~~ 1983-85

4. Improve the quality and review of PRAs by developing a review plan for PRAs, consensus on the methodology for assessing the performance of all types of containments, and guidance on the assessment of the risks of external events. (NRR/RES) ~~FY-83-85~~ 1983-85

5. ~~Implement~~ Evaluate the safety goals:

a. Prioritize generic safety issues (NRR) ~~FY-83~~ Early 1983

b. Evaluate proposed new requirements that are amenable to assessment by PRA (RES/NRR) ~~FY-83-85~~ 1983-85

c. Prioritize research in areas amenable to assessment by PRA (RES) ~~FY-83-85~~ 1983-85

d. Develop and begin to implement a plan to assess existing requirements to determine whether some aspects need changing (RES) ~~FY-83-85~~ 1983-85

e. Begin to develop risk-based reliability criteria for systems and components most important to safety (NRR/RES) ~~FY-83-85~~ 1983-85

f. Begin to develop a methodology to prioritize selected reactor inspection procedures and to assist decision-making on the issuance of ~~FY-83-84~~ 1983-85

circulars, bulletins, and orders related to generic issues (IE)

6. Make recommendations at the end of the ~~trial-use~~ evaluation period for the future use of safety goals in regulation and licensing, including: policy changes based on the experience gained; further guidance regarding implementation; any action guidelines felt to be warranted to assist decision-making as to whether new requirements should be implemented or existing requirements waived, and the timing of implementation of new requirements; application of the safety goals to operating reactors and licensing, e.g., the use of operating limits; and the effect of new developments, such as revised radiological source terms, on the implementation of the safety goals. (EDO)