

May 4, 1998

SECY-98-101

FOR: The Commissioners

FROM: L. Joseph Callan /s/
Executive Director for Operations

SUBJECT: MODIFICATIONS TO THE SAFETY GOAL POLICY STATEMENT

PURPOSE:

To request Commission approval of staff recommendations regarding possible modifications of the Safety Goal Policy Statement, in response to the Commission's October 16, 1997, Staff Requirements Memorandum on SECY-97-208.

BACKGROUND:

In the past several years, a number of issues have been identified which suggest a need to modify the Commission's Safety Goal Policy Statement, issued in 1986. The general objectives of modifying the policy statement include changes or additions to the basic policy established in the statement, changes to make the statement consistent with current practices, and clarifications on the role of safety goals in NRC's regulatory process.

Chairman Jackson's July 2, 1997, memorandum (Attachment 1) requested that the staff provide its views on one of these issues, an ACRS recommendation on making core damage frequency (CDF) a fundamental safety goal, as discussed in the Committee's August 15, 1996, letter (Attachment 2).

The staff responded to Chairman Jackson's memorandum in a September 12, 1997, Commission paper, SECY-97-208. In addition to discussing the pros and cons of making CDF a fundamental

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safety goal, the staff identified a number of other issues that may be appropriate to address in a modification to the policy statement. The staff recommended that a decision on updating the policy statement be deferred until completion of the final version of Regulatory Guide DG-1.174¹ and after discussions with ACRS. The staff proposed that a Commission paper with staff recommendations be provided by March 31, 1998. In an October 16, 1997, Staff Requirements Memorandum (SRM) (Attachment 3), the Commission approved the staff's recommendation to defer the decision on updating the policy statement.

DISCUSSION:

To help guide its consideration of each of the issues identified in SECY-97-208, the staff defined three general objectives of modifying the policy statement and a series of questions related to the benefits and impacts of such a modification. The general objectives defined are: to change or add to the basic policy established in the statement; to clarify the role of safety goals in NRC's regulatory process; and to make the policy statement consistent with current staff practice. The questions defined include: is a revision to the policy statement needed to resolve an outstanding safety issue; is a revision needed for continued progress in risk-informed regulation; would a revision improve the coherency, consistency, or understanding of agency policies and practices, including providing greater public understanding; and is a revision needed to ensure that the policy statement is factually correct and current? In addition, technical, legal, and resource impacts associated with any revision to the policy statement also need to be considered and, given these impacts, is this the best use of staff resources?

As a result of additional staff work and discussions with ACRS subsequent to SECY-97-208, additional issues and clarifications with respect to potential modifications to the policy statement have been developed. These have been integrated with the issues identified in SECY-97-208 and categorized according to the general objectives as follows:

Changes or additions to basic policy established in the statement

- Core damage frequency is now considered a subsidiary objective to the quantitative health objectives (QHOs). It may be appropriate to elevate it to a fundamental safety goal, as proposed in the ACRS letter of August 15, 1996.
- The second qualitative goal and QHO deal with societal risk. However, these measures of societal risk differ in two key respects from the societal risk calculations performed in other areas:
 - The policy statement defines a 10-mile radius for calculating societal impacts, while the Regulatory Analysis Guidelines and environmental impact analyses use a 50 mile radius.

¹ The proposed final version of RG 1.174 was transmitted to the Commission in SECY-98-015, dated January 30, 1998, with a request for Commission approval for publication.

- The calculational process used by the staff for comparison with the QHO is an average-individual risk, while the Regulatory Analysis Guidelines and environmental analyses use a summed risk (over all individuals).
- The goals and QHOs are described in terms of health risks; no goal has been established with respect to potential land contamination or other environmental impacts. As evidenced by the Chernobyl accident, this can be a major societal impact of accidents involving core damage and containment failure.
- The QHOs are expressed in terms of annual average frequencies. It may be appropriate to also provide a quantitative goal on risks during temporary plant configurations such as during PWR mid-loop operations, where risk can be substantially higher for a short period of time.²

Clarifications on the role of safety goals in NRC's regulatory process

- In a June 15, 1990, SRM, the Commission provided guidance to the staff that the safety goals were to be used to define "how safe is safe enough."³ The policy statement itself does not include this guidance. In the Regulatory Analysis Guidelines, metrics that are derived from the safety goals are defined for screening issues, thus implementing the Commission's guidance. Such use also is not discussed in the policy statement.
- Recognizing recent progress in risk-informed regulatory activities, discussion of the relationship between the safety goals and these activities should be considered for inclusion in the policy statement.
- In an April 11, 1997, letter (Attachment 4), the ACRS discussed the potential use of safety goals to define the adequate protection concept.
- In a June 17, 1997, letter (Attachment 5), the ACRS discussed the concept of defense-in-depth, as it relates to PRA and the safety goals, and recommended that a new policy statement be developed that "would provide more guidance on the extent and nature of defense-in-depth expected by the Commission."

²In SECY-97-287, the staff recommended that an assessment be made of risk-informed guidelines for temporary changes to plant configurations; this recommendation was approved by the Commission in an SRM dated March 19, 1998. At issue here is whether such guidelines should be included in the Safety Goal Policy Statement.

³ In that SRM, the Commission characterized "how safe is safe enough" as "how far [the staff] should go when proposing safety enhancements, including those to be considered under the Backfit Rule."

Changes to make the statement consistent with current practices

- Two issues were identified in the staff's recent risk-informed regulatory guidance development activities, and discussed as policy issues in SECY-96-218, dated October 11, 1996, and SECY-97-287, dated December 12, 1997:
 - Plant-specific application of safety goals, including a containment performance guideline derived from the QHOs (and defined in terms of a large early release frequency (LERF)).
 - Treatment of uncertainties in plant-specific, risk-informed decisionmaking

It may be appropriate to discuss the resolution of these issues in the policy statement, and upon receipt of Commission guidance on SECY-98-015, which provided the proposed final RG 1.174 to the Commission.

- The policy statement proposed (for further study) a general plant performance guideline of 10^{-6} per reactor year for a large release of radioactive material. The staff documented its study in SECY-93-138, in which it concluded that such a guideline could not be developed without the guideline being significantly more restrictive than the QHOs and recommended that work to develop such a guideline be terminated. The Commission approved this recommendation in a June 10, 1993, SRM. Therefore, removal of this general plant performance guideline from the policy statement should be considered.

The staff's review of each issue with respect to the questions identified above is provided in Attachment 6. This review reflects discussions with ACRS in a subcommittee meeting on February 20, 1998, and a full committee meeting on March 3, 1998.⁴ The general conclusions reached by the staff include the following:

- None of the issues identified suggest that an immediate update of the policy statement is needed. That is, no outstanding and urgent safety issue is apparent from the issues shown above and reviewed in Attachment 6. Staff implementation of risk-informed regulation can continue without update of the policy statement.
- Some changes to the policy statement are needed to make it consistent with current staff practices. In particular, this includes the two issues noted above resulting from the staff's development of risk-informed regulatory guidance and removal of the general plant performance guideline.
- Some potential changes to the policy statement are interwoven with the fundamental philosophies and policies of nuclear reactor regulation; additional study of the related issues is needed to ensure the implications of the issues are clearly understood before a recommendation is made. The issues of this type include the elevation of core damage frequency to a fundamental goal, modification to the treatment of societal risk, and the characterization of the relationships among the safety goals as a measure of "how safe is safe enough," staff regulatory analysis guidelines, risk-informed regulation, adequate protection, and defense-in-depth concepts. Inclusion in the policy statement of the LERF guideline contained in the proposed final

⁴ The ACRS elected not to issue a letter on this subject, pending additional discussion with the staff and among the members.

RG 1.174, and goals for land contamination and temporary plant configurations also need further study. The staff notes that some of these potential changes, if made to the Safety Goal Policy Statement, could necessitate changes in the PRA Policy Statement.

- Modifications to the policy statement should be coordinated with other staff policy-related activities. Such staff activities include the framework for risk-informed materials regulation and the strategic plan.
- The specific staff resources needed to update the policy statement may be better allocated in the near future to other activities. The staff with the needed expertise in this area are also important contributors to other staff risk-informed activities.

RESOURCES:

The staff provided some initial resource estimates for modifying the policy statement in SECY-97-208. That Commission paper indicated that:

The staff notes that, pending a Commission decision, no staff or contractor resources have been allocated in planning documents to modify the policy statement. A decision to proceed will require reprogramming available resources from other, lower priority, work. The staff estimates that the effort would require approximately 2 FTE per year and \$100,000 per year in contractor support for a two-year period. This estimate assumes the normal process for policy statement revisions would be followed (i.e., initial ACRS, CRGR and Commission interaction, public comment and final ACRS, CRGR and Commission interactions) as well as at least one public workshop to discuss the issues.

Since transmittal of SECY-97-208, there has been a more complete definition of the issues. As discussed below in the recommendations section, the staff is proposing further evaluation of the issues and a recommendation in about one year. This further evaluation can be made by reallocation of currently available resources from staff IPEEE reviews. The staff estimates that this evaluation will require on the order of 0.5 FTE. Resources to actually change the Safety Goal Policy Statement will be dependent upon that evaluation and, therefore, will be addressed as part of the staff's future recommendation.

COORDINATION:

This paper has been coordinated with OGC, which has no legal objection.

The Office of the Chief Financial Officer has reviewed this Commission Paper for resource implications and has no objections.

RECOMMENDATIONS:

The staff recommends the following:

1. The Safety Goal Policy Statement should be modified to make it consistent with the following current practices:
 - use of guidelines developed from the safety goals (and subsidiary objectives) in plant-specific regulatory activities
 - treatment of uncertainties in risk-informed decisionmaking
 - removal of the general plant performance guideline now in the policy statement.
2. Initiation of this modification should be deferred for one year to permit:
 - Additional consideration of the issues and impacts of elevating core damage frequency to a fundamental goal, inclusion of the LERF guideline contained in the proposed final version of RG 1.174, modification to the treatment of societal risk consideration of possible goals on land contamination and temporary plant configurations, and the relationship among the safety goals as a measure of "how safe is safe enough," staff regulatory analysis guidelines, risk-informed regulation, adequate protection, and defense-in-depth concepts. If necessary, modification of the policy statement to reflect these issues would be made at the same time as those noted in recommendation 1.
 - Coordination with related work in materials regulation.
 - Staff resource allocations to higher priority ongoing risk-informed activities. That is, the majority of the specific staff resources needed to modify the policy statement at this time would continue to be assigned to, for example, pilot plant reviews, with lesser allocations to policy statement-related matters made to the extent needed to further evaluate the issues noted in the preceding paragraph.
3. During this one-year period, the staff would evaluate these issues further, including additional discussions with ACRS, and possible requests for public comment, and provide by March 31, 1999, final recommendations to the Commission regarding the scope, schedule, and resources required for a modification to the Safety Goal Policy Statement.

L. Joseph Callan
Executive Director
for Operations

Attachments:

1. Memorandum from Chairman S.A. Jackson to L.J. Callan, EDO, "The Statement of Core Damage Frequency of 10^{-4} as a Fundamental Commission Goal," July 2, 1997
2. ACRS letter to Chairman S.A. Jackson, "Risk-Informed, Performance-Based Regulation and Related Matters," August 15, 1996
3. Staff Requirements - SECY-97-208 - Elevation of the Core Damage Frequency Objective to a Fundamental Commission Safety Goal, October 16, 1997
4. ACRS letter to Chairman Jackson, "Risk-Based Regulatory Acceptance Criteria for Plant-Specific Application of Safety Goals," April 11, 1997
5. ACRS letter to Chairman Jackson, "Proposed Staff Position Regarding Inclusion of a Containment Spray System in the AP600 Design," June 17, 1997
6. Staff Analysis of Issues Associated with Possible Modification of the Safety Goal Policy Statement

Distribution:

PRAB Subject File
Central File

DOCUMENT NAME: SECYSGPS.327

*see previous concurrence

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Attachment 1

Memorandum from Chairman S. A. Jackson to L.J. Callan, EDO, "The Statement of Core Damage Frequency of 10^{-4} as a Fundamental Commission Goal," July 2, 1997

THIS MEMO HAS BEEN SCANNED AND THE FORMAT MAY NOT LOOK LIKE THE ORIGINAL.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555

CHAIRMAN

July 2, 1997

MEMORANDUM TO: L. Joseph Callan
Executive Director for Operations

FROM: Shirley Ann Jackson

SUBJECT: THE STATEMENT OF CORE DAMAGE FREQUENCY OF 10^{-4} AS
A FUNDAMENTAL COMMISSION GOAL

In a Staff Requirements Memorandum, dated June 15, 1990, the Commission stated that, "Implementation of the safety goal may require development and use of 'partitioned' objectives." The Commission further stated that, "A core damage probability of less than 1 in 10,000 per year of reactor operation appears to be a very useful subsidiary benchmark in making judgements about that portion of our regulations which are directed toward accident prevention."

In a letter, dated August 15, 1996, the ACRS stated:

We believe the safety goals and subsidiary objectives should be used to derive guidelines for plant-specific applications. It is, however, impractical to rely exclusively on the Quantitative Health Objectives (QHOs) for routine use on an individual plant basis. Criteria based on core damage frequency (CDF) and large, early release frequency (LERF) focus more sharply on safety issues and can provide assurance that the QHOs are met. They should be used in developing detailed guidelines.

In the same ACRS letter, the committee also stated, "...the current subsidiary goal of 10^{-4} per reactor-year should be maintained and should be stated as a fundamental safety goal, along with the QHO."

There appears to be both pros and cons for using CDF as a fundamental Commission goal. The pros include: (1) the CDF of 10^{-4} is by de facto already used as a fundamental Commission goal; (2) the derivation of a CDF from the QHOs may yield unacceptably large CDFs; and (3) a core damage frequency goal would constitute a fundamental expression of our defense-in-depth philosophy.

The cons include: (1) several operating plants do not meet the CDF of 10^{-4} as measured by their IPEs, and (2) the CDF goal is difficult to justify on a societal basis (i.e., the QHOs follow directly from societal considerations).

I request that you send a policy paper to the Commission with your views on the merits of the ACRS recommendation to elevate the subsidiary CDF objective to a fundamental safety goal. The paper should clearly articulate the rationale and the pros and cons for your recommendation and should also propose a mechanism for stating CDF as a fundamental safety goal.

cc: Commissioner Dicus
Commissioner Diaz
Commissioner McGaffigan
SECY
OGC
CIO
CFO
ACRS

Attachment 2

ACRS letter to Chairman S.A. Jackson, "Risk-Informed, Performance-Based Regulation and Related Matters," August 15, 1996

August 15, 1996

The Honorable Shirley Ann Jackson
Chairman
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Dear Chairman Jackson:

SUBJECT: RISK-INFORMED, PERFORMANCE-BASED REGULATION AND RELATED MATTERS

During the 433rd meeting of the Advisory Committee on Reactor Safeguards, August 8-10, 1996, we discussed the issues identified in the Staff Requirements Memorandum dated May 15, 1996. We also discussed the pilot applications for risk-informed, performance-based regulation. Our Subcommittee on Probabilistic Risk Assessment (PRA) met with representatives of the NRC staff and the nuclear industry on July 18 and August 7, 1996. We also had the benefit of the documents referenced.

The staff presentations dealt only with the development of guidelines from the Commission's safety goals to be used as an element of the evaluation of licensee-initiated changes to licensing commitments. All of our comments address the application of risk-informed regulation in that context. At a later time, we will discuss the larger question of the application of the safety goals on a plant-specific basis.

CONCLUSIONS

Issue 1: Should the Commission's safety goals and subsidiary objectives be referenced or used to derive guidelines for plant-specific applications and, if so, how?

We believe the safety goals and subsidiary objectives can and should be used to derive guidelines for plant-specific applications. It is, however, impractical to rely exclusively on the Quantitative Health Objectives (QHOs) for routine use on an individual plant basis. Criteria based on core damage frequency (CDF) and large, early release frequency (LERF) focus more sharply

on safety issues and can provide assurance that the QHOs are met. They should be used in developing detailed guidelines.

Issue 2: How are uncertainties to be accounted for?

This is a difficult issue. There are models and formal methods to account explicitly for a large number of uncertainties. However, other uncertainties are unquantifiable. The staff proposes to explore a number of options, such as establishing margins in the acceptance guidelines, placing more importance on defense-in-depth, and others, to deal with such uncertainties. Such approaches seem appropriate, although much work remains to be done.

Issue 3: Should requested changes to the current licensing basis be risk-neutral or should increases be permitted?

We agree with the staff and industry that increases in risk should be permitted in some situations. Acceptance guidelines expressed in terms of the proposed change in risk and the current risk estimates should have three regions: a region in which some increase in risk is acceptable, one in which it is unacceptable, and one in which further analysis and evaluation would be required.

Issue 4: How should performance-based regulation be implemented in the context of risk-informed regulation?

We agree with the staff that, where practical, performance-based strategies should be included in the implementation and monitoring step of the risk-informed decision-making process. The pilot programs may provide an opportunity for a more concrete definition and development of performance-based strategies.

DISCUSSION

Issue 1

Even though a CDF could be derived from the QHOs that could be greater than 10^{-3} per reactor-year, the current subsidiary goal of 10^{-4} per reactor-year should be maintained and should be stated as a fundamental safety goal, along with the QHO. Accident sequences that have a high probability of leading to severe consequences could be controlled by the QHOs, but a more workable measure would be a subsidiary goal on the LERF. The definition of the latter needs to be improved. Whether the LERF should be a fixed value or derived from the QHOs, which would allow the LERF goal to include site-specific characteristics, needs to be investigated.

We recommend that the staff develop guidance for handling situations in which high values of the CDF occur for short periods of time (for example, 10^{-2} per reactor-year for a day).

Issue 2

In accounting for uncertainties, it is important to distinguish between those plant characteristics or phenomena that are modeled in the PRA and those that are not modeled (e.g., the actual layout of components and organizational factors). For those that are modeled, parameter and model uncertainties should be explicitly quantified and propagated through the PRA. The resulting distributions should be an input to the decision-making process along with other qualitative input.

Mean values of distributions should, in general, be used for comparison with goals or criteria, although the sensitivity of the mean value to the high tail of a distribution should not be overlooked. For very broad distributions, such as those that typically result when significant model uncertainty is present, reliance on the mean values may not be appropriate and a more detailed investigation of the reasons for this large uncertainty should be undertaken. This could possibly lead to decisions to conduct additional research or to take other measures.

Accounting for uncertainty in the case of plant characteristics or phenomena that are not currently modeled at all is much more difficult. The staff proposes to explore a number of options, such as establishing margins in the acceptance guidelines, placing more importance on defense-in-depth, and others. We agree and encourage the staff to actively pursue the resolution of this issue.

Issue 3

The concept of a "three-region" approach is consistent with the Electric Power Research Institute's PSA Applications Guide (PSAAG), although the boundaries of the regions used in the PSAAG are not necessarily the ones that the staff will adopt.

The staff has raised the issue of how "packaged" requests are to be handled. Packaging is the process by which risk trade-offs can be accomplished. It is a significant benefit of risk-informed regulation. We believe that it is the overall impact on plant risk that is important, and related changes should be handled as a package. Such changes should be consistent with the current philosophy of risk management; i.e., that the "bottom-line" numbers should not be the only input to the decision-making process, and other concepts such as defense-in-depth must be maintained.

We will continue to monitor the progress of the staff on these issues.

Sincerely,

/s/

T. S. Kress
Chairman

References:

1. Staff Requirements Memorandum dated May 15, 1996, from John C. Hoyle, Secretary, NRC, to James M. Taylor, Executive Director for Operations, NRC, regarding Briefing on PRA Implementation Plan on April 4, 1996
2. Memorandum dated June 20, 1996, from James M. Taylor, Executive Director for Operations, NRC, to the Commission, Subject: Status Update of the Agency-Wide Implementation Plan for Probabilistic Risk Assessment (PRA) (from March 1, 1996 to May 31, 1996)
3. Electric Power Research Institute, EPRI TR-105396, Final Report dated August 1995, "PSA Applications Guide"

Attachment 3

Staff Requirements - SECY-97-208 - Elevation of the Core Damage Frequency Objective
to a Fundamental Commission Safety Goal, October 16, 1997

October 16, 1997

MEMORANDUM TO: L. Joseph Callan
Executive Director for Operations

FROM: John C. Hoyle, Secretary /s/

SUBJECT: STAFF REQUIREMENTS - SECY-97-208 - ELEVATION OF THE
CORE DAMAGE FREQUENCY OBJECTIVE TO A
FUNDAMENTAL COMMISSION SAFETY GOAL

The Commission has approved the staff's proposal to defer the decision on elevation of core damage frequency to a fundamental safety goal until after further discussions with ACRS and after finalizing DG-1061 and related documents. In addition, the experience gained from the industry-initiated risk-informed pilot project regarding use of the quantitative health objectives should also be considered by the staff in providing recommendations to the Commission on this matter.

The staff should prepare its recommendation on modifying the Safety Goal Policy Statement and submit it for Commission approval by March 31, 1998.

(EDO)

(SECY Suspense: 3/31/98)

cc: Chairman Jackson
Commissioner Dicus
Commissioner Diaz
Commissioner McGaffigan
OGC
CIO
CFO
OCA
OIG
Office Directors, Regions, ACRS, ACNW, ASLBP (via E-Mail)
PDR
DCS

SECY NOTE: THIS SRM, SECY-97-208, AND THE COMMISSION VOTING RECORD
CONTAINING THE VOTE SHEETS OF ALL COMMISSIONERS WILL BE
MADE PUBLICLY AVAILABLE 5 WORKING DAYS FROM THE DATE OF
THIS SRM.

MEMORANDUM TO: Chairman Jackson
Commissioner Dicus
Commissioner Diaz
Commissioner McGaffigan

FROM: John C. Hoyle

SUBJECT: STAFF REQUIREMENTS MEMORANDUM

Attached is the staff requirements memorandum on SECY-97-208. The SRM will be issued to the staff by COB Thursday, October 16, 1997, unless I hear otherwise.

The attached SRM and the subject SECY paper are considered to be "final Commission decisions" and as such will be released to the public 5 days after the date of the final SRM.

All Commissioners have agreed to release their vote sheets. Their votes will be contained in the Commission Voting Record for SECY-97-208 which will be released at the same time the SRM is released.

Attachment:
As stated

cc: EDO
OGC

Attachment 4

ACRS letter to Chairman Jackson, "Risk-Based Regulatory Acceptance Criteria for Plant-Specific Application of Safety Goals," April 11, 1997

April 11, 1997

The Honorable Shirley Ann Jackson
Chairman
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Dear Chairman Jackson:

SUBJECT: RISK-BASED REGULATORY ACCEPTANCE CRITERIA FOR
PLANT-SPECIFIC
APPLICATION OF SAFETY GOALS

In our December 6, 1996 meeting with the Commission, we committed to provide an example of how risk-acceptance criteria could be developed directly from the Safety Goals. Additionally, in a Staff Requirements Memorandum dated January 14, 1997, the Commission asked for our views on the relationship between the concept of "adequate protection," as used in the NRC regulations, and the NRC Safety Goals, from the standpoint of level of risk.

During the 440th meeting of the ACRS, April 3-4, 1997, we completed our deliberations on plant-specific application of NRC Safety Goals and the relationship between the concept of "adequate protection" and the Safety Goals. In our November 18, 1996 report on this subject, we stated that "the safety goals and subsidiary objectives can and should be used to derive guidelines for plant-specific applications." We noted that full-scope Level 3 probabilistic risk assessments (PRAs) would be necessary to use the quantitative health objectives (QHOs) directly to assess the acceptability of plant-specific risk. We also stated that this assessment of risk could be done in terms of the QHOs, along with the core damage frequency (CDF), or in terms of the CDF and large, early release frequency (LERF).

This report further discusses the need for plant-specific application of risk-acceptance criteria and the appropriateness of these criteria being derived from the Safety Goal QHO on early fatalities. The additional comments to this report provide examples of approaches that could be used to quantify lower tier acceptance criteria (i.e., LERF, or CDF and conditional containment failure probability) that will ensure that the early fatality QHO is met at each site. Quantification of the LERF at each site is needed to ensure the appropriateness of the choice of the LERF acceptance criterion proposed in draft Regulatory Guide

DG-1061 and draft Standard Review Plan sections that support risk-informed, performance-based regulation.

Need for Plant-Specific Application

The Safety Goal Policy Statement makes it clear that the QHOs and the subsidiary goal on CDF were intended only to provide standards for the NRC to judge the overall effectiveness of its regulatory system. The Policy Statement specifically precludes enforcement of the Safety Goals on a plant-specific basis.

In the development of draft Regulatory Guide DG-1061 and the associated draft Standard Review Plan sections in support of risk-informed, performance-based regulation, the staff has found it necessary to propose risk-acceptance guidelines that can be applied on a plant-specific basis. These guidelines would be used, along with other considerations and inputs, for making judgments on the acceptability of requested changes to a licensee's current licensing basis. Reviewing plant-specific license amendments by using risk-acceptance guidelines is a positive action toward risk-informed, performance-based regulation.

We also note that, in the longer term, the Commission may want to consider having a quantified acceptable risk level to replace the current concept of "adequate protection." This risk level could eventually serve as an objective risk-acceptance criterion for many enforcement decisions.

Risk-Informed, Performance-Based Regulation

The Commission has directed the staff to increase the use of PRA in the regulatory process. We have endorsed this because we believe that a risk-informed, performance-based regulatory approach will lead to increased coherence in the regulatory system, to enhanced decision-making ability, and to technically defensible bases for granting regulatory relief.

A risk-informed, performance-based regulatory system ought not be implemented without the existence of top-level risk-acceptance criteria. The obvious choices for these criteria are the NRC Safety Goal QHOs. As it is the responsibility of the NRC to license individual plants and ensure adequate protection, there seems to be no alternative to plant-specific applications.

Relationship Between Adequate Protection and the Safety Goals

Currently, licensing acceptance criteria are embodied in the concept of "adequate protection." With this concept, a plant that is licensed and complies fully with the applicable rules and regulations, is considered to meet the "adequate protection" standard. "Adequate protection" embodies protection of public health and safety against threats that can be quantified in terms of risk as well as threats, such as sabotage and diversion of special nuclear material, for which the risk cannot now be quantified. In the discussion that follows, the nonquantifiable aspects of adequate protection are set aside. Since there are many ways in which plants can be designed and operated within the confines of the regulations, the natural result is a spectrum of risk levels across the

population of operating plants. This conclusion is consistent with the results of the recent Individual Plant Examination Program. Since each licensed plant must, by definition, provide adequate protection, the licensed plant that poses the highest level of risk places a bound on the quantified level of risk to be associated with "adequate protection."

Within the spectrum of risk, it is likely that there are plants with risk levels above the Safety Goals and other plants with risk levels below. If this is indeed the case, a single risk level that bounds "adequate protection" would be a risk level greater than the Safety Goal level. For those plants with risk levels below the Safety Goals, the difference between the plant risk and the Safety Goals can be viewed as margin. It is from some portion of this margin that plant-specific regulatory relief could be granted. For those plants with risk levels greater than the Safety Goals, the challenge will be to eventually reduce their risk to below the Safety Goal level within the confines of the backfit rule.

Regulatory Transparency

The unquantified "adequate protection" concept is not well understood by the general public because the public is unfamiliar with the regulatory process, the body of nuclear regulations, and associated underlying technical bases. We believe that a long-term objective of replacing the "adequate protection" concept with a well articulated and quantified "acceptable level of risk" if achievable, would enhance the public's understanding and acceptance of the regulatory process and would lead to a more uniform level of protection for all individuals living in the vicinity of nuclear plants.

We note that the use of risk-acceptance criteria such as the QHOs will add stability to the regulatory process. This is because the Safety Goals are determined primarily from considerations of societal risk, while the NRC rules and regulations, which are now used to specify adequate protection, change with time as our understanding of reactor safety issues evolves.

Safety Goals as Risk-Acceptance Criteria

It is our opinion that the QHOs are the appropriate choices for risk-acceptance criteria for plant-specific applications. The Safety Goals are the expression by NRC for "how safe is safe enough." In our opinion, this is what risk-acceptance criteria ought to be. As we stated in our August 15, 1996 report, the subsidiary CDF goal should be elevated to the status of a fundamental goal. Elevating the CDF subsidiary goal to the status of a fundamental goal can be considered as a defense-in-depth principle that provides balance between prevention and mitigation.

The early fatality QHO generally controls the risks from nuclear plant operations. Our understanding of risk associated with low-power and shutdown operations, or accidents initiated by external events in which emergency response is impeded, is not yet sufficient to draw definitive conclusions concerning the limiting QHO in these situations.

Additional comments by ACRS Member T. S. Kress are presented below.

Sincerely,

/s/

R. L. Seale
Chairman

Additional Comments by ACRS Member T. S. Kress

While I agree completely with the Committee's report, I think it could be augmented in two respects. First, it could make it clearer that, with respect to plant-specific application of the Safety Goals, we are making two related, somewhat radical proposals ■■ the second more so than the first:

- 1) That lower tier risk-acceptance criteria (CDF and LERF), now being proposed in Draft Regulatory Guide DG-1061 for use in making decisions regarding requested changes to a licensee's current licensing basis, be derived directly from the prompt fatality QHO and be of such value as to bound all current sites.
- 2) That, in the long run for enforcement purposes, the prompt fatality QHO be considered as the quantification of a risk level to replace "adequate protection."

Second, guidance on how lower tier criteria are to be derived from the QHO is needed. Consequently, I am including two attachments to these additional comments (one developed by me and a complementary one developed by ACRS Senior Fellow Rick Sherry). These provide examples of how to more rigorously derive the lower tier criteria. It is suggested that the staff consider these for use if the first proposal above is to be implemented.

Attachments:

1. Kress, T. S., "Risk-Based Regulatory Acceptance Criteria for Plant-Specific Application of Safety Goals," March 1997
2. Sherry, R. R., "Methodology for Estimating Offsite Early Fatality Risk in the Absence of a Level 3 PRA," March 1997

References:

1. Staff Requirements Memorandum dated January 14, 1997, from John C. Hoyle, Secretary, NRC, to John T. Larkins, Executive Director, ACRS, Subject: Meeting with ACRS, 9:30 A.M., Friday, December 6, 1996, Commissioners' Conference Room.
2. Report dated November 18, 1996, from T. S. Kress, Chairman, ACRS, to Shirley Ann Jackson, Chairman, NRC, Subject: Plant-Specific Application of Safety Goals.
3. Report dated August 15, 1996, from T. S. Kress, Chairman, ACRS, to Shirley

Ann Jackson, Chairman, NRC, Subject: Risk-Informed, Performance-Based Regulation and Related Matters.

4. U.S. Nuclear Regulatory Commission, NUREG-1560, Volume 1, Part 1, "Individual Plant Examination Program: Perspectives on Reactor Safety and Plant Performance," Summary Report, Draft Report for Comment, October 1996.
5. U.S. Nuclear Regulatory Commission Draft Regulatory Guide, Draft DG-1061, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Current Licensing Basis," dated February 28, 1997 (Predecisional).
6. U.S. Nuclear Regulatory Commission, Draft Standard Review Plan Chapter 19, Revision L, "Use of Probabilistic Risk Assessment in Plant-Specific, Risk-Informed Decisionmaking: General Guidance," dated March 3, 1997 (Predecisional).

Attachment 5

ACRS letter to Chairman Jackson, "Proposed Staff Position Regarding Inclusion of a Containment Spray System in the AP600 Design," June 17, 1997.

June 17, 1997

The Honorable Shirley Ann Jackson
Chairman
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Dear Chairman Jackson:

SUBJECT: PROPOSED STAFF POSITION REGARDING INCLUSION OF A
CONTAINMENT SPRAY SYSTEM IN THE AP600 DESIGN

During the 442nd meeting of the Advisory Committee on Reactor Safeguards, June 11-14, 1997, we met with representatives of the NRC staff and the Westinghouse Electric Corporation to discuss the proposed staff position that the AP600 design should include a containment spray system or equivalent for accident management following a severe accident. We also had the benefit of the documents referenced.

The staff position is that the addition of a nonsafety-related containment spray system in the AP600 design would achieve an appropriate balance between prevention and mitigation of severe accidents. The staff stated that such a system would compensate for the uncertainties associated with natural removal mechanisms for aerosols during severe accidents and provide for accident mitigation and operator intervention capability as part of a long-term accident management strategy. The staff believes that a containment spray system or equivalent is consistent with the AP600 passive design philosophy and the Commission's defense-in-depth philosophy.

The Westinghouse position is that the AP600 design meets existing regulatory prevention and mitigation criteria, including the Safety Goals. This may well be the case; however, we have not yet completed our review. Westinghouse also contends that a requirement for additional systems is neither justified nor warranted. The information presented to us by Westinghouse did not address the relevant uncertainties associated with the AP600

probabilistic risk assessment.

Ideally, the determination of the need for a containment spray system should be based on a judgment as to the levels of uncertainties associated with aerosol depletion and overall risk, as well as on the value of additional accident management capability. The first question of interest is, what are the nature and extent of the uncertainties of concern. If all uncertainties were quantifiable, it would be fairly straightforward to determine whether sufficient defense-in-depth is built into the system by assessing the risk status with respect to the subsidiary Safety Goals (core damage frequency and large, early release frequency). At present, however, a large component of uncertainties remain unquantified. The identification of these uncertainties and the qualitative judgments regarding their impact on regulatory decisions would make the debate more specific and would enhance communication among the stakeholders.

In judging the usefulness of a containment spray system in compensating for these uncertainties, both positive and negative impacts of this system should be evaluated in a quantitative and qualitative way. A judgment based on such an evaluation would help make the decision more acceptable to stakeholders because the basis for the decision would be explicit and transparent. Furthermore, such an evaluation process would be a good first step towards the integration of risk and traditional concepts such as defense-in-depth.

Although we prefer to have the information from the evaluation outlined above, based on our current state of knowledge, we support the staff's contention that the addition of a severe accident mitigation system is appropriate. The addition of a spray system to the AP600 containment would significantly increase its effectiveness in fission product control and provide the ability to intervene and control the course of an accident. We believe, however, that the spray design concept suggested by the staff is marginally adequate.

The debate associated with this issue and the difficulty of making a decision highlight our belief that the NRC needs to develop a new policy statement that would provide more guidance on the extent and nature of defense-in-depth expected by the Commission.

Dr. Dana A. Powers did not participate in the Committee's deliberations regarding this matter.

Sincerely,

/s/

R. L. Seale
Chairman

References:

1. ACRS letter dated June 15, 1995, from T. S. Kress, Chairman, ACRS, to James M. Taylor, Executive Director for Operations, NRC, Subject: Proposed Commission Paper on Staff Positions on Technical Issues Pertaining to the Westinghouse AP600 Standardized Passive Reactor Design.
2. ACRS report dated August 15, 1996, from T. S. Kress, Chairman, ACRS, to Shirley Ann Jackson, Chairman, NRC, Subject: SECY-96-128, "Policy and Key Technical Issues Pertaining to the Westinghouse AP600 Standardized Passive Reactor Design."
3. Memorandum dated November 12, 1996, from James M. Taylor, Executive Director for Operations, NRC, to the NRC Commissioners, Subject: Clarification of Staff Position in SECY-96-128, "Policy and Key Technical Issues Pertaining to the Westinghouse AP600 Standard Pressurized Reactor Design."
4. Memorandum dated January 15, 1997, from John C. Hoyle, Secretary, NRC, to Hugh L. Thompson, Jr., Acting Executive Director for Operations, NRC, and Karen D. Cyr, General Counsel, NRC, Subject: Staff Requirements - SECY-96-128 - Policy and Key Technical Issues Pertaining to the Westinghouse AP600 Standardized Passive Reactor Design.
5. Memorandum dated February 19, 1997, for the Commissioners, from Hugh L. Thompson, Jr., Acting Executive Director for Operations, NRC, Subject: SECY-97-044, "Policy and Key Technical Issues Pertaining to the Westinghouse AP600 Standardized Passive Reactor Design."
6. Memorandum dated March 18, 1997, from L. Joseph Callan, Executive Director for Operations, NRC, to Chairman Jackson, Subject: Use of Non-Safety-Related Equipment to Address Safety Concerns on Nuclear Power Plants.
7. Letter dated March 13, 1997, from Brian A. McIntyre, Westinghouse Electric Corporation, to John Hoyle, Secretary, NRC, Subject: Westinghouse Comments on SECY-97-044, "Policy and Key Technical Issues Pertaining to the Westinghouse AP600 Standard Pressurized Reactor Design."
8. Memorandum dated May 16, 1997, from L. Joseph Callan, Executive Director for Operations, NRC, to the NRC Commissioners, Subject: Westinghouse Comments on SECY-97-044, "Policy and Key Technical Issues Pertaining to the Westinghouse AP600 Standard Pressurized Reactor Design."

Attachment 6

Staff Analysis of Issues Associated with Possible Modification of the Safety Goal Policy Statement

SECY-97-208 identified eight issues which have been raised in the past several years with respect to a possible modification of the Safety Goal Policy Statement. These issues, together with four additional issues identified subsequent to SECY-97-208, can be categorized as follows:

Changes or additions to the basic policy established in the statement

- Core damage frequency is now considered a subsidiary objective to the QHOs. It may be appropriate to elevate it to a fundamental safety goal, as proposed in the ACRS letter of August 15, 1996.
- The second qualitative goal and QHO deal with societal risk. However, these measures of societal risk differ in two key respects from the societal risk calculations performed in staff analyses, as described in the Regulatory Analysis Guidelines and in environmental impact statements.
 - The policy statement defines a ten-mile radius for calculating societal impacts, while the Regulatory Analysis Guidelines and environmental impact analyses use a fifty-mile radius.
 - The calculational process used by the staff for comparison with the QHO is an average-individual risk, while the Regulatory Analysis Guidelines and environmental analyses use a summed risk (over all individuals).
- The goals and QHOs are described in terms of health risks; no goal has been established with respect to potential land contamination and interdiction. As evidenced by the Chernobyl accident, this can be a major societal impact of accidents involving core damage and containment failure.
- The QHOs are expressed in terms of annual average frequencies. It may be appropriate to also provide a quantitative goal on risks during temporary plant configurations such as during PWR mid-loop operations, where risk can be substantially higher for a short period of time.

Clarifications on the role of safety goals in NRC's regulatory process

- In a June 15, 1990, SRM, the Commission provided guidance to the staff that the safety goals were to be used to define "how safe is safe enough." The policy statement itself does not include this guidance.
- Recognizing recent progress in risk-informed regulatory activities, discussion of the relationship between the safety goals and these activities should be considered for inclusion in the policy statement.

- In an April 11, 1997, letter (Attachment 4), the ACRS discussed the potential use of safety goals to define the adequate protection concept.
- In a June 17, 1997, letter (Attachment 5), the ACRS discussed the concept of defense-in-depth, as it relates to PRA and the safety goals, and recommended that a new policy statement be developed that “would provide more guidance on the extent and nature of defense-in-depth expected by the Commission.”
- In the staff’s Regulatory Analysis Guidelines, metrics are defined for screening issues which are derived from the safety goals. Such use is not discussed in the policy statement.

Changes to make the statement consistent with current practices

- Two issues were identified in the staff’s recent risk-informed regulatory guidance development activities, and discussed as policy issues in SECY-96-218, dated October 11, 1996, and SECY-97-287, dated December 12, 1997:
 - Plant-specific application of safety goals, including a containment performance guideline derived from the QHOs (and defined in terms of a large early release frequency (LERF)).
 - Treatment of uncertainties in plant-specific, risk-informed decisionmaking

It may be appropriate to discuss the resolution of these issues provided in the proposed final RG 1.174 in the policy statement.
- The policy statement proposed (for further study) a general plant performance guideline of 10^{-6} per reactor year for a large release of radioactive material. The staff documented its study in SECY-93-138, concluded that such a guideline could not be developed without it being significantly more restrictive than the QHOs, and recommended that work to develop such a guideline be terminated. The Commission approved this recommendation in a June 10, 1993, SRM. Therefore, removal of this general plant performance guideline should be considered.

To help guide its consideration of the benefits of each of these issues, the staff defined a series of questions: (1) is a revision to the policy statement needed to resolve an outstanding safety issue; (2) is a revision needed for continued progress in risk-informed regulation; (3) would a revision improve the coherency, consistency, or understanding of agency policies and practices, including providing greater public understanding; and (4) is a revision needed to ensure that the policy statement is factually correct and current? In addition, the staff has defined a question regarding the cost of resolving the set of issues: what are the specific staff resources needed to address the issue, and is this the best use of these resources?

The staff’s review of each issue with respect to these questions is provided below. The review includes a description of the issue, key benefits and detriments of modifying the

policy statement with respect to the issue (and considering the questions noted above), and, where appropriate, a staff recommendation. This review reflects discussions with ACRS at a February 20, 1998, subcommittee meeting and a March 3, 1998, Full Committee meeting.

Elevating Core Damage Frequency to a Fundamental Safety Goal

The Safety Goal Policy Statement defined two qualitative safety goals and two quantitative health objectives. These goals and objectives were characterized in terms of prompt fatality and cancer fatality public health risks. In addition, the policy statement noted that "the Commission intends to continue to pursue a regulatory program that has as its objective providing reasonable assurance...that a severe core damage accident will not occur at a U.S. nuclear power plant." This intention was not, however, explicitly defined as a qualitative goal, nor was a corresponding core damage frequency (CDF) quantitative goal defined. A subsidiary CDF objective of 1×10^{-4} per reactor year for accident prevention was proposed by the staff several years later, in SECY-89-102, and approved for use in a June 15, 1990, SRM. In its August 15, 1996, letter, the ACRS recommended that the subsidiary CDF objective be elevated to a fundamental goal.

Benefits and Detriments

SECY-97-208 described the key benefits and detriments of modifying the policy statement to include CDF as a fundamental goal. The discussion below is modified somewhat from that description, based on the staff's discussions with ACRS. The key benefits include:

- It clearly states the Commission's philosophical expectation regarding the prevention of core damage accidents, whether or not such accidents have serious public health consequences. Such a goal may be more clearly understood by the public than health goals, and is not as uncertain (e.g., it is not affected by the highly variable post-core-melt physical processes).
- The CDF, in conjunction with the QHOs, would provide the Commission's views on the relative importance of accident prevention versus mitigation. Such a statement could help to relate better the traditional defense-in-depth concept with PRA and the safety goals, thereby addressing the ACRS concern in this area.
- It introduces the concept of a core damage frequency goal to more broad review and comment, beyond that obtained when the subsidiary CDF objective was established in 1990.

The key detriments include:

- A CDF goal of 10^{-4} per reactor year would be more restrictive than the QHOs. Some plants, which are considered "safe enough" from a QHO perspective, might not be "safe enough" as viewed from a CDF perspective.

- Statement of a CDF goal without a corresponding large release or containment performance goal could lead to the impression that the Commission is placing a higher importance on preventive features than on mitigative features, and thus is compromising on its traditional defense-in-depth policy. For example, a CDF goal set at 10^{-4} per reactor year, without a corresponding LERF goal, could be taken to imply little need for accident mitigative capabilities in plants if the QHOs are the only expressions of mitigation. That is, plants meeting the CDF goal could have poor accident mitigative capability and still meet the QHOs.
- This change would necessitate reallocation of limited staff resources to understand and document clearly the basis for the CDF goal. It should also be noted that, in practice, the staff is already using a 10^{-4} per reactor year CDF as a benchmark for accident prevention in both generic and plant-specific activities. This CDF objective was used in the Regulatory Analysis Guidelines to develop criteria to screen potential backfits and is used in proposed final RG 1.174 in the CLB-change review process. Elevation of this benchmark to a fundamental safety goal will have little practical impact on these activities. However, it would communicate to the public a clear statement on the Commission's expectations regarding the prevention of core damage accidents, whether or not such accidents have serious public health consequences. In addition, it would provide an opportunity for public scrutiny and comment on a metric and value currently in use.

Recommendation

The staff does not make a recommendation on this issue at this time.

Quantitative Health Objective Treating Societal Risk

The second qualitative safety goal is defined in terms of societal risks:

Societal risks to life and health from nuclear power plant operation should be comparable to or less than the risks from generating electricity by viable competing technologies and should not be a significant addition to other societal risks.

The associated quantitative health objective is defined as:

The risk to the population in 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 percent) of the sum of cancer fatality risks resulting from all other causes.

The policy statement also includes a general description of and rationale for the calculation of latent cancer fatality risks for comparison with this QHO. A key aspect of

this is that the societal risks should be calculated within a ten-mile radius of the plant site boundary. In contrast, since publication of the policy statement, the staff has developed guidance on how regulatory analyses should be performed (i.e., the Regulatory Analysis Guidelines). The staff also uses these guidelines for performing backfit analyses under 10 CFR 50.109(a)(3). For those proposed backfits requiring a value-impact analysis, a societal risk analysis (using as a measure the total population dose) is performed to provide an estimate of the benefit of the proposal. This analysis uses a fifty-mile radius, consistent with staff practices in other areas (i.e., environmental impact analyses).

Since publication of the policy statement, the staff has also defined the calculational process by which comparisons with the societal risk QHO are to be made. This process was used in the safety goal comparisons in NUREG-1150. This process results in an estimate of the latent fatality risk to an average individual within a ten-mile radius of the plant site boundary.

Benefits and detriments

The principal benefit of making a change to the policy statement with respect to this issue would be improving the consistency of agency practice in addressing societal risk issues between the policy statement, the Regulatory Analysis Guidelines and environmental impact analyses.

The principal detriment is that this change would necessitate reallocation of limited staff resources to develop the technical basis for a revised calculational process, as well as to understand its implications to agency practices.

Recommendation

The staff does not make a recommendation on this issue at this time.

Goals and QHOs for Land Contamination and Interdiction

As noted above, the policy statement's qualitative goals and QHOs are characterized in terms of public health risks, with the societal qualitative goal defined in terms of risks from "viable competing technologies" for producing electricity. As evidenced by the Chernobyl accident, land contamination and interdiction can also be a major societal impact of reactor accidents involving core damage and containment failure, an impact which arguably is unique to nuclear power plants among current technologies for producing electricity. This perspective raises the issue of whether land contamination costs and risks should be discussed in the policy statement.

Since publication of the policy statement, the staff has developed guidance on how regulatory analyses should be performed (i.e., the Regulatory Analysis Guidelines). This guidance describes the factors which are to be included in value-impact analyses, including impacts associated with land contamination. More specifically, impacts to be considered include those from interdiction measures such as evacuation as well as property damage, loss of agricultural products, and decontamination of contaminated ground. Consideration of land contamination has also been included in more recent staff environmental statements (i.e., since the mid-1980's).

Benefits and Detriments

The principal benefit of modifying the policy statement to include a goal for land contamination risks is that it would provide a clear Commission statement on the importance of such contamination as a consequence of severe accidents.

An important detriment of this issue is that it could be viewed as deemphasizing the focus of NRC's regulatory process on public health and safety. This issue would also require considerable staff resources to resolve, both in developing a proposed goal and in reconciling such a goal with the considerations of economic impacts in the Regulatory Analysis Guidelines and Environmental Statements.

It should be noted that the legacy of the Chernobyl accident could be considered a justification for elevating this factor to a more prominent level. However, the accident was fresh in the minds of the Commission when it approved the current policy statement, without a land contamination risk goal.⁵

Recommendation

The staff does not make a recommendation at this time.

Quantitative Goals for Temporary Plant Configurations

The QHOs are expressed in terms of annual average frequencies. It may be appropriate to also provide a quantitative goal on risks during temporary plant configurations where risk can be substantially higher for a short period of time.⁶

Benefits and Detriments

The principal benefit of modifying the policy statement to include goals for temporary configurations would be to provide a clear Commission message on acceptable levels of risk in such conditions. That is, it would extend the Commission's safety goal philosophy, as expressed in the qualitative goals and QHOs, to include both short-duration plant conditions (such as when important pieces of equipment are taken out of service at the same time or during PWR mid-loop operations) and long-term averaged conditions.

An important concern with respect to addressing this issue at this time is the need to closely coordinate guidance for temporary changes with ongoing staff work to revise the Maintenance Rule and (possibly) 10 CFR 50.59, and to assure consistency of this guidance with the Commission's Strategic Plan performance goal for maintaining "low

⁵ The Chernobyl accident occurred a few months before the Commission's final approval and publication of the policy statement.

⁶ In SECY-97-287, the staff recommended that an assessment be made of risk-informed guidelines for temporary changes to plant configurations; this recommendation was approved by the Commission in an SRM dated March 19, 1998. At issue here is whether such guidelines should be included in the Safety Goal Policy Statement.

frequency of events which could lead to a severe accident.” In addition, concerns have been raised in some circumstances (e.g., shutdown operations) that such guidelines may be difficult to enforce and may unduly constrain licensee flexibility to manage their operations.

Recommendation

The staff does not make a recommendation at this time.

Relationship among Safety Goals as a Measure of “How Safe is Safe Enough,” Staff Regulatory Analysis Guidelines, and Risk-Informed Regulation, Defense-in-Depth, and Adequate Protection Concepts

The present policy statement briefly discusses the relationship between the concepts of adequate protection and defense-in-depth and the safety goals. Since the policy statement was issued, a number of staff documents have been written which help to clarify this relationship. As noted above, the ACRS recommended that a new policy statement be developed that “would provide more guidance on the extent and nature of defense-in-depth expected by the Commission.” In SECY-97-208, the staff discussed including such guidance in a revision to the Safety Goal Policy Statement. In addition, other documents describe how safety goals are a measure of “how safe is safe enough” (SRM on SECY-89-108, dated June 15, 1990), subsidiary objectives (derived from the QHOs) for use in the staff’s Regulatory Analysis Guidelines, and the staff’s approach to risk-informed regulation.

Benefits and Detriments

The principal benefit of a change to the policy statement with respect to this issue is that it would document the Commission’s current positions on these topics. In addition, it could provide a description not now in the policy statement of the Commission’s position on the role of the safety goals with respect to the backfit rule and the agency’s strategic plan and goals.

The principal detriment is that this change would necessitate reallocation of limited staff resources to develop and document clearly the basis for a description of the relationship between the safety goals and other Commission policies and practices.

Recommendation

The staff does not make a recommendation on this issue at this time.

Plant-Specific Application of Safety Goals

The original intended use of the safety goals, as indicated in the policy statement and the Commission's June 15, 1990, SRM, was for examination of regulations and other generic matters, and not for making plant-specific decisions. However, as the staff began its efforts to develop guidance for risk-informed plant-specific regulatory decisionmaking, it became clear that any probabilistic acceptance guidelines developed for plant-specific decisions should be consistent with the safety goals. As such, the staff proposed in SECY-96-218 that the safety goals be used in plant-specific decisionmaking. The Commission tentatively approved, in a January 22, 1997, SRM, use of the safety goals in a plant-specific manner, subject to an analysis of the legal ramifications of such use. Draft Regulatory Guide DG-1061 made use of the probabilistic acceptance guidelines based on the Commission's Safety Goals and subsidiary objectives. The basic approach for using safety goals in plant-specific decisionmaking has been retained in the proposed final version of the guide (RG 1.174).

The OGC staff provided its analysis and legal views of the use of safety goals in plant-specific decisionmaking in a June 30, 1997, memorandum to the Commissioners. The memorandum then discussed the potential adverse consequences.

As part of the development of guidance for risk-informed plant-specific decisionmaking, the staff developed a "large early release frequency" (LERF) acceptance guideline of 10^{-5} per reactor year as a surrogate for the Safety Goal quantitative health objectives. This definition of LERF was derived from the early fatality QHO based upon Level 3 PRA analyses from NUREG-1150. It was included in the draft version of DG-1061 and is now contained in the proposed final version (RG 1.174).

Benefits and Detriments

The principal benefit of modifying the policy statement with respect to this issue is that it would make it consistent with current staff practice, as defined in the proposed final RG 1.174.

There appear to be no significant technical detriments with respect to this potential revision to the policy statement. However, the specific need for and role of a LERF guideline in the policy statement requires further study.

Recommendation

The staff concludes that recent Commission and staff guidance on use of PRA in regulation has made the current policy statement obsolete with respect to uses of safety goals in decisionmaking. As such, the staff recommends that for consistency with agency practice, the policy statement be revised to discuss use of the goals in plant-specific decisionmaking. This revised discussion would be in the context of the proposed final RG 1.174 integrated decision-making process. This process includes consideration of both risk information and traditional engineering information (in terms of defense-in-depth and safety margins). The staff has no recommendation at this time on inclusion of a LERF guideline in the policy statement.

Treatment of Uncertainties in Plant-Specific Regulatory Decisionmaking

The policy statement indicated that mean values should be used for comparison with the QHOs, and that "quantitative techniques used for regulatory decisionmaking take into account the potential uncertainties that exist so that an estimate can be made on the confidence level to be ascribed to the quantitative results." In practice, however, staff uses of the safety goals traditionally have not included quantitative statements on associated confidence levels.

As part of the development of the proposed final version of RG 1.174, the staff reassessed its treatment of uncertainties and developed an approach which reflects current understanding of plant risk and associated uncertainties. This approach was defined in draft Regulatory Guide DG-1061 and the subject of public comment during the review of that guide. As the staff was finalizing DG-1061, this approach was identified in SECY-97-287 as a policy issue requiring Commission approval. The proposed final version of the guide (RG 1.174) transmitted to the Commission in SECY-98-015, contains the staff's latest discussion of this issue.

Benefits and Detriments

The principal benefit of modifying the policy statement with respect to the treatment of uncertainties is that it would make it consistent with current staff practices, as defined in the proposed final version of RG 1.174, as well as more complete than the discussion in the current policy statement.

There appear to be no significant technical detriments with respect to this potential revision to the policy statement.

Recommendation

The staff concludes that recent Commission and staff guidance on use of PRA in regulation has made the current policy statement obsolete with respect to consideration of uncertainties in decisionmaking. As such, the staff recommends that the policy statement be revised to describe the staff's present approach to treatment of uncertainties in decisionmaking.

General Performance Guideline Included in the Current Policy Statement

The policy statement proposed for further study a "general performance guideline" in terms of a large release of radioactive material with an associated frequency of 1×10^{-6} per reactor year. This guideline was intended to provide a basis for "determining whether a level of safety ascribed to a plant is consistent with the safety goal policy." As discussed in SECY-93-138, the staff attempted to define a guideline using this frequency, but was unable to do so without making the guideline significantly more restrictive than the QHOs. Work on defining a large release of radioactive material with this associated frequency was terminated in 1993, with the approval of the Commission in a June 10, 1993, SRM. However, the current policy statement still retains discussion of this proposed guideline. As such, it may be appropriate to remove this discussion from the policy statement.

Benefits and Detriments

The principal benefit of modifying the policy statement with respect to the elimination of the general performance guideline is that it would make it consistent with current staff practices.

There appear to be no significant technical detriments with respect to this potential revision to the policy statement.

Recommendation

The staff concludes that recent Commission and staff guidance on use of PRA in regulation has made the current policy statement obsolete with respect to characterization of a containment performance guideline. As such, the staff recommends that the policy statement be revised to remove the discussion of a general performance guideline.