UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, D.C. 20555-0001

September 11, 2000

MEMORANDUM TO: ACRS Members

FROM: Michael T. Markley, Senior Staff Engineer
ACRS

SUBJECT: CERTIFICATION OF THE MINUTES OF THE MEETING OF THE ACRS SUBCOMMITTEE ON RELIABILITY AND PROBABILISTIC RISK ASSESSMENT - JULY 11, 2000 - ROCKVILLE, MARYLAND

The minutes of the subject meeting, issued August 27, 2000, have been certified as the official record of the proceedings of that meeting. A copy of the certified minutes is attached.

Attachment: As stated

cc: via E-mail
J. Larkins
H. Larson
S. Duraiswamy
ACRS Staff Engineers
ACRS Fellows

UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, D.C. 20555-0001

MEMORANDUM TO: Michael T. Markley, Senior Staff Engineer

FROM: George Apostolakis, Chairman
Reliability and Probabilistic Risk Assessment Subcommittee

SUBJECT: CERTIFICATION OF THE SUMMARY/MINUTES OF THE JOINT MEETING OF THE ACRS SUBCOMMITTEE ON RELIABILITY AND PROBABILISTIC RISK ASSESSMENT, JULY 11, 2000 - ROCKVILLE, MARYLAND

I do hereby certify that, to the best of my knowledge and belief, the minutes of the subject meeting on July 11, 1999, are an accurate record of the proceedings for that meeting.

8/27/00

George Apostolakis, Chairman Date
Reliability and PRA Subcommittee

UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, D.C. 20555-0001

August 14, 2000

MEMORANDUM TO: George Apostolakis, Chairman
Reliability and Probabilistic Risk Assessment Subcommittee

FROM: Michael T. Markley, Senior Staff Engineer

SUBJECT: WORKING COPY OF THE MINUTES OF THE MEETING OF THE ACRS SUBCOMMITTEE ON RELIABILITY AND PROBABILISTIC RISK ASSESSMENT, JULY 11, 2000, ROCKVILLE, MARYLAND

A working copy of the minutes for the subject meeting is attached for your review. Please review and comment on them at your soonest convenience. Copies are being sent to each ACRS Member who attended the meeting for information and/or review.

Attachment:
As Stated

cc: ACRS Members
J. Larkins
H. Larson
S. Duraiswamy
ACRS Staff and Fellows

CERTIFIED

CERTIFIED BY: Date:8/14/00
G. Apostolakis - 8/29/00

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
MEETING OF THE SUBCOMMITTEE ON
RELIABILITY AND PROBABILISTIC RISK ASSESSMENT
MEETING MINUTES - JULY 11, 2000
ROCKVILLE, MARYLAND

INTRODUCTION

The ACRS Subcommittee on Reliability and Probabilistic Risk Assessment met on July 11, 2000, at 11545 Rockville Pike, Rockville, MD, in Room T-2B3. The purpose of this meeting was to discuss the NRC framework for risk-informing the technical requirements of 10 CFR Part 50 described in SECY-00-0086, and related matters.

The entire meeting was open to public attendance. Mr. Michael T. Markley was the cognizant ACRS staff engineer for this meeting. The meeting was convened at 1:00 p.m. and adjourned at 5:05 p.m.

ATTENDEES

ACRS Members

G. Apostolakis, Chairman
M. Bonaca, Member
T. Kress, Member
D. Powers, Member
W. Shack, Member
J. Sieber, Member
G. Wallis, Member
M. Markley, ACRS Staff

Principal NRC Speakers

M. Drouin, RES
E. Haskin, ERI Consulting
T. King, RES
M. Snodderly, NRR*

Principal Industry Speakers

B. Christie, Performance Technology, Inc.

RES Office of Nuclear Regulatory Research
NRR Office of Nuclear Reactor Regulation

There were approximately 3 members of the public in attendance at this meeting. A complete list of attendees is in the ACRS Office File, and will be made available upon request. The presentation slides and handouts used during the meeting are attached to the office copy of these minutes.

OPENING REMARKS BY THE SUBCOMMITTEE CHAIRMAN

Dr. George Apostolakis, Chairman of the ACRS Subcommittee on Reliability and Probabilistic Risk Assessment, convened the meeting at 8:30 a.m. He introduced the ACRS Members in attendance and stated that the purpose of this meeting was to discuss the NRC framework for risk-informing the technical requirements of 10 CFR Part 50 described in SECY-00-0086, and related matters.

Dr. Apostolakis stated that the Subcommittee had received no written comments from members of the public but noted that Mr. Bob Christie of Performance Technology, Inc. had requested time to make a presentation concerning the staff's proposed framework for risk-informing 10 CFR Part 50 (Option 3) and the proposed revision to 10 CFR 50.44 for combustible gas control systems.

At the beginning of the meeting, Dr. Apostolakis noted that he had developed a number of comments/notes on SECY-00-0086. The staff requested to review Dr. Apostolakis' markup to SECY-00-0086 for the purpose of facilitating discussion during the meeting. Dr. Apostolakis agreed and copies were provided to Mr. Thomas King and Ms. Mary Drouin, RES. These copies were returned to Mr. Markley, ACRS Staff, at the conclusion of the meeting.

DISCUSSION OF AGENDA ITEMS

NRC Presentation

Mr. Thomas King and Ms. Mary Drouin, RES, led the discussions for the NRC staff. Messrs. Eric Haskin of ERI Consulting and Michael Snodderly, NRR, provided supporting discussion. Significant points raised during the presentation include:

- The proposed framework in SECY-00-0086 uses a defense-in-depth approach. It is based on prevention and mitigation strategies derived from the "cornerstones" of the revised reactor oversight process, identifies tactics for implementing strategies, and requires consideration of both the design basis and severe accidents. The framework is intended for use by the NRC staff in considering risk-informed changes to the technical requirements of 10 CFR Part 50.

- The proposed approach is based on full-scope PRAs and provides quantitative guidelines to establish, screen, and formulate technical requirements. The guidelines include risk criteria from Regulatory Guide 1.174 using core damage frequency (CDF) and large, early release frequency (LERF). It also provides for consideration of uncertainties. However, a quantitative definition of "adequate protection" is not proposed.

- Policy issues include (1) whether selective implementation within a regulation will be allowed, (2) whether safety enhancements will be required to pass a backfit test, and (3) whether there should be a "reverse backfit test" for burden reduction.

Industry Presentation

Mr. Bob Christie of Performance Technology, Inc. provided a brief presentation to the Subcommittee. He discussed the issue of adequate protection, the Commission's Safety Goal Policy Statement, the issue of goal allocation, and a staff requirements memorandum dated

June 15, 1990, concerning the Backfit Rule. Significant points made during the presentation include:

- The NRC's mission is to ensure adequate protection of public health and safety. Licensees are assumed to meet adequate protection if they are in compliance with the NRC's regulations. The Safety Goals are "goals" and not requirements for safety performance. In SECY-00-0086, the staff is proposing to apply subsidiary quantitative objectives to operating plants contrary to Commission direction that they be used for evolutionary plants.

- The staff's Option 3 framework proposes new requirements that go beyond adequate protection and are not needed. The staff should take action on the proposed rulemaking to 10 CFR 50.44 independently of the Option 3 initiative. The NEI Task Zero initiative demonstrated that removal of combustible gas control systems is a risk-positive change.

- In the staff requirements memorandum dated June 15, 1990, the Commission directed the staff to perform cost-benefit analysis for safety enhancements associated with proposed regulations. Mr. Christie contends that the staff is ignoring the requirements of the Backfit Rule in going beyond adequate protection.

SUBCOMMITTEE COMMENTS, CONCERNS, AND RECOMMENDATIONS

Subcommittee members raised the following significant points during its discussion with the staff and industry representatives:

- Dr. Apostolakis questioned the issues of safety margins and adequate protection. In particular, he questioned whether use of risk criteria in the Option 3 framework constitutes a *de facto* increase in regulatory requirements. The staff reiterated that the framework is intended for use by the staff in reviewing licensee initiatives and stated that the regulatory analysis guidelines are based on the Commission's Safety Goal Policy Statement. The staff also stated that it would be preferable to have a regulatory guide with risk criteria rather than regulatory requirements. Dr. Apostolakis suggested that there needs to be a clear statement that these risk criteria are not intended to satisfy adequate protection.

- With respect to the quantitative guidelines in Section 3.1, Drs. Apostolakis and Kress questioned whether "late containment failure" should be listed. The staff stated that an analysis has not been done relating LERF versus late-release frequency and fatality. The staff noted that the proposed guidelines are not intended to be used on a plant-specific basis. The staff reiterated that they are intended to apply to the aggregate population of plants and for both design basis and individual accident classes (i.e., severe accidents).

- Dr. Apostolakis noted that some accident initiators are not easy to address and tend to dominate the risk calculation (e.g., seismic risk). The staff stated that the intent of the defense-in-depth approach in the framework is not to allow a single element to dominate the risk contribution. Dr. Powers questioned whether low-power and shutdown risk might be such a single contributor to risk for domestic reactors. The staff acknowledged Dr. Powers' concern on this matter.

STAFF AND INDUSTRY COMMITMENTS

During the discussion, the staff agreed to the following Subcommittee suggestions:

- Dr. Apostolakis suggested that Section 2.2 describing the defense-in-depth approach be modified to reflect language from the ACRS report dated May 19, 1999, concerning structuralist versus rationalist approaches. The staff agreed to consider this suggestion.

- Drs. Apostolakis and Kress noted industry comments on the role of emergency preparedness (EP) in protecting the public and suggested that framework be modified to reflect the safety benefit of EP. The staff stated that they would reconcile this issue in the revised framework document scheduled to be provided to the Commission in mid-August 2000.

- Dr. Powers questioned whether the staff would evaluate the original data and analysis for individual regulations being considered for change (e.g., 10 CFR 50.46 concerning emergency core cooling systems). He suggested that the original assumptions that went into issuance of the operating license must be considered. Dr. Kress suggested that this issue be better defined in the framework document. The staff agreed to consider modifying the document related to these recommendations.

SUBCOMMITTEE DECISIONS

At the conclusion of the meeting, Dr. Apostolakis questioned the staff's schedule for reporting to the Commission on this matter. The staff stated that their draft Commission paper, revised framework document, and associated recommendations on the proposed revision to 10 CFR 50.44 concerning combustible gas control systems, was due in mid-September 2000. Dr. Apostolakis suggested and the Subcommittee agreed to recommend that the ACRS prepare a report during the August 30-September 1, 2000 ACRS meeting, following receipt of the staff's documents.

FOLLOW-UP ACTIONS

None.

BACKGROUND MATERIALS PROVIDED TO THE SUBCOMMITTEE PRIOR TO THIS MEETING

1. Subcommittee agenda.
2. Subcommittee status report.
3. E-mail from ACRS Members Shack, Powers, and Kress
4. Staff Requirements Memoranda dated January 31, 2000 (SECY-99-256) on Option 2 and February 3, 2000 (SECY-99-264) on Option 3).
5. Staff Requirements Memoranda dated April 5, 2000 concerning the NEI letter dated January 19, 2000, and April 18, 2000, on staff plans to address the issue of PRA quality.
6. Letter dated January 19, 2000 from Joe Colvin, NEI, to Chairman Meserve, Chairman, NRC, Subject: Priorities for risk-informing 10 CFR Part 50 (Option 3).

7. Use Needs Request dated June 19, 2000 concerning NEI 00-02 PRA Peer Review Process Guideline.
8. SECY-00-0086 and associated Commission meeting transcript.
9. Revised framework (SECY-00-0086) for RIP50 Option 3.
10. Letter dated April 18, 2000 from Steven D. Floyd, NEI, to Thomas L. King, RES, Subject: Industry Comments on SECY-00-0086 and draft NRC report on risk-informing 10 CFR 50.44.
11. Letter dated February 18, 2000, from Ashok C. Thadani, to Joe F. Colvin, Subject: SECY-99-264.
12. Letter dated January 19, 2000, from Joe F. Colvin, Nuclear Energy Institute, to Richard A. Meserve, Chairman, NRC, Subject: SECY-99-264 on risk-informing 10 CFR Part 50 (Option 3).
13. Report dated October 12, 1999, from Dana A. Powers, Chairman, ACRS, to Greta Joy Dicus, Chairman, NRC, Subject: Proposed Plans for Risk-Informing 10 CFR Part 50.
14. Report dated October 12, 1999, from Dana A. Powers, Chairman, ACRS, to Greta Joy Dicus, Chairman, NRC, Subject: Proposed plans for developing risk-informed revisions to 10 CFR Part 50.

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Note: Additional details of this meeting can be obtained from a transcript of this meeting available in the NRC Public Document Room, 2120 L Street, N.W. Washington, D.C. 20006, (202) 634-3274, or can be purchased from Ann Riley & Associates, Ltd., (Court Reporters and Transcribers) 1250 I Street, NW, Suite 1014, Washington, D.C. Rhode Island Avenue, N.W. Washington, D.C. 20036 (202) 842-0034.

Markley

7/7/00

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
MEETING OF THE SUBCOMMITTEE ON PROBABILISTIC RISK ASSESSMENT
ROOM T-2B3, 11545 ROCKVILLE PIKE, ROCKVILLE, MD
JULY 11, 2000

ACRS Contact: Michael T. Markley (301) 415-6885

- PROPOSED SCHEDULE -

	TOPIC	PRESENTER	TIME
1)	**Introduction**		1:00-1:05 pm
•	Review goals and objectives for this meeting	G. Apostolakis, ACRS	
•	Review issues from June 29, 2000 Subcommittee meeting, including framework (SECY-00-0086) for risk-informing 10 CFR Part 50 (Option 3) and related issues		
2)	**NRC Staff Presentation**		1:05-2:45 pm
•	Discussion of SECY-00-0086	T. King, RES M. Cunningham, RES M. Drouin, RES	
	Related Issues:		
	– Status of proposed revision to 10 CFR 50.44 concerning combustible gas control systems		
	– Perspective on NEI letters dated January 19, and April 18, 2000		
	– Schedule for future meetings related to Option 3		
	**** BREAK ****		2:35-2:50 ~~2:45-3:00~~ pm
3)	**NRC Staff Presentation - continued**		2:50-3:55 ~~3:00-4:00~~ pm
•	Discussion of SECY-00-0086 and related issues - noted above	T. King, RES M. Cunningham, RES M. Drouin, RES	

* BREAK * 3:55-4:00pm

4) Industry Presentation 4:00-~~4:15~~ 4:45 pm

- Comments on SECY-00-0086 and 10 CFR 50.44 — B. Christie, Performance Technology, Inc.

5) General Discussion and Adjournment ~~4:15-6:00~~ 4:45-5:05 pm

- General discussion and comments by Members of the Subcommittee; items for July 12-14, 2000 ACRS meeting — G. Apostolakis, ACRS

Note: Presentation time should not exceed 50% of the total time allocated for a specific item. Number of copies of presentation materials to be provided to the ACRS - 35.

INTRODUCTORY STATEMENT BY THE CHAIRMAN OF THE
SUBCOMMITTEE ON RELIABILITY AND PRA
11545 ROCKVILLE PIKE, ROOM T-2B3
ROCKVILLE, MARYLAND
JULY 11, 2000

The meeting will now come to order. This is a meeting of the ACRS Subcommittee on Reliability and Probabilistic Risk Assessment. I am George Apostolakis Chairman of the Subcommittee.

ACRS Members in attendance are: Mario Bonaca, Thomas Kress, Dana Powers, William Shack, Jack Sieber and Robert Uhrig.

The purpose of this meeting is to discuss the NRC framework for risk-informing 10 CFR Part 50 described in SECY-00-0086, and related matters. The Subcommittee will gather information, analyze relevant issues and facts, and formulate proposed positions and actions, as appropriate, for deliberation by the full Committee. Michael T. Markley is the Cognizant ACRS Staff Engineer for this meeting.

The Notice of this meeting was not published in the *Federal Register* in sufficient time to inform the public properly. Therefore, we will keep the transcript record open for ten additional days subsequent to the availability of this transcript to the public to enable persons desiring to have written comments and oral statements entered into the official record to do so.

A transcript of the meeting is being kept and will be made available as stated in the Federal Register Notice. It is requested that speakers first identify themselves and speak with sufficient clarity and volume so that they can be readily heard.

We have received no written comments from members of the public regarding today's meeting. However, Mr. Bob Christie of Performance Technology, Inc. has requested time to make a presentation concerning the staff's proposed framework for risk-informing 10 CFR Part 50 (Option 3) and the proposed revision to 10 CFR 50.44.

(Chairman's Comments-if any)

We will now proceed with the meeting and I call upon Mr. Thomas King of RES to begin.

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

SUBCOMMITTEE MEETING ON RELIABILITY AND PRA

JULY 11, 2000
Today's Date

ATTENDEES - PLEASE SIGN BELOW

PLEASE PRINT

NAME	AFFILIATION
Eric Haskin	ERI Consulting
Bob Christie	Performance Technology
Yue Guan	DSTM, Inc.

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

SUBCOMMITTEE MEETING ON

RELIABILITY AND PRA

July 11, 2000
Today's Date

NRC STAFF SIGN IN FOR ACRS MEETING

PLEASE PRINT

NAME	BADGE #	AFFILIATION
Alan Kuritzky	B-8696	RES/DRAA/PRAB
Mery Drouin	B-7563	RES
MICHAEL SNODDERLY	B-709	NRR/DSSA/SPSB
JOE JOYCE	B6341	NRR/DIPM/IQMB

Markley
(D)

United States
Nuclear Regulatory Commission

Risk-Informed Part 50 Framework

Presented to

ACRS Subcommittee

July 11, 2000

FRAMEWORK

- Framework applied to regulations, regulatory guides, DBAs, to screen and formulate technical requirements
- Framework is a risk-informed Defense-in-depth approach
- Framework based upon prevention and mitigation strategies to protect public (derived from Reactor Safety Cornerstones)
- Framework includes various tactics to implement prevention and mitigation
- Framework requires consideration of both design basis and severe accidents

DEFENSE-IN-DEPTH STRATEGIES

- Prevent core damage
  - Limit frequency of accident initiating events
  - Limit the probability of core damage given event

- Mitigate core damage
  - Limit radionuclide releases given core damage (containment)
  - Limit public health effects given release (emergency planning)

DEFENSE-IN-DEPTH TACTICS

- Tactics not dependent on risk insights:
  - use of good engineering practices (e.g., codes and standards, negative power coefficient, etc.)
  - maintain same level of protection against AOOs
  - three barriers to radionuclide release
  - emergency planning

- Tactics dependent on risk insights:
  - balance between prevention and mitigation
  - level of redundancy/diversity/independence necessary to achieve balance
  - guidelines for consideration of passive component failures
  - temporary conditions

QUANTITATIVE GUIDELINES

- Quantitative guidelines used to help establish, screen and formulate regulation and technical requirements

- Guidelines for staff use, ***will not appear in regulation*** (although may appear in regulatory guide)

- Guidelines derived from Commission Safety Goals (Quantitative Health Objectives)
  - Safety goals define "how safe is safe enough"
  - Risk-informing regulations should not impose requirements that force risk from plants to go beyond these guidelines

- No quantitative definition of "adequate protection"

QUANTITATIVE GUIDELINES

- Based on full-scope PRAs
- Guidelines:
  - Core damage frequency < 1E-4/yr
  - Conditional early containment failure probability < 0.1
  - Large early release frequency (LERF) < 1E-5/yr (surrogate for early health effect guideline)
  - Conditional probability of large late release < 0.1
- CDF and LERF guidelines consistent with RG 1.174
- Initiator and accident class considerations
  - More frequent initiators require better core damage prevention
  - No individual accident class contributes more than 10% to frequency guidelines
  - Accident class defined as *"group of accidents that require the same plant response to prevent core damage or containment failure"*
  - Should not have to design for rare initiators (e.g., not have to design mitigative features for vessel ruptures)
  - Some initiators render a defense-in-depth element ineffective and need to be compensated by making other defense-in-depth elements stronger (e.g., ISLOCAs bypass containment)

LARGE RELEASE FREQUENCY GUIDELINES

- LERF guideline emphasizes early containment failure
- Early containment failure most critical for ensuring public health and safety
- Late large release frequence (LLRF) guideline for late containment failures
  - Health effects
  - Worker protection/Severe Accident Management Guideline implementation
  - Environmental contamination

CONSIDERATION OF UNCERTAINTIES

- Quantitative guidelines apply to mean values, but need to consider the causes in the spread of the distribution
- Three categories of uncertainties: parameter, modeling, completeness
- Parameter uncertainties can be addressed by redundancy, diversity, independence single failure criterion
- Modeling uncertainties can be accounted for with safety margin and acceptance criteria
- Completeness uncertainty can be accounted for with defense-in-depth and safety margin

ISSUES

- ***Should selective implementation within a regulation of the technical requirements be allowed?***
- ***Should safety enhancements be required to pass backfit rule?***
- ***Should there be a reverse backfit test for burden reduction?***

Markley
(2)

Advisory Committee on Reactor Safeguards
Subcommittee on Probabilistic Risk Assessment

SECY-98-300
Option 3 Framework

July 11, 2000
Two White Flint, Rockville, MD

Bob Christie

Performance Technology
P. O. Box 51663
Knoxville, TN 37950-1663
(865) 588-1444
FAX (865) 584-3043
performtech@compuserve.com

Agenda

A. Adequate Protection

B. 1986 Policy Statement on Safety Goals

C. June 15, 1990 Staff Requirements Memorandum

D. Goal Allocation

E. Summary

BASIS

- The primary responsibility for the "public health and safety" of a nuclear unit lies with the people at the site who are running the nuclear unit.
- The regulatory process that oversees the nuclear unit must ensure "adequate protection of public health and safety."

ADEQUATE PROTECTION

If a nuclear electric power unit is in compliance with the regulations, it is presumed that the nuclear unit provides adequate protection of public health and safety.

NRC SAFETY GOALS

Qualitative

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

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

NRC SAFETY GOALS

Quantitative Objectives

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 exceed one-tenth of one percent (0.1%) of the sum of prompt fatality risks resulting from other accidents to which members of the United States population are generally exposed.

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%) of the sum of cancer fatality risks resulting from all other causes.

Prompt Fatality Accidents in USA.

Approximately 100,000 accidental deaths per year in a population of approximately 200, 000, 000 people. This equates to approximately 1 in 2000 per year.

Latent Cancer Fatalities in USA.

Approximately 400,000 cancer deaths per year in a population of approximately 200,000,000 people. This equates to approximately 1 per 500 per year.

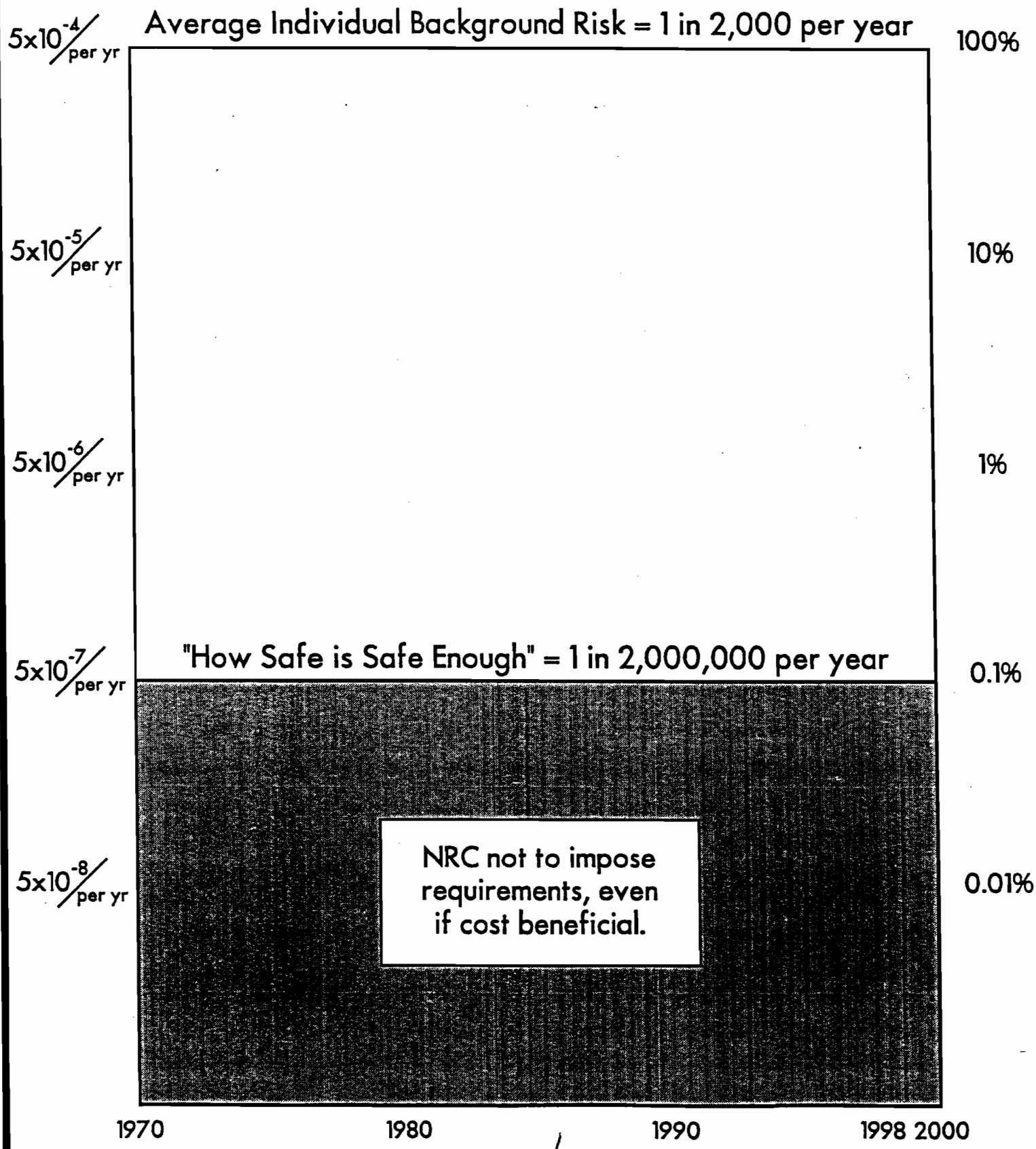
Staff Requirements Memorandum
June 15,1990 - Implementation of the Safety Goals

11) The Commission agrees that it must not depart from or be seen as obscuring the arguments made in court defending the Backfit Rule.

These arguments clearly established that there is a level of safety that is referred to as "adequate protection." This is the level that must be assured without regard to cost and, thus, without invoking the procedures required by the Backfit Rule. 1/ Beyond adequate protection, if the NRC decides to consider enhancements to safety, costs must be considered, and the cost-benefit analysis required by the Backfit Rule must be performed. The Safety Goals, on the other hand, are silent on the issue of cost but do provide a definition of "how safe is safe enough" that should be seen as guidance on how far to go when proposing safety enhancements, including those to be considered under the Backfit Rule.

1/ On a related point, the presumption is that compliance with our regulations provides adequate protection. The converse, however, is not true, i.e. adequate protection does not necessarily require compliance with the body of our regulations. The Commission can and does grant exemptions to specific requirements in our regulations as long as we assure adequate protection is achieved by other means. Moreover, we also have regulations which go beyond adequate protection and have been issued to enhance safety e.g. the Station Blackout Rule. Thus, if an "enhancement" passes the tests of the Backfit Rule, there is nothing to prohibit its imposition other than the guidance provided by the Safety Goals Policy.

Individual Risk (Prompt Fatality Risk)



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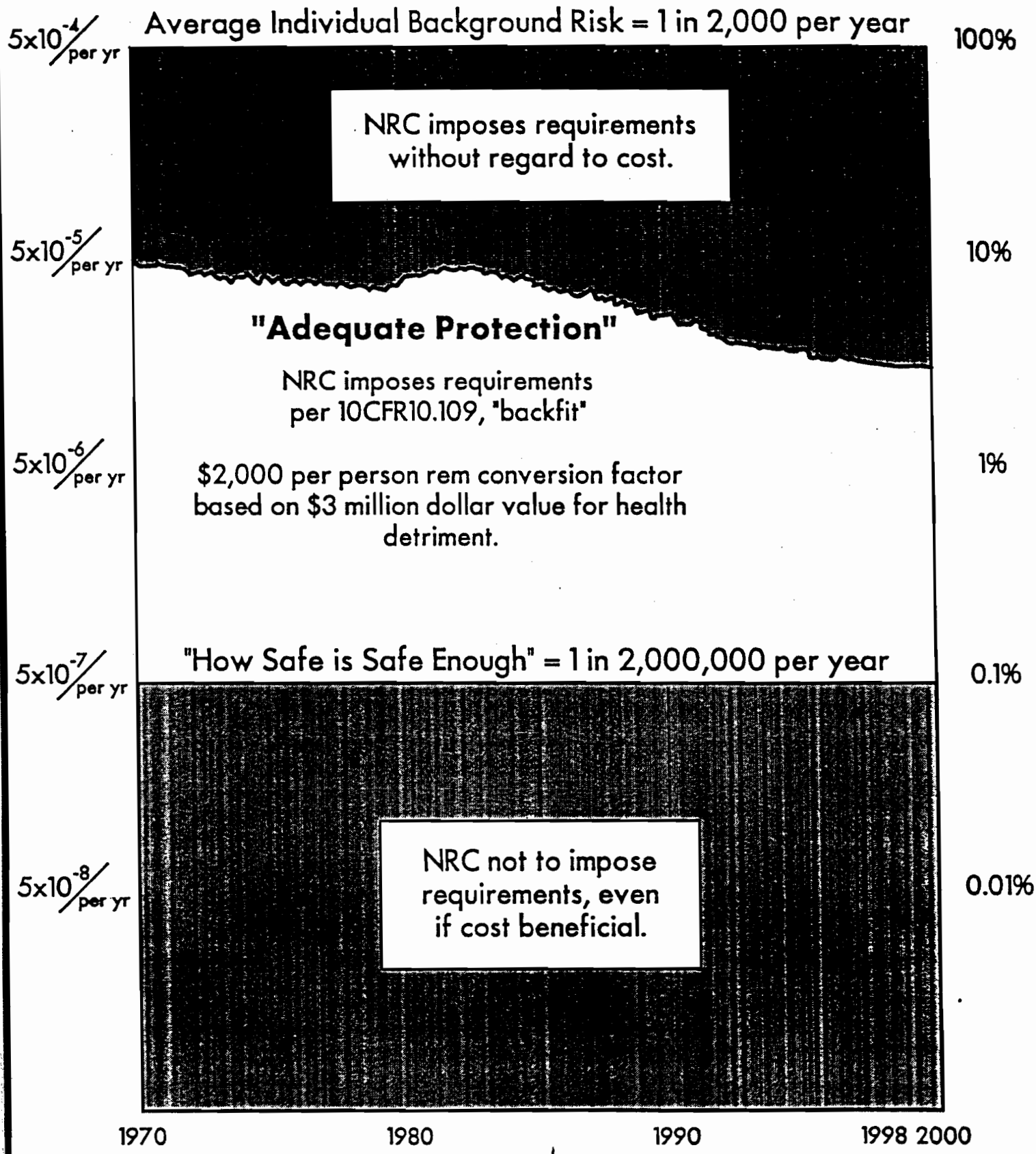
Individual Risk (Prompt Fatality Risk)



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CRITERIA

- The best requirements are those that define the criteria to be met but do not specify "how" to meet the criteria.
- The criteria should lead to a comprehensive approach to the whole nuclear unit. Defining the overall criteria is better than defining a set of lower level criteria.

PUBLIC HEALTH RISK

1. Is different for each nuclear unit.

2. Changes with time.

Accordingly, subsidiary quantitative objectives based on risk measures related to the four high-level defense-in-depth strategies are developed in the following subsections. The subsidiary quantitative objectives are developed from the QHOs, and are generally consistent with subsidiary goals in current use (e.g., (Ref. 7), (Ref. 8)). A context for the development and a summary of the quantitative objectives is provided below and in Figure 3-1, which illustrates two methods of quantitatively assessing the level of protection against accidents at a given nuclear power plant.

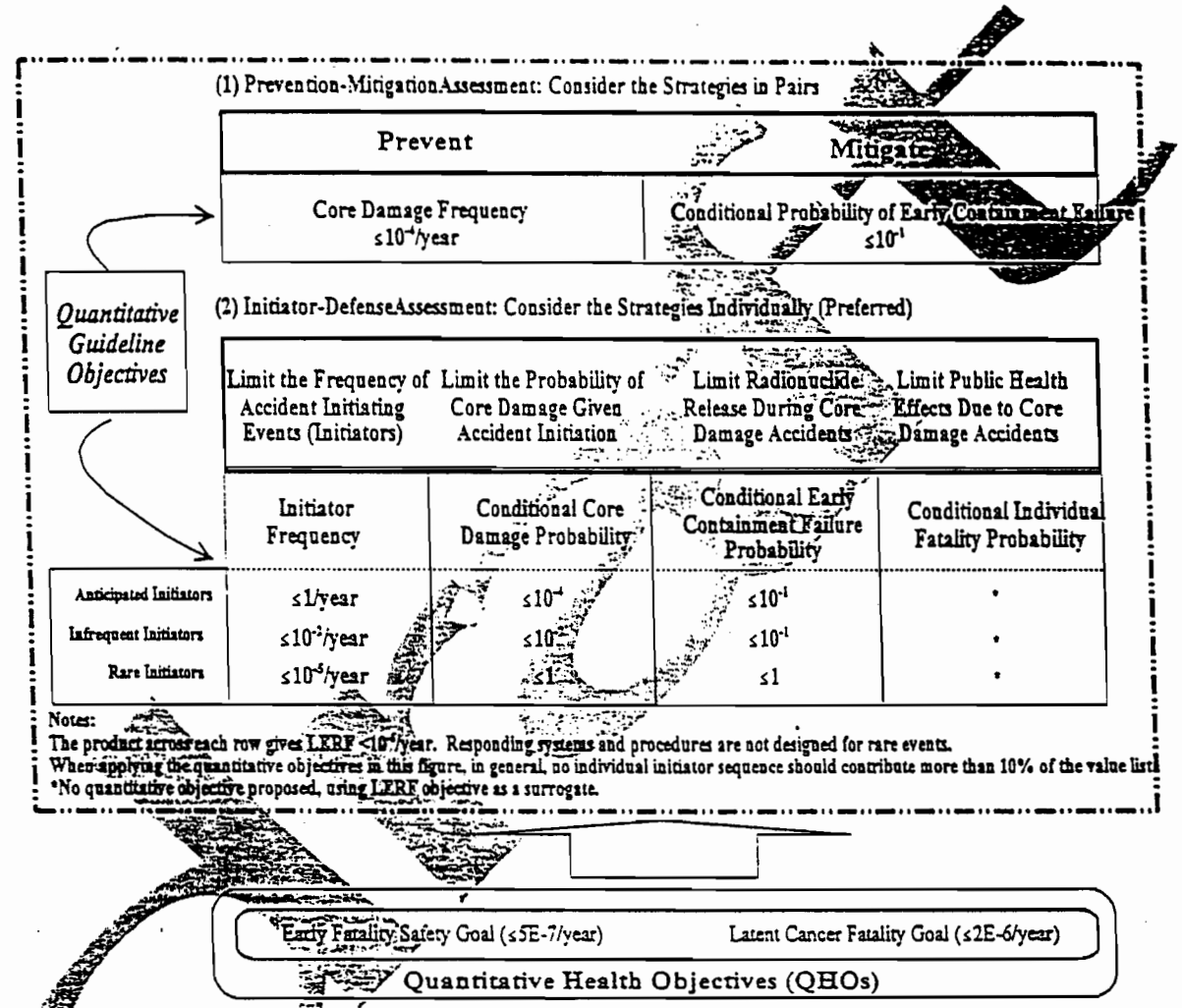

Figure 3-1. Quantitative Objectives for Risk-Informing Regulatory Requirements

(1) The prevention-mitigation method assesses the impact of the two preventive strategies and that of the two mitigative strategies. The quantitative objectives are:

- the core damage frequency should be less than 10^{-4}/year, and
- the probability of early containment failure (breach or bypass) given a core damage accident should be less than 0.1.

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CORE DAMAGE FREQUENCY

Letter: R. L. Seale to Shirley Ann Jackson, May 11, 1998, "Elevation of CDF to a Fundamental Safety Goal, and Possible Revision of the Commission's Safety Goal Policy Statement."

"...Observation 2. Results of analyses indicate that a CDF of 10^{-4} per reactor year, if applied to all plants with their current level of containment performance, in many cases would be more conservative than the QHOs. This would, therefore, be a new *de facto* fundamental safety goal."

Staff Requirements Memorandum

June 15,1990 - Implementation of the Safety Goals

4) Implementation of the safety goal may require development and use of "partitioned" objectives. In general, the additional objectives should not introduce additional conservatism. The staff should bring its recommendations on the use of each such subsidiary objective to the Commission in the context of the specific issue for which it would be useful and appropriate, and explain its compatibility with the safety goals....

...Accordingly, for the purpose of implementation, the staff may establish subsidiary quantitative core damage frequency and containment performance objectives through partitioning of the Large Release Guideline. These subsidiary objectives should anchor, or provide guidance on "minimum" acceptance criteria for prevention (e.g. core damage frequency) and mitigation (e.g. containment or confinement performance) and thus assure an appropriate multi-barrier defense-in-depth balance in design. Such subsidiary objectives should be consistent with the large release guideline, and not introduce additional conservatism so as to create de facto new Large Release Guideline.

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 judgments about that portion of our regulations which are directed toward accident prevention....

...The Commission has no objection to the use of a 0.1 Containment Conditional Failure Probability for the evolutionary design, as applied in the manner described above....

...These partitioned objectives are not to be imposed as requirements themselves but may be useful as a basis for regulatory guidance.

LARGE EARLY RELEASE FREQUENCY

SECY-98-015, January 30, 1998, Attachment 1, page 8.

"...The guideline value of 10^{-5} /RY for Large Early Release Frequency contained in RG 1.174 is based upon risk analysis results presented in NUREG-1150, which calculated offsite health risks for five nuclear power plants and compared them to the Safety Goal Quantitative Health Effects Objectives (QHOs). Analysis for all five plants calculated health risks well below the QHOs. However, if the results of this analyses were adjusted so that the offsite health risks just met the early fatality QHO (the most limiting QHO), with allowance for the unanalyzed modes of operation (shutdown) and, in some cases external events, a corresponding Large Early Release Frequency value of 10^{-5}/RY is the result for those plants whose calculated offsite health risks are closest to the QHOs.

Site to site variations in Large Early Release Frequency were judged to not be a large factor (this was also confirmed in a study reported by the Advisory Committee for Reactor Safeguards in a September 19, 1997 letter to Chairman Jackson) and thus a single value for all plants is used."

SUMMARY

In the Framework document for Option 3

1. The staff is proposing requirements for "risk-informed" regulations for the existing nuclear units far beyond the standard of "adequate protection." The nuclear units are to be penalized for "volunteering" for Option 3.

2 The staff is ignoring the requirement of the Backfit Rule when the staff wishes to go beyond adequate protection. The staff is ignoring the expressed wish of the NRC Commissioners in the June 15, 1990, Staff Requirements Memorandum to use the Backfit Rule in the application of the Safety Goals.

3. The staff is proposing "subsidiary" quantitative objectives for existing plants that the NRC Commissioners said were applicable to the evolutionary plants.

4. The staff is proposing "subsidiary" quantitative objectives that go beyond the Quantitative Health Effects Objectives in the 1986 Policy Statement on Safety Goals. Thus, the staff is not only ignoring adequate protection and the Backfit Rule, but they propose requirements that go beyond "how safe is safe enough."