



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

May 16, 2000

MEMORANDUM TO: ACRS Members

Noel Dudley

FROM: Noel Dudley, Senior Staff Engineer

SUBJECT: CERTIFICATION OF THE SUMMARY/MINUTES OF THE JOINT ACRS
SUBCOMMITTEE MEETING ON MATERIALS AND METALLURGY AND
ON RELIABILITY AND PROBABILISTIC RISK ASSESSMENT
CONCERNING POTENTIAL REVISIONS TO THE PTS RULE
ACCEPTANCE CRITERION, APRIL 27, 2000 - ROCKVILLE, MARYLAND

The minutes of the subject meeting, issued on May 1, 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: Technical Support Branch
Operations Support Branch (3 copies)

cc via e-mail:
J. Larkins
H. Larson
S. Duraiswamy
ACRS Fellows and Technical Staff
E. Barnard



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

MEMORANDUM TO: Noel Dudley, Senior Staff Engineer
ACRS

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

Dr. William J. Shack, Chairman
Materials and Metallurgy Subcommittee

SUBJECT: CERTIFICATION OF THE MINUTES OF THE JOINT ACRS
SUBCOMMITTEE MEETING ON MATERIALS AND METALLURGY
AND ON RELIABILITY AND PROBABILISTIC RISK ASSESSMENT
CONCERNING POTENTIAL REVISIONS TO THE PTS RULE
ACCEPTANCE CRITERION, APRIL 27, 2000 - ROCKVILLE,
MARYLAND

I hereby certify that, to the best of my knowledge and belief, the minutes of the subject meeting issued on May 1, 2000, are an accurate record of the proceedings for the meeting.

Dr. George Apostolakis, Chairman
Reliability and PRA Subcommittee

5/13/00

Date

Dr. William J. Shack, Chairman
Materials and Metallurgy Subcommittee

5/12/00

Date

CERTIFIED

Issued: May 1, 2000
CERTIFIED: May 13, 2000

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
MINUTES OF JOINT ACRS SUBCOMMITTEE MEETING ON
MATERIALS AND METALLURGY AND
RELIABILITY AND PROBABILISTIC RISK ASSESSMENT
POTENTIAL REVISIONS TO THE PTS RULE ACCEPTANCE CRITERION
APRIL 27, 2000
ROCKVILLE, MARYLAND

The ACRS Subcommittees on Materials and Metallurgy and on Reliability and Probabilistic Risk Assessment met on April 27, 2000, to hold discussions with representatives of the NRC staff concerning the draft Commission paper, "Reevaluation of the Pressurized Thermal Shock Rule (10CFR50.61) Screening Criterion." The entire meeting was open to public attendance. Mr. Noel Dudley was the cognizant ACRS staff engineer for this meeting. The meeting was convened at 1:00 p.m. and was adjourned at 3:45 p.m.

ATTENDEES

ACRS

G. Apostolakis, Co-Chairman
W. Shack, Co-Chairman
J. Baron, Member
M. Bonaca, Member
T. Kress, Member

R. Seale, Member
J. Sieber, Member
G. Wallis, Member
N. Dudley, ACRS Staff

NRC REPRESENTATIVES

M. Cunningham, RES
E. Hackett, RES
M. Mayfield, RES

S. Malik, RES
T. King, NRR
H. Woods, RES

There were no written comments or requests for time to make oral statements received from members of the public. One member of the public attended the meeting. A list of meeting attendees is available in the ACRS office files.

INTRODUCTION

Dr. George Apostolakis, Chairman of the Reliability and Probabilistic Risk Assessment Subcommittee, explained that the purpose of the meeting was to review a draft Commission paper concerning options for potential revisions to the pressurized thermal shock (PTS) rule acceptance criteria. He noted that the Subcommittee was introduced to this subject at its March 16, 2000 meeting, concerning the PTS Technical Basis Reevaluation Project.

POTENTIAL REVISIONS TO PTS ACCEPTANCE CRITERION : Mr. Mark Cunningham and Mr. Edwin Hackett, RES

Mr. Mark Cunningham, RES, presented a draft Commission paper that provided options and a recommendation for reevaluating the PTS screening criterion. He stated that the purpose of the paper is to obtain an early Commission decision on the staff's recommendation. Mr. Cunningham explained that the PTS rule issued in 1983 is an adequate protection rule with a probabilistic risk assessment criterion of less than 5×10^{-6} through-wall cracks per reactor year. He described how the staff determined the value for the criterion. He noted that the rule assumes that a through-wall crack is equivalent to a large opening in a reactor vessel, which results in core damage.

Mr. Edwin Hackett explained that recent material research results provide a better understanding of material properties such as flaw distributions, irradiation embrittlement correlations, fracture toughness, and beltline fluence calculations. He described how improvements in the fracture mechanics computer code and in the understanding of material properties could result in a more accurate PTS screening criterion.

Mr. Cunningham presented the different regulatory approaches and assumptions embodied in the following Commission guidance:

- Safety Goal Policy Statement,
- Station Blackout and Anticipated Transient Without Scram (ATWS) Rules,
- Backfit Rule, and
- Regulatory Guide 1.174.

On the basis of the above Commission guidance, Mr. Cunningham outlined the following options for revising the PTS screening criterion:

- A. Make no change to the core damage frequency value (CDF) underlying the screening criterion.
- B. Utilize a CDF consistent with those for the Station Blackout and ATWS Rules.
- C. Apply the Regulatory Guide 1.174 principles and acceptance guidelines to define the allowable change in the PTS acceptable CDF.
- D. Apply the Regulatory Guide 1.174 principles and acceptance guidelines assuming CDF and large, early release frequency (LERF) are equivalent.

Mr. Cunningham explained that the staff recommended Option C because it was most consistent with the Commission's most recent PRA policy implementation guidance and would explicitly include the consideration of defense-in-depth and safety margin issues. He stated that the staff plans to issue the draft Commission paper in May 2000.

DISCUSSIONS

The Subcommittee members asked what criteria the staff used to differentiate between an adequate protection rule and a safety-benefit rule. The staff stated that there are no criteria and that it uses qualitative judgement. The Subcommittee members and the staff discussed requirements for performing a cost-benefit analysis when revising either type of rule.

The Subcommittee members and the staff discussed the derivation of the present criterion of 5×10^{-6} per year and the allocation of risk between event scenarios. They discussed the uncertainties associated with the mean surface reference transition temperatures and the calculated CDFs used to determine the present criterion. Dr. Apostolakis suggested explaining, in the proposed Commission paper, how the event scenarios were used to determine that the criterion would provide adequate protection.

The Subcommittee members and the staff discussed whether the uncertainties associated with the materials properties were aleatory or epistemic. They also discussed the types of vessel failures that might result from a through-wall crack during a PTS event.

Dr. Kress proposed an additional option, which would include developing processes for deriving a quantitative value for adequate protection, allocating the risk among the PTS event scenarios, and integrating defense-in-depth and uncertainty considerations. He noted that the staff would need to develop a guiding set of principles for these processes and would need Commission approval. The Subcommittee members noted that these principles could be used to guide future efforts related to risk-informing the regulations.

Dr. Bonaca noted that the staff had not determined the amount of work that would be required to implement the different Options. The Subcommittee members and the staff agreed that tools for calculating LERF do not exist and would be time consuming to develop. The staff suggested that LERF values could be derived for specific types of containments and that detailed plant-specific LERF calculations might not be needed. Mr. Sieber recommended that responsibility for deriving and justifying LERF be left to the licensees. The staff noted, however, that it would still have to develop a regulatory guide to describe methods of analysis that would be acceptable.

Dr. Bonaca noted that since the staff stated that the comprehensive evaluation of Option C, which considers risk in terms of LERF and defense-in-depth more explicitly, could show the need for a more restrictive CDF screening criterion, then the staff may not be able to justify Options A and B, which would maintain or relax the present CDF criterion without assessing LERF considerations. He recommended that the staff reviews this issue to determine if Options A and B are indeed justifiable.

The staff stated that it would consider revising the proposed Commission paper based on its discussions with the Subcommittee members.

SUBCOMMITTEE COMMENTS, CONCERNS, AND RECOMMENDATIONS

Mr. John Sieber supported Dr. Kress' proposed option that would include developing guidelines for calculating LERF, allocating risk among principle accident scenarios, and integrating defense-in-depth and uncertainty considerations. He stated that this approach would be complex and would require approval by the Commission. He noted that the guidelines would be applicable to other risk-informed rulemaking efforts. Mr. Sieber also supported Option C because it provides flexibility and places the burden of calculating LERF on the licensees. He stated that Option C would not have as good a technical basis as Dr. Kress' proposed option.

Dr. Bonaca stated that he would support Option C or Dr. Kress' option, if the staff would proceed with it. He stated that Options A and B may not be justifiable because they would allow reduction in the CDF criterion without an appropriate assessment of LERF considerations.

Dr. William Shack recommended not using any option that would require the calculation of LERF. He suggested adopting Option A until further guidance is developed, or adopting Option D that assumes containment failure when the reactor vessel fails and uses LERF as the bounding criterion.

Dr. Thomas Kress stated that a methodology or set of principles for assessing LERF would have to be developed before considering the effects of containment on the criterion.

Dr. Graham Wallis stated that Option A may be the best option until the staff can justify the other options.

Dr. Robert Seale recommended waiting for the staff to develop a process for risk-informing the regulations. He would support Option D if the licensees were allowed to consider LERF. He noted that it is hard to compare Station Blackout and ATWS scenarios with the scenarios that lead to PTS events.

Dr. Apostolakis stated that he did not know enough to make any recommendations on the Options. He suggested that the staff rewrite the Commission paper as a status report instead of recommending an option.

STAFF AND INDUSTRY COMMITMENTS

The staff agreed to brief the full Committee regarding the draft Commission paper at the May 11-13, 2000 ACRS meeting.

The staff agreed to brief the joint Subcommittee on the status of the PTS Technical Basis Reevaluation Project activities in September 2000.

SUBCOMMITTEE DECISIONS

The Subcommittee requested that the staff make a presentation at the May 11-13, 2000 ACRS meeting, including a summary of the draft Commission paper, background on the event trees used in the PTS scenarios, and the benefits associated with each option.

The Subcommittee recommended that a report be prepared at the May 11-13, 2000 ACRS meeting, concerning this matter.

FOLLOW-UP ACTIONS

None

PRESENTATION SLIDES AND HANDOUTS PROVIDED DURING THE MEETING

The presentation slides and handouts used during the meeting are available in the ACRS office files or as attachments to the transcript.

BACKGROUND MATERIAL PROVIDED TO THE SUBCOMMITTEE:

1. Draft SECY, "Reevaluation of the Pressurized Thermal Shock Rule (10CFR50.61) Screening Criterion," received via e-mail April 20, 2000.

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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., 1025 Connecticut Ave., NW, Suite 1041, Washington, D.C. 20036, (202) 842-0034.

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

May 1, 2000

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

Dr. William J. Shack, Chairman
Materials and Metallurgy Subcommittee

Noel Dudley

FROM: Noel Dudley, Senior Staff Engineer
ACRS

SUBJECT: WORKING COPY OF THE MINUTES OF THE JOINT ACRS
SUBCOMMITTEE MEETING ON MATERIALS AND METALLURGY
AND ON RELIABILITY AND PROBABILISTIC RISK ASSESSMENT
CONCERNING POTENTIAL REVISIONS TO THE PTS RULE
ACCEPTANCE CRITERION, APRIL 27, 2000 - ROCKVILLE,
MARYLAND

A working copy of the minutes for the subject meeting is attached for your review. I would appreciate your review and comment as soon as possible. Copies are being sent to the Joint Subcommittee members for information and/or review.

Attachment: As stated

cc: J. Barton
M. Bonaca
T. Kress
R. Seale
J. Sieber
G. Wallis

cc via e-mail:
J. Larkins
H. Larson
S. Duraiswamy

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
JOINT MEETING OF THE SUBCOMMITTEES ON
MATERIALS AND METALLURGY AND
RELIABILITY AND PROBABILISTIC RISK ASSESSMENT
POTENTIAL REVISIONS TO THE PTS RULE ACCEPTANCE CRITERION
APRIL 27, 2000
ROCKVILLE, MARYLAND

- **AGENDA** -

<u>TOPIC</u>	<u>PRESENTER</u>	<u>TIME</u>
I. Opening Remarks	G. Apostolakis ACRS	1:00-1:00 p.m.
II. Draft Commission Paper Reevaluation of the Pressurized Thermal Shock Rule (10CFR50.61) Screening Criterion	M. Cunningham, RES <i>E. HACKETT, RES</i>	1:05-2:15 p.m.
- BREAK -		
		<i>2:05 - 2:25</i>
		2:15-2:30 p.m.
III. Draft Commission Paper (Continued)	M. Cunningham, RES	2:30-3:45 p.m.
		<i>2:25 - 3:20</i>
		<i>3:20 - 3:30</i>
		<i>3:30 - 3:45</i>
IV. Discussion	G. Apostolakis, ACRS	3:45-4:30 p.m.
		<i>3:45</i>
V. Adjournment	G. Apostolakis ACRS	4:30 p.m.

NOTE:

Presentation time should not exceed 50 percent of the total time allotted for specific item. The remaining 50 percent of the time is reserved for discussion.

Number of copies of the presentation materials to be provided to the ACRS - 25.

NFD

responses to its other issuances, the Board asked that on or before March 22, 2000, those participants each provide the Board with some indication it wished to continue to participate in this operating license adjudication.

The allotted time having passed without a response from CSP or the State, it appears to the Board that neither has an interest in further pursuing this litigation. As a consequence, the Board hereby gives notice that, absent some response from these parties within thirty days of the date of publication of this issuance in the Federal Register that demonstrates a continued interest in this cause, the Board will terminate the proceeding.¹ Applicant WPPSS and the NRC staff likewise are permitted to file a response to this issuance within that time frame if either wishes to do so.

It is so Ordered.

For the Atomic Safety and Licensing Board²

This memorandum and order is issued pursuant to the authority of the Chairman of the Atomic Safety and Licensing Board designated for this proceeding.

Rockville, Maryland.

Dated: March 30, 2000.

G. Paul Bellwork, III,
Administrative Judge.

[FR Doc. 00-8338 Filed 4-4-00; 8:45 am]

BILLING CODE 7880-01-P

NUCLEAR REGULATORY COMMISSION

Advisory Committee on Reactor Safeguards; Joint Meeting of the ACRS Subcommittees on Materials and Metallurgy and on Reliability and Probabilistic Risk Assessment; Notice of Meeting

The ACRS Subcommittees on Materials and Metallurgy and on Reliability and Probabilistic Risk Assessment will hold a joint meeting on April 27, 2000, Room T-2B3, 11545 Rockville Pike, Rockville, Maryland.

The entire meeting will be open to public attendance.

The agenda for the subject meeting shall be as follows:

¹ As it has done in its January 11, February 16, and March 7, 2000 issuances, the Board requests that each participant who has the capability to do so send a copy of its response by facsimile transmission or internet e-mail to the two Board members, the Office of the Secretary, counsel for WPPSS, and counsel for the any other party who has provided a facsimile number and/or e-mail address.

² In addition to service by regular mail to all parties on the service list, copies of this memorandum and order were sent this date by Internet e-mail transmission to counsel for applicant WPPSS, a State representative previously identified by WPPSS, and the staff.

Thursday, April 27, 2000—1 p.m. until the conclusion of business.

The Subcommittees will review a draft Commission paper concerning options for potential revisions to the pressurized thermal shock rule acceptance criterion. The purpose of this meeting is to gather information, analyze relevant issues and facts, and to formulate proposed positions and actions, as appropriate, for deliberation by the full Committee.

Oral statements may be presented by members of the public with the concurrence of the Subcommittee Chairman; written statements will be accepted and made available to the Committee. Electronic recordings will be permitted only during those portions of the meeting that are open to the public, and questions may be asked only by members of the Subcommittees, their consultants, and staff. Persons desiring to make oral statements should notify the cognizant ACRS staff engineer named below five days prior to the meeting, if possible, so that appropriate arrangements can be made.

During the initial portion of the meeting, the Subcommittees, along with any of their consultants who may be present, may exchange preliminary views regarding matters to be considered during the balance of the meeting.

The Subcommittees will then hear presentations by and hold discussions with representatives of the NRC staff and other interested persons regarding this review.

Further information regarding topics to be discussed, whether the meeting has been canceled or rescheduled, and the Chairman's ruling on requests for the opportunity to present oral statements and the time allotted therefor, can be obtained by contacting the cognizant ACRS staff engineer, Mr. Noel F. Dudley (telephone 301/415-6888) between 7:30 a.m. and 4:15 p.m. (EST). Persons planning to attend this meeting are urged to contact the above named individual one or two working days prior to the meeting to be advised of any potential changes to the agenda, etc., that may have occurred.

Dated: March 30, 2000.

Howard J. Larson,

Acting Associate Director for Technical Support, ACRS/ACNW.

[FR Doc. 00-8339 Filed 4-4-00; 8:45 am]

BILLING CODE 7880-01-P

NUCLEAR REGULATORY COMMISSION

Advisory Committee on Reactor Safeguards Joint Meeting of the ACRS Subcommittees on Plant Operations and on Reliability and Probabilistic Risk Assessment; Notice of Meeting

The ACRS Subcommittees on Plant Operations and on Reliability and Probabilistic Risk Assessment will hold a joint meeting on April 28, 2000, in Room T-2B3, 11545 Rockville Pike, Rockville, Maryland.

The entire meeting will be open to public attendance.

The agenda for the subject meeting shall be as follows:

Friday, April 28, 2000—8:30 a.m. until the conclusion of business.

The Subcommittees will discuss NRC staff and industry initiatives related to risk-informed technical specifications. The purpose of this meeting is to gather information, analyze relevant issues and facts, and to formulate proposed positions and actions, as appropriate, for deliberation by the full Committee.

Oral statements may be presented by members of the public with the concurrence of the Subcommittee Chairman and written statements will be accepted and made available to the Committee. Electronic recordings will be permitted only during those portions of the meeting that are open to the public, and questions may be asked only by members of the Subcommittees, their consultants, and staff. Persons desiring to make oral statements should notify the cognizant ACRS staff engineer named below five days prior to the meeting, if possible, so that appropriate arrangements can be made.

During the initial portion of the meeting, the Subcommittees, along with any of their consultants who may be present, may exchange preliminary views regarding matters to be considered during the balance of the meeting.

The Subcommittees will then hear presentations by and hold discussions with representatives of the NRC staff and other interested persons regarding this review.

Further information regarding topics to be discussed, whether the meeting has been canceled or rescheduled, and the Chairman's ruling on requests for the opportunity to present oral statements and the time allotted therefor, can be obtained by contacting the cognizant ACRS staff engineer, Mr. Michael T. Markley (telephone 301/415-6885) between 7:30 a.m. and 4:15 p.m. (EST). Persons planning to attend this meeting are urged to contact the



*United States
Nuclear Regulatory Commission*

Potential Revisions to PTS Screening Criterion

Mark Cunningham
Division of Risk Analysis and Applications
Office of Nuclear Regulatory Research

Ed Hackett
Division of Engineering Technology
Office of Nuclear Regulatory Research

Presentation to ACRS
Materials and Metallurgy Subcommittee

April 27, 2000

Overview

- Discuss draft Commission paper on PTS screening criterion
 - Purpose of paper
 - PTS screening criterion
 - More recent materials research
 - More recent Commission guidance
 - More recent severe accident information
 - Options for modifying screening criterion
- Solicit ACRS comment on proposed staff options
- Request letter

Purpose of Paper

- ❑ Staff has work underway to revise the technical basis for the Pressurized Thermal Shock Rule (10 CFR 50.61), to support a possible rule revision to reflect experience in its implementation and research on the materials properties of reactor pressure vessels.

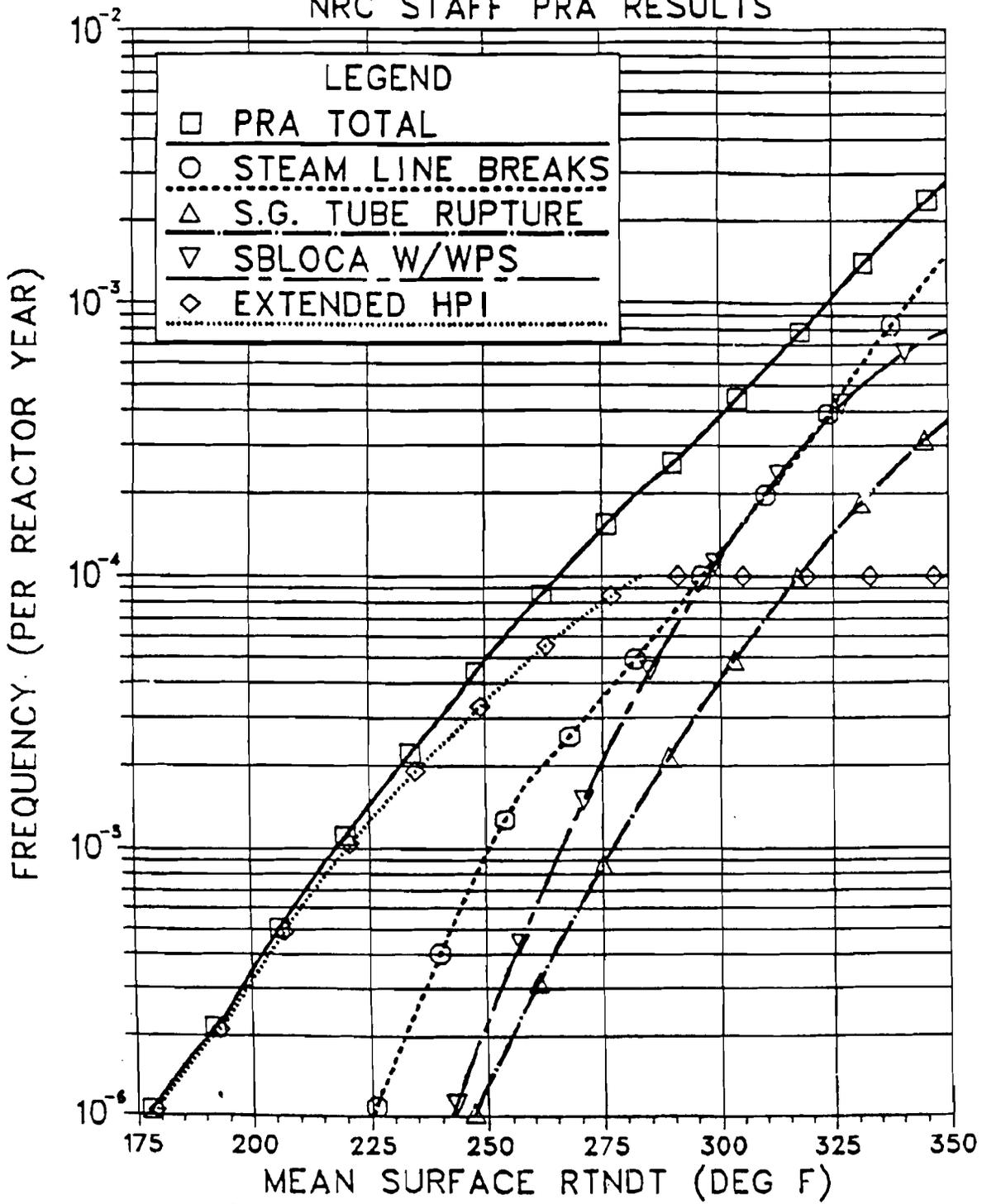
- ❑ Purpose of draft Commission paper:
 - ❑ To provide a staff recommendation on revisions to one part of the screening criterion used in the Pressurized Thermal Shock Rule

 - ❑ To obtain an early Commission decision on the staff recommendation to ensure proper program direction

PTS Acceptance Criterion

- ❑ PTS Rule issued in 1983 as adequate protection rule
- ❑ Established an acceptance criterion (embrittlement screening criterion), above which licensees are required to demonstrate pressure vessel safety
- ❑ Associated with screening criterion is a frequency of a through-wall crack in the pressure vessel
 - ❑ RT_{PTS} of 270°F linked to 5×10^{-6} per reactor year
 - ❑ RG 1.154 - frequency of 5×10^{-6} per reactor year is "acceptable"

LONGITUDINAL CRACK EXTENSION NO ARREST
 NRC STAFF PRA RESULTS



PTS Acceptance Criterion (cont.)

PTS Acceptance Criterion (cont.)

- ❑ Key underlying assumptions
 - ❑ Through-wall crack frequency of 5×10^{-6} per reactor year is acceptable
 - ❑ Through-wall crack equivalent to:
 - ❑ large opening in reactor vessel
 - ❑ core melt
 - ❑ Containment performance not substantially impaired by PTS event

Materials Research

Flaw Size, Density, and Location Distributions

- ❑ Examination of an actual unused PWR vessel in the Pressure Vessel Research User Facility (PVRUF)
- ❑ Examination of Shoreham reactor vessel
- ❑ Analysis of NDE/DE data from River Bend-2 and Hope Creek-2 vessels welds and NDE of PVRUF plate material
- ❑ Development of generalized statistical distributions on flaw sizes, flaw locations and flaw densities in welds and base-metals

Materials Research (cont.)

Irradiation Embrittlement Correlations

- ❑ Improvements to embrittlement correlations; ongoing refinement to include more recent embrittlement data, effect of long irradiation exposure time at vessel normal operating temperatures, and statistical uncertainties in the predicted shift in RT_{NDT}

Statistical Distributions for Material Fracture Toughness

- ❑ Extension of the original ASME fracture toughness databases and development of rigorous statistical distributions for $K1c$ and $K1a$.

Statistical Distributions for Material Chemistry and Initial RT_{NDT}

- ❑ Development of statistical distributions for plant-specific material chemistry (nickel, copper) and initial RT_{NDT} (RT_{NDT0}) to represent the local variability of plate and weld materials

Materials Research (cont.)

Beltline Vessel Fluence Calculations

- ❑ Calculation of end-of-life fluence values for each of the plants that are being studied in the PTS Rule reevaluation; based on up-to-date information of the plant's cycle-by-cycle fuel loading history and the draft regulatory guide DG-1053 proposed method

Improvements in Fracture Mechanics Methods

- ❑ Improvements in FAVOR, including treatment of:
 - ❑ The effect of clad to base-metal differential thermal expansion induced residual stress
 - ❑ The residual stress distribution through the vessel
 - ❑ The stress intensity factor, K , solutions for semi-elliptical surface flaws have been determined for clad vessels
 - ❑ The stress intensity factor, K , solutions for elliptical sub-surface (embedded) flaws

Commission Guidance

- Safety Goal Policy Statement
- Station blackout and ATWS rules
- Backfit rule
- Regulatory Guide 1.174

Commission Guidance (cont.)

- ❑ Safety Goal Policy Statement
 - ❑ Defined qualitative and quantitative goals for acceptable risk
 - ❑ Subsequent Commission decisions established a subsidiary core damage frequency goal of 1×10^{-4} per reactor year
 - ❑ Intended for generic decisions using industry-average core damage frequency and risk estimates.

- ❑ Station Blackout and ATWS Rules
 - ❑ Developed as cost-beneficial safety enhancements
 - ❑ Used probabilistic goals for the acceptable frequency of core-damage accidents
 - ❑ Justified on averted offsite risk basis

Commission Guidance (cont.)

- ❑ Backfit Rule (and Regulatory Analysis Guidelines)
 - ❑ Includes initial screening on potential reductions in CDF and conditional probability of early containment failure
 - ❑ Uses screening criteria based on the Safety Goal QHOs and subsidiary CDF goal
 - ❑ Uses final decision criteria based on averted public risk

- ❑ Regulatory Guide 1.174
 - ❑ Describes a set of general principles for risk-informed license changes
 - ❑ Provides probabilistic guidelines defining acceptable changes in CDF and LERF
 - ❑ Consistent with Safety Goals and Regulatory Analysis Guidelines

Severe Accident Information

- ❑ Major improvements in understanding accident phenomenology since rule established
 - ❑ NUREG-1150
 - ❑ Direct containment heating analyses
- ❑ Impact on containment performance issues in PTS accidents
 - ❑ Dynamic loadings on core and vessel internals
 - ❑ Dynamic loadings on reactor vessel and piping
 - ❑ Containment pressure loadings
 - ❑ Dispersal and coolability of core material
 - ❑ Availability of containment engineered safety features

Options for Revisions

- A. Make no change to the core damage frequency value underlying the screening criterion.
- B. Utilize a core damage frequency consistent with those for the ATWS and Station Blackout Rules.
- C. Apply the Regulatory Guide 1.174 principles and acceptance guidelines to define the allowable change in the PTS acceptable core damage frequency.
- D. Apply the Regulatory Guide 1.174 principles and acceptance guidelines assuming CDF and LERF are equivalent.

Options (cont.)

- A. Make no change to the core damage frequency value underlying the screening criterion
- ▶ Would keep the focus the rule's technical basis revision on PTS technology improvements; would then reduce the complexity of a proposed rule revision.
 - ▶ Would not require the resolution of the issue of containment performance during PTS accidents and related uncertainties
 - ▶ Would not make use of the considerable advances made in agency guidance on use of PRA development since the rule was completed in 1983

Options (cont.)

B. Utilize CDF consistent with Station Blackout and ATWS Rules

- ▶ Would establish greater consistency among the three major risk-informed rules and associated CDFs.
- ▶ Increase in CDF which would be permitted by this option would be near the limit of those permitted in Regulatory Guide 1.174
- ▶ Would require considerable additional work to establish consistency in containment performance and offsite risk estimates

Options (cont.)

C. Apply RG 1.174 principles and acceptance guidelines

- ▶ Would be most consistent with the Commission's most recent PRA policy implementation guidance
- ▶ Would explicitly include in the reevaluation the consideration of defense-in-depth and safety margins issues
- ▶ would maintain the acceptable CDF at a value essentially no higher than it is now
- ▶ Would introduce consideration of containment performance and offsite risk via the use of the guide's LERF guideline
- ▶ Would require the resolution of the issue of containment performance during PTS accidents and related uncertainties, and the acceptability of a large early release frequency

Options (cont.)

- D. Apply RG 1.174 principles and acceptance guidelines, assuming CDF and LERF are equivalent
- ▶ Would be generally consistent with the Commission's most recent PRA policy implementation guidance in RG 1.174
 - ▶ Would explicitly include in the reevaluation the consideration of defense-in-depth and safety margins issues
 - ▶ Would reduce the acceptable CDF to 1×10^{-6} per reactor year, since CDF and LERF are presumed to be equivalent.
 - ▶ Would eliminate consideration of containment performance and offsite risk
 - ▶ Could unnecessarily constrain some PWR plants with more robust containments

Next Steps

- ❑ Finalize Commission paper
 - ❑ Brief full committee; address ACRS comments
 - ❑ Address NRR and OGC comments
- ❑ Continue technical basis revision
 - ❑ Reflect Commission decisions
 - ❑ Continue PRA/HRA and thermal hydraulic analyses
 - ❑ Complete development of generalized statistical distributions on flaw sizes, flaw locations and densities in welds and base-metals
 - ❑ Complete development of material chemistry distributions
 - ❑ Continue development of embrittlement correlations
 - ❑ Continue development of updated fluence maps
 - ❑ Complete development of fracture toughness (K_{1c} , K_{1a}) statistical distributions

Next Steps (cont.)

- ❑ Provide next update to ACRS (August/September)
 - ❑ Commission guidance on screening criterion
 - ❑ Generalized flaw distributions
 - ❑ Materials-related developments (chemistry, embrittlement, fluence, fracture toughness)
 - ❑ Uncertainty analysis methodology
 - ❑ Some of the initial analyses for a PTS plant (PRA/HRA, TH, possibly PFM)

CONTENTS OF OFFICIAL RECORD FOLDERS FOR ACRS SUBCOMMITTEES

The Federal Advisory Committee Act requires retention of certain documents related to every advisory committee meeting. The ACRS has applied this requirement to all ACRS subcommittee meetings. The cognizant staff engineer is responsible for assembling an official record folder for each subcommittee meeting. The folder is retained on file by the Operations Support Branch (Michele Kelton). The following is a list of the documents that should be included in the official record folder.

- ~~✱~~ Original copy of the certified minutes,
 - ~~✱~~ Signed Subcommittee Chairman certification sheet,
 - ~~✱~~ Memorandum forwarding the certified minutes to the members,
 - ~~✱~~ Memorandum forwarding the working draft of the minutes to the members,
 - ~~✱~~ Marked-up agenda or proposed schedule,
 - ~~✱~~ List of attendees
 - ~~✱~~ Federal Register Notice, and
 - ~~✱~~ Slides presented at the subcommittee meeting.
- ~~✱~~ A copy of the certified minutes should be provided to the ACRS secretary.
- ~~✱~~ Three copies of the certified minutes and an electronic copy of the certified minutes should be provided to the Operations Support Branch (Ethel Barnard) for further distribution.