



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

July 1, 2004

SECRETARY

COMMISSION VOTING RECORD

DECISION ITEM: SECY-04-0037

TITLE: ISSUES RELATED TO PROPOSED
RULEMAKING TO RISK-INFORM
REQUIREMENTS RELATED TO LARGE BREAK
LOSS-OF-COOLANT ACCIDENT (LOCA) BREAK
SIZE AND PLANS FOR RULEMAKING ON LOCA
WITH COINCIDENT LOSS-OF-OFFSITE POWER

The Commission (with Chairman Diaz and Commissioner McGaffigan agreeing) approved the subject paper as recorded in the Staff Requirements Memorandum (SRM) of July 1, 2004. Commissioner Merrifield approved in part and disapproved in part.

This Record contains a summary of voting on this matter together with the individual vote sheets, views and comments of the Commission.

A handwritten signature in cursive script, reading "Annette Vietti-Cook".

Annette L. Vietti-Cook
Secretary of the Commission

Attachments:

1. Voting Summary
2. Commissioner Vote Sheets

cc: Chairman Diaz
Commissioner McGaffigan
Commissioner Merrifield
OGC
EDO
PDR

VOTING SUMMARY - SECY-04-0037

RECORDED VOTES

	APRVD	DISAPRVD	ABSTAIN	NOT PARTICIP	COMMENTS	DATE
CHRM. DIAZ	X				X	4/13/04
COMR. McGAFFIGAN	X				X	6/4/04
COMR. MERRIFIELD	X	X			X	4/13/04

COMMENT RESOLUTION

In their vote sheets, Chairman Diaz and Commissioner McGaffigan approved the staff's recommendation while Commissioner Merrifield approved in part and disapproved in part. All Commissioners provided additional comments. Subsequently, the comments of the Commission were incorporated into the guidance to staff as reflected in the SRM issued on July 1, 2004.

NOTATION VOTE

RESPONSE SHEET

TO: Annette Vietti-Cook, Secretary

FROM: CHAIRMAN DIAZ

SUBJECT: SECY-04-0037 - ISSUES RELATED TO PROPOSED
RULEMAKING TO RISK-INFORM REQUIREMENTS
RELATED TO LARGE BREAK LOSS-OF-COOLANT
ACCIDENT (LOCA) BREAK SIZE AND PLANS FOR
RULEMAKING ON LOCA WITH COINCIDENT LOSS-
OF-OFFSITE POWER

Approved xx ^{w/comments} Disapproved _____ Abstain _____

Not Participating _____

COMMENTS:

See attached comments.

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SIGNATURE
Ap 13, 04
DATE

Entered on "STARS" Yes No _____

Chairman Diaz' Comments on SECY-04-0037

In 1995, the Commission issued the PRA Policy Statement establishing the foundation for risk-informing our regulations. Since that time, the staff has continued to progress toward that goal, using evolving technology to ensure that new regulations focus on the safety-significant issues, while providing appropriate defense-in-depth and maintaining adequate safety margins. The staff and industry have put many years of hard work into developing risk assessment capabilities, and we know this work will continue to evolve and improve. Yet, there are times that call for a discrete and notable advance in the state-of-the-regulation.

The SRM on SECY-98-0300, "Options for Risk-Informed Revisions to 10 CFR Part 50," sets the framework for the comprehensive reassessment of the Part 50 requirements that would provide the capability to develop a coherent risk-informed regulatory framework for nuclear power plants. This framework should be able to propagate improvements throughout the regulations. It supports those changes to Part 50 that incorporate risk-informed attributes, including developing a new set of design-basis accidents. At that time, five years ago, I was thinking of the large-break loss of coolant accident (LOCA). We have known for some time that the large-break LOCA is using resources disproportionate to its importance to safety, taking attention and resources from what we know is much more safety significant, and now we can do something about it.

It is in this spirit of moving forward that I provide my views on preparing a new risk-informed rule for 10 CFR 50.46.

Defining a new maximum break size for the design-basis LOCA using a risk-informed basis is a significant step in moving the regulation and operation of nuclear power plants forward to focus appropriate resources on issues based on their safety significance. To move forward, the staff should use the initiating event frequencies from the expert elicitation process to guide the determination of the appropriate delineation between design-basis and beyond design-basis LOCAs. In addition, the staff should use (or require licensees to use) the approach and guidance in Regulatory Guide (RG) 1.174 to assure that the selection of the maximum break size is risk-informed and conforms to the RG 1.174 safety principles. A frequency of 1 E-05/Ry is an appropriate mean value for the LOCA frequency criterion for establishing the maximum design-basis LOCA since it is complemented by the requirement that appropriate mitigation

capability must be retained for the beyond design-basis LOCA category. In order to effectively implement this approach, plants should be required, by regulation, to retain the capability to successfully mitigate the full spectrum of LOCAs up to and including the double-ended guillotine break of the largest pipe in the reactor coolant system. Successful mitigation for a beyond design-basis LOCA should be to maintain the core in a coolable geometry. The level of regulatory oversight including the required level of detail and conservatism of the supporting analyses should be commensurate with the category (i.e., design-basis or beyond design-basis). For example, design-basis LOCA analysis should continue to meet the requirements of 10 CFR 50.46 (either the Appendix K requirements or the 95th percentile of the realistic alternative), while the appropriate mitigation capability for beyond design-basis LOCAs need not be single failure proof nor would the models used to demonstrate mitigation capability need to be 50.46 evaluation models.

The staff should develop a proposed rule package guided by the following considerations. The scope of the proposal should allow operational changes (e.g., power level, allowable core parameters such as peaking factors and maximum linear heat generation rates, and technical specification limits of allowable outage times) and should allow design changes where safety benefits can be gained (e.g., optimization of the use of safety systems such as containment sprays, and diesel generator start and load requirements). However, the scope of changes should be restrictive in areas where engineering margins should be retained to satisfy the safety principles of RG 1.174 (e.g., containment design pressure, and severe accident mitigation capability). Finally, this scope should be restrictive in areas where the current design requirements contribute significantly to the "built-in capability" of the plant to ameliorate security threats.

A change process for proposed plant changes using the rule should follow existing regulations (e.g., 10 CFR 50.59 and 50.90, and RG 1.174). If specific requirements to control changes are needed for this rule, then an appropriate change process should be part of the rule.

The proposed rule should be structured such that a backfit analysis is not necessary for plant changes resulting from LOCA frequency increases identified by the required 10-year re-estimation and 5-year failure review. The re-estimation of LOCA frequencies should build on the existing information at the time and should not involve a complete repeat of the expert elicitation process. Stability and reliability of the process should be important considerations.

Additionally, licensees should be aware that changes or other adjustments may be necessary if estimated LOCA frequencies increase as a result of the re-estimation or review.

In SECY-04-0037, the staff points out that small-break LOCA evaluation models for the current fleet of BWR and PWR nuclear power plants have not been reviewed and approved by the staff. I do believe we should encourage the use of realistic LOCA methods, but we should not delay the safety benefits to be gained by the re-definition of the large-break LOCA by requiring that the implementation of the rule be coupled to other activities that might be desirable but are not critical to addressing the safety issues.

The staff should continue to consider how future plant designs would be covered by the rule; however, the rulemaking should not be unnecessarily delayed in an attempt to resolve future plant design issues that can be addressed separately.

I would like to re-emphasize that this is a safety enhancement effort that needs to move forward in an expedited manner. The staff should provide the Commission a proposed rule in 6 months of the date of the SRM.

NOTATION VOTE

RESPONSE SHEET

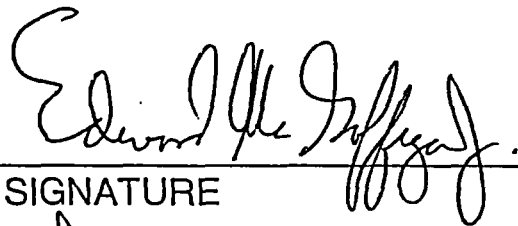
TO: Annette Vietti-Cook, Secretary
FROM: COMMISSIONER MCGAFFIGAN
SUBJECT: SECY-04-0037 - ISSUES RELATED TO PROPOSED
RULEMAKING TO RISK-INFORM REQUIREMENTS
RELATED TO LARGE BREAK LOSS-OF-COOLANT
ACCIDENT (LOCA) BREAK SIZE AND PLANS FOR
RULEMAKING ON LOCA WITH COINCIDENT LOSS-
OF-OFFSITE POWER

Approved ^{w/comments} Disapproved _____ Abstain _____

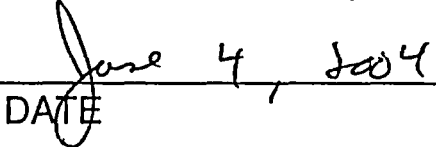
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COMMENTS:

See attached comments.



SIGNATURE



DATE

Entered on "STARS" Yes No _____

Commissioner McGaffigan's Comments on SECY-04-0037

I appreciate the staff's effort in this paper to raise policy issues and identify technical issues involved in proceeding with a proposed rulemaking to risk-inform the current design basis large-break loss of coolant accident (LOCA) break size. I believe that the staff has done an excellent job in describing these issues. I particularly want to thank Mr. Rubin and Mr. Kelly for utilizing the new NRR non-concurrence process. Their memos clearly contributed to the overall quality of the discussion.

I should note at the outset that I am deeply skeptical that we are ready to begin this rulemaking, particularly with the scope and pace envisioned by my two colleagues on the Commission. This past Memorial Day weekend, I watched "A Bridge Too Far" on one of the cable channels. In one memorable scene British General Browning is describing Field Marshall Montgomery's daring but doomed plan to seize the bridges all the way to Arnhem on the Rhine (Operation Market Garden) to British airborne commander General Urquhart, American airborne commanders, Generals Gavin and Taylor, and Polish airborne commander, General Sosabowski. General Sosabowski expresses his skepticism about the complexity and viability of the plan.¹ Of course, he proves all too right.

This rulemaking has every bit as much complexity as Operation Market Garden. I am sure that the NRC staff, if directed to do so, will try to deliver a broad-scope proposed rule on a very tight schedule. But haste on the front end will, in my view, not speed the ultimate final rule, just as Montgomery's ill-conceived plan did not lead to early allied victory in World War II. Five of the six technical issues described in Attachment 3 are termed to be of high complexity for a broad scope rule. Highly complex technical issues are not resolved on tight timetables. Even the allegedly moderately complex task of determining the redefined large break LOCA size applicable to various categories of plants is unlikely to have achieved any broad consensus in the short term. This is a task that is dependent on an expert panel to predict break size-frequency curves, a process in which I personally do not have high confidence.²

The paper asks us for guidance on how broadly (with respect to the scope of allowed changes) the redefinition of the maximum LOCA break size should be applied. If we are going to attempt to write a rule in the short-term, I believe that we should direct the staff to develop a narrow scope rule. That is all we are really prepared for at the current time. I continue to believe that a broad scope 50.46 rule change will require at least a phase 3 level 2 PRA (in the lexicon of the staff requirements memorandum (SRM) on COMNJD-03-0002). Such PRAs will not be available until 2008 under the SRM and some (in industry and the standards organizations) have suggested it could take significantly longer.³

¹General Sosabowski states, "I promise you that I'll be properly ecstatic if it works."

²I have read both SECY-04-0060 and the transcript of ACRS' April 15, 2004 meeting that dealt with the expert elicitation process. This whole effort needs to be rigorously peer-reviewed once the promised NUREG is available later this year. I am particularly uncomfortable with the use of the geometric mean in analyzing the experts' input, which essentially means throwing out the highest and lowest estimates of LOCA frequency for a given break size (akin to Olympic figure skating scoring). I assume that the final NUREG will do sensitivity analysis on this technique. The break size-frequency curves are the technical heart of this rulemaking, and thus the rulemaking will succeed or fall on whether there is broad international acceptance of NRC's approach among technical experts.

³It is not clear whether any standards organization is stepping to the plate to develop level 2 PRAs.

As the staff points out in the SECY paper (and Mssrs. Rubin and Kelly emphasize), under a broad scope rule there is the potential for "unacceptable changes in the plant's ability to prevent and mitigate beyond design basis events." In addition there is a safety-security nexus that is not addressed directly in the paper. As I wrote in my vote on SECY-02-0057, it is very important to maintain safety margins "because doing so is relevant to potential terrorist-induced accidents which are not modeled in PRAs and cannot be modeled in PRAs." The fact that the plants are currently designed to cope with a 36" pipe break engenders public confidence. In my view many of the potential plant changes under a broad scope rule would need a classified (or safeguards information) analysis of the security implications in addition to a safety evaluation, both reviewed by the NRC staff. Developing the framework for such analysis will take time. If we were to aim for a final rule in about five years, a broad scope rule might prove possible. The phase 3 PRAs, which we should require, would likely be available. A framework for analyzing the security implications of potential changes could have been developed and piloted. There would still be 20 years remaining on the licenses of the oldest currently licensed plants and potentially 47 years for the youngest, plenty of time for the industry to gain whatever economic benefits the rule may offer.

Let me now turn to the four guidance areas discussed in Attachment 2:

Retention of Mitigation Capability

I strongly favor retention through regulatory requirements of mitigative capability for LOCAs up to the largest double-ended guillotine break size. I do not believe that relying on severe accident management guidelines (SAMGs) in this area would be satisfactory, particularly in a broad scope rule and particularly given the importance of these mitigation capabilities to potential terrorist-induced events.

Reversibility

As the staff points out, the issue of reversibility is not as big an issue under a narrow scope rule. I support reversibility not only for LOCA frequency changes, but also for other changes where the core damage frequency (CDF) or large early release frequency (LERF) differential or cumulative limits were exceeded. I also agree with the staff that backfit analyses should not be required where restorations to the design basis and other actions are necessary because the licensee is unable to maintain compliance with the relevant LBLOCA criteria as a result of changes in plant design and operating characteristics (or new information such as revised frequency estimates).

Use of Best-Estimate Evaluation Models

I join with Chairman Diaz and Commissioner Merrifield in encouraging the use of more realistic best estimate models for all break sizes but, given that the existing analytical models for small breaks are adequate and conservative, I am unwilling to make those best estimate models a regulatory requirement for small break LOCA analyses.

Redefinition Applicability to Future Plants

I agree with the staff and my colleagues that LOCA redefinition for future plants should be pursued on a separate (and slower) path from rulemaking for existing plants. Taking on that additional task at this time would truly be a bridge too far.

In conclusion, I would note that an NEI staff member at the ACRS' April 15 meeting expressed great disappointment in this SECY paper (a disappointment I do not share), in part because it

tries to anticipate all the ways a broad-scope rule might be utilized, some of which he found extreme. He went on to state: "There's been no successful regulatory initiative that hasn't been preceded by some form of industry pilot or exemption-type request. And this effort is sorely in need of one." He suggested resolution of GSI-191, the PWR sump screen issue, be that pilot. NEI has made similar arguments in other fora. In the Commission's meeting with ACRS on June 2, 2004, some ACRS members suggested a risk-informed approach to GSI-191 might be appropriate. In my view, resolution of GSI-191 as soon as possible should be one of the NRC's highest priorities. Staff analyses have indicated that for about half of our PWR fleet, improvements on the order of 10^{-4} /yr in core damage frequency may be obtainable. It may also be an area where the existing phase 1 internal initiating event level 1 PRAs may be adequate for analysis purposes (although some sort of adjustment for seismic events would need to be made). Such a pilot may therefore make sense, although it would still be dependent on utilizing the break size-frequency curves which, as I stated above, NRC staff are still months away from completing and longer still from winning broad international technical support for. Having a real concrete example -- GSI-191 -- relevant to a broad group of international regulators, may help win that technical support, and may ultimately help in achieving a broad-scope rule change for this critical rule.

NOTATION VOTE
RESPONSE SHEET

TO: Annette Vietti-Cook, Secretary
FROM: COMMISSIONER MERRIFIELD
SUBJECT: **SECY-04-0037 - ISSUES RELATED TO PROPOSED
RULEMAKING TO RISK-INFORM REQUIREMENTS
RELATED TO LARGE BREAK LOSS-OF-COOLANT
ACCIDENT (LOCA) BREAK SIZE AND PLANS FOR
RULEMAKING ON LOCA WITH COINCIDENT LOSS-
OF-OFFSITE POWER**

Approved Disapproved Abstain _____

Not Participating _____

COMMENTS:

See attached comments.



SIGNATURE

April 13, 2004

DATE

Entered on "STARS" Yes No _____

Commissioner Merrifield's Comments on SECY-04-0037:

Overall, I believe that risk-informed rulemakings, like the loss-of-coolant accident (LOCA) redefinition rulemaking, could result in a net safety benefit. While such rulemakings reduce regulatory oversight of low risk contributors by taking them out of the design basis, they enhance regulatory oversight of higher risk contributors that are currently outside the design basis. This leads to a better safety focus of NRC resources. My votes discussed below are intended to allow us to accelerate the realization of these safety benefits in a methodical and defensible manner.

Direction on Policy Issues:

How narrowly or broadly (with respect to the scope of allowed changes) should the redefinition of the maximum LOCA break size be applied?

I support a rule that allows broad changes, including removal of safety-related equipment when adequately justified. As noted in the paper, changes that could be allowed by a broad redefinition rule could impact the plant's ability to respond to beyond design basis events. Such events play an important role in the calculations of core damage frequencies (CDF) and large early release frequencies (LERF). The values of CDF and LERF and changes in these values are key to the fundamental basis for the rulemaking. They are also key to justifying changes that could be allowed by the redefinition rule. Therefore, any changes resulting from the redefinition rule should be fully risk-informed and supported by analyses that conform to a Regulatory Guide 1.174, "An Approach For Using Probabilistic Risk Assessment In Risk-informed Decisions on Plant-specific Changes To The Licensing Basis,"-type process. The staff should ensure that the review mechanisms for such changes provide for adequate NRC oversight.

Does the Commission agree that some degree of mitigation capability must be retained for break sizes between a new maximum break size and the double ended guillotine break?

For the reasons discussed in the paper, I support the staff's view that mitigative capability should be maintained for break sizes between the new maximum break size and the double ended guillotine break. I also support the staff view that such capability should be less than presently required for design basis accidents with respect to redundancy, qualification, and analysis methods.

Does the Commission agree that primary mitigative capability for beyond design basis LOCA should be retained through system functional capability, rather than reliance on SAMGs [Severe Accident Management Guidelines] which are voluntary programs, often directed to post core damage actions?

Under a revised rule, the level of mitigation capability assumed in the risk analyses for beyond design basis events would become an important part of the basis for a licensee to implement the redefinition rule. Validity of these assumptions tie directly to the quality of the risk analyses supporting the implementation of the rule. As such, the mitigation capability for beyond design basis events, and any changes to this capability, should be controlled by NRC requirements not

by voluntary means. This should be controlled by requirements addressing updates and quality of probabilistic risk assessments.

The requirement for mitigation of a large break LOCA should also be required not voluntary. Because of the low frequencies required to eliminate large break LOCAs from the design basis, the contribution of such LOCAs to risk should be small. Based on this, it would likely not be sufficient to cover this capability by requirements on PRA updates and quality. However, due to the large uncertainties associated with the estimates of the large break LOCA frequencies and calculational methods used for scenarios where core melt leads to vessel breach, I believe that regulatory controls to preclude such an event is warranted to maintain appropriate levels of defense-in-depth and safety margin. I understand the staff's statement "less than presently required" to mean that further deliberation on defining the requirements are needed. The complexity of an effort to define such requirements is eluded to in Attachment 3 of the paper. I believe that the low risk contribution of the large break LOCA, which allows us to remove the large break LOCA from the design basis should weigh heavily in the types of requirements that would be imposed in this area. Because of the low safety significance of this capability, I support including a high level criterion in the rule that would require the licensee to provide mitigation capability to preclude vessel breach. Consistent with the approach taken in the 10 CFR 50.69 rulemaking on treatment and commensurate with the low safety significance of this capability, I do not believe the staff should prescribe how such a capability is to be provided.

Furthermore, to address the potential consequences from a beyond design basis LOCA, the staff should include a requirement for containment integrity. This requirement should be similar to the one described above on vessel breach.

Does reversibility extend beyond increases in LOCA frequency and what is the relationship between the backfit rule and reversibility?

Over time, changes could occur in the estimates of LOCA frequency and actual plant performance related to mitigation systems availability, reliability, and capability. Such changes could result in changes to the CDF and LERF differential or cumulative values that formed the basis for a plant to move from the deterministic rule to the risk-informed rule. When such changes occur, the plant should be required to take action, including make plant hardware modifications if necessary, to bring the CDF and LERF differential and/or cumulative values to those that are consistent with the concepts upon which the rule was fundamentally based. The staff should not have to apply the backfit process to effect such change. The risk-informed rule should be developed in a manner to make this situation result in a compliance issue. This concept is not new. The same concept was used in the development of 10 CFR 50.69 which, as proposed, requires licensees to apply special treatment requirements to structures, systems, and components that over time may be re-categorized from low safety significant to safety significant. This approach should lead licensees to seriously consider hardware changes that would be allowed based on current estimates, performance, and state of knowledge as they may have to incur significant costs if these assumptions change. This was an attractive feature in the proposed 10 CFR 50.69 and should consistently be used in this and other risk-informed rulemakings.

Should licensees have to reanalyze small breaks in the design basis with best estimate models?

In the interest of moving this rulemaking along, I do not believe that licensees should have to reanalyze small breaks in the design basis with best-estimate models. I realize this is a change from my position in the vote on SECY-02-0057. This change in my position results from two related factors. First, both the Appendix K and the best-estimate approaches provide adequate means for demonstrating safety. Second, I am sensitive to the time it would take to develop best-estimate models for small break LOCAs.

Should rulemaking for future plants be a separate effort?

In the interest of moving this rulemaking along and consistent with my position on use of best estimate models, I believe that the rulemaking for future plants should be treated separately. In addition, the rulemaking for future plants should not be constrained by the decisions made on the rulemaking for existing plants. For example, in my vote on the use of realistic analysis techniques for small breaks, I indicated that plants should not have to reanalyze small breaks in the design basis with best-estimate methods. This decision, although maintains safety, was greatly influenced by my desire to move the rulemaking for existing plants along on a faster track. I believe this should be given more consideration in the rulemaking for future plants. I believe that use of more realistic techniques has significant benefits, not just for reducing unnecessary conservatisms, but also for better understanding the behavior of plants to the transients. This understanding could sometimes be masked by the significant conservatisms in non-best-estimate methods. Therefore, the staff should continue to consider the use of best-estimate models and other issues for the rulemaking to cover future plants.

Schedule to provide a plan for the redefinition rule:

I disapprove the staff's recommendation to prepare a plan for the redefinition rule, including resource and schedule information, six months after the staff receives the Commission's direction. Given the considerable amount of time and effort the staff has already spent working on this rulemaking, the staff should provide a proposed rule in six months. I expect the staff to ensure that quality and safety are not compromised in order to meet this schedule. The staff should keep the Commission fully and currently informed of any significant issues that arise and any delays in this schedule.

Use of BWROG pilot exemption request for LOCA/LOOP:

I approve the staff's recommendation to review the Boiling Water Reactor Owners Group (BWROG) pilot exemption request and subsequently proceed with rulemaking on LOCA/LOOP [loss-of-coolant accident/loss of offsite power]. However, the staff should be ready to proceed with rulemaking if the BWROG efforts encounter significant delays (i.e., delays of six months or more). The BWROG should be informed of the potential impacts, consistent with staffing issues, that delays in its application could have on the staff's ability to perform the review prior to completing the rulemaking.

Comments on the Nonconcurrency Process:

I commend the staff for developing the new nonconcurrency process which was used for the first time in this SECY paper. I believe this approach makes the concurrence process more efficient and transparent to all internal and external stakeholders, including the Commission and the public. I encourage the staff to continue to look for ways to enhance the Agency's activities relative to our performance goals.



4/13/04