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

SECRETARY

March 15, 2011

COMMISSION VOTING RECORD

DECISION ITEM: SECY-11-0014

TITLE: USE OF CONTAINMENT ACCIDENT PRESSURE IN ANALYZING EMERGENCY CORE COOLING SYSTEM AND CONTAINMENT HEAT REMOVAL SYSTEM PUMP PERFORMANCE IN POSTULATED ACCIDENTS

The Commission (with Commissioners Svinicki, Apostolakis, Magwood, and Ostendorff agreeing) approved the subject paper as recorded in the Staff Requirements Memorandum (SRM) of March 15, 2011. Chairman Jaczko disapproved the paper.

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

Annette L. Vietti-Cook
Secretary of the Commission

Attachments:
1. Voting Summary
2. Commissioner Vote Sheets

cc: Chairman Jaczko
Commissioner Svinicki
Commissioner Apostolakis
Commissioner Magwood
Commissioner Ostendorff
OGC
EDO
PDR

VOTING SUMMARY - SECY-11-0014

RECORDED VOTES

	APRVD	DISAPRVD	ABSTAIN	NOT PARTICIP	COMMENTS	DATE
CHRM. JACZKO		X			X	2/18/11
COMR. SVINICKI	X				X	3/3/11
COMR. APOSTOLAKIS	X				X	2/23/11
COMR. MAGWOOD	X				X	3/4/11
COMR. OSTENDORFF	X				X	3/2/11

COMMENT RESOLUTION

In their vote sheets, Commissioners Svinicki, Apostolakis, Magwood, and Ostendorff approved the staff's recommendation and provided some additional comments. Chairman Jaczko disapproved the paper. Subsequently, the comments of the Commission were incorporated into the guidance to staff as reflected in the SRM issued on March 15, 2011.

NOTATION VOTE

RESPONSE SHEET

TO: Annette Vietti-Cook, Secretary

FROM: Gregory B. Jaczko

SUBJECT: SECY-11-0014 – USE OF CONTAINMENT ACCIDENT PRESSURE IN ANALYZING EMERGENCY CORE COOLING SYSTEM AND CONTAINMENT HEAT REMOVAL SYSTEM PUMP PERFORMANCE IN POSTULATED ACCIDENTS

Approved _____ Disapproved __X__ Abstain _____

Not Participating _____

COMMENTS: Below ___ Attached _X_ None ___

SIGNATURE

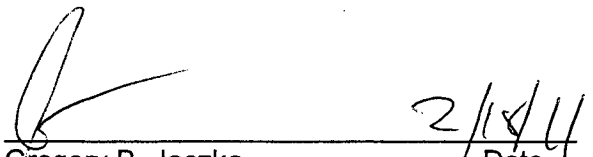
2/18/11

DATE

Entered on "STARS" Yes _x_ No ___

Chairman Jaczko's Comments on SECY-11-0014,
"Use Of Containment Accident Pressure In Analyzing Emergency Core Cooling System And Containment Heat Removal System Pump Performance In Postulated Accidents"

I disapprove the staff approach to credit containment accident pressure (CAP) in the analyses of emergency core cooling systems. I am, however, comfortable with the approach recommended by the Advisory Committee on Reactor Safeguards in their May 19, 2010 letter. I appreciate the many discussions that have occurred between the staff and the ACRS, but I believe at this point there is not a sufficient safety basis to allow CAP to be credited in ongoing license amendments and other licensing actions. As the ACRS reiterates in their February 17, 2011 letter to the Commission, "crediting containment accident pressure is a serious compromise of the independence of the prevention and mitigation functions, a basic element of the defense-in-depth philosophy." In particular, I am very supportive of the ACRS approach to allow licensees to justify the use of CAP credit with plant specific risk information that demonstrates the risk of relying on CAP is small. As ACRS indicates, this analysis should utilize risk analyses that include internal, fire, and seismic initiating events and consider the effect of operator errors.



Gregory B. Jaczko 2/18/11
Date

NOTATION VOTE

RESPONSE SHEET

TO: Annette Vietti-Cook, Secretary

FROM: COMMISSIONER SVINICKI

SUBJECT: SECY-11-0014 – USE OF CONTAINMENT ACCIDENT PRESSURE IN ANALYZING EMERGENCY CORE COOLING SYSTEM AND CONTAINMENT HEAT REMOVAL SYSTEM PUMP PERFORMANCE IN POSTULATED ACCIDENTS

Approved __XX__ Disapproved _____ Abstain _____

Not Participating _____

COMMENTS: Below ___ Attached _XX_ None ___

SIGNATURE

03/13/11

DATE

Entered on "STARS" Yes ✓ No ___

Commissioner Svinicki's Comments on SECY-11-0014
Use of Containment Accident Pressure in Analyzing Emergency Core Cooling System and Containment Head Removal System Pump Performance in Postulated Accidents

I approve the staff's recommended Option 1. The staff should evaluate current extended power uprate (EPU) applications, as well as future applications for new or increased credit for containment accident pressure (CAP), consistent with staff practice in implementing the current risk review guidance (Standard Review Plan Section 19.2), including the review of nonrisk-informed applications such as EPUs and the recently-developed deterministic guidance based on recommendations of the Advisory Committee on Reactor Safeguards (ACRS) to include uncertainty and margins in CAP calculations. The staff should revise the regulatory guidance as described in SECY-11-0014, consistent with this option.

I am persuaded by the staff's arguments outlined in the paper, as well as the underlying history as put forward in Enclosure 1, that the CAP credit issue does not rise to the level of questioning adequate protection and that the use of CAP does not constitute noncompliance with applicable NRC requirements. Further, I have studied the thoughtful analysis of this issue put forward by Commissioner Apostolakis, in his vote, and I agree with his interpretation of the agency's philosophy on defense-in-depth and the issue of degree of independence among successive fission product barriers. As he notes, the NRC defines defense-in-depth as "an element of the NRC's safety philosophy that employs successive compensatory measures to prevent accidents or mitigate damage if a malfunction, accident, or naturally-caused event occurs at a nuclear facility" but this definition "does not state that the compensatory measures must be independent." Commissioner Apostolakis further notes that use of the word "philosophy" was "recognition of the possibility that some proposed changes could be approved even though they might adversely affect some defense-in-depth measures already built into the licensing basis."

Ultimately, I believe that the use of CAP as proposed under Option 1 will allow the staff to review whether a reasonable balance has been preserved among prevention of core damage, prevention of containment failure, and consequence mitigation, while not putting staff into the position of judging whether the licensee could possibly have met its objective some other way. Option 1 will also capture, however, the improved guidance that results from ACRS recommendations to include margin and uncertainty determinations in CAP calculations. These improvements provide an enduring benefit to the agency's review of the use of CAP.

Kristine L. Svinicki 03/ /11

NOTATION VOTE

RESPONSE SHEET

TO: Annette Vietti-Cook, Secretary

FROM: Commissioner Apostolakis

SUBJECT: SECY-11-0014 – USE OF CONTAINMENT ACCIDENT PRESSURE IN ANALYZING EMERGENCY CORE COOLING SYSTEM AND CONTAINMENT HEAT REMOVAL SYSTEM PUMP PERFORMANCE IN POSTULATED ACCIDENTS

Approved XX Disapproved _____ Abstain _____

Not Participating _____

COMMENTS: Below ___ Attached XX None ___

SIGNATURE

2/23/11
DATE

Entered on "STARS" Yes X No ___

Commissioner Apostolakis' Comments on SECY-11-0014,
"Use Of Containment Accident Pressure In Analyzing Emergency Core Cooling System And Containment Heat Removal System Pump Performance In Postulated Accidents"

I approve Option 1, as recommended by the staff. The staff's arguments convinced me that crediting containment accident pressure does not call into question adequate protection of public health and safety. In addition, I am concerned that not following the approach of Option 1 could unnecessarily create regulatory instability.

It appears that much of the argument regarding the appropriate course of action is centered on differing interpretations of the principle of defense in depth. The ACRS, in its letter dated February 17, 2011, asserts that "crediting containment accident pressure is a serious compromise of the independence of the prevention and mitigation functions, a basic element of the defense-in-depth philosophy." The staff, on the other hand, argues that "the regulations do not specify that the fission product barriers be independent."

The Commission, in its White Paper of March 1999, defines defense in depth as "an element of the NRC's safety philosophy that employs successive compensatory measures to prevent accidents or mitigate damage if a malfunction, accident, or naturally caused event occurs at a nuclear facility". This definition does not state that the compensatory measures must be independent. Regulatory Guide 1.174 is the regulatory document that elaborates on defense in depth. In accordance with this regulatory guide, the staff, in evaluating proposed changes to a plant's licensing basis, should maintain the defense-in-depth philosophy. The word "philosophy" was added to this regulatory guide after a considerable discussion between the staff and the ACRS. Its addition was recognition of the possibility that some proposed changes could be approved even though they might adversely affect some defense-in-depth measures already built into the licensing basis. However, the basic idea of "successive compensatory measures" was to be preserved.

Regulatory Guide 1.174 provides a list of elements that can be used as guidelines for judging whether the proposed change meets the defense-in-depth principle. Three of these are relevant here:

- A reasonable balance is preserved among prevention of core damage, prevention of containment failure, and consequence mitigation.
- System redundancy, independence, and diversity are preserved commensurate with the expected frequency, consequences of challenges to the system, and uncertainties (e.g., no risk outliers).
- Independence of barriers is not degraded.

I believe that the word "independence" in the second and third bullets is not used in its strict mathematical sense. The ACRS position appears to consider the third bullet as the essence of defense in depth[1]. In my view, it is the first bullet that describes the essence of defense in depth.

Because the statements in Regulatory Guide 1.174 are subject to different interpretations, the staff should revise this guide using precise language to assure that the defense-in-depth philosophy is interpreted and implemented consistently. To the extent that other regulatory guidance refers to defense in depth, the relevant documents should be updated also, as appropriate.

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[1] As stated above, the ACRS claims that the independence of the prevention and mitigation functions is seriously compromised. This statement would imply that the reasonable balance mentioned in the first bullet is not preserved. It is on this point that reasonable people may disagree.

NOTATION VOTE

RESPONSE SHEET

TO: Annette Vietti-Cook, Secretary

FROM: COMMISSIONER MAGWOOD

SUBJECT: SECY-11-0014 – USE OF CONTAINMENT ACCIDENT PRESSURE IN ANALYZING EMERGENCY CORE COOLING SYSTEM AND CONTAINMENT HEAT REMOVAL SYSTEM PUMP PERFORMANCE IN POSTULATED ACCIDENTS

Approved _X_ Disapproved _____ Abstain _____

Not Participating _____

COMMENTS: Below ___ Attached _X_ None ___

SIGNATURE

4 March 2011

DATE

Entered on "STARS" Yes _X_ No ___

Commissioner Magwood's Comments on SECY-11-0014:
"Use of Containment Accident Pressure in Analyzing
Emergency Core Cooling System and
Containment Heat Removal System Pump Performance in Postulated Accidents"

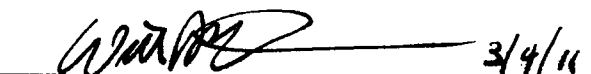
I approve staff's recommended Option 1 subject to the following provisions.

First, I appreciate the staff's alacrity in providing SECY-11-0014 to the Commission in such short order. This paper is well written and very informative and should stand as an excellent guide to anyone who cares to develop an understanding of this complex issue. However, I am also quite frustrated that this issue has taken so long to reach the Commission for a final decision and that significant regulatory actions have been delayed as a result. I recognize that it is perhaps the Commission itself that created this situation, but whatever its cause, I hope we prove able to avoid similar situations in the future.

I very much appreciate Commissioner Apostolakis' very cogent analysis of the defense-in-depth concerns raised by the ACRS. I agree with his conclusions that the Committee's assertion that "crediting containment accident pressure is a serious compromise of the independence of the prevention and mitigation functions, a basic element of the defense-in-depth philosophy" overemphasizes the desire for independence of barriers to core damage. Of equal merit is the element of defense-in-depth that focuses on the preservation of a "reasonable balance" among measures to prevent core damage, prevent containment failure, and mitigate consequences. I am confident that the staff's conservative and proven approach to crediting containment accident pressure strikes that reasonable balance.

Nevertheless, I am not prepared to discount entirely the concerns of the ACRS in this matter. While I firmly believe that crediting containment accident pressure does not call into question adequate protection of public health and safety, I find that ACRS has rightly highlighted gaps in our knowledge that should be addressed. In particular, the Committee has noted that the agency has never performed a comprehensive risk assessment of the prospects of leakage from older BWR containments under various scenarios such as seismic events, fires, and various operator actions. We should do so. I also believe a more complete assessment of the performance of cavitating pumps under various conditions would help complete our understanding the issue.

I therefore recommend that the staff develop a program of investigation to explore these and related questions. I understand that the staff is planning assessments in this area and I recommend that this work be expanded as necessary to address the concerns above. I also recommend that ACRS be consulted formally to provide its advice regarding the scope of these endeavors. Should staff find, in course of the resulting work, that the risks associated with crediting containment accident pressure vary from our current understanding, it should present this information as soon as possible to the Commission with options for appropriate regulatory response.



William D. Magwood, IV Date

NOTATION VOTE

RESPONSE SHEET

TO: Annette Vietti-Cook, Secretary

FROM: COMMISSIONER OSTENDORFF

SUBJECT: SECY-11-0014 – USE OF CONTAINMENT ACCIDENT PRESSURE IN ANALYZING EMERGENCY CORE COOLING SYSTEM AND CONTAINMENT HEAT REMOVAL SYSTEM PUMP PERFORMANCE IN POSTULATED ACCIDENTS

Approved __X__ Disapproved _____ Abstain _____

Not Participating _____

COMMENTS: Below ___ Attached _X__ None ___

_____
SIGNATURE

3/2/11
DATE

Entered on "STARS" Yes _X__ No ___

Commissioner Ostendorff's Comments on SECY 11-0014

"Use of Containment Accident Pressure in Analyzing Emergency Core Cooling System and Containment Heat Removal System Pump Performance in Postulated Accidents"

I approve Option 1 for the staff to resume work on extended power uprate (EPU) applications. The issues regarding containment accident pressure (CAP) credit have been an understandably protracted focus area given the concerns about defense-in-depth and, more fundamentally, uncertainties with emergency core cooling system (ECCS) and containment heat removal performance under postulated, rare events. However, I share Commissioner Apostolakis' concern that unnecessary regulatory instability could occur if Option 1 is not adopted by the Commission. The ACRS has faithfully adhered to its independent advisory role and challenged current EPU regulatory guidance and practices. Because of the ACRS's critical assessment of EPU reviews, the staff has increased its focus on the uncertainties associated with system pump performance during accident conditions. This work has improved the agency's knowledge base regarding centrifugal pump margins and robustness. As such, these efforts have culminated in draft technical guidance that quantifies uncertainty and margin in using CAP. Hence, I agree with the staff and support changes to Regulatory Guide 1.82 to reflect an approach focused on pump performance margins, uncertainties, and other conservatisms rather than assessing the practicability of plant hardware changes to eliminate CAP credit.

Regarding the CAP issue as a potential special circumstance warranting deviation from existing NRC requirements, there is insufficient information that rebuts the presumption of adequate protection for public health and safety (e.g., core damage frequency on the order of 10^{-3}/year, strong evidence that defense-in-depth would not be maintained). Specifically on the matter of defense-in-depth safety philosophy and degree of independence maintained amongst multiple successive fission product barriers, I agree with Commissioner Apostolakis' assessment. The essence of defense-in-depth requires a reasonable balance among prevention of core damage, prevention of containment failure, and consequence mitigation. I believe the staff's recommendation has balanced these factors and has, in the case of containment reliability to maintain sufficient pressure, appropriately considered containment integrity and relevant operating experience as a basis for its recommendation. The staff may consider expanding its generic risk assessment of EPU CAP credit, if resources permit, by including the ACRS's technical issues as part of a forthcoming research proposal to update the NUREG-1150 risk study and also apply insights from the State of the Art Reactor Consequences Analysis project.