



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

August 5, 2005

SECRETARY

COMMISSION VOTING RECORD

DECISION ITEM: SECY-05-0113

TITLE: DENIAL OF A PETITION FOR RULEMAKING TO REVISE  
APPENDIX K TO 10 CFR PART 50 AND ASSOCIATED  
GUIDANCE DOCUMENTS (PRM-50-76)

The Commission (with all Commissioners agreeing) approved the subject paper as recorded in the Staff Requirements Memorandum (SRM) of August 5, 2005.

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 black ink, appearing to read "Annette L. Vietti-Cook", with a long, sweeping flourish extending to the right.

Annette L. Vietti-Cook  
Secretary of the Commission

Attachments:

1. Voting Summary
2. Commissioner Vote Sheets

cc: Chairman Diaz  
Commissioner Merrifield  
Commissioner Jaczko  
Commissioner Lyons  
OGC  
EDO  
PDR

SECY NOTE: TO BE MADE PUBLICLY AVAILABLE 5 WORKING DAYS AFTER  
DISPATCH OF THE LETTER TO THE PETITIONER.

VOTING SUMMARY - SECY-05-0113

RECORDED VOTES

	APRVD	DISAPRVD	ABSTAIN	NOT PARTICIP	COMMENTS	DATE
CHRM. DIAZ	X				X	7/28/05
COMR. MERRIFIELD	X				X	7/19/05
COMR. JACZKO	X				X	8/2/05
COMR. LYONS	X				X	7/22/05

COMMENT RESOLUTION

In their vote sheets, all Commissioners approved the staff's recommendation and provided some additional comments. Subsequently, the comments of the Commission were incorporated into the guidance to staff as reflected in the SRM issued on August 5, 2005.

SECY NOTE: TO BE MADE PUBLICLY AVAILABLE 5 WORKING DAYS AFTER DISPATCH OF THE LETTER TO THE PETITIONER.

NOTATION VOTE

RESPONSE SHEET

TO: Annette Vietti-Cook, Secretary  
FROM: CHAIRMAN DIAZ  
SUBJECT: **SECY-05-0113 - DENIAL OF A PETITION FOR  
RULEMAKING TO REVISE APPENDIX K TO 10  
CFR PART 50 AND ASSOCIATED GUIDANCE  
DOCUMENTS (PRM-50-76)**

Approved <sup>w/ comments and edits</sup> xx Disapproved \_\_\_\_\_ Abstain \_\_\_\_\_  
Not Participating \_\_\_\_\_

COMMENTS:

See attached.

h. j. Diaz  
SIGNATURE

July 28, 05  
DATE

Entered on "STARS" Yes ✓ No \_\_\_\_\_

Chairman Diaz' Comments on SECY-05-0113

I approve the staff's recommendation in SECY-05-0113 to deny the petition for rulemaking, PRM-50-76, that requested the agency to revise the metal-water oxidation criteria in Appendix K to 10 CFR Part 50 and Regulatory Guide 1.157. After careful review of the staff's proposal, I agree that the existing requirements and guidance are adequate to ensure that LOCA analyses are either conservative or realistic, depending on the 10 CFR 50.46 option a licensee chooses. However, I found the proposed Federal Register notice hard to follow. In addition, I believe that some of the discussion in the notice is not clearly linked to the petition or the agency's decision on the petition. In this regard, I support the comments provided by Commissioner Lyons and believe that addressing his comments would improve the Federal Register notice and the letter. Therefore, I approve publication of the Federal Register Notice subject to the attached edits and subject to the staff addressing the comments provided in Commissioner Lyons' vote.

NUCLEAR REGULATORY COMMISSION

10 CFR Part 50

[Docket No. PRM-50-76]

Robert H. Leyse; Denial of Petition for Rulemaking

AGENCY: Nuclear Regulatory Commission

ACTION: Petition for Rulemaking; Denial

SUMMARY: The Nuclear Regulatory Commission (NRC) is denying a petition for rulemaking submitted by Mr. Robert H. Leyse (PRM-50-76). The petitioner requests that the NRC's regulations concerning the specified evaluation models for emergency core cooling systems (ECCS) and associated guidance documents be amended. The petitioner asserts that amendments are necessary to correct technical deficiencies in the calculation of metal-water oxidation. The petitioner states that the <sup>correlations used for</sup> calculation does not consider the complex thermal-hydraulic conditions present during a loss-of-coolant accident (LOCA), including the potential for very high fluid temperature. The Commission is denying Mr. Leyse's petition for rulemaking (PRM-50-76). None of the specific technical issues raised by the petitioner have shown safety-significant deficiencies in the research, calculation methods, or data used to support ECCS performance evaluations. NRC's technical safety analysis demonstrates that current procedures for evaluating ECCS performance are based on sound science and that no amendments to the NRC's regulations and guidance documents are necessary.

ADDRESSES: The NRC is making the documents identified in the table below available to interested persons through several means. Publicly available documents related to this petition,

Issue 1: Amending Appendix K to Part 50

The petitioner describes at length alleged technical deficiencies in Appendix K Section I.A.5, "Metal-Water Reaction Rate." The petitioner claims that Section I.A.5 does not accurately describe the extent of zirconium-water reactions that may occur during a LOCA. The petitioner states that the Baker-Just equation, which is used to calculate the metal-water reaction in assessing ECCS performance, does not <sup>include any allowance</sup> allow for the complex thermal-hydraulic conditions during a LOCA, including the potential for very high bulk fluid temperatures within the cooling channels of the zirconium-clad fuel elements.

The petitioner cites the abstract of ANL-6548 and disputes the conclusions based on ~~tests that~~ <sup>that the tests discussed in ANL-6548</sup> in the petitioner's opinion do not accurately reflect the conditions present during a LOCA. The petitioner makes the following points to support his views:

- The bulk water temperature was no greater than 315 °C (599 °F).
- The volume of water within the test apparatus was substantially greater than the volume of zirconium specimens, creating a vastly greater capacity to cool the heated zirconium particles of the Baker and Just experiment than would exist under LOCA conditions.
- Zirconium specimens were exposed to water only, while LOCA conditions include steam and nonequilibrium water-steam mixtures that reached higher bulk fluid temperatures.
- A footnote in ANL-6548 states: "This discussion is of a preliminary nature: work in this area is continuing." Based on this footnote, the petitioner concludes that it is not appropriate to apply the Baker-Just equation as prescribed in Appendix K Section I.A.5 for the calculation of energy release rates, hydrogen generation, and cladding oxidation from the metal-water reaction.

Issue 2: Amending Regulatory Guide 1.157

The petitioner states that RG 1.157, which allows use of data from NUREG-17 for calculating energy release rates, hydrogen generation, and cladding oxidation for cladding

temperatures greater than 1900 °F, results in flawed ECCS performance evaluations. The petitioner claims the NUREG-17 data is based on very limited test conditions and consequently the results should not be used for evaluating LOCA conditions.

In support of this contention, the petitioner describes the following test conditions:

- Zircaloy-4 specimens exposed only to steam, rather than fluid conditions as present in a LOCA.
- No documented heat transfer from the Zircaloy surface to the slow-flowing steam.
- Small-scale laboratory testing without conditions typical of the complex thermal-hydraulic conditions that prevail during a LOCA.
- An unexplained shift from the MaxiZWOK (testing apparatus for investigations in the temperature range 1652 °F to 1832 °F) to the MiniZWOK (a different testing apparatus for investigations in the temperature range 1832 °F to 2734 °F).

The petitioner believes that the investigators' conclusions <sup>include a statement that</sup> "overlook very substantially <sub>& the</sub> greater mass transfer coefficients that accompany the so-called appropriate heat transfer coefficients." The petitioner concludes that "it is those very substantially greater mass transfer coefficients that led to the temperature overshoot of the MaxiZWOK test at 1832 °F, and that would have led to very substantially greater temperature overshoots and likely destruction of the Zircaloy tubing if MaxiZWOK had been operated over the temperature range of the MiniZWOK runs."

The petitioner contends that the NUREG-17 investigators do not warrant their work, and specifically assume no responsibility for the accuracy of their work, and therefore, that NUREG-17 is not applicable to the regulation of nuclear power reactors in the United States of America. To support this contention, the petitioner cites the following statement on the introductory page of NUREG-17:

## NRC Requirements for ECCS Evaluations

Section 50.46 specifies the performance criteria against which the ECCS must be evaluated. The criteria include the maximum peak cladding temperature, the maximum cladding oxidation thickness, the maximum total hydrogen generation, and requirements to assure a coolable core geometry and abundant long-term cooling. This regulation also states that the calculated ECCS cooling performance following postulated LOCAs must be calculated in accordance with either a realistic (also called a best-estimate) evaluation model that accounts for uncertainty or a conservative evaluation model that conforms with the required features of Appendix K to 10 CFR Part 50. If a licensee elects to calculate ECCS performance using an Appendix K evaluation model, then one important feature of that model is the way the metal-water reaction is calculated. For this calculation, Appendix K prescribes the use of the Baker-Just equation from ANL report ANL-6548 (L. Baker, L.C. Just, "Studies of Metal Water Reactions at High Temperatures, III. Experimental and Theoretical Studies of the Zirconium-Water Reaction" May 1962). The metal-water reaction, which is predicted to occur during the LOCA and which is calculated using the Baker-Just equation, is the subject of much of this petition. The Baker-Just equation calculates a conservative rate of hydrogen generation and fuel cladding oxidation during the LOCA transient. Additionally, for licensees electing to use best-estimate calculations to evaluate ECCS performance, NRC RG 1.157 provides guidance for such evaluations. RG 1.157 allows the use of data from NUREG-17 (ORNL/NUREG-17, "Zirconium Metal-Water Oxidation Kinetics IV, Reaction Rate Studies," by Cathcart et al., August 1977) for the calculation of the metal-water reaction.



staff to obtain new and better zirconium-water reaction data. The petitioner also expressed concerns about the need for additional data. The substantial work of Cathcart and Pawel was performed for the NRC in response to the Commission's expectation.

The NRC compares the Baker-Just correlation to other correlations in a technical study (ADAMS accession ML041210109). The comparisons show the conservatism of the Baker-Just correlation <sup>in the temperature range important for clad oxidation calculations for LOCA's.</sup> ~~above 1900 °F.~~ In the discussion of Issue 3, comparisons of the Baker-Just correlation to relevant data demonstrate the substantial conservatism of the Baker-Just correlation. The petitioner expresses concern about the low water temperature (no greater than 599 °F) in the Baker-Just experiments. This temperature corresponds to the saturation temperature at 1530 psia, which was the pressure for that particular experiment. While a few degrees of liquid superheat may be possible under LOCA/ECCS conditions, the degree of nonequilibrium required for higher liquid or "bulk" temperatures postulated by the petitioner is not possible. Only directly-heated steam can achieve high temperatures, as has been observed in many ECCS tests (such as those reported in WCAP-7665).

The petitioner is also concerned about the large water volume compared to the zirconium sample size with respect to the quench capability of zirconium-clad fuel rods. As noted, these experiments were atypical in that respect, but barely used in the formulation of the Baker-Just correlation. Further, it should be noted that the Baker-Just report was not intended to be a heat transfer study, but rather an investigation of zirconium-water reaction kinetics at very high temperatures.

One interesting feature of the Baker-Just report is the heat and mass transfer analysis of an example case analyzed to examine the processes limiting the reaction rate. In this severe case, a 0.21 cm zirconium sphere at its melting point was dropped into water. Baker and Just were concerned that the reaction could be limited by gas phase diffusion of steam through a film of steam and hydrogen. This appears to be similar to the petitioner's concern. As

explained in the Baker-Just report, water cannot stay in contact with the hot metal and a vapor film immediately forms around the sphere. Figure 15 in that report shows that vapor phase diffusion is the limiting steam transport process for less than 0.2 seconds, during which a slight film of oxide is forming on the surface of the sphere. After that, the parabolic rate equation, (e.g., the Baker-Just equation) becomes limiting. The figure also shows that the gas phase diffusion is far less temperature-sensitive than the parabolic rate law. Certainly at lower temperatures more typical of a LOCA, the parabolic law is even more limiting than gas phase diffusion as long as the reaction is not steam starved.

Comparison of the Baker-Just equation to numerous data sets has shown the equation to be conservative. A significant example of this conservatism is discussed under Issue <sup>3</sup>~~2~~. X

In summary, the NRC found no technical basis in the petition or in NRC records for the assertion that the NRC requirement to use the Baker-Just equation, along with other requirements of Appendix K, is flawed and is a significant safety concern.

#### Issue 2: Amending Regulatory Guide 1.157

The petitioner stated that RG 1.157, which allows use of the data and the Cathcart-Pawel equation presented in NUREG-17, results in flawed evaluations of ECCS performance. The NRC disagrees with the petitioner's assertions on this issue. In Section 3.2 of the petition, the petitioner states that the limited test conditions described in NUREG-17 preclude the use of the results for LOCA calculations. He further states that Zircaloy-4 specimens were not exposed to LOCA fluid conditions and that only steam was applied at very low velocities for the main test series. The petitioner states that there was no documented heat transfer from the Zircaloy surface to the slow-flowing steam and that as a result the conditions of the small-scale laboratory tests were not typical of the complex thermal-hydraulic conditions that prevail during a LOCA.

and the development of more realistic, performance-based, and contemporary criteria and models.

16

As is the case with many other research activities and their link to their agency's regulatory framework,

Work in this area did not end in 1977. The NRC, foreign partners, and the industry ~~and~~ have continued to currently conduct and evaluate experimental and analytical programs on fuel cladding behavior. The research includes the effects of fuel relocation, various types of zirconium-based cladding, high burnup, mixed oxides,  $ZrO_2$  phase change hysteresis, and system pressure. An important objective of this work is ~~to evaluate the adequacy~~ <sup>the confirmation</sup> of current § 50.46 ~~criteria~~ and models. An important link to the current work is the extensive research reported by Cathcart and Pawel. |

~~The petitioner is mistaken in asserting~~ <sup>NRC disagrees with the petitioner's assertion</sup> that the disclaimer in the introduction to NUREG-17 causes the technical work to be inapplicable to reactor regulation. The disclaimer protects the United States Government from potential litigation. It is not intended to discredit the technical validity of the work documented in NUREG-17. As such, the disclaimer is irrelevant to whether the NUREG-17 work is an adequate basis for reactor regulation. That is a question that should be decided solely on the technical merits of the work.

The NRC found no technical basis in the petition nor in NRC records to support the assertion that the Regulatory Guide 1.157 conditions for acceptance of the use of ORNL/NUREG-17 information result in flawed evaluation of ECCS performance.

### Issue 3: Need for Further Analysis of Appendix K Backup Data

In Section 3.4 of his petition, the petitioner quotes from the AEC decision on the ECCS rulemaking [See Rulemaking Hearing, Acceptance Criteria for Emergency Core Cooling Systems for Light-Water Cooled Nuclear Power Reactors, RM-50-1, CLI-73-39, 6AEC1085, at 1124]: "It is apparent, however, that more experiments with Zircaloy cladding are needed to overcome the impression left from run 9573." The petitioner claims that such experiments have not been performed and are necessary. The NRC disagrees.

Run 9573 refers to one of four Zircaloy clad FLECHT experiments performed in 1969 and reported in WCAP-7665. The "impression" referred to by the AEC Commissioners in 1973

RES technical study clearly demonstrates that the analysis in WCAP-7665 is correct and that the Baker-Just correlation is conservative even under the severe conditions of run 9573.

The petitioner asserts that a detailed thermal-hydraulic analysis of run 9573, including evaluation of the heating from Zircaloy-water reactions, was never performed. Contrary to that assertion, not only was an evaluation of the heating from Zircaloy-water reaction performed for run 9573, it was done for all four Zircaloy tests. Unfortunately, using the conservative Baker-Just correlation to estimate the zirconium-water heat release results is an overestimation of the derived heat transfer coefficients. Thirty-five years later, it would be difficult to replicate the DATAR code, substitute a better metal-water model, and re-derive the heat transfer coefficients. The difficulty would be in addition to the significant monetary expense of conducting high-temperature Zircaloy tests and would have marginal benefit in terms of increased understanding of large-break LOCA heat transfer and metal-water reaction kinetics. The current programs being conducted at Pennsylvania State University and Argonne National Laboratory are far more cost-effective.

~~The~~ high-temperature tests similar to run 9573 would require rod bundle powers well outside the range of operation of any current or proposed pressurized water reactors (PWRs). ~~Also, no realistic transient experiments or analyses have indicated cladding temperatures at the beginning of reflood anywhere near the 1970 °F achieved in run 9573. If run 9573 were repeated, the results would probably be the same. The high temperatures and high power would quickly catapult the cladding into the severe metal-water reaction regime, destroying the bundles and producing very little useful heat transfer information.~~ <sup>and would produce</sup>

The petitioner states that more experiments with Zircaloy cladding have not been conducted on the scale necessary to overcome the impression left from run 9573. The NRC disagrees. In fact additional Zircaloy tests have been performed. In the early 1980s, the NRC contracted with National Research Universal (NRU) at Chalk River, Ontario, Canada to run a

Therefore, the NRC does not believe that such tests are necessary.

published since the Baker-Just correlation was developed has clearly demonstrated the conservatism of the correlation <sup>for the temperature range important to clad oxidation</sup> ~~above 1800°F.~~ <sup>calculations for LOCAs.</sup>

The parabolic/Arrhenius behavior of the Cathcart-Pawel isothermal experiments confirmed that there was adequate availability of steam. An NRC analysis confirms the ORNL/ANL assessment that the Cathcart-Pawel isothermal experiments were not steam starved by at least two orders of magnitude. Therefore, the experimental data is valid.

NRC has continued to study complex thermal hydraulic effects on ECCS heat transfer processes during LOCA accident conditions consistent with Commission direction. The NRC funded more than 50 Zircaloy-clad bundle reflood experiments at the NRU reactor, <sup>and</sup> ~~is continuing to~~ <sup>The NRC is currently</sup> conducting and evaluating <sup>e</sup> experimental and analytical programs on fuel cladding behavior ~~(e.g., the effects of fuel relocation, other zirconium-based cladding, high burnup, mixed oxides, ZrO<sub>2</sub> phase change hysteresis, and system pressure)~~ to evaluate the adequacy of current ~~§ 50.48 oxidation-related criteria and models.~~

The petitioner did not take into account Westinghouse's metallurgical analyses performed on the cladding for all four FLECHT Zircaloy-clad experiments reported in WCAP-7665. The petitioner also ignored the Westinghouse application of the Baker-Just correlation to these experiments, which had the "complex thermal hydraulic phenomena" deemed important by the petitioner. This application of the correlation to the metallurgical data clearly demonstrates the conservatism of the Baker-Just correlation for 21 typical temperature transients. The NRC also applied the Baker-Just correlation to the FLECHT Zircaloy experiments with nearly identical results, confirming the WCAP-7665 results.

For the development of oxidation correlations, limited by oxygen diffusion into the metal, well-characterized isothermal tests are more important than the complex thermal hydraulics suggested by the petitioner. The petitioner's suggested use of complex thermal-hydraulic conditions would be counter-productive in reaction kinetics tests because temperature control is

required to develop a consistent set of data for correlation development. Isothermal tests allow this needed temperature control. It is more appropriate to apply the developed correlations to more prototypic transients (including complex thermal hydraulic conditions) to verify that the proposed phenomena embodied in the correlations are indeed limiting. This is what was done by Westinghouse in WCAP-7665, by Cathcart and Pawel in NUREG-17 and by the NRC in its technical safety analysis of PRM-50-76.

The NRC applied the Cathcart-Pawel oxygen uptake and  $ZrO_2$  thickness equations to the four FLECHT Zircaloy experiments, confirming the best-estimate behavior of the Cathcart-Pawel equations for large-break LOCA reflood transients. The NRC applied the Cathcart-Pawel oxide thickness equation to 15 of their transient temperature experiments. The equation was conservative or best-estimate for 13 experiments and nonconservative for the remaining two. This result is consistent with the application of the Cathcart-Pawel equations, which are intended for use in best-estimate LOCA calculations in accordance with RG 1.157.

#### Petitioner's Public Comments

The petitioner submitted two public comment letters in which he again asserted that the Baker-Just and Cathcart-Pawel equations are grossly misapplied by the NRC. The first comment letter basically repeated the arguments in the petition. No new technical information was supplied. The second comment letter introduced the issue of severe fouling, which was the subject of PRM-50-78. *and addressed the staff's conclusion of that petition* Other issues addressed in the second letter are related to the *for rulemaking* issues already discussed in this document, and therefore, no further response is necessary.

#### Reasons for Denial

For the reasons cited in this document, the Commission is denying the petition for rulemaking (PRM-50-76) submitted by Mr. Robert Leyse. The NRC believes that the requested

NOTATION VOTE

RESPONSE SHEET

TO: Annette Vietti-Cook, Secretary  
FROM: COMMISSIONER MERRIFIELD  
SUBJECT: **SECY-05-0113 - DENIAL OF A PETITION FOR  
RULEMAKING TO REVISE APPENDIX K TO 10  
CFR PART 50 AND ASSOCIATED GUIDANCE  
DOCUMENTS (PRM-50-76)**

Approved  Disapproved  Abstain

Not Participating

COMMENTS:

See attached comments.

  
\_\_\_\_\_  
SIGNATURE

  
\_\_\_\_\_  
DATE

Entered on "STARS" Yes  No

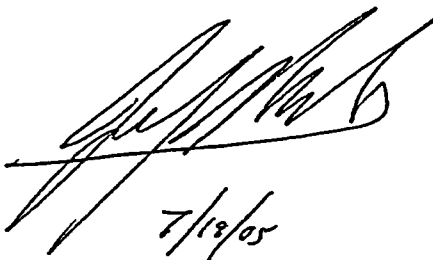
**Commissioner Merrifield's Comments on SECY-05-0113**

I approve, with comment, the staff's denial of a petition for rulemaking to revise/amend 10 CFR Part 50, Appendix K, and the supporting guidance in NRC Regulatory Guide (RG) 1.157, "Best Estimate Calculations of Emergency Core Cooling System (ECCS) Performance."

During my review of the draft Federal Register Notice, I noted that the staff is relying on various data sets, tests, and experiments to support their assessments for denying the issues raised by the petitioner.

For example, the staff in their assessments of the petitioner's issues discussed data sets that have published since the Baker-Just correlation was developed and that those data sets have demonstrated the conservatism of the correlation for fuel cladding performance above 1,800° F. In addition, the staff discussed the NRC's funding of more than 50 Zircaloy-clad bundle re-flood tests that were conducted in the 1980s to evaluate the thermal-hydraulic and mechanical deformation behavior of a full-length rod bundle during the various phases of a large-break loss-of-coolant accident. The staff also discussed its application of the Cathcart-Pawel oxide thickness equations to 4 FLECT Zircaloy experiments and 15 transient temperature experiments which confirmed the best-estimate behavior of the Cathcart-Pawel equations for large-break loss-of-coolant accidents.

In order to support the public's review of this Agency action, the staff should confirm that the various data sets, tests, and experiments it discussed in support of denial of the petitioner's request are published and that they are appropriately referenced in the Federal Register Notice. If the documentation of the referenced data sets, tests, and experiments are in ADAMS, the appropriate accession numbers should also be referenced in the Federal Register Notice.



7/12/05



NOTATION VOTE


RESPONSE SHEET

TO: Annette Vietti-Cook, Secretary  
FROM: COMMISSIONER JACZKO  
SUBJECT: **SECY-05-0113 - DENIAL OF A PETITION FOR  
RULEMAKING TO REVISE APPENDIX K TO 10  
CFR PART 50 AND ASSOCIATED GUIDANCE  
DOCUMENTS (PRM-50-76)**

Approved  Disapproved  Abstain

Not Participating

COMMENTS: See attached comments.


  
\_\_\_\_\_  
SIGNATURE  
  
5/2/05  
\_\_\_\_\_  
DATE

Entered on "STARS" Yes  No

**Commissioner Jaczko's Comments on SECY-05-0113  
Denial of a Petition for Rulemaking to Revise Appendix K to 10 CFR Part 50 and  
Associated Guidance Documents (PRM-50-76)**

I approve the staff's recommendation to deny the petition for rulemaking, PRM-50-76, in which the petitioner requested that the NRC amend 10 CFR Part 50, Appendix K, and supporting guidance to correct technical deficiencies in the calculation of the metal-water oxidation. The staff has provided reasonable basis to conclude that the 10 CFR 50.46 models provide sufficient conservatism of fuel performance during a loss-of-coolant-accident.

This is a complex subject matter and the staff has done a commendable job of communicating it. The staff should ensure that the Federal Register Notice adequately defines all the acronyms used. There are many which are defined in the Secy paper and not the Notice. As Commissioner Merrifield proposes, the staff should also ensure that the basis for the staff's assessment and conclusion is properly referenced and made publicly available to the extent possible.

  
\_\_\_\_\_  
Gregory B. Jaczko      5/2/05      Date

NOTATION VOTE

RESPONSE SHEET

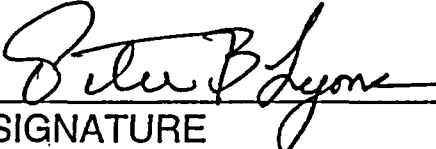
TO: Annette Vietti-Cook, Secretary  
FROM: COMMISSIONER LYONS  
SUBJECT: **SECY-05-0113 - DENIAL OF A PETITION FOR  
RULEMAKING TO REVISE APPENDIX K TO 10  
CFR PART 50 AND ASSOCIATED GUIDANCE  
DOCUMENTS (PRM-50-76)**

Approved  Disapproved \_\_\_\_\_ Abstain \_\_\_\_\_

Not Participating \_\_\_\_\_

COMMENTS:

*with attached comments*

  
\_\_\_\_\_  
SIGNATURE

*7/22/05*  
\_\_\_\_\_  
DATE

Entered on "STARS" Yes  No \_\_\_\_\_

**Commissioner Peter B. Lyons' Vote and Comments on SECY-05-0113**

**Denial of a Petition for Rulemaking to Revise Appendix K to 10 CFR Part 50 and Associated Guidance Documents.**

I appreciate the effort of staff to develop a response for such a complex technical issue.

I approve the staff's recommendation to deny the petition for rulemaking and concur with the comments of Commissioner Merrifield. The staff needs to address the following comments in both the Federal Register Notice and the denial letter to the petitioner:

1. The following sentence contained on page 2, lines 4 and 5 of the letter to the petitioner and page 21, lines 8 and 9 of the Federal Register Notice needs to be modified to clarify how these experiments relate to the denial of the petition. "The NRC funded more than 50 Zircaloy clad bundle reflood experiments at the National Research Universal (NRU) reactor."
2. The following sentence contained on page 2, lines 5 through 10 of the letter to the petitioner and page 21, lines 10 through 13 of the Federal Register Notice needs to be modified to clarify how these programs relate to the denial of the petition. "The NRC is currently conducting and evaluating experimental and analytical programs on fuel cladding behavior.....to evaluate the adequacy of current 50.46 oxidation-related criteria and models."
3. The following paragraph on page 2 of the letter to the petitioner and page 22 of the Federal Register Notice needs to be modified to clarify how this information relates to the denial of the petition.

"The NRC applied the Cathcart-Pawel oxygen uptake and ZRO<sub>2</sub> thickness equations to the four FLECT Zircaloy experiments.....[start new paragraph] The NRC applied the Cathcart-Pawel oxide thickness equation to 15 of their transient temperature experiments.....This result is consistent with the application of the Cathcart-Pawel equations, which are intended for use in best-estimate LOCA calculations in accordance with RG 1.157."

*PL 7/22/05*