



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

August 28, 2003

SECRETARY

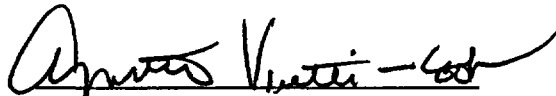
COMMISSION VOTING RECORD

DECISION ITEM:      SECY-03-0127

TITLE:                      FINAL RULEMAKING – RISK-INFORMED 10  
CFR 50.44, "COMBUSTIBLE GAS CONTROL IN  
CONTAINMENT"

The Commission (with all Commissioners agreeing) approved the final rule in an Affirmation Session as recorded in the Staff Requirements Memorandum (SRM) of August 28, 2003.

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 Diaz  
         Commissioner McGaffigan  
         Commissioner Merrifield  
         OGC  
         EDO  
         PDR

**VOTING SUMMARY - SECY-03-0127**

**RECORDED VOTES**

	APRVD	DISAPRVD	ABSTAIN	NOT PARTICIP	COMMENTS	DATE
CHRM. DIAZ	X				X	8/7/03
COMR. McGAFFIGAN	X				X	8/19/03
COMR. MERRIFIELD	X				X	8/13/03

**COMMENT RESOLUTION**

In their vote sheets, all Commissioners approved the final rule and provided some additional comments. Subsequently, the Commission approved the final rule in an Affirmation Session as reflected in the SRM issued on August 28, 2003.

**AFFIRMATION ITEM**

CHAIRMAN REC'D

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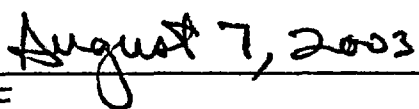
**RESPONSE SHEET**

TO: Annette Vietti-Cook, Secretary  
FROM: CHAIRMAN DIAZ  
SUBJECT: **SECY-03-0127 - FINAL RULEMAKING-RISK-  
INFORMED 10 CFR 50.44, "COMBUSTIBLE GAS  
CONTROL IN CONTAINMENT"**

Approved <sup>w/comments</sup>  Disapproved  Abstain   
Not Participating

**COMMENTS:**

This action represents another significant step in the NRC's progress towards a risk-informed regulatory approach. I look forward to continuing progress in this area.

  
\_\_\_\_\_  
SIGNATURE  
  
\_\_\_\_\_  
DATE

Entered on "STARS" Yes  No

**AFFIRMATION ITEM**

**RESPONSE SHEET**

TO: Annette Vietti-Cook, Secretary  
FROM: COMMISSIONER MCGAFFIGAN  
SUBJECT: **SECY-03-0127 - FINAL RULEMAKING—RISK-  
INFORMED 10 CFR 50.44, "COMBUSTIBLE GAS  
CONTROL IN CONTAINMENT"**

Approved <sup>w/edits and comments</sup> XX Disapproved \_\_\_\_\_ Abstain \_\_\_\_\_

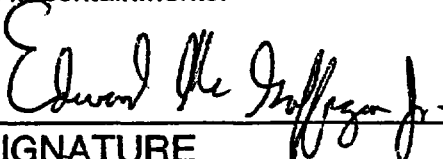
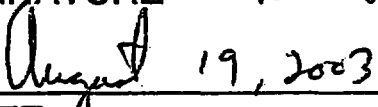
Not Participating \_\_\_\_\_

**COMMENTS:**

See attached minor edits to Federal Register Notice.

This rulemaking took far longer than originally projected to complete. This was supposed to be the easiest of the risk-informed reactor rulemakings with the soundest technical basis and least controversy going into the rulemaking. Our more ambitious risk-informed rulemakings may well face similar delays before their completion.

I hope that generic safety issue -189 will soon be resolved with appropriate additional measures being required for ice condenser and BWR Mark III containments.

  
\_\_\_\_\_  
SIGNATURE  
  
\_\_\_\_\_  
DATE

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

Feasibility Study found that combustible gas generated from design-basis accidents was not risk-significant for any containment type, given intrinsic design capabilities or installed mitigative features. The Feasibility Study also concluded that combustible gas generated from severe accidents was not risk significant for: (1) Mark I and II containments, provided that the required inerted atmosphere was maintained; (2) Mark III and ice condenser containments, provided that the required igniter systems were maintained and operational, and (3) large, dry and sub-atmospheric containments because <sup>of</sup> the large volumes, high failure pressures, and likelihood of random ignition to help prevent the build-up of detonable hydrogen concentrations. X

The Feasibility Study did conclude that the above requirements for combustible gas mitigative features were risk-significant and must be retained. Additionally, the Feasibility Study also indicated that some mitigative features may need to be enhanced beyond current requirements. This concern was identified as Generic Safety Issue-189 (GI-189). The resolution of GI-189 will assess the costs and benefits of improvements to safety which can be achieved by enhancing combustible gas control requirements for Mark III and ice condenser containment designs. The resolution of GI-189 is proceeding independently of this rulemaking. In an SRM dated January 19, 2001, the NRC directed the NRC staff to proceed expeditiously with rulemaking on the risk-informed alternative to § 50.44.

In SECY-01-0162, "Staff Plans for Proceeding with the Risk-Informed Alternative to the Standards for Combustible Gas Control Systems in Light-Water-Cooled Power Reactors in 10 CFR 50.44," dated August 23, 2001, the NRC staff recommended a revised approach to the rulemaking effort. This revised approach recognized that risk-informing Part 50, Option 3 was based on a realistic reevaluation of the basis of a regulation and the application of realistic risk analyses to determine the need for and relative value of regulations that address a design-basis issue. The result of this process necessitates a fundamental reevaluation or "rebaselining" of

the existing regulation, rather than the development of a voluntary alternative approach to rulemaking. On November 14, 2001, in response to NRC direction in an SRM dated August 2, 2001, the NRC staff published draft rule language on the NRC web site for stakeholder review and comment. In an SRM dated December 31, 2001, the NRC directed the staff to proceed with the revision to the existing § 50.44 regulations.

### **III. Final Action**

The NRC is retaining existing requirements for ensuring a mixed atmosphere, inerting Mark I and II containments, and hydrogen control systems capable of accommodating an amount of hydrogen generated from a metal-water reaction involving 75 percent of the fuel cladding surrounding the active fuel region in Mark III and ice condenser containments. The NRC is eliminating the design-basis LOCA hydrogen release from § 50.44 and consolidating the requirements for hydrogen and oxygen monitoring into § 50.44 while relaxing safety classifications and licensee commitments to certain design and qualification criteria. The NRC is also relocating and rewording without materially changing the hydrogen control requirements in § 50.34(f) to § 50.44. The high point vent requirements are being relocated from § 50.44 to a new § 50.46a with a change that eliminates a requirement prohibiting venting the reactor coolant system if it could "aggravate" the challenge to containment.

Substantive issues are addressed in the following sections.

#### **A. Retention of Inerting, BWR Mark III and PWR Ice Condenser Hydrogen Control Systems, Mixed Atmosphere Requirements, And Associated Analysis Requirements**

The final rule retains the existing requirement in § 50.44(c)(3)(i) to inert Mark I and II type containments. Given the relatively small volume and large zirconium inventory, these containments, without inerting, would have a high likelihood of failure from hydrogen combustion due to the potentially large concentration of hydrogen that a severe accident could

changes for Mark I Boiling Water Reactor containments. The other licensee endorsed the comments submitted by NEI. The reactor vendor commented that the petitioner's proposal simplifies the language and requirements of the regulation while retaining an equivalent level of safety. However, the vendor also noted that the proposal does not appear to address the structural integrity of the containment as in the existing language at §50.44(c)(3)(iv). The owner's group commented that the changes requested by the petitioner for large, dry containments were also applicable to ice condenser containments and suggested that the requirement for all hydrogen control measures in §50.44 be reexamined and made "consistent with many other portions of plant operation and maintenance." The NEI agreed with the petitioner that the San Onofre hydrogen control licensing actions could be applied generically for pressurized water reactors with large, dry (including subatmospheric) containments. One licensee, the reactor vendor and the NEI disagreed with the petitioner's position that an interim policy statement is necessary to instruct the NRC staff how to proceed in instances when "adherence to design basis requirements would be detrimental to public health." The other commenters were silent regarding the request for an interim policy statement.

The NRC has evaluated the technical issues and the associated public comments and has determined that the specific issues contained in PRM-50-68 should be granted in part and denied in part as discussed in the following paragraphs.

Issue 1: Retain the existing requirement for inerting the atmosphere of existing Mark I and Mark II containments.

Resolution of Issue 1: Consistent with the petitioner's request, §50.44(b)(2)(i) of the final rule retains the current requirement for inerting of existing Mark I and Mark II containments. The NRC's basis for this decision is provided in section III/A of this document.

Issue 2: Retain the existing requirement for hydrogen control systems in existing Mark III and PWR ice condenser containments to be capable of handling hydrogen generated by a metal/water reaction involving 75 percent of the fuel cladding.

Resolution of Issue 2: Consistent with the petitioner's request, § 50.44(b)(2)(ii) of the final rule retains the above requirement for hydrogen control systems in existing Mark III and

PWR ice condenser containments to be capable of handling hydrogen generated by a metal/water reaction involving 75 percent of the fuel cladding. The NRC's basis for this decision is provided in section III A, of this document.

**Issue 3:** Require all future light water reactors to postulate a 75 percent metal/water reaction (instead of the 100 percent required by the current rule) for analyses under § 50.44(c).

**Resolution of Issue 3:** The NRC declines to adopt this request. For future water-cooled reactors, the final rule retains the previous requirement to postulate hydrogen generation by a 100 percent metal/water reaction when performing structural analyses of reactor containments under accident conditions. Future containments that cannot structurally withstand the consequences of this amount of hydrogen must be inerted or must be equipped with equipment to reduce the concentration of hydrogen during and following an accident. The NRC's basis for this decision is provided in section III E, of this document.

**Issue 4:** Retain the existing requirements for high point vents.

**Resolution of Issue 4:** Consistent with the petitioner's request, the requirements for high point vents in former 10 CFR 50.44(c)(3)(iii) have been retained in the final rule, but have been modified slightly to clarify the acceptable use of these vents during and following an accident. Because the need for high point vents is relevant to ECCS performance during severe accidents and is not pertinent to combustible gas control, these high point venting requirements have been removed from 10 CFR 50.44 and relocated to 10 CFR 50.46a where the remaining requirements for ECCS are located. The basis for this decision is provided in section III F, of this document.

**Issue 5** Eliminate the existing requirement in § 50.44(b)(2) to ensure a mixed atmosphere in containment.

**Resolution of Issue 5:** The NRC declines to adopt this request. The final rule retains the requirement for all containments to ensure a mixed atmosphere to prevent local accumulation of combustible or detonable gasses that could threaten containment integrity or equipment operating in a local compartment. The NRC's basis for retaining this requirement is provided in section III A, of this document.



**Issue 6:** Eliminate the existing requirement for postulating design basis accident hydrogen releases of an amount equal to that produced by a metal/water reaction of 5 percent of the cladding.

**Resolution of Issue 6:** The NRC grants this request. The NRC has determined that hydrogen release during design basis accidents is not risk-significant because it does not contribute to the conditional probability of a large release of radionuclides up to approximately 24 hours after the onset of core damage. The NRC believes that accumulation of combustible gases beyond 24 hours can be managed by implementation of severe accident management guidelines. The NRC's technical basis for eliminating this requirement is discussed in greater detail in section III/B of this document.

**Issue 7:** Eliminate the requirement for hydrogen recombiners or purge in light-water reactor containments.

**Resolution of Issue 7:** The NRC grants this request. As noted in Issue 6 above, the NRC has determined that hydrogen release during design basis accidents is not risk-significant because it does not contribute to the conditional probability of a large release of radionuclides up to approximately 24 hours after the onset of core damage. The NRC believes that accumulation of combustible gases beyond 24 hours can be managed by implementation of severe accident management guidelines. Thus, hydrogen recombiners and hydrogen vent and purge systems are not required. The NRC's basis for eliminating these requirements is discussed in greater detail in section III/B of this document.

**Issue 8:** Eliminate the existing requirements for hydrogen and oxygen monitoring in light-water reactor containments.

**Resolution of Issue 8:** The NRC declines to adopt this request. The final rule retains the existing requirement for monitoring hydrogen in the containment atmosphere for all plant designs. Hydrogen monitors are required to assess the degree of core damage during beyond design-basis accidents. Hydrogen monitors are also used in conjunction with oxygen monitors to guide licensees in implementation of severe accident management strategies. Also, the NRC has decided to codify the existing regulatory practice of monitoring oxygen in

containments that use an inerted atmosphere for combustible gas control. If an inerted containment became de-inerted during a beyond design-basis accident, other severe accident management strategies, such as purging and venting, would need to be considered. Monitoring of both hydrogen and oxygen is necessary to implement these strategies. The NRC's bases for these requirements are discussed in greater detail in sections III C. and III D. of this document.

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**Issue 9:** Revise GDC 41 -- Containment Atmosphere Cleanup -- to require systems to control fission products and other substances that may be released into the reactor containment for accidents only when there is a high probability that fission products will be released to the reactor containment.

**Resolution of Issue 9:** The NRC declines to adopt the petitioner's request on this issue. The NRC believes that the amended rule alleviates the need to revise Criterion 41. In a December 4, 2001, letter from the petitioner to the NRC, the petitioner inferred that the intent of the proposed change was to focus Criterion 41 on the containment capability when a severe accident occurs. This concern is addressed in the final § 50.44 that establishes the design criteria for reactor containment and associated equipment for controlling combustible gas released during a postulated severe accident. The General Design Criteria in Appendix A of 10 CFR Part 50 were established to set the minimum requirements for the principal design criteria for water-cooled nuclear power plants. The postulated accidents used in the development of these minimum design criteria are normally design-basis accidents. The NRC believes it is not appropriate to address severe accident design requirements in the General Design Criteria.

**Issue 10:** The petitioner requested the NRC to issue an interim policy statement applicable to the NRC staff to ensure that the NRC Executive Director for Operations was promptly notified whenever the staff discovered cases where compliance with design-basis accident requirements was detrimental to public health.

**Resolution of Issue 10:** The petitioner's additional request for an interim policy statement is not part of the petition for rulemaking. Nevertheless, the NRC has evaluated the request and associated public comments and has concluded that hydrogen control requirements referenced by the petitioner have been modified in the final rule so that design

**AFFIRMATION ITEM**

**RESPONSE SHEET**

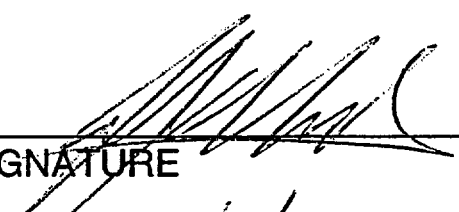
TO: Annette Vietti-Cook, Secretary  
FROM: COMMISSIONER MERRIFIELD  
SUBJECT: **SECY-03-0127 - FINAL RULEMAKING-RISK-  
INFORMED 10 CFR 50.44, "COMBUSTIBLE GAS  
CONTROL IN CONTAINMENT"**

Approved  Disapproved  Abstain

Not Participating

COMMENTS:

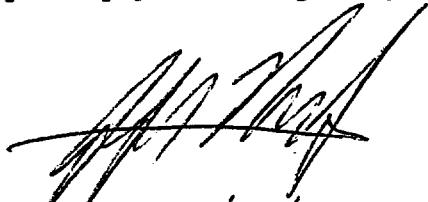
*See attached comments.*

  
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*8/13/02*  
\_\_\_\_\_  
DATE

Entered on "STARS" Yes  No

**Commissioner Merrifield's Comments on SECY-03-0127**

I approve the staff's recommendation to publish the Final Rule that would amend 10 C.F.R. 50.44 and commend the staff for their considerable efforts throughout this rulemaking process. I believe the Final Rule will accomplish the objectives of making the Combustible Gas Rule risk-informed and performance-based. I agree with Chairman Diaz that this accomplishment represents another significant step forward in our continued effort to advance the risk-informed philosophy into our regulatory structure.



8/13/03