

**RULEMAKING ISSUE**  
(Notation Vote)

August 23, 2001

SECY-01-0162

FOR: The Commissioners

FROM: William D. Travers  
Executive Director for Operations /RA/

SUBJECT: 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  
(WITS 20010003)

PURPOSE:

To obtain Commission approval of the staff's plans for proceeding with rulemaking to risk-inform 10 CFR 50.44, "Standards for combustible gas control systems in light-water-cooled power reactors," as requested in the staff requirements memorandum (SRM) dated January 19, 2001. This SRM was issued in response to SECY-00-0198, "Status Report on Study of Risk-Informed Changes to the Technical Requirements of 10 CFR 50 (Option 3) and Recommendations on Risk-Informed Changes to 10 CFR 50.44 (Combustible gas control)."

BACKGROUND:

The SRM directed the staff to proceed expeditiously with rulemaking on the risk-informed alternative to 10 CFR 50.44, including completing outstanding technical work and necessary regulatory analyses. The Commission requested that the staff avoid overly prescriptive requirements and develop sufficiently flexible requirements to permit improvements in the methodology if better models become available. The Commission also directed the staff to provide recommendations for actions that could shorten the time for developing the proposed rule.

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The Commission, in its SRM, agreed with the staff position that licensee implementation of the risk-informed alternative would be voluntary and that the alternative would not be subject to the backfit rule (10 CFR 50.109). However, the Commission requested the staff to establish a disciplined, meaningful, and scrutable process to evaluate the cost effectiveness of any new voluntary, alternative requirements. The Commission requested that the cost-benefit criterion add fairness and equity without adding significant complexity. The Commission directed the staff to submit its proposed resolution to the Commission for approval.

## DISCUSSION:

### **Approach and Expedious Completion of the Rulemaking**

In SECY-00-0198, the staff proposed a risk-informed voluntary alternative to the current 10 CFR 50.44. Attachment 2 to that paper described a process by which licensees could determine which of a number of possible regulatory requirements would apply to their facility, if they chose the voluntary alternative. Since it completed SECY-00-0198, the staff has taken three actions that affect its approach and schedule for risk informing 10 CFR 50.44.

First, the staff has continued the technical work described in the paper to develop more realistic hydrogen source terms and to assess the significance of seismically- and fire-initiated accidents. Second, it established Generic Issue 189 (GI-189) to assess the costs and benefits of possible additional hydrogen control requirements for PWR ice condenser and BWR Mark III containment designs. (The issue raised in SECY-00-0198 was that analyses indicate these containments have a high conditional containment failure probability associated with station blackout sequences during which the AC powered igniters are not available. Therefore, removing the dependence on AC power for the combustible gas control systems could be of value for risk-significant accidents.) Third, the staff has applied the process described in Attachment 2 to SECY-00-0198 to each of the generic containment design types. In the last action, the staff found that the outcome for PWR large dry and subatmospheric containment designs and for BWR Mark I and II containment designs was always the same. That is, for these containment types, the outcomes were that hydrogen recombiners could be eliminated from the design basis and no additional hydrogen control requirements would be needed. These outcomes were found to be insensitive to the expected results of the ongoing technical work. As such, the staff concluded that for these containment types, a more efficient regulatory approach than that proposed in SECY-00-0198 would be to modify the current 50.44 to eliminate the requirement for recombiners rather than offering a voluntary alternative that would, upon licensee evaluation, lead to the same result. Adopting this simplified approach could also help expedite the schedule for this rulemaking.

The outcome of the SECY-00-0198 process is less clear for PWR ice condenser and BWR Mark III containment designs. With respect to the need for recombiners, the outcome was similar to that for other containment designs. That is, recombiners could be eliminated from the design basis of facilities with these containment designs with no negative safety impact. However, pending the resolution of GI-189, the need for hydrogen control requirements beyond the current igniter system has not been established. In addition, the latter conclusion may be sensitive to the results of the ongoing technical work. Separating these issues also provides opportunities for expediting the schedule for this rulemaking.

The analyses from SECY-00-0198 further concluded that hydrogen monitors at some facilities are not necessary for combustible gas control. However, these monitors, depending on plant type, may be needed to support emergency operating procedures, severe accident guidelines, and accident assessment functions that facilitate emergency response decision making. If these monitors are determined to be necessary only for accident assessment purposes, then this equipment would no longer be required to be safety grade. Therefore, unnecessary burden reduction benefits of updating hydrogen monitoring requirements could be realized in the areas of procurement, upgrading, and maintenance of these systems. As discussed below, this issue is applicable to the rulemaking approach.

### Rulemaking Options

The risk-informing Part 50, Option 3, approach was based on a realistic reevaluation of the fundamental basis of a regulation and the application of realistic risk and uncertainty analyses to determine the need for and relative value of regulations that address a design basis issue. In this case, 10 CFR 50.44, this process resulted in a fundamental reevaluation or “rebaselining” of the existing regulation. The staff previously discussed the concept of providing a voluntary alternative to allow licensees to choose between the existing regulation or a new risk-informed voluntary alternative regulation. A voluntary alternative approach involves maintaining the existing regulation. Maintaining requirements that are not necessary for safety does not promote consistency and does not simplify the regulatory infrastructure. The Commission’s Principles of Good Regulation state that regulations should be clear and efficient. Leaving in place existing regulations that impose unnecessary regulatory burden could be confusing and does not increase public confidence. Therefore, the staff now believes that “rebaselining” the existing regulation offers a better opportunity for a cleaner, more efficient, and simplified regulatory structure.

The staff proposes two options for this rulemaking. Both of these options, which are discussed below, deviate from the approach previously described in SECY-00-0198, but meet Commission guidance for reducing unnecessary burden in a timely way. The staff previously considered an approach in SECY-00-0198 for a voluntary alternative regulation.

Under the voluntary alternative approach, licensees could continue to comply with the existing requirements for hydrogen control, or with new alternative requirements that would delete the hydrogen recombiner requirements for all facilities except those with BWR Mark III and PWR condenser containments. For the BWR Mark III and PWR ice condenser facilities, the alternative requirements would address both hydrogen recombiners and the igniter issue now addressed in GSI-189.

After careful consideration, the staff concluded that this approach would not be effective or efficient. In addition, OGC advised the staff that there is a legal concern with this approach since hydrogen recombiner elimination is not technically linked to the igniter issue (GSI-189). Therefore, the staff concluded that this is not a viable option for this rulemaking and does not offer it for Commission consideration.

### Option 1

Update the existing rule and delete the hydrogen recombiner requirements for all containment types. As a part of this rulemaking, additional changes to the regulations may be necessary to

retain hydrogen monitoring requirements for accident assessment purposes. In addition, complete the resolution of GSI-189.

#### Option 2

Update the existing rule and delete the hydrogen recombiner requirements for all facilities except those with BWR Mark III and PWR ice condenser containments. As a part of this rulemaking, additional changes to the regulations may be necessary to retain hydrogen monitoring requirements for accident assessment purposes. In addition, for the BWR Mark III and PWR ice condenser facilities, defer any rule changes until the staff completes its resolution of GI-189.

#### Recommendation

The staff believes that Option 1 is the best alternative because it presents the most complete, expeditious, and efficient method of updating the regulations by eliminating the hydrogen recombiner requirements for combustible gas control purposes. This would be acceptable because the lack of safety significance and the low risk significance of the recombiners justify deleting the existing requirement. Since only one regulation for combustible gas control would exist, this option provides for clear and efficient regulation and a simplified regulatory structure. Since BWR Mark III and PWR ice condenser facilities would have to wait for the resolution of GI-189 under Option 2, Option 1 would also provide relief from an unnecessary and unrelated regulatory burden in a shorter time frame. The staff notes that depending on the resolution of GI-189, if Option 1 is adopted, a subsequent rulemaking or some other generic action may be needed to address igniter reliability. If the resolution of GI-189 does not result in the need for additional actions to address igniter system reliability, then no further regulatory actions would be necessary.

Option 2 would provide timely relief from unnecessary regulatory burden for most, but not all licensees. The principal advantage of Option 2 is that the set of requirements associated with hydrogen control for BWR Mark III and PWR ice condenser facilities would be addressed in one (subsequent) rulemaking. This could enhance public confidence by demonstrating a balanced approach to the rulemaking. However, the removal of the hydrogen recombiner requirements is a separate technical issue from the igniter reliability issue. The low risk significance of the recombiners alone warrants the deletion of the existing requirement. The staff believes that the reliability of the igniter systems should not be tied to the need for hydrogen recombiners and should be evaluated on its own merits. For Option 2, if the resolution of GI-189 requires no actions for igniter system reliability, a separate rulemaking would be needed to remove the hydrogen recombiner requirements for BWR Mark III and PWR ice condenser facilities.

### Rulemaking Without Preparation of a Rulemaking Plan

Since most of the issues that are normally addressed in a formal rulemaking plan were addressed by the staff in SECY-00-0198 and approved by the Commission in its SRM, the staff believes that preparing a separate rulemaking plan would not provide any significant value to this rulemaking. The staff is currently preparing the proposed rule and has developed an internal schedule that meets the commitments discussed below. The staff's past practice has been to take no action on a proposed rule until a rulemaking plan is approved by the Commission. The staff estimates that a rulemaking plan would take one to two months to develop. This would result in a delay in the rulemaking schedule and would divert resources and attention from the ongoing proposed rule preparation. Therefore, unless directed otherwise by the Commission, the staff will proceed with the development of the proposed rule without preparing a rulemaking plan.

Independent of this effort to expedite this rulemaking, as noted in the July 20, 2001 Commission meeting on Risk Informing Part 50, Option 2, the staff will continue to seek other opportunities to implement rulemaking process improvements for efficiencies and effectiveness. In addition, as discussed during this Commission meeting, the staff intends to share draft rule language with stakeholders in advance of the proposed rule to obtain information that may improve the focus and quality of the subsequent rulemaking.

### Scheduling

The staff estimates that it could submit the proposed rule recommended under Option 1 to the Commission by January 2002 and a final rule 6 to 9 months after the Commission approves the proposed rulemaking. The schedule for the final rule will depend on the number and complexity of issues raised by commenters on the proposed rule. The staff is currently evaluating an accelerated schedule for resolving GI-189.

### **Process for Evaluating the Value-Impact of New Requirements**

The Commission stated in its SRM of January 19, 2001, that a disciplined, meaningful, and scrutable process needs to be in place to justify, on some cost-benefit basis, any new requirements that are added as a result of the development of risk-informed alternative versions of regulations. Options 1 and 2 for this rulemaking will not result in a voluntary alternative version of 10 CFR 50.44 or any new requirements. Therefore, if the Commission approves either of these options, the process requested by the Commission would not be needed for this rulemaking.

The staff agrees, nevertheless, that it should use such a process to justify any new requirements that are added to future risk-informed alternative versions of regulations. In the way of background, the staff notes that the "Framework for Risk-Informed Changes to the Technical Requirements of 10 CFR Part 50," which it used to assess the issue of combustible gas control and its regulatory requirements, provides a systematic process for examining candidate rule changes for technical adequacy and completeness for meeting the NRC safety

goals. The staff also notes that the intent of the Commission's regulatory analysis guidelines<sup>1</sup> "is to ensure that its decisions that impose regulatory burdens on licensees are based on adequate information regarding reasonable alternatives and the extent of their burdens and the resulting values (benefits) and to follow a systematic and disciplined process that is also open and transparent in arriving at these decisions." The framework document and the regulatory analysis guidelines serve somewhat different purposes in risk-informed rulemaking; the first is used to identify the ideal elements of a risk-informed rule while the other is used to provide the basis for imposing the revised requirements in a manner that conforms with the rulemaking process and other requirements, such as cost-benefit determinations.

Thus, the Commission's intent is clear and the basic processes needed to frame and assess risk-informed rules are in place. However, because the regulatory analysis guidelines were written before the present proposals for risk-informed voluntary alternative rules were put forth, they do not explicitly address how to evaluate cost-benefit of new requirements that might be added to voluntary alternative rules. The fundamental questions that arise are essentially what set of requirements should be included in a voluntary alternative rule and whether or not they should be considered individually or as a whole in the analysis process.

The staff has experience in this area that it can use to implement the process enhancement requested by the Commission in its SRM of January 19, 2001. For instance, RG 1.174 addresses the subject of combined change requests (CCR), stating that changes that make up a CCR should be related to one another, for example by affecting the same system or activity, by affecting the same safety function or accident sequence, or group of sequences, or by being of the same type. Individual changes as well as the cumulative effect of the changes taken together are evaluated with respect to the quantitative acceptance guidelines.

Using this experience, the staff will identify any revisions that would be needed to existing guidance to put into place a disciplined, meaningful, and scrutable guidelines for assessing any new requirements that could be added by a risk-informed alternative rule. Consistent with past practice and public expectations, the staff plans to seek stakeholder input before reporting its recommendations to the Commission. It is important to note that the existing guidance impacts all NRC licensees, not just reactor licensees. In addition, the staff expects that the public will provide comments on areas of the guidance outside those the staff revises. For these reasons, the staff estimates that it will take approximately 8 months to report its recommendations to the Commission.

### **Exemption Requests for Hydrogen Control Systems**

The NRC has received requests for exemption from the requirements of 10 CFR 50.44 to remove requirements for hydrogen recombiners from a number of licensees and others plan to submit similar requests. On June 22, 2001, the BWR Owners Group submitted a topical report, NEDO-33003, "Regulatory Relaxation for the H<sub>2</sub>/O<sub>2</sub> Monitors and Combustible Gas Control System." This topical report, which applies to the entire fleet of BWRs, has resulted in a number of technical specification initiatives being discussed that address 10 CFR 50.44 issues.

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<sup>1</sup>"Regulatory Analysis Guidelines of the U.S. Nuclear Regulatory Commission," NUREG/BR-0058, Rev. 3, July 2000, and "Regulatory Analysis Technical Evaluation Handbook," NUREG/BR-0184, January 1997.

The staff plans to continue processing all actions, consistent with the normal priorities for licensing actions. The staff intends to continue to give rulemaking the highest priority among these activities since it is the most efficient process for providing the desired relief consistent with the NRC's strategic and performance goals.

### **Other Technical Considerations**

#### Hydrogen Source Term Issue

Because the staff recommends risk-informing the existing requirements by rebaselining the existing rule rather than preparing a new voluntary alternative rule, the research activities previously discussed in SECY-00-0198 to develop a hydrogen source term and to assess the implications of seismic and fire events on the risk from hydrogen combustion in BWR Mark III and PWR ice condenser facilities are no longer needed to support the rulemaking. However, these research activities are needed to support resolution of GI-189 regarding the reliability of the igniter systems in these facilities.

Since it issued SECY-00-0198, the staff expanded the scope of the research activities to include an uncertainty analysis for the hydrogen source term calculations. This expansion was based on the recognition of the input provided by internal stakeholders, including the Advisory Committee for Reactor Safeguards, external stakeholders (industry organizations and concerned citizens), and the staff experience with evaluating spent fuel pool accident risk. The staff's experience indicates that a high value is placed on using realistic risk estimates, evaluating uncertainty, and avoiding overly conservative approaches.

Adding uncertainty analysis to the scope of the hydrogen source term calculations increased the estimated time to do the calculations by approximately 5 months. In addition, the staff received an additional \$300K of fiscal year (FY) 2001 technical assistance resources at midyear. While the expanded scope of the research work has extended the research schedule, this extension will not adversely impact the schedule for Option 1.

#### International Experience With Hydrogen Recombiners

In a letter dated June 28, 2001, the French Nuclear Installations Safety Directorate directed Electricite de France to install passive autocatalytic recombiners for hydrogen control in all PWR reactors by the end of 2007. These recombiners are different from the thermal recombiners installed in currently licensed US reactors to meet design basis hydrogen control requirements. The staff will provide further information on this and other international experience with hydrogen recombiners to the Commission in subsequent correspondence.

#### RESOURCES:

The conduct of technical work and the preparation of this rulemaking will require both technical assistance funds and staff resources. The Office of Nuclear Regulatory Research (RES) has budgeted resources to support this work. This includes funds to complete the technical work and \$100,000 with 1.5 FTE (FY02) and \$100,000 with 1 FTE (FY03) to support the rulemaking. The Office of Nuclear Reactor Regulation (NRR) estimates that \$97,000 in funds will be required to prepare the regulatory analysis. Resources for NRR staff support of 3.0 FTE and

RES staff support of 0.5 FTE to prepare the rulemaking, regulatory guidance, standard review plan addition, and public communications would be required and are included in the current budget.

COORDINATION:

The Office of the General Counsel has reviewed this Commission paper and has no legal objection. The Office of the Chief Financial Officer has reviewed this Commission paper for resource implications and has no objections.

RECOMMENDATIONS:

The staff recommends that the Commission:

- (1) Approve the development of a risk-informed revision to 10 CFR 50.44 without the preparation of a rulemaking plan.
- (2) Approve Option 1.
- (3) Approve the staff's plan for addressing the Commission's direction regarding the process for evaluating the value-impact of new voluntary requirements.

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