

On January 25, 1985 (50 FR 3498), the NRC published another amendment to § 50.44. This amendment, which added paragraph (c)(3)(iv), required a hydrogen control system justified by a suitable program of experiment and analysis for BWRs with Mark III containments and pressurized water reactors (PWRs) with ice condenser containments. In addition, plants with these containment designs must have systems and components to establish and maintain safe shutdown and containment integrity. These systems must be able to function in an environment after burning and detonation of hydrogen unless it is shown that these events are unlikely to occur. The control system must handle an amount of hydrogen equivalent to that generated from a metal-water reaction involving 75 percent of the fuel cladding surrounding the active fuel region.

When § 50.44 was amended in 1985, the NRC recognized that an improved understanding of the behavior of accidents involving severe core damage was needed. During the 1980s and 1990s, the NRC sponsored a severe accident research program to improve the understanding of core melt phenomena, combustible gas generation, transport and combustion, and to develop improved models to predict the progression of severe accidents. The results of this research have been incorporated into various studies (e.g., NUREG-1150 and probabilistic risk assessments performed as part of the Individual Plant Examination (IPE) program) to quantify the risk posed by severe accidents for light water reactors.

The result of these studies has been an improved understanding of combustible gas behavior during severe accidents and confirmation that the hydrogen release postulated from a design-basis LOCA was not risk-significant because it was not large enough to lead to early containment failure, and that the risk associated with hydrogen combustion was from beyond design-basis (e.g., severe) accidents. These studies also confirmed the assessment of vulnerabilities that went into the 1981 and 1985 amendments that required additional hydrogen control measures for some containment designs.

II. Rulemaking Initiation

In a June 8, 1999, Staff Requirements Memorandum (SRM) on SECY-98-300, Options for Risk-Informed Revisions to 10 CFR Part 50—"Domestic Licensing of Production and Utilization Facilities," the NRC approved proceeding with a study of risk-informing the technical requirements of 10 CFR Part 50. The

NRC staff provided its plan and schedule for the study phase of its work to risk-inform the technical requirements of 10 CFR Part 50 in SECY-99-264, "Proposed Staff Plan for Risk-Informing Technical Requirements in 10 CFR Part 50," dated November 8, 1999. The NRC approved proceeding with the plan for risk-informing the Part 50 technical requirements in a February 3, 2000, SRM. Section 50.44 was selected as a test case for piloting the process of risk-informing 10 CFR Part 50 in SECY-00-0086, "Status Report on Risk-Informing the Technical Requirements of 10 CFR Part 50 (Option 3)."

Mr. Christie of Performance Technology, Inc. submitted letters, dated October 7 and November 9, 1999, that requested changes to the regulations in § 50.44. He requested that the regulations be amended to:

1. Retain the existing requirement in § 50.44(b)(2)(i) for inerting the atmosphere of existing Mark I and Mark II containments.
2. Retain the existing requirement in § 50.44(b)(2)(ii) 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.
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 undertaken pursuant to § 50.44(c).
4. Retain the existing requirements in § 50.44 for high point vents.
5. Eliminate the existing requirement in § 50.44(b)(2) to insure a mixed atmosphere in containment.
6. Eliminate the existing requirement for hydrogen releases during design basis accidents of an amount equal to that produced by a metal/water reaction of 5 percent of the cladding.
7. Eliminate the requirement for hydrogen recombiners or purge in LWR containments.
8. Eliminate the existing requirements for hydrogen and oxygen monitoring in LWR containments.
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 where there is a high probability that fission products will be released to the reactor containment.

These letters have been treated by the NRC as a petition for rulemaking and assigned Docket No. PRM-50-68. The NRC published a document requesting comment on the petition in the **Federal**

Register on January 12, 2000 (65 FR 1829). The issues associated with § 50.44 raised by the petitioner were discussed in SECY-00-0198, "Status Report on Study of Risk-Informed Changes to the Technical Requirements of 10 CFR Part 50 (Option 3) and Recommendations on Risk-Informed Changes to 10 CFR 50.44 (Combustible Gas Control)." The final rule and the petition are consistent in many areas, but differ regarding the functional requirements for hydrogen and oxygen monitoring, the requirement for ensuring a mixed atmosphere, the source term of hydrogen for water-cooled reactors to analyze in order to ensure containment integrity, and the need to revise GDC-41. The NRC's detailed basis for including these requirements in the rule is addressed in a subsequent section of this supplementary information.

The NRC also received a petition for rulemaking filed by the Nuclear Energy Institute. The petition was docketed on April 12, 2000, and has been assigned Docket No. PRM-50-71. The petitioner requests that the NRC amend its regulations to allow nuclear power plant licensees to use zirconium-based cladding materials other than zircaloy or ZIRLO, provided the cladding materials meet the requirements for fuel cladding performance and have received approval by the NRC staff. The petitioner believes the proposed amendment would improve the efficiency of the regulatory process by eliminating the need for individual licensees to obtain exemptions to use advanced cladding materials that have already been approved by the NRC. The change would remove the language in 10 CFR 50.44 regarding the use of zirconium-based cladding materials other than Zircaloy or ZIRLO. The NRC published a document requesting comment on the petition in the **Federal Register** on May 30, 2000 (65 FR 34599). The requested change is unrelated to the risk-informing of 10 CFR 50.44. The NRC addressed the NEI petition in this rulemaking for effective use of resources. Although the final rule does not contain the rule language changes requested by the petitioner, in its revision to 10 CFR 50.44, the NRC eliminated the old language referring to various types of fuel cladding. Thus, the final rule resolves the petitioner's concern regarding § 50.44. The NRC's detailed basis for this decision is addressed in a subsequent section of this supplementary information.

In SECY-00-0198, dated September 14, 2000, the NRC staff proposed a risk-informed voluntary alternative to the current § 50.44. Attachment 2 to that