D920814

Mr. James M. Taylor
Executive Director for Operations
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Taylor:

SUBJECT: PROPOSED RESOLUTION OF GENERIC SAFETY ISSUE 106, "PIPING AND THE USE OF HIGHLY COMBUSTIBLE GASES IN VITAL AREAS"

During the 387th and 388th meetings of the Advisory Committee on Reactor Safeguards, July 9-11 and August 6-8, 1992, we reviewed the NRC staff's proposed resolution of Generic Safety Issue 106 (GI-106), "Piping and the Use of Highly Combustible Gases in Vital Areas." Our Subcommittee on Auxiliary and Secondary Systems also reviewed this matter during its meeting on July 8, 1992. During this review, we had the benefit of discussions with representatives of the NRC staff and its contractor and of the documents referenced.

The proposed resolution deals with the piping and use of combustible gases, principally hydrogen, within nuclear power plant buildings. Storage facilities external to plant buildings are being dealt with by a new separate licensing issue. Hydrogen is stored usually in large quantities, and used in both boiling water reactor (BWR) and pressurized water reactor (PWR) units. The concern is that a large release of hydrogen may lead to fires or explosions that could jeopardize safety. Although scoping analyses reported in the Regulatory Analysis (NUREG-1364) indicate that the risk is generally small, detailed analyses for some PWRs have shown that certain corrective measures may be justifiable under the Backfit Rule. For the selected BWRs the analyses showed that corrective measures were not necessary.

The staff is intending to implement the proposed resolution by issuing a generic letter to inform all licensees and applicants of the findings. Only affected PWR licensees and applicants (i.e., those who find corrective measures are necessary) are requested to respond, but no new staff requirements or positions are being imposed. The response will require an evaluation which may be performed separately or as a part of the IPE or IPEEE. The staff resolution does not cover hydrogen water chemistry installations for BWR units or liquified petroleum gas installations for PWR or BWR plants. These are being treated as a separate Licensing Issue identified as LI-136.

We have the following comments concerning the proposed generic letter:

1. The letter should apply to both BWR and PWR units. Otherwise, the hydrogen distribution system for a BWR main generator will not receive an evaluation. Further, a BWR turbine building may contain safety-related equipment.

2. The letter should point out that the turbine building evaluation should include consideration of the effects of hydrogen detonations on the physical separation barrier wall (including penetrations such as doors) between the turbine building and adjoining reactor, control, or auxiliary buildings. It is not clear that this consideration was included by the NRC staff in deciding to exclude BWR units from the evaluation and response requirements of the letter. A similar detonation vulnerability consideration should apply to separation barriers (e.g., fire barriers) within PWR auxiliary buildings.

3. The letter should indicate what preoperational and periodic testing provisions and requirements should apply when the evaluation takes credit for the functioning of excess flow-check valves or other active isolation provisions.

4. The letter should provide guidance on dealing with hydrogen fires. Our concern is that extinguishing a hydrogen fire could result in the accumulation and possible detonation of the hydrogen.

If these comments are appropriately addressed in the generic letter, we would agree with the NRC staff that NUREG-1364 provides a satisfactory basis for the resolution of GI-106 and that the proposed generic letter constitutes a suitable implementation of the resolution. We would like to review the final revision of the generic letter before it is issued.

As part of the GI-106 effort to arrive at resolution, a study of hydrogen combustion and detonation was done by INEL. This study is currently in draft form and is under peer review. The study yielded the shock loadings on concrete walls as a function of distance from the ignition point and amount of hydrogen involved. The shock loading was used by INEL and its contractor, RPK Structural Mechanics Consulting, to establish separation distances needed to prevent unacceptable damage to the walls. The staff and its contractors are to be commended for a fine analysis of a difficult problem. We recommend that the draft report describing the effort be released as soon as possible so that it can benefit those who must make decisions about severe accident containment loading.

Sincerely,

David A. Ward
Chairman

Reference:

Memorandum dated April 3, 1992, from Warren Minners, Office of Nuclear Regulatory Research, for Raymond F. Fraley, ACRS, transmitting resolution package for review, including:

(a) U.S. Nuclear Regulatory Commission, NUREG-1364, "Regulatory Analysis for the Resolution of Generic Issue 106: Piping and the Use of Highly Combustible Gases in Vital Areas"

(b) Generic Letter to Licensees and Applicants, Subject: Request for Information Related to the Resolution of Generic Issue 106, "Piping and the Use of Highly Combustible Gases in Vital Areas," Pursuant to 10 CFR 50.54(f) - Generic Letter 29-XX

(c) W. W. Madsen, D. H. Van Haaften, EG&G Idaho, Inc., and R. P. Kennedy, RPK Structural Mechanics Consulting, EGG-SSRE-9747, "Improved Estimates of Separation Distances to Prevent Unacceptable Damage to Nuclear Power Plant Structures from Hydrogen Detonation for Gaseous Hydrogen Storage," December 1991