UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION
WASHINGTON, DC 20555-0001

May 6, 2003

NRC INFORMATION NOTICE 2002-15, SUPPLEMENT 1: POTENTIAL HYDROGEN COMBUSTION EVENTS IN BWR PIPING

Addressees

All holders of operating licenses for light water reactors, except those who have permanently ceased operations and have certified that fuel has been permanently removed from the reactor.

Purpose

The U.S. Nuclear Regulatory Commission (NRC) is issuing this supplement to inform addressees about the status of the followup actions taken by the staff and the Boiling Water Reactor Owners Group (BWROG) after the issuance of Information Notice (IN) 2002-15 on April 12, 2002. The original information notice discussed hydrogen combustion events in piping at foreign boiling water reactors (BWRs).

The NRC expects recipients to review the information for applicability to their facilities and consider actions, as appropriate, to avoid similar problems. However, suggestions contained in this IN are not NRC requirements; therefore, the NRC requires no specific action or written response .

Background

The NRC issued IN 2002-15, "Hydrogen Combustion Events in Foreign BWR Piping," on April 12, 2002, to inform addressees about the hydrogen combustion events at two foreign BWRs. The NRC requested that recipients review the information and consider actions, as appropriate, to avoid similar problems in U.S. plants. At a BWROG/NRC senior management meeting on July 25, 2002, the NRC staff asked the BWROG to submit a written report about the group's followup activities in response to the foreign events. The BWROG submitted the information to the staff in a letter dated December 20, 2002 (ADAMS Accession No. ML023610269).

Description of Circumstances

In response to the foreign hydrogen combustion events, General Electric (GE) convened a task force. The BWROG participated in the GE task force to study the events. The task force concluded that although the probability of similar events in U.S. BWRs is small, such events cannot be completely precluded. GE issued GE Service Information Letter (SIL) No. 643, "Potential for Radiolytic Gas Detonation," dated June 14, 2002, to all BWR licensees recommending that piping systems (primary and secondary) susceptible to accumulation of noncondensable gases be reviewed and actions taken where necessary to avoid the problem.

Based on its review of GE SIL No. 643, the BWROG concluded that piping configurations and conditions conducive to radiolytic gas accumulation are expected to be rare, and therefore the likelihood of hydrogen combustion events in U.S. BWRs is small. However, the possibility could not be ruled out, particularly in the case of degraded performance that may not be immediately recognizable. Very unusual combinations of geometry and plant material condition are required for radiolytic gas to accumulate, but should the gas accumulate, there is a potential for detonation, resulting in piping failure.

Consequently, the BWROG formed a Hydrogen Accumulation Committee to develop detailed guidance for U.S. BWR utilities on identifying, disposing of, and mitigating potential radiolytic hydrogen and oxygen in plant piping and equipment. The committee did the following:

1. Identified the most significant generic plant equipment that could be subject to rapid hydrogen accumulation.

2. Surveyed BWR licensee members about plant areas with the greatest potential for hydrogen/oxygen accumulation and about actions taken to address this configuration.

3. Reviewed the recommendations of Generic Letter (GL) 91-18, "Information to Licensees Regarding NRC Inspection Manual Section on Resolution of Degraded and Nonconforming Conditions," to ensure that operability with hydrogen accumulation is properly addressed.

4. Developed a guidance document, "BWR Piping and Component Susceptibility to Hydrogen Detonation," which provides detailed guidance on identifying equipment subject to hydrogen accumulation and potential rupture. This document also identifies short-term and long-term mitigation strategies for such equipment.

At the February 2003 BWROG/NRC senior management meeting, the BWROG said it will provide a final summary report to the NRC later in 2003 to document the results of the implementation of the BWROG guidance on this issue.

Conclusion

This IN provides a summary of the actions taken by the BWROG and NRC in response to the hydrogen combustion events in foreign BWRs initially described in IN 2002-15. The NRC staff is continuing to monitor the BWROG activities related to hydrogen accumulation.

Related Generic Communications

The following documents describe reactor operating experience with gas intrusion and combustion events:

- IN 88-23, "Potential for Gas Binding of High-Pressure Safety Injection Pumps," with five supplements, the latest dated April 23, 1999.

- IN 90-64, "Potential for Common-Mode Failure of High Pressure Safety Injection Pumps," dated October 4, 1990.

- GL 93-06, "Research Results on Generic Safety Issue 106, 'Piping and the Use of Highly Combustible Gases in Vital Areas,'" dated October 25, 1993.

- IE Bulletin No. 78-03, "Potential Explosive Gas Mixture Accumulations Associated With BWR Offgas System Operations," dated February 8, 1978.

This information notice does not require any specific action or written response. If you have any questions about the information in this notice, please contact one of the technical contacts listed below or the appropriate project manager in the NRC's Office of Nuclear Reactor Regulation (NRR).

/RA/
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