MARK III CONTAINMENT
HYDROGEN CONTROL OWNERS GROUP
Sam H. Hobbs, Chairman
c/o Mississippi Power and Light • P.O. Box 1640 • Jackson, Mississippi 39205
601-969-2458

July 26, 1985
HGN-051

Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Mr. Robert Bernero

Dear Mr. Bernero:

Subject: Availability of Containment Spray System

The availability of containment sprays during degraded core accidents was the subject of recent conversations between the NRC Staff and the Hydrogen Control Owners Group (HCOG). This letter documents the HCOG justification for assuming containment sprays are available to mitigate postulated hydrogen generation events.

Two redundant containment spray systems are provided for the Mark III containment plants which are equipped with containment sprays. Each containment spray system is a subsystem of the residual heat removal (RHR) system which also provides an emergency core cooling function through the low pressure coolant injection (LPCI) subsystem. The containment spray subsystems and two of the three LPCI systems utilize common pumps. The common pump on each RHR system can provide water to either the containment spray system or to the reactor pressure vessel through the LPCI subsystem.

HCOG has analyzed hydrogen generation events in order to calculate hydrogen production as a function of time. The assumptions for these analyses and the results from these analyses have been previously submitted in numerous letters to the NRC staff. HCOG has assumed that a transient or accident causes inventory to be lost from the reactor coolant pressure boundary. No makeup systems are assumed to operate for up to 3100 seconds after the accident is initiated. For analysis of events in which the Emergency Core Cooling Systems (ECCS) are assumed to be recovered, they are assumed to be unavailable until 3800 seconds after the event is initiated.

Given the large number of Emergency Core Cooling Systems which should be capable of providing injection to the vessel, it is reasonable to postulate that at least one RHR pump connected to a containment spray subsystem should be operable. This situation would be created if the LPCI motor operated injection valve failed in the closed position. Since reliability data indicates that motor operated valves have a higher unavailability rate than large pump motors, HCOG's assumption that a motor operated valve is the likely failure mechanism preventing injection to the reactor pressure vessel for at least one RHR system is reasonable.

The emergency procedure guidelines (EPGs) developed by the General Electric BWR Owners Group (BWROG) for boiling water reactors provide symptom based guidance to nuclear power plant operators. The Primary Containment EPG provides guidance to the operator on responding to conditions which might threaten Containment integrity. This EPG directs the operator to actuate the containment spray system before the containment temperature reaches the design limit. A caution is applied to this direction so that the operator would not divert water to the containment spray system unless adequate core cooling is assured.

The NRC staff has expressed concern that in a degraded core accident, the caution in the current containment EPG would preclude the operator from using the containment spray mode of the RHR system. Given the scenario in which a LPCI motor operated isolation valve inside containment cannot be opened, the associated LPCI system could not be used to assure adequate core cooling. The operator would not have the capability to reopen the closed isolation valve from outside the containment. He would therefore be expected to place the containment spray subsystem in service if high temperatures appeared to be threatening either equipment or the containment structure.

The HCOG has previously documented that recoverable degraded core accidents which produce large amounts of hydrogen are improbable events. Events in which one containment spray system is required to operate in the LPCI mode to assure adequate core cooling while the other containment spray system is inoperable have a much lower probability. Therefore HCOG deems it acceptable to assume the failure of a LPCI motor operated isolation valve which precludes the associated LPCI valve from providing adequate core cooling, but does not preclude the operator from using the containment spray subsystem.

This submittal was compiled by HCOG from the best information available for submittal to the Nuclear Regulatory Commission. The submittal is believed to be complete and accurate, but it is not submitted on any specific plant docket. The information contained in this letter and its attachments should not be used for evaluation of any specific plant unless the information has been endorsed by the appropriate member utility. HCOG members may individually reference this letter in whole or in part as being applicable to their specific plants.

Very truly yours,

S. H. Hobbs

SHH/jlw

cc: Mr. Carl R. Stahle
Hydrogen Control Project Manager
U. S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Washington, D. C. 20555

Mr. Charles G. Tinkler
Containment Systems Branch
Office of Nuclear Reactor Regulation
Washington, D. C. 20555

Sandia National Laboratories
Attention: John C. Cummings
Organization 1512
P. O. Box 5800
Albuquerque, New Mexico 87185