January 24, 1983

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Docket Nos: 50-369
and 50-370

Mr. H. B. Tucker, Vice President
Nuclear Production Department
Duke Power Company
422 South Church Street
Charlotte, North Carolina 28242

Dear Mr. Tucker:

Subject: Hydrogen Mitigation System
(McGuire Nuclear Station, Units 1 & 2)

As a result of our continuing review of your proposed Hydrogen Mitigation System we are in need of specific additional information which is described in the enclosure. In order to meet your licensing schedule, we request that you provide your response to this matter no later than February 11, 1983.

The reporting and/or recordkeeping requirements contained in this letter affect fewer than ten respondents, therefore, OMB clearance is not required under P.L. 96-511.

Sincerely,

/S/

Elinor G. Adensam, Chief
Licensing Branch No. 4
Division of Licensing

Enclosure:
As stated

cc: See next page

OFFICE ▶	DL:LB #4	LA:DL:LB #4	DL:LB #4				
SURNAME ▶	RBirkel/hmc	MDuncan	EAdensam				
DATE ▶	1/21/83	1/21/83	1/21/83				

McGuire

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Request for Additional Information
Regarding Hydrogen Control for
McGuire Nuclear Station

1. Recent discussions with Duke suggest that the upper plenum igniters in McGuire are located alternately between the crane wall side and the containment shell side of the upper plenum in a staggered fashion, rather than all on the containment shell side of the upper plenum as depicted in Figure 3.4-5 of the McGuire submittal. Verify the "as-installed" locations for these and all other igniters in the permanent system. Provide revised drawings as necessary.

2. Section 3.4 of the McGuire submittal cites results of an analysis performed by Duke to ensure that 6 of the 12 upper plenum igniters will provide adequate coverage of this region. Based on the information supplied, this analysis appears to differ somewhat from one performed by TVA to justify the use of 16 upper plenum igniters. In view of the differences between the number and locations of upper plenum igniters inthe McGuire and Sequoyah plants, provide details and justification of the McGuire analysis including (1) assumptions regarding vertical and horizontal velocities of the rising mixture and propagating flame, and (2) the method for computing the maximum hydrogen concentration for a given ignition concentration. Address in your response the possibility of the gas mixture bypassing the igniters. If the analysis relies on horizontally propagating flames being carried into the upper compartment by rising gases, discuss the effects of turbulent mixing and dilution of the mixture with the upper compartment atmosphere.

3. Figure 3.4-2 of the McGuire submittal shows a typical igniter circuit but does not include details of the overall power distribution. In this regard provide a more comprehensive description of the power distribution to the igniters for

each train. Specifically, describe the circuit branches, starting from the Class IE power supply and proceeding through the control switches, fuses and emergency lighting panel board, to the igniters. Identify in your response: the number of control switches and the circuits which they control, the location of the fuses in the system, the number of igniters supplied through each fuse, the means by which system status can be monitored during an accident, the location in the system at which voltage and current readings are taken for surveillance purposes, and the number of igniters on each tested circuit. Assess the potential of a short circuit in a single igniter to inhibit operation of the deliberate ignition system over a critical region of containment.

4. Verify that the GM glow plug will reliably initiate combustion in a spray environment typical of the ice condenser upper compartment. Acceptable tests for demonstrating igniter operability should be characterized by a spray droplet density equivalent to that in the upper compartment, droplets at terminal velocity with induced turbulence to simulate upper compartment mixing, and a sufficiently uniform mixture such that hollow cone nozzle effects are eliminated.

5. Provide the results of the AECL-Whiteshell combustion test with top ignition, 8.5% H_2, and 30% steam, as committed to by response to question 1C of the September 17, 1982, NRC Request for Information.

6. Tables summarizing CLASIX results are presented in the McGuire submittal for only the base case and the flame speed sensitivity case. Provide similar tables for all other sensitivity cases analyzed.

7. With regard to the structural capability of the McGuire containment, provide the following information:

   (a) the ASME Boiler and Pressure Vessel Code, Service Level C Pressure Limit for the McGuire steel containment shell.

   (b) a brief description of the calculation method and material properties used to determine the ASME Boiler and Pressure Vessel Code Service Level C Pressure Limit for the McGuire steel containment shell.

   (c) the pressure retention capabilities of the penetrations through the McGuire steel containment shell.

   (d) the pressure capacities of the operating concrete floor for resisting pressures above and below the floor.

8. In response to Item 2 of the NRC letter dated February 10, 1982, Duke has stated that the basis for the assumptions that the equipment did indeed reach an equilibrium temperature at least equivalent to the MSLB peak temperature (qualification temperature) was engineering judgment. Please confirm that the judgment and/or analysis was performed for all the equipment required for the hydrogen burn event. Also, provide the reference to individual summary component evaluation worksheets (SCEWS) together with the qualification profile for all the equipment whose survivability is demonstrated based on the qualification test performed in accordance with NUREG-0588. For any other equipment which is required for the hydrogen burn event but is not in the EQ program, provide the justification for survivability during the hydrogen burn event.

9. The lists of equipment provided in Section 5.2 of the McGuire submittal do not include all essential equipment, e.g., isolation and PORV valves. In this regard, provide a summary table, such as Table 2.2-1 in Attachment 4 to TVA's October 1, 1981, submittal for Sequoyah, and justification for the survivability treatment of each item. As a minimum, add the following equipment to the list of the equipment required for the hydrogen burn event and provide the analysis to demonstrate the survivability of this equipment during the hydrogen burn event:
   (a) Hydrogen Recombiner
   (b) Reactor Vessel Vent Valves
   (c) PORV and Block Valves

10. In response to Question 10 of the February 10, 1982, NRC Request for Information, Duke justified exclusion of the T_BB_2 scenario from consideration on the basis of offsite and onsite power reliability. A description of the utility grid system was provided to support the Duke position. To further justify the reliability of AC power, provide the probability values for the station blackout (total loss of AC power) at McGuire Nuclear Station lasting longer than 90 minutes, but shorter than 140 minutes. Also, describe the procedures for actuating the igniter system following a degraded core accident concurrent with loss of all AC power.

11. Provide a description of the procedural instructions for turning on and turning off the hydrogen igniters to clarify and supplement information provided in Section 3.7.1 of the McGuire submittal. Your description should include the following items:
    (a) the procedures in which operator actions are required to turn on the igniters.

(b) the conditions which would require the actions (e.g., any diagnosed loss of coolant, any safety injection actuation signal, only if inadequate core cooling is diagnosed).

(c) the procedures in which operator actions are required to turn off or verify the igniters are turned off.

(d) the conditions which would require those actions (e.g., upon reaching cold shutdown, return to power operation, diagnosed spurious safety injection).