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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

JUL 18 1980

MEMORANDUM FOR: John F. Ahearne, Chairman

THRU: (Signed) T. A. Rehm
William J. Dircks, Acting Executive Director for Operations

FROM: Harold R. Denton, Director, Office of Nuclear Reactor Regulation

SUBJECT: INFORMATION ON IGNITION SYSTEM FOR SEQUOYAH

In your memorandum of July 14, 1980, you cited certain discussions we have been having with TVA regarding hydrogen control in ice condenser plants and you requested information on: 1) a description of the TVA proposal; 2) the status of our review; 3) applicability of the ignition system to other ice condenser plants; and 4) an estimate of when we will have an NRR position on the proposal. Our responses are detailed below.

1. DESCRIPTION OF THE TVA PROPOSAL

TVA has proposed, by letter dated July 17, 1980, an interim distributed ignition system for use in the Sequoyah ice condenser containment. The object of the ignition system is to ignite the hydrogen generated during a severe degraded core accident prior to its reaching a dangerously high concentration.

The interim distributed ignition system will consist of up to about 40 thermal igniters distributed throughout the containment. The thermal igniters will produce temperatures of about 1500°F.

The igniters will be powered by the existing standby lighting circuit (used in the event of a station blackout) with diesel power backup. They will be controlled by the operator from the auxiliary building.

TVA expects to have the interim distributed ignition system operational by about September 15, 1980 if approved.

2. STATUS OF OUR REVIEW

The staff recognizes the potential that distributed ignition has for improving the safety margins relative to hydrogen control. In conjunction with our overall program to support the upcoming rulemaking proceeding on degraded/melted cores, we plan an expeditious review of the proposed use of the distributed ignition system in the Sequoyah ice condenser plants.

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The objective of the staff's review of the proposed interim distributed ignition system is to assure that safety margins will, in fact, be improved by their use. Our present plans are to engage the Lawrence Livermore Laboratory via a technical assistance contract so that certain elementary tests of the performance characteristics of the ignition devices can be performed. The effect of steam on ignition and combustion of lean mixtures of hydrogen and air need to be determined and their impact on igniter performance evaluated for the Sequoyah ice condenser plants. Moreover, the ignition strategies to be used for various degraded core accident sequences need to be developed to assure effective performance of the proposed system.

We understand that TVA is planning to furnish us with a safety analysis report on the interim distributed ignition system by mid-August 1980. We are targeting completion of our review of the interim system within about a month after our receipt of the information from TVA.

In its letter of July 17, 1980, TVA states that it has "... determined pursuant to 10 CFR 50.59 that installation is not an unreviewed safety question. However, implementation of this system has been determined to be an unreviewed safety question. Therefore, the operation of this system will not be initiated until TVA has NRC approval."

The ACRS considered the proposed design during its July 1980 meeting and concludes that "Though the work accomplished to date is limited in scope, these studies are definitely responsive to the Committee's recommendations on these points." The Committee further stated in a letter dated July 15, 1980, that in its opinion, "... their present incomplete status need not delay the issuance of a full power operating license."

3. APPLICABILITY TO OTHER ICE CONDENSER PLANTS

There are 10 licensed ice condenser units at five sites. The containment designs for these units are substantially the same. They are all free-standing steel containments, except the two D. C. Cook units which are steel lined, reinforced concrete structures. Six units are designed for an internal pressure of 15 psig while four are designed to 12 psig. The two D. C. Cook units have containment sprays in both the upper and lower compartments while all the others have sprays in the upper compartment only.

Any hydrogen mitigation system proved useful for one unit should also prove useful for all the other units. The design differences between the various ice condenser containments should not significantly change the performance of any of the hydrogen mitigation systems.

We plan to evaluate TVA's proposed interim distributed ignition system to determine its effectiveness in dealing with large amounts of hydrogen.

Once the conditions under which the proposed system would be effective are defined, we plan to appropriately implement them at all the other ice condenser units so as to improve their safety margins for dealing with post-accident hydrogen generation.

4. SCHEDULE FOR NRR POSITION

The NRR staff is conducting an accelerated review of the TVA proposed interim distributed ignition system. This review includes an experimental assessment of the performance of the ignition system in lean mixtures of hydrogen and air in the presence of various amounts of steam. It also includes a study of ignition strategies to assure that the safety margins for dealing with hydrogen are improved.

TVA is planning to file a safety analysis report on its proposed system and the procedures for its use by mid-August 1980. We would expect completion of the staff's review of the proposed system by about a month following receipt of the information from TVA. An NRR position on applicability of the proposed system to the other ice condenser plants should follow soon thereafter.

Harold R. Denton, Director 7/18/80
Office of Nuclear Reactor Regulation

cc: Commissioner Gilinsky
Commissioner Hendrie
Commissioner Bradford
Secretary
OGC
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