

To: Thadani, RES  
Appropriate Action



Tennessee Valley Authority, 1101 Market Street, Chattanooga, Tennessee 37402-2801

CYS: EDO  
DEDMS  
DEDR  
DEDM  
AO  
NRR  
ACRS

July 25, 2002

Dr. William D. Travers  
Executive Director for Operations  
U.S. Nuclear Regulatory Commission  
One White Flint, North  
11555 Rockville Pike  
Rockville, Maryland 20852-2739

Dear Dr. Travers:

RECOMMENDATIONS PROPOSED BY THE OFFICE OF NUCLEAR REGULATORY RESEARCH FOR RESOLVING GENERIC SAFETY ISSUE-189, "SUSCEPTIBILITY OF ICE CONDENSER AND MARK III CONTAINMENTS TO EARLY FAILURE FROM HYDROGEN COMBUSTION DURING A SEVERE ACCIDENT"

- References:
1. NUREG-0011, Safety Evaluation Report related to the operation of Sequoyah Nuclear Plant, Units 1 and 2, Docket Nos. 50-327 and 50-328, Tennessee Valley Authority, Supplement No. 3, September 1980
  2. NUREG-0011, Safety Evaluation Report related to the operation of Sequoyah Nuclear Plant, Units 1 and 2, Docket Nos. 50-327 and 50-328, Tennessee Valley Authority, Supplement No. 4, February 1981
  3. NUREG-0011, Safety Evaluation Report related to the operation of Sequoyah Nuclear Plant, Units 1 and 2, Docket Nos. 50-327 and 50-328, Tennessee Valley Authority, Supplement No. 6, December 1982

TVA has reviewed NRC Report, "Backup Power for PWR's with Ice Condenser Containments and BWR's with Mark III Containments under SBP Conditions: Impact Assessment" prepared by the Office of Nuclear Regulatory Research (ADAMS ML021340149). TVA participated in the discussion of Generic Safety Issue (GSI) - 189 at the Advisory Committee on Reactor Safeguards (ACRS) meeting held on June 6, 2002. TVA has also reviewed the comments provided by ACRS on GSI-189 in a letter to you from George Apostolakis dated June 17, 2002. TVA provides its perspective on this issue based on experience with research and development of the Hydrogen Mitigation Systems (HMS) used at TVA's ice condenser plants.

Template: EDO-001

E-RIS: EDO-C1

In general, TVA found that the impact assessment prepared by the Office of Nuclear Regulatory Research lacks a solid technical basis for key assumptions about hydrogen igniter performance. It is also based on information that is not correct for TVA plants.

1. The report assumes a total power requirement of 4300 watts for one train of the HMS in developing the cost estimates for a backup power source. That assumption is low by a factor of 5. TVA uses the Tayco style igniters in the HMS design. These igniters require in excess of 20 kW to power one train. The assumptions about backup diesel generator capabilities and associated cost estimates should be revised accordingly.
2. The report assumes that a single backup power supply will be needed for a multi-unit site. This assumption minimizes the estimate for the front-end hardware costs. However, it rests on the explicit assumption that the station blackout (SBO) event will only affect one unit. In fact, this assumption ignores the cross-tie capability at Sequoyah Nuclear Plant (SQN) that would allow equipment from the SBO-affected unit to be powered from the non-SBO unit. The cost/benefit assessment should be revised to reflect the cross-tie capabilities at SQN. TVA believes that this revised assessment will increase the cost for supplying backup power since multiple power source will be required. TVA also believes that it will lower the benefits since additional protection is only provided for the less frequent multi-site SBO scenario.
3. The report suggests that it would be cost-effective to provide minimal backup power. However, that case assumes that operation of the Containment Air Return Fan (CARF) is not required to support successful HMS operation that maintains containment integrity. This assumption runs contrary to the conclusions documented in previous NRC safety evaluation reports, which concluded that CARF operation was required for successful operation of the HMS (references 1, 2, and 3). TVA believes that this critical assumption should be replaced with the appropriate technical research and analysis before any decisions about rulemaking is made. Alternately, the down-side effects (probabilities and consequences) of unwanted/unexpected hydrogen detonation should be factored into the decision analysis, if the assumption that CARF operation is not required is retained.
4. The report assumes incremental licensing and NRC review costs associated with implementation of a limited capability backup power supply for the HMS. On the other hand, TVA estimates that the industry spent ~\$100 million on the research and development costs for the HMS. TVA fully believes that a substantial amount of engineering, licensing, and NRC review costs would be required to support the technical basis for the limited capability backup power supply for the HMS. Our experience with the substantial research that was conducted to satisfy NRC that containment integrity would be assured with operation of the HMS, leads TVA to believe that a similar review effort would be required for the limited capability backup power supply for the HMS. The original research required that TVA demonstrate that the CARFs would survive the

postulated hydrogen burns, since they were critical to the safe operation of the HMS. We have no reason to believe that, in the end, a similar research and development effort would not be required to ensure containment integrity and safe operation of the HMS without the CARFs. In fact, it is not clear to us how the associated procedure changes associated with the low-cost option can be made without prior NRC approval under 10 CFR 50.59 without the research and analysis that clearly demonstrates that CARF operation is not required to support successful operation of the HMS. The cost estimates for the backup power supply should be revised to reflect these development, review, and approval costs before any decision to pursue rulemaking is made.

5. Similarly, the low-cost option relies on significant operator actions in the field to connect the backup power supply to power the HMS. Our experience with credit for operator actions associated with fire protection contingency actions and compensatory actions evaluated in the significance determination process indicate that more than a minimal review is necessary to provide the proper assurance of successful operator actions. The suggested operator actions for the low-cost backup power supply are more extensive and complicated than the types of actions considered for fire protection contingency actions and compensatory actions evaluated in the significance determination process issues. The cost estimates for the backup power supply should be revised to reflect more realistic development, review, and approval costs for the operator actions before any decision to pursue rulemaking is made.
6. The core damage contribution from the SBO sequence was specifically considered by NRC in the licensing of the HMS (reference 2). Based on the analyses performed, the HMS was not required to function during SBO sequences because of the low probability of occurrence. The current initiating event frequency for SBO at SQN is essentially the same as when the decision was made by NRC that this event did not need to be considered during licensing of the HMS. Thus, we do not believe requiring additional plant systems or licensing action on the part of the NRC is warranted. Since that time, TVA has made significant hardware improvements that have increased the availability and reliability of onsite (diesel generators) and offsite (switchyard) power systems. In addition, TVA has instituted improved work controls to minimize the potential for problems caused by human error during work activities on this equipment. If anything, these improvements have lessened the likelihood of a SBO from the probabilities considered during the review and approval of the HMS.
7. Based on the discussion at the ACRS meeting, TVA understands that the low-cost backup power supply option relies on the use of diesel fuel from the installed diesel generator system. It was not clear from the discussion how, or if, the impact assessment considered the implications of any common mode fuel problems. TVA believes that this issue needs to be considered and the assessment of the benefits for this option reduced appropriately, if not correctly considered in the impact analysis.

U.S. Nuclear Regulatory Commission  
Page 4  
July 25, 2002

8. TVA considered back-up power to the HMS and the CARFs as part of the Severe Accident Management Design Alternative evaluations during the initial licensing of Watts Bar Nuclear Plant. It was found that less than 25 man rem would be averted by making this change. This change would not be accepted even if we accepted the NRC cost numbers for the low-cost alternative. The costs would be over four times the benefit obtained.

TVA appreciates the opportunity to provide comments on GSI-189 and hope the information is helpful to you in consideration of any decisions associated with resolution of this issue. If you need additional information, please feel free to call me at 423/751-2508.

Sincerely,

  
Mark J. Burzynski  
Manager  
Nuclear Licensing

cc: U.S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, D.C. 20555-0001