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CERTIFIED
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MINUTES OF THE ACRS SUBCOMMITTEE ON THE SEQUOYAH NUCLEAR POWER PLANT WASHINGTON, D.C., JANUARY 6, 1981

The principal attendees were:

ACRS	NRC STAFF	TVA
J. C. Mark, Chairman	C. Stahle	Dr. Lau
S. Lawroski, Member	C. Tinkler	
M. Bender, Member	S. Israel	
C. Siess, Member	Z. Rosztoczy	
M. Sichel, Consultant	H. Polk	
W. Lipinski, Consultant	H. Dance	
I. Catton, Consultant		
Z. Zudans, Consultant		
G. Quittschreiber, ACRS Staff*		
R. Savio, ACRS Staff (partial mtg coverage)		

INTRODUCTION- C. Stahle, NRC Staff

The NRC Staff requested that the ACRS write a letter with regard to hydrogen control measure - Condition 1, of the Sequoyah License which requires that by January 31, 1981, TVA, shall by testing and analysis, satisfy the NRC Staff that an interim hydrogen control system provides, with reasonable assurance, protection against breach of containment in the event that a substantial quantity of hydrogen is generated. The NRC Staff currently believes this condition is satisfied.

STATUS OF SEQUOYAH STARTUP TEST PROGRAM - H. Dance, NRC Staff

The Sequoyah startup program has been in progress for about three months. Several shutdowns have been required for numerous reasons, most of which are associated with the steam/feed related systems. I&E feels that the low power test program did help the startup program and that most problems have been associated with the steam/feed portions of the plant which were not tested in the low power test program. During December the plant has been critical 522 hours out of a possible 744 hours.

*Designated Federal Employee

PROBABILITY OF CORE DAMAGE EVENT- S. Israel, NRC Staff

The NRC Staff, using Sandia, TVA studies, and the MARCH Code has determined that about 50% of the core melt events are rectifiable, which if corrected, would lead to a degraded core instead of full core melt. H_2 control measures would be effective during degraded core events but would not be adequate for full core melt events. Even though 50% of the core melt events are rectifiable, only 10% of these events are likely to be turned into degraded core events due to the short time windows for which components must be repaired, e.g., it takes longer than four hours to repair 90% of the diesel failures.

EFFICACY OF INTERIM DISTRIBUTION IGNITION SYSTEM DESIGN - C. Tinkler, NRC Staff

TVA has decided to add 13 ignitors to the upper containment area in addition to the three ignitors previously proposed for this area.

The TVA Fenwall tests are consistent with published data showing there is limited combustion with H_2 concentratins of 6-8% and complete combustion with H_2 concentrations of 10-12%. Steam concentrations up to 40% steam fractions do not hinder the igniters' ability to initiate combustion. Water sprays had no discernible effect on combustion. Pressures reached during the Fenwall tests were as high as 70 psi at H_2 concentrations of about 12%.

The NRC Staff's tests performed at Livermore also showed results consistent with the literature with steam concentrations up to 40% steam fractions; however, steam inerting occurred at 50% concentration and when reduced by condensation, ignition did not apparently occur even though the literature indicates combustion should have occurred. This may have been caused by fogging and is an area requiring further investigation to see what effect this may have in an ice condenser plant.

Sandia has reviewed the IDIS and has concluded that for moderate H_2 release rates deliberate ignition is beneficial. Sandia has recommended that igniters in the upper plenum be removed based on concern over detonations. The NRC Staff and TVA do not presently agree with this recommendation.

The NRC Staff has concluded that deliberate ignition in the Sequoyah containment is beneficial for degraded core accidents and that the IDIS is a reliable means for initiating combustion. The NRC Staff pointed out several topics for review over the January 1981 to January 1982 period.

SURVIVABILITY OF ESSENTIAL EQUIPMENT - Dr. Lau, TVA

Representatives of TVA discussed the survivability of essential components required to operate during a degraded core hydrogen burn event. TVA has looked at all equipment needed during such an event and has tested representative components in a hydrogen burn atmosphere in a test chamber at Fenwall. TVA has determined that all necessary equipment would function following such a hydrogen burn event. Several actual components which were tested in the burn atmosphere were shown to the Subcommittee, minor scorch marks and oxidation were visible.

SURVIVABILITY OF ESSENTIAL EQUIPMENT - Z. Rosztoczy

The NRC analysis of equipment survivability was discussed. TVA calculations indicate peak temperatures of 2000°F (less than 1 second duration) and, under the assumption of no heat transfer, average temperatures of about 800°F. Realistic estimates of the sustained temperature level is not yet available. Surface scorching, the melting of teflon insulation and soldered

connections was observed in the Fenwall tests. Surface scorching and solder melting was also observed inside of protective housings. The relationship between the test environment and the actual containment environment has not been established. The NRC is proposing requiring TVA to perform further analysis and tests to be submitted by May 1, 1981. TVA has not yet concurred.

STRUCTURAL RESPONSE - H. Polk, NRC Staff

The loading resulting from the detonation of a spherical hydrogen cloud 6 ft. in diameter was considered. A 180 psi peak pressure, one-half millisecond loading pulse resulted. The dynamic analysis performed by Ames yielded an effective pressure of 7.1 psi. Dynamic analysis performed by the NRC, using two methods, yielded effective pressures of 12.1 psi and 13.3 psi.

CLOSING REMARKS

Dr. Mark, Subcommittee Chairman, informed the NRC Staff and Applicant that this matter would be brought before the ACRS at the January 8-10, 1981 meeting for a brief presentation by the NRC Staff. It was the opinion of the Subcommittee members that if there is hydrogen in the containment in sufficient quantity it will be ignited, and the IDIS would likely be beneficial. The question of equipment survivability still remains an issue. It was felt that there was a better likelihood of survivability with the IDIS in the event that an unlikely accident should occur, since with planned ignition hydrogen would burn in relatively small amounts and less damage to equipment would occur than if the hydrogen were to accumulate to larger amounts before it should be ignited.

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For additional details, a complete transcript of the meeting is available in the NRC Public Document Room, 1717 H Street, NW., Washington, D.C, 20555 or from Alderson Reporting, Inc., 300 7th Street, SW, Washington, D.C., (202/554-2345).

Sequoyah 1/6/81 Meeting

List of Documents

1. NRC - 48 slides
2. Charlie Tinkler, NRC - 25 slides
3. Letter from V. L. Conrad to J. C. Mark, dated 1/19/81 concerning colloquy between ACRS member Ebersole and two attendees at 249th Meeting 1/9/81.
4. Letter w/attach from L. M. Mills to A. Schwencer, dated 12/24/80 on hydrogen issue on 12/18/80.
5. Memo from J. C. Mark to ACRS Members, dated 1/2/81, Subject: Comments on NUREG/CR-1762 (12/1/80, Draft) "Analysis of Hydrogen Mitigation for Degraded Core Accidents in the Sequoyah Nuclear Power Plant".
6. L. W. Lau, TVA - 9 slides