



UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, D. C. 20555

December 11, 1979

Honorable John F. Ahearne
Chairman
U.S. Nuclear Regulatory Commission
Washington, DC 20555

SUBJECT: INTERIM LOW POWER OPERATION OF SEQUOYAH NUCLEAR POWER PLANT,
UNIT 1

Dear Dr. Ahearne:

During its 236th meeting, December 6-8, 1979, the Committee considered a proposal for interim, low power operation of the Sequoyah Nuclear Power Plant, Unit 1. At its 229th meeting, May 10-12, 1979 and also at its 228th meeting, April 5-7, 1979 the Committee had considered aspects of the application of the Tennessee Valley Authority (hereinafter referred to as the Applicant) for authorization to operate the Sequoyah Nuclear Power Plant, Units 1 and 2. A tour of the facility was made by members of the Subcommittee on January 24, 1976 and the application was considered at Subcommittee meetings on March 12, 1979 and on November 5, 1979. During its review, the Committee had the benefit of discussions with representatives and consultants of the Applicant, the Westinghouse Electric Corporation, and the Nuclear Regulatory Commission (NRC) Staff. The Committee also had the benefit of the documents listed. The Committee reported on the application for a construction permit for this plant on February 11, 1970.

The Sequoyah Nuclear Power Plant is located on the west bank of the Tennessee River in Hamilton County in southeastern Tennessee approximately 17 miles northeast of the center of Chattanooga, Tennessee. Construction on Unit 1 is essentially complete and construction of Unit 2 is about 90% complete. Each unit will utilize a four-loop pressurized water reactor nuclear steam supply system having a power level of 3411 MWt and an ice condenser system enclosed within a free-standing steel containment vessel which is surrounded by a reinforced concrete shield building. The ice condenser system is similar to that used in the McGuire Nuclear Station and the Donald C. Cook Nuclear Plant. The Applicant has modified the ice condenser system as a result of the operating experience gained in the Donald C. Cook Nuclear Plant. The Applicant and the NRC Staff have made plans to monitor the performance of the ice condenser containments at the Sequoyah Nuclear Power Plant (Generic Item 63 in the ACRS report, "Status of Generic Items Relating to Light-Water Reactors: Report No. 7," dated March 21, 1979). The Committee recommends that such plans be implemented.

The Sequoyah Nuclear Plant will utilize 17x17 fuel assemblies. A surveillance program has been developed by the NRC Staff to follow the behavior of these assemblies, and data are being obtained from several plants now in operation in which such assemblies have been installed for test. Experience to date has been satisfactory. The Committee wishes to be kept informed of the results of the various 17x17 assembly inspections and test programs now under way.

The Sequoyah site is considered by the NRC Staff to be within the Southern Valley and Ridge tectonic province. The maximum historic earthquake within this tectonic province is the 1897 Modified Mercalli Intensity (MMI) VIII earthquake in Giles County, Virginia. During the construction permit review, the NRC Staff concluded that a modified Housner response spectrum anchored at 0.18g was acceptable as the safe shutdown earthquake. Since that time, the NRC Staff has adopted methods which would characterize an MMI VIII earthquake with the more conservative response spectrum specified in Regulatory Guide 1.60 anchored at 0.25g.

The Applicant, in response to NRC Staff recommendations, has evaluated the Sequoyah design using a site-specific safe shutdown response spectrum developed from North American and Italian strong motion records of appropriate magnitude and epicentral distance and has compared the probability of the safe shutdown earthquake being exceeded at Sequoyah to that at other Tennessee Valley Authority plants that meet the Standard Review Plan. It has been concluded that the risk of exceeding the present design spectrum and the risk of exceeding the site-specific spectrum are comparable and that the probability of exceeding the safe shutdown earthquake is not appreciably different from that for other plants in this region. The NRC Staff has reviewed the Applicant's evaluation and has concluded that the Sequoyah plant is adequate to withstand the effects of the safe shutdown earthquake without loss of its capability to perform required safety functions. The NRC Staff, to verify their judgments regarding structural and component design margins, has performed an audit of the design margins in representative critical sections of the reactor and auxiliary building structures and in representative components required for safe shutdown.

The Committee recommends that this program for the quantification of the seismic design margin be continued and expanded to the extent necessary to ensure that all structures and equipment necessary to accomplish safe shutdown do indeed have some margin. Similar recommendations have been made by the Committee for the North Anna Power Station, Units 1 and 2, and the Davis-Besse Unit 1 in its reports dated January 17, 1977 and January 14, 1979. This matter should be resolved on a schedule and in a manner satisfactory to the Staff.

The Emergency Core Cooling Systems (ECCS) for the Sequoyah Nuclear Plant incorporate the Upper Head Injection (UHI) system. The NRC Staff has completed its review of the Westinghouse Electric Corporation ECCS evaluation model for plants equipped with UHI, and the Committee in its April 12, 1978 report on the McGuire Nuclear Station has concurred with the

Staff's conclusions. The NRC Staff has completed its review of the application of this approved evaluation model to the Sequoyah Nuclear Plant and concurs with the Applicant.

The Committee has been reviewing the circumstances relating to the recent accident at the Three Mile Island Nuclear Station Unit 2 and has made recommendations for improvements in plant design and operating procedures which should be considered for all pressurized water reactors. The Committee is continuing its review of the implications of this accident and expects to provide additional recommendations. It is expected that these recommendations will be considered and implemented as appropriate by the NRC Staff. The Committee wishes to be kept informed.

The NRC Staff has identified a number of outstanding issues, confirmatory issues, and licensing conditions, not related to TMI-2 accident considerations, which have not been specifically addressed in this report. These issues should be resolved in a manner satisfactory to the NRC Staff.

Various generic problems are discussed in the Committee's report, "Status of Generic Items Relating to Light-Water Reactors: Report No. 7," dated March 21, 1979. Those problems relevant to the Sequoyah Nuclear Plant should be dealt with by the NRC Staff and the Applicant as solutions are found. The relevant items are: 54-60, 63-65, 69, 71, 72, 74, and 76.

The NRC Staff has not completed its review of the Sequoyah Nuclear Power Plant application for a normal operating license at full power, and various implications of the Three Mile Island accident on the Sequoyah Plant remain to be decided. The ACRS has not completed its own review in regard to these matters.

The Applicant has proposed a program of interim low power operation to provide improved operator training and the development of additional experimental information on the behavior of a nuclear unit and its systems under transient conditions. The Applicant has proposed a special test series which includes the following:

1. Natural circulation following a simulated reactor trip.
2. Natural circulation following a simulated loss of offsite power.
3. Natural circulation with loss of pressurizer heaters.
4. Effect of steam generator isolation on natural circulation.
5. Natural circulation at reduced pressure.
6. Cooldown capability of the charging and letdown system.

7. Heat removal following a simulated loss of onsite and offsite AC power.
8. Establishment of natural circulation from stagnant flow conditions.
9. Boron mixing and cooldown.

The NRC Staff plans to review the proposed experimental program in detail to assure itself that all safety-related aspects are being dealt with appropriately. The Committee wishes to be kept informed.

The NRC Staff advised the Committee that it will require that TVA's emergency procedures for Sequoyah be reviewed by Westinghouse. The NRC Staff also stated that an acceptable emergency plan will exist prior to reactor operation.

The Committee believes that there is reasonable assurance that the Sequoyah Nuclear Power Plant, Unit 1 can be operated on an interim basis up to power levels of about five percent of full power without undue risk to the health and safety of the public. Subject to approval of the detailed test program by the NRC Staff, the Committee recommends approval of an interim low power license for the purposes proposed.

Sincerely,



Max W. Carbon
Chairman

References:

1. Tennessee Valley Authority, "Final Safety Analysis Report, Sequoyah Nuclear Power Plant," Volumes 1 to 13, and Amendments 1 to 61.
2. U.S. Nuclear Regulatory Commission, "Safety Evaluation Report Related to the operation of Sequoyah Nuclear Plant Units 1 and 2," NUREG-0011, March 1979.
3. Letter from L. M. Mills, TVA, to D. B. Vassallo, NRC, dated October 31, 1979, containing revised responses to the Lessons Learned Requirements.
4. Letter, L. M. Mills, TVA, to L. S. Rubinstein, NRC, dated October 30, 1979, containing responses to ACRS questions.
5. Letter from L. M. Mills, TVA, to L. S. Rubinstein, NRC, dated October 23, 1979, containing information on natural circulation in Sequoyah, Unit 1, and Diablo Canyon, Unit 1.
6. Letter from L. M. Mills, TVA, to D. B. Vassallo, NRC, dated October 12, 1979, containing responses to ACRS recommendations.

7. Letter from L. M. Mills, TVA, to D. B. Vassallo, NRC, dated September 7, 1979, containing responses to the Short-Term Recommendations of the Lessons Learned Task Force.
8. Letter from L. M. Mills, TVA, to D. B. Vassallo, NRC, dated July 12, 1979, containing responses to NRC-I&E Bulletin 79-06A and ACRS recommendations.