ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
UNITED STATES ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

February 11, 1970

Honorable Glenn T. Seaborg
Chairman
U. S. Atomic Energy Commission
Washington, D. C. 20545

Subject: REPORT ON SEQUOYAH NUCLEAR PLANT

Dear Dr. Seaborg:

At its 117th meeting, January 8-10, 1970, and its 118th meeting, February 5-7, 1970, the Advisory Committee on Reactor Safeguards reviewed the proposal of the Tennessee Valley Authority to construct Units 1 and 2 of the Sequoyah Nuclear Plant. A Subcommittee met to review this proposal on December 2, 1969, in Chattanooga, Tennessee and on January 5 and January 31, 1970, in Chicago, Illinois. During its review, the Committee had the benefit of discussions with representatives of the applicant, the Westinghouse Electric Corporation, the AEC Regulatory Staff, and their consultants. The Committee also had the benefit of the documents listed below.

The plant will be located on the west shore of Chickamauga Lake on the Tennessee River, approximately 12 miles northeast of Chattanooga, Tennessee (1960 population about 130,000). The minimum exclusion distance will be 1920 ft. and the nearest residence will be approximately 2700 ft. from the plant.

The Sequoyah units will include four-loop pressurized water reactors designed for initial core power levels up to 3411 MWt. The nuclear steam supply systems and the emergency core cooling systems are esentially identical to those provided for the Diablo Canyon units. The proposed power level for the Sequoyah units is approximately five percent higher than the power level of 3250 MWt for which similar units have been approved. This higher power level has been justified by the applicant on the basis of a more detailed calculation of hot channel conditions in the core. The applicant described measurements which have been made or will be made on operating reactors, including some having cores similar to those of the Sequoyah units, to demonstrate the validity of the calculations on which the power level increase is based. If the results of these measurements are not conclusive, similar measurements will be made on the Sequoyah units during start-up. If the designer's expectations should not be adequately confirmed, system modifications or restrictions on operation may be appropriate.

Each containment will utilize the ice-condenser system within a free-standing containment building consisting of a steel dome and walls and a reinforced concrete flat base. A reinforced concrete shield building surrounds the containment. The volume between the two will be provided with a ventilation system employing both particulate and iodine filters. The reinforced concrete divider barrier which separates the upper and lower compartments of the ice-condenser containment system is subjected to pressure loading in the unlikely event of a loss-of-coolant accident. Since this barrier cannot be pressure tested, the Committee believes that it should be designed on a very conservative basis and that an independent check of the design should be made.

The plant will be protected against flooding to an elevation of 705 ft. MSL. In the event that flooding to an elevation of 700 ft. is predicted, the applicant has proposed that the reactors will be brought to a cold shut-down condition. If the flood level should exceed 705 ft., the auxiliary building will be allowed to flood, and decay heat will be removed from the reactors by means of a system which is protected against flooding up to the "probable maximum flood" level of 721 ft. The applicant has described general design bases and design criteria for this system. The Committee believes it important that this system be designed to provide the high standards of performance and reliability required of an engineered safety system. This matter, as well as the development of plans for recovery of the normal decay heat removal systems after flooding, should be resolved in a manner satisfactory to the Regulatory Staff during construction of the plant.

It is expected that the calculated doses to the public in the unlikely event of a design basis accident will be reduced by iodine removal in the ice condenser, by mixing in the volume between the containment and the shield building, and by reduction of leakage from the containment. The applicant should continue his study of these and other means of reducing doses.

The applicant considers the possibility of melting and subsequent disintegration of a portion of a fuel assembly because of flow starvation, gross enrichment error, or from other causes to be remote. However, the resulting effects in terms of local high temperature or pressure and possible initiation of failure in adjacent fuel elements are not well known. Appropriate studies should be made to show that such an incident will not lead to unacceptable conditions.

Information on a number of items identified in previous reports of the Committee is to be provided by the applicant during construction. These

include:

(a) A study of means of preventing common failure modes from negating scram action and of design features to make tolerable the consequences of failure to scram during anticipated transients.

(b) Review of development of systems to control buildup of hydrogen in the containment following a loss-of-coolant accident.

Other problems related to large water reactors have been identified by the Regulatory Staff and the ACRS and cited in previous ACRS reports. The Committee believes that resolution of these items should apply equally to the Sequoyah plant.

The Advisory Committee on Reactor Safeguards believes that the items mentioned above can be resolved during construction and that, if due consideration is given to the foregoing, the Sequoyah Nuclear Plant can be constructed with reasonable assurance that it can be operated without undue risk to the health and safety of the public.

Sincerely yours,

/s/
Joseph M. Hendrie
Chairman

References:

1. Sequoyah Nuclear Plant, Units 1 and 2, Preliminary Safety Analysis Report, Volumes 1 - 3

2. Amendments 1 - 9 to Application for Licenses