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

July 11, 1967

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

Subject: REPORT ON OCONEE NUCLEAR STATION, UNITS 1, 2, AND 3

Dear Dr. Seaborg:

At its eighty-sixth meeting, on June 8-10, 1967, and its eighty-seventh meeting, on July 6-8, 1967, the Advisory Committee on Reactor Safeguards reviewed the proposal of the Duke Power Company to construct the Oconee Nuclear Station, Units 1, 2, and 3, at a site near Clemson, South Carolina. This project was reviewed by an ACRS Subcommittee on May 2, 1967, at the site and at Clemson, and on May 31 and June 23, 1967, in Washington, D. C. The Committee had the benefit of discussions with representatives of the Duke Power Company and its consultants, The Babcock and Wilcox Company, Bechtel Corporation, and the AEC Regulatory Staff, and of the documents listed.

Each unit of the Oconee Station includes a pressurized-water reactor rated at 2452 MWt. Each unit is to be provided with an emergency core cooling system (ECCS), including two core flooding tanks, three high-pressure injection pumps, and three low-pressure injection and recirculation pumps. The applicant proposes not to operate a unit with a core flooding tank valved off. The Committee recommends that the Regulatory Staff review the detailed design of the ECCS and the analysis of its performance for the entire spectrum of break sizes, as soon as this information is available. In this respect:

1. The Regulatory Staff should review analyses of possible effects, upon pressure-vessel integrity, arising from thermal shock induced by ECCS operation.*

2. The effects of blowdown forces on core and other primary system components should be analyzed more fully as detailed design proceeds.*

3. Further evidence should be obtained to show that fuel-rod failure in loss-of-coolant accidents will not affect significantly the ability of the ECCS to prevent clad melting.*

4. The applicant has proposed adding swing-check valves in the core barrel to ensure obtaining adequate height of cooling water in the core under all circumstances of ECCS operation. This feature should be further reviewed to ensure that no new problems are introduced.

5. The applicant will explore further possibilities for improvement, particularly by diversification, of the instrumentation that initiates ECCS action.

Emergency power sources for the ECCS and other safeguards are: (a) the other Oconee units (each unit can withstand and will be tested to withstand instantaneous loss of load without a reactor trip or a turbine trip); (b) two hydroelectric units at Keowee station less than one mile away, with independent overhead and underground transmission lines; and (c) a gas-turbine unit thirty miles away with independent transmission line, transformer, and switchyard -- all in addition to the usual multiple ties to the power transmission grid. The applicant stated that switching and sequencing of sources, buses, and loads would be such that no single failure would impair system availability.

The applicant stated that the entire primary system of each unit, including the inside and outside of the reactor vessel, will be accessible for inspection over the life of the plant.

The Committee continues to emphasize the importance of quality assurance in fabrication of the primary system as well as inspection during service life, and recommends that the applicant implement those improvements in primary system quality that are practical with current technology.*

The moderator coefficient of reactivity is calculated to be positive at the beginning of core life, for the first core. The applicant is making detailed studies of the effect of this coefficient on the course of postulated accidents; if necessary, the coefficient will be made more negative by the addition of solid poison shims to the core.

Further evidence should be obtained concerning the ability of the fuel to withstand expected transients at the end of its anticipated lifetime.*

The applicant is investigating further the stability margin for xenon oscillations.

The containment structures are similar to those for the Turkey Point reactors previously reviewed. Consideration should be given to improved inspection of welds in the steel liner of such containments, because an acceptance pressurization test does not stress the liner to postulated accident conditions.

Power for the reactor protection systems and the safeguards protection systems for all three units is provided by a system of six batteries, static inverters, and six buses. The same batteries, via other inverters and buses, provide power to the control systems for all three units. The Committee urges the applicant to review the design of these systems with respect to independence of each unit from troubles in the others.

The applicant proposes to construct a submerged earthen weir in the intake canal to assure a heat sink in the event Keowee Reservoir is drawn down excessively. The Committee believes that careful attention is necessary in the design and construction of this weir to avoid hydraulic erosion and soil instability, particularly in case of rapid drawdown.

The Advisory Committee on Reactor Safeguards believes that the items mentioned above can be resolved by the applicant and the Regulatory Staff during construction of the reactors. On the basis of the foregoing comments, the Committee believes that the proposed Oconee Nuclear Station 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/
N. J. Palladino
Chairman

*The Committee believes that these matters are significant for all large water-cooled power reactors, and warrant careful attention.

References:

1. Duke Power Company, Oconee Nuclear Station, Units 1 and 2, Preliminary Safety Analysis Report, Volumes I and II, undated, received December 5, 1966.
2. Amendment No. 1, dated April 1, 1967
3. Amendment No. 2, dated April 18, 1967.
4. Amendment No. 3, dated April 29, 1967.
5. Amendment No. 4, dated May 25, 1967.
6. Amendment No. 5, dated June 16, 1967.