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

January 17, 1968

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

Subject: REPORT ON THREE MILE ISLAND NUCLEAR STATION UNIT 1

Dear Dr. Seaborg:

At its ninety-third meeting, January 11-13, 1968, the Advisory Committee on Reactor Safeguards reviewed the proposal of the Metropolitan Edison Company to construct Three Mile Island Nuclear Station Unit 1. This project had been considered previously at Subcommittee meetings held on January 4, 1968, in Washington, D. C., and on October 19, 1967, in Hershey, Pa. During its review, the Committee had the benefit of discussions with representatives and consultants of the Metropolitan Edison Company, the Babcock and Wilcox Company, Gilbert Associates, Inc., and the AEC Regulatory Staff. The Committee also had available the documents listed below.

The station is located on Three Mile Island near the east shore of the Susquehanna River in Dauphin County, Pennsylvania, about 10 miles southeast of Harrisburg. Unit 1 is a pressurized-water reactor plant, rated at 2452 MWt, and is similar in design to the units already approved for construction at the Duke Power Company's Oconee Nuclear Station. Flood protection is to be provided at the site by suitable earth dikes. Two natural-draft cooling towers are to be used for condenser-water cooling.

The emergency core cooling system (ECCS) includes two core flooding tanks, two independent low-pressure systems, and two independent high-pressure systems. Two separate systems are provided for containment cooling. One system consists of three fan-cooling units, and the other consists of two spray systems. The applicant stated that suitable and periodic component and integrated system tests will be performed on these engineered safety features. To further insure low containment leak rates, a fluid block system and a containment penetration pressurization system are to be provided.

Operation of the ECCS is initiated automatically by redundant low-pressure signals from transducers actuated by pressure in the two primary loops. The Committee recommends that in the interest of diversity another method,

different in principle from the one proposed, should be added to initiate this function. The diversity thus achieved would enhance the probability that this vital function would be initiated in the unlikely event it is needed.

The output circuit of the proposed reactor protection system consists of a single d-c circuit (bus) fed from two station batteries. Both feeders must be interrupted to de-energize the bus and drop all rods. Failure to interrupt either feeder, or any other event that prevents de-energizing the single bus, will inhibit dropping all the rods. The Committee believes this system can and should be revised to correct the deficiency. The revised design should be provided for review prior to installation of the protection system.

The applicant has proposed using certain signals from protection instruments for control purposes. The Committee believes that control and protection instrumentation should be separated to the fullest extent practicable, and recommends that the applicant explore further the possibility of making safety instrumentation more nearly independent of control functions.

Consideration should be given to the development and utilization of instrumentation for prompt detection of gross failure of a fuel element.

The applicant described the research and development work planned to confirm the final design of the plant. The Committee continues to emphasize the importance of work to assure that fuel-rod failures in loss-of-coolant accidents will not affect significantly the ability of the ECCS to prevent clad melting.

The applicant is continuing studies on the possible use of part-length rods for stabilizing potential xenon oscillations. Solid poison shims will be added to the fuel elements if necessary to make the moderator temperature coefficient more negative at the beginning of core life.

The Regulatory Staff should review the effects of blowdown forces on core internals and the development of appropriate load combinations and deformation limits. The Regulatory Staff should also review analyses of the possible effects upon pressure vessel integrity of thermal shock induced by ECCS operation.

The applicant has proposed core barrel check valves between the hot leg and the cold leg to insure proper operation of the ECCS under all circumstances. Analytical studies indicate that vibrations will not unseat these valves during normal operation. This point should be verified experimentally.

The Advisory Committee on Reactor Safeguards believes that the various items mentioned can be resolved during construction and that the proposed reactor can be constructed at the Three Mile Island site with reasonable assurance that it can be operated without undue risk to the health and safety of the public.

Sincerely yours,

/s/ C. W. Zabel

Carroll W. Zabel
Chairman

References:

1. Metropolitan Edison Company letter, dated May 1, 1967; Application for Reactor Construction Permit and Operating License, Metropolitan Edison Company, Three Mile Island Nuclear Station Unit 1; Preliminary Safety Analysis Report, Vols. 1, 2, and 3.
2. Metropolitan Edison Company letter, dated July 21, 1967; Amendment No. 1 to application.
3. Metropolitan Edison Company letter, dated October 2, 1967; Amendment No. 2 to application, including Supplement No. 1, Safety Analysis Report, Vol. 4.
4. Metropolitan Edison Company letter, dated November 6, 1967; Amendment No. 3 to application, including Supplement No. 2.
5. Metropolitan Edison Company letter, dated December 8, 1967; Amendment No. 4 to application, including Supplement No. 3.
6. Metropolitan Edison Company letter, dated December 22, 1967; Amendment No. 5 to application, including Supplement No. 4.
7. Metropolitan Edison Company letter, dated January 8, 1968; Amendment No. 6 to application.