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

August 20, 1970

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

Subject: REPORT ON DAVIS-BESSE NUCLEAR POWER STATION

Dear Dr. Seaborg:

At its 124th meeting, August 13-15, 1970, the Advisory Committee on Reactor Safeguards completed its review of the application by the Toledo Edison Company and The Cleveland Electric Illuminating Company for a permit to construct the Davis-Besse Nuclear Power Station. A Subcommittee met to review the project on May 26, 1970, at the site and in Toledo, Ohio, and on August 4, 1970, in Washington, D. C. During its review, the Committee had the benefit of discussions with representatives and consultants of the applicants, the Babcock and Wilcox Company, the Bechtel Corporation, and the AEC Regulatory Staff. The Committee also had the benefit of the documents listed.

The plant will be located on the southwestern shore of Lake Erie approximately 21 miles east of Toledo, Ohio. The nearest population centers are Toledo and Sandusky, Ohio, each about 20 miles from the site, with populations in 1960 of 379,000 and 32,000, respectively. The city of Fremont, Ohio, with a 1960 population of about 18,000, is located 17 miles from the site. The minimum exclusion distance is 2400 feet and the low population zone distance is two miles. Approximately 3200 people live within five miles of the site.

Camp Perry, an Ohio National Guard facility, is located on Lake Erie about five miles east of the site. This installation is used during a short period each year for target practice with small arms and with 40-mm. anti-aircraft shells armed only with a small destruct charge. At the Erie Industrial Park, about three to four miles east of the site, Cadillac Gage Company is engaged in testing ordnance equipment firing 120-mm. mortar shells with a maximum range of about two miles. All firing from both locations is directed into restricted areas in Lake Erie. The applicants have provided studies which demonstrate that none of the projectiles now being fired from these installations could

penetrate the heavy reinforced concrete structures provided to protect the essential portions of the plant. The Committee recommends, however, that the applicants and the Regulatory Staff make suitable arrangements to be informed of any changes in these activities so that their possible effect on the safety of the plant may be evaluated.

An area in Lake Erie about ten miles north of the site is used by aircraft from the Selfridge Air Force Base in Michigan as an Anti-Submarine Warfare practice area and by the Lockbourne Air Force Base at Columbus, Ohio, as an impact area for automatic weapon firing from aircraft. The applicants have been given assurance by officials of the Department of Defense that military aircraft enroute to or from this area will not be routed closer than ten miles from the site. The Committee believes that this arrangement reduces, to acceptably low levels, the probability of an aircraft striking the plant, but recommends that formal arrangements be made to enable the applicants and the Regulatory Staff to maintain continuing awareness of the operational patterns of military aircraft in this area.

The Davis-Besse plant will include a two-loop pressurized water reactor similar to those for the Midland units except that the internal vent valves have been eliminated by changes in the elevations of the steam generators to obviate their need. Since the proposed arrangement eliminates the possibility of coolant flow bypass through an open vent valve, the Davis-Besse reactor is designed for an initial core power level of 2633 MWt as compared to 2452 MWt for the Midland units.

The applicants stated that it will be possible to anneal the pressure vessel if this should become necessary at some time after operation is begun.

A suitable preoperational vibration testing program should be employed for the primary system. Also, attention should be given to the development and utilization of instrumentation for in-service monitoring for excessive vibration or loose parts in the primary system.

The containment consists of a steel vessel surrounded by a reinforced concrete shield building, with the annular space maintained at a slightly negative pressure and the air from this space exhausted through filters. This design is similar to that for the Prairie Island, Kewaunee, and Hutchinson Island plants, except that the free volume of the steel containment is much greater, nearly three million cubic feet. The Regulatory Staff should review the containment design pressure to assure that an adequate margin of conservatism exists.

Detailed criteria remain to be formulated by the applicants for the design of the penetrations for the hot process pipes which traverse the annulus between the two containment barriers. In view of the importance of these penetrations, criteria should be reviewed by the Regulatory Staff to assure adequate conservatism, and the applicants should arrange for an independent review of the actual design.

The Committee has commented in previous reports on the development of systems to control the buildup of hydrogen in the containment which might follow in the unlikely event of a loss-of-coolant accident. The applicants are studying various methods of coping with this problem, including purging and the use of catalytic recombiners. The Committee recommends that the primary protection in this regard should utilize a hydrogen control method which keeps the hydrogen concentration within safe limits by means other than purging. The capability for purging should also be provided. The hydrogen control system and provisions for containment atmosphere mixing and sampling should have redundancy and instrumentation suitable for an engineered safety feature. The Committee wishes to be kept informed of the resolution of this matter.

The applicants have stated that they will provide additional evidence obtained by improved multi-node analytical techniques to assure that the emergency core cooling system is capable of limiting core temperatures to acceptably conservative values. They will also make appropriate plant changes if further analysis demonstrates that such changes are required. This matter should be resolved during construction in a manner satisfactory to the Regulatory Staff. The Committee wishes to be kept informed.

The Committee recommends that the applicants accelerate the study of means to prevent common failure modes from negating scram action, and of design features to make tolerable the consequences of failure to scram during anticipated transients. The applicants stated that the engineering design would maintain flexibility with regard to relief capacity of the primary system and to a diverse means of reducing reactivity. This matter should be resolved in a manner satisfactory to the Regulatory Staff during construction. The Committee wishes to be kept informed.

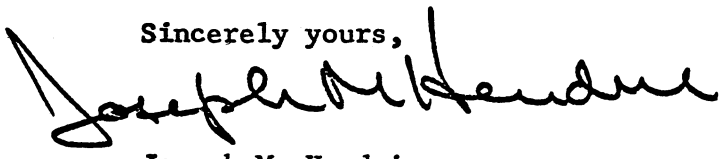
The Committee believes that consideration should be given to the utilization of instrumentation for prompt detection of gross failure of a fuel element. Consideration should be given also to the use of core exit thermocouples as an aid to reliable operation and as an additional method of detecting behavior anomalies.

The applicants propose batch discharge of liquid wastes following treatment. Concentrations of radionuclides in the discharge will be kept well below 10 CFR 20 limits with positive dilution being provided from several equipment cooling water streams. Plans for operation of waste treatment equipment should be such as to minimize the quantities of radioactivity discharged, and provisions should be made to achieve rapid dispersion in the lake.

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 Davis-Besse plant.

The Committee believes that the above items can be resolved during construction and that, if due consideration is given to these items, the Davis-Besse Nuclear Power 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,



Joseph M. Hendrie
Chairman

References:

1. Letter from Toledo Edison Company, dated August 1, 1969; License Application, Volumes 1, 2 and 3 of the Preliminary Safety Analysis Report (PSAR)

2. Volume 4 of the PSAR, dated April 16, 1970

3. Amendments 1 through 9 to License Application