



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

January 14, 1977

Honorable Marcus A. Rowden
Chairman
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Subject: REPORT ON DAVIS-BESSE NUCLEAR POWER STATION, UNIT 1

Dear Mr. Rowden:

At its 201st meeting, January 6-8, 1977, 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 license to operate the Davis-Besse Nuclear Power Station, Unit 1. Members of the Committee visited the plant on May 18, 1976, and a subcommittee meeting was held in Washington, D.C. on December 21, 1976. During its review, the Committee had the benefit of discussions with representatives and consultants of the Applicant, the Babcock and Wilcox Company, the Bechtel Corporation, and the NRC Staff. The Committee also had the benefit of the documents listed. The Committee reported on the application for a construction permit for this unit on August 20, 1970.

The Davis-Besse Nuclear Power Station, Unit 1, is located on the southwestern shore of Lake Erie about midway between the cities of Toledo and Sandusky, Ohio. The minimum exclusion distance is 2400 ft. The low population zone, with a radius of two miles, included about 870 people in the 1970 census. The nearest population centers are Toledo (1970 population 383,818) and Sandusky (1970 population 32,674), both about 20 miles from the plant.

The nuclear steam supply system employs a Babcock and Wilcox pressurized water reactor similar in most respects to those first used in the Oconee Nuclear Station. This system differs from the Oconee units and several other similar units in that the steam generator loops are raised about 30 ft above the level in the original plant arrangement. Although this change was made to eliminate the need for internal vent valves, four such valves are provided because of their beneficial effect in reducing steam binding following a postulated loss-of-coolant accident.

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The proposed power level for the unit is 2772 Mwt, as compared to 2633 Mwt proposed at the construction permit stage. This higher power level is the same as that proposed for the Rancho Seco and Three Mile Island, Unit 2 reactors, both of which have been reviewed by the NRC Staff and the Committee and found acceptable.

The structures and components of Davis-Besse, Unit 1, were designed for a Safe Shutdown Earthquake (SSE) acceleration of 0.15g at the foundation level. Because of changes in the regulatory approach to selection of seismic design bases, the Committee believes that an acceleration of 0.20g would be more appropriate for the SSE acceleration at a site such as this in the Central Stable Region. The Applicant presented the results of preliminary calculations concerning the safety margins of the plant for an SSE acceleration of 0.20g. The Committee recommends that the NRC Staff review this aspect of the design in detail and assure itself that significant margins exist in all systems required to accomplish safe shutdown of the reactor and continued shutdown heat removal, in the event of an SSE at this higher level. The Committee believes that such an evaluation need not delay the start of operation of Davis-Besse, Unit 1. The Committee wishes to be kept informed.

The performance of the Emergency Core Cooling System (ECCS) has been evaluated using a Babcock and Wilcox evaluation model applicable to the raised-loop configuration. The NRC Staff has reviewed these evaluations and has determined that certain assumptions regarding return to nucleate boiling do not comply strictly with the provisions of Appendix K to 10 CFR Part 50. The NRC Staff is also reviewing several other areas relating to ECCS performance. These matters should be resolved in a manner satisfactory to the NRC Staff.

In conjunction with the evaluation and assessment of the impact of routine waste releases from this plant, the Committee recommends that the NRC Staff provide leadership in encouraging the development of improved environmental radiation surveillance capabilities on the part of the State of Ohio and appropriate local regulatory agencies.

The Committee notes that post-accident operation of the plant to maintain safe shutdown conditions may be dependent on instrumentation and electrical equipment within containment which is susceptible to ingress of steam or water if the hermetic seals are either initially

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defective or should become defective as a result of damage or aging. The Committee believes that appropriate test and maintenance procedures should be developed to assure continuous long-term seal capability.

The Committee recommends that, prior to commercial power operation of Davis-Besse, Unit 1, additional means for evaluating the cause and likely course of various accidents, including those of very low probability, should be in hand in order to provide improved bases for timely decisions concerning possible off-site emergency measures. The Committee wishes to be kept informed.

The question of whether the design of this plant must be modified in order to comply with the requirements of WASH-1270, "Technical Report on Anticipated Transients Without Scram (ATWS) for Water-Cooled Reactors," remains an outstanding issue pending the NRC Staff completion of its review of the Babcock and Wilcox generic analyses of ATWS. The Committee recommends that the NRC Staff, the Applicant, and the Babcock and Wilcox Company continue to strive for an early resolution of this matter in a manner acceptable to the NRC Staff. The Committee wishes to be kept informed.

Davis-Besse, Unit 1, has installed a bypass loop containing two manually operated valves around the decay heat removal system suction line isolation valves. The normally closed bypass valves would be opened in the event of a spurious closure of one of the decay heat removal system suction line isolation valves during system operation. The Committee recommends that further attention be given to the means employed for isolation of the low pressure residual heat removal system from the primary system while the latter is pressurized, and that reliable means be developed to assure such isolation. This matter should be resolved in a manner satisfactory to the NRC Staff. The Committee wishes to be kept informed.

The Committee supports the NRC Staff program for evaluation of fire protection in accordance with Appendix A to Auxiliary and Power Conversion Systems Branch Technical Position 9.5-1, "Guidelines for Fire Protection for Nuclear Power Plants." The Committee recommends that the NRC Staff give high priority to the completion of both owner and staff evaluations and to recommendations for Davis-Besse, Unit 1, and for other plants nearing completion of construction in order to maximize the opportunity for improving fire protection while areas are still accessible and changes are more feasible.

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