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

December 11, 1973

Honorable Dixy Lee Ray
Chairman
U. S. Atomic Energy Commission
Washington, D. C. 20545

Subject: REPORT ON BRUNSWICK STEAM ELECTRIC PLANT, UNITS 1 AND 2

Dear Dr. Ray:

At its 164th meeting, December 6-8, 1973, the Advisory Committee on Reactor Safeguards completed its review of the application by the Carolina Power and Light Company for authorization to operate the Brunswick Steam Electric Plant, Units 1 and 2. A Subcommittee made a tour of the plant on October 24, 1973. The project was considered during a Subcommittee meeting in Washington, D. C. on November 16, 1973. During its review, the Committee had the benefit of discussions with representatives and consultants of the Carolina Power and Light Company, United Engineers and Constructors, Incorporated, the General Electric Company, and the AEC Regulatory Staff. The Committee also had the benefit of the documents listed. The Committee reported to the Commission on the construction of this station in letters dated May 15, 1969 and October 16, 1969.

The Brunswick Plant is located on a 1200 acre site in Brunswick County, North Carolina about two and one-half miles north of the town of Southport and sixteen miles south of Wilmington, North Carolina. The site is near the west bank of the Cape Fear River and about five miles from the Atlantic Ocean.

Brunswick utilizes General Electric boiling water reactors similar to those provided for the Edwin I. Hatch Nuclear Plant, Unit 1 and for the Cooper Nuclear Station, previously reviewed by the ACRS for operation. The Brunswick reactors are designed to produce 2436 MWt. Cooling water will be taken from the Cape Fear River estuary and discharged 2000 feet off shore into the Atlantic Ocean.

Leakage tests for the main steam line isolation valves will be performed prior to initial startup, after each refueling outage and during unscheduled outages during the operating cycle. If results of these leak tests should be unsatisfactory, the Committee recommends that a valve sealing system be installed.

Plans have been developed for in-service inspection of accessible portions of the reactor coolant pressure boundary both inside and outside of containment. The Committee recommends that continued attention be given to means for assuring the integrity of those portions of the reactor pressure vessel that are currently inaccessible for inspection.

In the unlikely event that a break occurs in the recirculation pump discharge line, the pump impeller might act as a turbine, causing the pump and motor to overspeed and become potential sources of missiles. Methods of dealing with this matter are under review and should be resolved in a manner satisfactory to the Regulatory Staff.

To avoid damage from a postulated cask drop over the fuel pool and reactor operating floor, the applicant has proposed to modify the Reactor Building overhead crane to provide appropriate redundancy in the hoisting system. The modifications will be made prior to the time of first refueling.

The applicant has considered traffic on the Intracoastal Waterway including traffic from the nearby Sunny Point Army Terminal and has determined that an accident involving hazardous cargo would not have a significant effect on the Brunswick Plant. He stated that he will keep himself informed of any changes in the nature of such traffic or cargo and will re-evaluate the consequences of a possible accident as required.

To limit the consequences of a rod drop accident the applicant plans to install a Rod Sequence Control System (RSCS) which will include a group notch control feature. The functional adequacy of the installed arrangement should be verified by the Regulatory Staff prior to initial fuel loading.

The applicant, with the General Electric Company, has studied extensively the problem of fuel densification. His analyses indicate that, except in regard to peak clad temperatures in postulated loss of coolant accidents,

the effects of expected densification are relatively small. To assure conformance with peak clad temperature and other limits of the Interim Acceptance Criteria, the applicant proposes to operate the Brunswick reactors in such manner as to maintain the maximum average planar linear heat generation rate (MAPLHGR) at all times below a specific allowable value. So-called "gamma" curves, developed by the applicant and reviewed and approved (to date, only for the first fuel cycle) by the Regulatory Staff, depict the allowable value as a function of fuel exposure. The applicant indicates that reactor power level may have to be restricted to less than the rated power level during portions of the fuel cycle in order to remain within the allowable MAPLHGR values. A limit on peak linear heat generation rate, not normally expected to be controlling, also is proposed by the applicant. This limit is 18.5 kw/ft, including a densification spiking factor allowance specified as a function of axial position in the core. The Committee believes that the approach described is acceptable, but notes that the Regulatory Staff is still evaluating the methods of determining power distribution. The ACRS recommends that the Regulatory Staff assure itself that the detailed procedures to be employed by the reactor operator to accomplish and to demonstrate compliance with the proposed limits on core conditions are adequate. Particular emphasis should be given to the procedures to be used when the computer normally used for core power distribution calculations is inoperable or unavailable. The Committee wishes to be kept informed.

The Committee recognizes that re-evaluation of core operating limits may be necessary as a result of possible changes in the acceptance criteria for emergency core cooling systems. The Committee wishes to be kept informed.

The Committee recommends that limits on cumulative downtime of protection systems and engineered safety features be considered further in the development of technical specifications.

Generic problems relating to large water reactors have been identified by the Regulatory Staff and the ACRS and discussed in the Committee's report dated December 18, 1972. Those problems and additional generic problems identified in more recent ACRS reports should be dealt with appropriately by the Regulatory Staff and the applicant.

The Advisory Committee on Reactor Safeguards believes that, if due regard is given to the items mentioned above, and subject to satisfactory completion of construction and preoperational testing, there is reasonable assurance that the Brunswick Steam Electric Plant, Units 1 and 2, can be operated at power levels up to 2436 MWt without undue risk to the health and safety of the public.

Sincerely yours,

Original Signed by
H. G. Mangelsdorf

Chairman

References

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References

1. Carolina Power and Light Company letter dated October 5, 1972, transmitting Volumes 1 through 12 of the Final Safety Analysis Report

2. Amendments 13 through 24 to the License Application

3. Directorate of Licensing Safety Evaluation Report for Operating Licenses for the Brunswick Steam Electric Plant, Units 1 and 2, dated November 9, 1973

4. Carolina Power and Light Company, Brunswick Nuclear Plant, Units 1 and 2 Design Reports, Nos. 4, and 9 through 16

5. Carolina Power and Light Company letters dated March 6, 1973 and July 26, 1973, submitting "Analysis of Postulated Pipe Failures at Brunswick"

6. Carolina Power and Light Company letter dated August 10, 1973, transmitting responses to AEC Questions

7. GE Topical Report, NEDM-10735, "Densification Considerations in BWR Fuel Design and Performance," including Supplements 1 through 8