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

February 14, 1975

Honorable William A. Anders
Chairman
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

SUBJECT: REPORT ON SALEM NUCLEAR GENERATING STATION, UNIT 1

Dear Mr. Anders:

At its 178th meeting, February 6-8, 1975, the Advisory Committee on Reactor Safeguards completed its review of the application of the Public Service Electric and Gas Company, the Philadelphia Electric Company, the Delmarva Power and Light Company, and the Atlantic City Electric Company for authorization to operate the Salem Nuclear Generating Station, Units 1 and 2. The project was previously considered at a Subcommittee meeting in Washington, D. C., on November 7, 1974, and a tour of the facility was made by Subcommittee members on January 22, 1974. Certain generic aspects of the nuclear steam supply system and the new Westinghouse 17x17 fuel rod assembly were reviewed by the Committee at its 175th meeting and in connection with its review of the Trojan Nuclear Plant, which was reported on in the Committee's letter of November 20, 1974. During its review, the Committee had the benefit of discussions with representatives and consultants of the Public Service Electric and Gas Company, the Westinghouse Electric Corporation, and the Regulatory Staff. The Committee also had the benefit of the documents listed. The Committee reported on the application for a construction permit for the Salem Nuclear Generating Station in its letter of June 21, 1968.

Because the expected fuel loading date for Unit 2 is still some distance in the future (estimated to be December, 1978), the Committee believes that its report on Unit 2 should be deferred until a time somewhat closer to the expected start of operations.

The plant is located on a 700-acre site and is adjacent to the proposed Hope Creek Generating Station on the southern part of land that is referred to as Artificial Island in Salem County, New Jersey. The site is on the east bank of the Delaware River, about 18 miles south of Wilmington, Delaware.

In connection with the construction permit review of the Hope Creek Generating Station, the Applicant is making a study to determine the probability of an accident involving waterborne traffic on the Delaware River that is of such a nature as to affect the safety of the plants. The study includes, among other things, barge collison with the service water intake structure, spills

of oil or of LNG and possible fires, clouds of LNG resulting from a ship collision, and explosions of ship cargoes. The Committee believes that, if the probability of such an accident affecting the safety of the plant is not acceptably low, design changes to provide suitable protection should be required on a timely basis for the Salem units. This matter should be resolved in a manner satisfactory to the Regulatory Staff. The Committee wishes to be kept informed.

The Regulatory Staff has initiated discussions with the Federal Power Commission and other agencies concerning the potential adverse effects on the safety of the nuclear reactors of ongoing or projected installations or operations under the control or surveillance of such agences. The Applicant stated that special procedures were being instituted at other ports in connection with the transport of LNG and that they anticipated that the Captain of the Port at Philadelphia will develop similar procedures. The Committee recommends that the Regulatory Staff review the Port Plan with regard to control of hazardous shipments within the Delaware Bay and on the Delaware River. The Committee also recommends that interagency arrangements be formalized whereby the NRC is automatically informed of potential impacts on nuclear power plant safety of matters under review by other agencies.

The two units at the Salem Station are essentially identical. Each includes a four-loop Westinghouse nuclear steam supply system similar in most respects to that for the Trojan Nuclear Plant. The design core power level for Unit 1 is 3338 Mwt.

The Salem plant is scheduled to be one of the first to go into operation using a full core of 17x17 fuel. While many of the various required verification programs have been completed and reviewed by the Regulatory Staff, other tests and analyses are still to be completed and documented. These include: DNB tests with non-uniform heat flux, single-rod burst tests, fuel assembly flow tests, guide tube tests, and the effect of bowing on DNB. The results of such tests and analyses should be evaluated fully by the Regulatory Staff and resolved to their satisfaction prior to the full core use of 17x17 fuel to produce power. Four prototype 17x17 fuel rod assemblies are to be loaded into other operating pressurized water reactors in the near future; the results of these irradiations should be followed closely. The Committee wishes to be kept informed concerning the results of the various ongoing 17x17 test and analytical programs, and any design changes which may be proposed in the future.

Following each cycle of operation, 17x17 fuel assemblies will be examined for fuel rod integrity, fuel rod and assembly dimension and alignment, and surface deposits. In view of the fact that the 17x17 fuel array is a new design and that no prototype irradiations are planned for 17x17 fuel containing eight spacer-grids (which will be employed only in full - core operation), the results of surveillance programs for this type fuel should be followed closely. The Committee wishes to be kept informed.

The recently proposed method of constant axial offset control will be used for in-core power distribution monitoring and control. The Regulatory Staff should review carefully the effectiveness of this method of control in protecting against adverse consequences of postulated reactor transients and accidents. The Committee wishes to be kept informed.

Several changes are to be made in the Westinghouse ECCS evaluation model to bring it into conformance with the Commission Criteria as given in 10 CFR 50.46. The performance of the emergency core cooling systems will be re-evaluated with the approved evaluation model, and appropriate operating limits and procedures for ensuring monitoring of the power distribution are to be incorporated in the Technical Specifications. The Committee wishes to be kept informed.

The evaluation of Anticipated Transients Without Scram (ATWS) has been made generically for Westinghouse plants, and the Applicant has made comparisons indicating that the results obtained are applicable to the Salem Plant. Regulatory review should be completed and this matter resolved in a manner satisfactory to the Regulatory Staff. The Committee wishes to be kept informed

Salem Unit 1 may be one of the first reactors of its type to operate with a rated power as high as 3338 Mwt. Because there is limited operating experience with very large, high-power density reactors, the ACRS believes that a more cautious than normal approach to full power is prudent, with longer periods of operation at power levels in the range of 70 to 90% of full power, and with additional monitoring of core and systems performance throughout the life of the first core. The Committee recommends that the Regulatory Staff evaluate the overall operating experience prior to sustained operation at full power.

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 February 13, 1974. These problems should be dealt with appropriately by the Regulatory Staff and the Applicant as suitable approaches are developed.

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 pre-operational testing, there is reasonable assurance that the Salem Nuclear Generating Station, Unit 1 can be operated at power levels up to 3338 Mwt without undue risk to the health and safety of the public.

Sincerely yours,

/s/ W. Kerr

W. Kerr, Chairman

References:

1. Final Safety Analysis Report (FSAR) for the Salem Nuclear Generating Station, Units 1 and 2 (Amendment No. 10 to the Salem Application)

2. Amendments Nos. (12-24) and (26-32) to the Salem Application

3. Safety Evaluation of the Salem Nuclear Generating Station, Units 1 and 2, dated October 11, 1974, by the U.S. Atomic Energy Commission, Directorate of Licensing (DL)

4. Letter, received February 7, 1975, Mrs. Richard Horner, Hancock's Bridge, New Jersey, to ACRS, concerning "AEC Inspection No. 50-272/74-16"

5. RO Inspection Report No. 50-272/74-16, dated December 13, 1974, concerning Unusual Occurrence - Flooding in Turbine Building and Auxiliary Building, reported December 2, 1974

6. Letter, dated October 25, 1974, Public Service Electric and Gas Company of New Jersey (PSE&G) to DL, concerning safeguards equipment control system

7. Letter, dated September 30, 1974, PSE&G to DL, concerning ATWS analysis for Salem 1 and 2

8. Letter, dated April 23, 1974, PSE&G to DL, concerning review of safety related circuity

9. Letter, dated March 7, 1974, PSE&G to DL, concerning operator requalification

10. Letter, dated March 4, 1974, DL to ACRS, concerning emergency planning for Salem-Hope Creek Stations

11. Letter, dated February 21, 1974, PSE&G to DL, concerning Quality Assurance organization

12. Letter, dated November 2, 1972, PSE&G to DL, concerning failure of Non-Class I (Seismic) equipment

13. Letter, dated January 2, 1975, PSE&G to DL, concerning ECCS analyses