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

November 20, 1974

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

Subject: REPORT ON BEAVER VALLEY POWER STATION, UNIT 1

Dear Dr. Ray:

At its 175th meeting, November 14-16, 1974, the Advisory Committee on Reactor Safeguards completed its review of the application of the Duquesne Light Company, Ohio Edison Company, and Pennsylvania Power Company for a license to operate the Beaver Valley Power Station, Unit 1 at power levels up to 2652 MW(t). This project was considered during a Subcommittee meeting in Washington, D. C. on October 19, 1974. There was also a site visit and a Subcommittee meeting in Beaver, Pennsylvania on October 16, 1974. In the course of the review, the Committee had the benefit of discussions with representatives and consultants of Duquesne Light Company, Stone and Webster Engineering Corporation, Westinghouse Electric Corporation, and the AEC Regulatory Staff. The Committee also had the benefit of the documents listed below. The Committee reported on the application for construction of Beaver Valley Unit 1 on March 12, 1970. The Committee notes that specific matters identified at the construction permit stage have been satisfactorily taken into account.

The station is located on the Ohio River in Beaver County, Pennsylvania about 25 miles northwest of Pittsburgh. The 446-acre site also is occupied by the Shippingport Atomic Power Station and by Beaver Valley Unit 2, now under construction. A minimum exclusion distance of 2,000 feet and a low population zone radius of 3.6 miles have been selected.

Beaver Valley Unit 1 employs a Westinghouse three-loop pressurized water reactor similar in design to those previously reviewed for Surry Nuclear Plant, Units 1 and 2. However, Beaver Valley Unit 1 will use a 17x17 assembly compared to the 15x15 fuel assembly used for Surry.

The Westinghouse 17x17 fuel rod array is identical to that to be used in Catawba Units 1 and 2 and in several other nuclear power stations which have also recently been reviewed for construction by the Committee. The Beaver Valley Power Station, Unit No. 1 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 tests and analytical programs and of any changes which may be proposed in the future.

The proposed fuel surveillance program of the applicant is of a limited nature. Since this reactor may, according to present schedules, be the first to produce power from the full-core utilization of the new 17x17 fuel array, and no prototype irradiations of 17x17 fuel with 8 spacer-grids are planned, the Committee recommends that a more comprehensive fuel surveillance program, similar to that proposed for the Trojan Nuclear Plant, be implemented. Since the fuel for the Beaver Valley Power Station, Unit 1, has not yet been fabricated, the inclusion of one assembly containing removable fuel rods, similar to that to be provided in the Trojan Nuclear Plant, is recommended for the first core. 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. Also, because the maximum permissible peaking factor is relatively low, the Committee believes that consideration should be given to more frequent measurement of core power distribution by use of the in-core instrumentation than is proposed, at least until substantial operating experience has been obtained with the 17x17 fuel at the core operating conditions to be employed. 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's Criteria as given in 10 CFR 50.46. The performance of the emergency core cooling systems will be reevaluated 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 Beaver Valley Unit 1. Regulatory review should be completed and this matter resolved in a manner satisfactory to the Regulatory Staff. The Committee wishes to be kept informed.

Problems have been reported with the safe ends on the Beaver Valley, Unit 1 reactor pressure vessel, which were fabricated by a build-up of stainless steel weld metal. The interfacial region between the nozzle and weld metal has been reported to contain a narrow zone of relatively high hardness, whose safety significance has not been assessed completely. The Regulatory Staff is evaluating the safe ends to determine whether corrective actions are necessary. This matter should be resolved in a manner satisfactory to the Regulatory Staff and the ACRS.

An auxiliary river water cooling system has been provided as an alternate in the unlikely event that the main intake structure is destroyed by an accident such as an impact and coincident explosion of a gasoline barge. The Committee believes that the auxiliary system can be satisfactorily activated, if needed, by either an automatic or a manual method.

Other 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 preoperational testing, there is reasonable assurance that the Beaver Valley Power Station, Unit 1, can be operated

at power levels up to 2652 MW(t) without undue risk to the health and safety of the public.

Sincerely yours,

W. R. Stratton

W. R. Stratton
Chairman

References:

1. Final Safety Analysis Report, Beaver Valley Power Station, Unit 1, Volumes 1-12 (includes Amendments 1-12)

2. Directorate of Licensing Safety Evaluation of Beaver Valley Power Station, Unit 1 dated October 11, 1974

3. Directorate of Licensing, Summary of Safety-Related Issues for Which Review Is Incomplete, Beaver Valley Power Station, Unit 1

4. Duquesne Light Company letter dated October 25, 1972, concerning the design of non-Category-1 equipment

5. DLC letter dated January 1973 regarding densification of light water reactor fuels

6. DLC letter dated March 12, 1974 concerning quality assurance, organization and personnel

7. DLC letter dated September 12, 1974 concerning realignment of the ECCS from the injection to the recirculation mode

8. DLC letter, dated September 24, 1974 regarding analysis of Anticipated Transients Without Scram (ATWS)