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

April 8, 1975

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

Subject: REPORT ON FULTON GENERATING STATION UNITS 1 AND 2

Dear Mr. Anders:

At its 180th meeing, April 3-5, 1975, the Advisory Committee on Reactor Safeguards completed its review of the application of the Philadelphia Electric Company for a permit to construct the Fulton Generating Station, Units 1 and 2. The Committee reported previously on the Conceptual Design for a Large High Temperature Gas Cooled Reactor (HTGR) in its letter of November 12, 1969; that design was a prototype for the Fulton Generating Station. Subcommittee meetings were held in Lancaster, Pennsylvania on January 7, 1975, in connection with a site visit, and in Des Plaines, Illinois on March 20, 1975. In addition, a General Atomic Company Subcommittee meeting was held in Denver, Colorado on January 30-31, 1975. In its review, the Committee had the benefit of discussions with representatives and consultants of the Philadelphia Electric Company, the General Atomic Company, and the Nuclear Regulatory Commission (NRC) Staff. The Committee also had the benefit of the documents listed.

The Fulton Generating Station will be located in Fulton and Drumore Townships on the east bank of Conowingo Pond, approximately 17 miles south of Lancaster, Pennsylvania. The Peach Bottom Atomic Power Station, which is also owned and operated by the Applicant, is located opposite the site on the west bank of Conowingo Pond. The Applicant has proposed an exclusion area with a radius of 2500 ft., and a low population zone with a radius of 1.5 miles. The nearest population center is Lancaster, approximately 17 miles north of the site, with a 1970 census population of about 58,000. The 1970 population within 50 miles of the site was about 4.4 million, and is expected to increase to about 9.7 million by 2020.

The Fulton Generating Station consists of two nuclear units, each using a General Atomic High Temperature Gas-Cooled Reactor (HTGR) having a rated power level of 1160 MW(e). All safety systems were analyzed and designed for 3150 MW(t). The reactors for the Fulton Station are very similar to those for the Summit Station except that they have six loops rather than four for Summit.

Since this plant will be the prototype for future six-loop HTGRs, an appropriate testing program to confirm design and operating features will be required. The Committee wishes to be kept informed of progress in research and development and testing of components critical to safety such as primary circulators, primary valves, core auxiliary cooling systems, and insulation, and in verification of prestressed concrete reactor vessel design and steam generator performance.

The Fulton Station will incorporate a feature unique to nuclear power plants in the United States; the steam produced by each reactor will be used to drive two turbines, of approximately 600 MW(e) rating each, arranged in parallel. A review of this feature to assure that systems important to safety are not affected adversely will be conducted by the NRC Staff during construction. The Committee wishes to be kept informed.

The similarities between the Fulton and Summit Stations have been taken into account in the Committee's review. With no significant exceptions, the Committee's concerns are generic to both the Fulton and Summit Stations and to all large HTGRs. This is reflected in the following comments which are essentially the same as those made in the Committee's report of March 12, 1975 on the Summit Power Station.

The Committee recognizes that the Fulton Generating Station represents a new design so that many of the proposed systems and components are relatively untested at this time. This aspect is apparent in the NRC Staff Safety Evaluation Report (SER) where several items are unresolved or resolution is to be deferred until the post-construction permit period. The Committee urges the resolution of these outstanding items well before equipment is installed.

A significant number of outstanding items remain in the field of nuclear instrumentation, moisture monitors and various electrical systems. Particular attention should be given to the environmental qualification of vital instruments prior to installation. These items should be resolved to the the satisfaction of the NRC Staff. The Committee wishes to be kept informed.

Further information is being developed by the Applicant and his contractors with regard to the subject of anticipated transients without scram. This matter should be resolved in a manner satisfactory to the NRC Staff and the ACRS.

The NRC Staff is gaining an independent capability for accident analysis of HTGRs. The Committee believes this is an appropriate step. The Committee recommends that the NRC Staff also assure that appropriate independent confirmation of the adequacy of actual design exists for the PCRV, core structural supports, and other vital structures for this prototype reactor.

Substantial information concerning performance of vital materials and components such as fuel, graphite moderator and structural members, insulation, liner, instrumentation, valves, circulators, steam generators, and PCRV should be developed during power ascension and operation of the Fort St. Vrain Reactor.

The NRC Staff should reconfirm the adequacy of performance criteria for graphite used in structural components, including such factors as permissible level of impurities, mechanical behavior, acceptable flaw sizes, and dimensional changes due to neutron irradiation.

The Committee reiterates its interest in construction to high quality standards and in the development of well-conceived surveillance and inspection programs for vital components. Current progress on the ASME Section XI Division 2 Code for Inservice Inspection is an acceptable beginning. Continued effort is required to develop inspection criteria for vital components such as insulation, graphite structures, circulators and steam generators. Similar programs are required for the PCRV tendons. These programs should cover both the integrity of vital components and their operational reliability. A necessary aspect of the surveillance testing of this prototype plant is a well conceived vibration testing program acceptable to both Staff and ACRS.

The Committee recommends that the NRC Staff and the Applicant review the plant designs and layout for potential enhancement of physical security, particularly the protection of the fuel.

The ACRS believes it advisable to review the various outstanding items cited in this report and the SER in approximately 12-18 months.

The Advisory Committee on Reactor Safeguards believes that the above items can be resolved by the Applicant and the NRC Staff during construction. Subject to the satisfactory resolution of these items the Committee believes that the Fulton Generating 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,

Original Signed by:
W. Kerr

William Kerr
Chairman

References attached.

References

1. Philadelphia Electric Company Application and Preliminary Safety Analysis Report (PSAR) (Volumes 1-6), for Fulton Generating Station Units 1 and 2.

2. Amendments 1-25 to the Fulton Generating Station Units 1 and 2 PSAR.

3. Proprietary report entitled "Detailed Discussion of Materials Used for Compressional and Shear Wave Velocity Measurements and How Shear Waves are Identified from the Wave Train" dated November 16, 1973.

4. AEC Licensing Staff, Advanced draft of Chapter 2 of the Safety Evaluation Report, Issued January 2, 1975.

5. NRC Licensing Staff, Safety Evaluation Report (NUREG-75/015), Issued March 1975.