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

September 17, 1971

Honorable James R. Schlesinger
Chairman
U. S. Atomic Energy Commission
Washington, D. C. 20545

Subject: REPORT ON WILLIAM H. ZIMMER NUCLEAR POWER STATION, UNIT 1

Dear Dr. Schlesinger:

At its 137th meeting, September 9-11, 1971, the Advisory Committee on Reactor Safeguards completed its review of the application from the Cincinnati Gas and Electric Company, the Columbus and Southern Ohio Electric Company, and the Dayton Power and Light Company for a permit to construct the William H. Zimmer Nuclear Power Station, Unit 1. The Cincinnati Gas and Electric Company is responsible for the design, construction, and operation of the plant and is authorized to act as sole agent during construction and for licensing negotiations. The project was considered at Subcommittee meetings on August 27, 1971, at the plant site, and on September 1 and September 8, 1971, in Washington, D. C. During its review the Committee had the benefit of discussions with representatives and consultants of the applicants, Sargent and Lundy, the General Electric Company, and the AEC Regulatory Staff. The Committee also had the benefit of the documents listed below.

The Zimmer Station will be located in Ohio on a 635-acre site on the Ohio River approximately 24 miles southeast of Cincinnati and one-half mile north of Moscow, Ohio. The population of Moscow is estimated by the applicants to be 348. The nearest population center is Covington, Kentucky which is located 20 miles northwest of the site and has a population of 60,000. The low population zone radius is 3.0 miles within which the 1960 population was less than 1,900 and the projected 1985 population less than 2,800. The projected 1985 population within 10 miles of the site is 30,100. The exclusion zone has a minimum radius of 1,250 feet, is bounded on the north by U. S. Route 52, and includes a small manufacturing plant located on the periphery. Provisions have been made to evacuate the employees of this plant in the unlikely event of an accident.

The Zimmer Station will utilize a General Electric boiling water reactor to be operated at a power level of 2436 MWt. It is the first reactor of the GE 1969 product line reviewed by the Committee. Waste heat is rejected to the atmosphere by a natural-draft cooling tower.

The primary containment is of the over-under pressure suppression type similar to those of the previously reviewed Limerick and Shoreham units. The drywell is a steel-lined prestressed concrete truncated cone; the pressure suppression chamber is a cylinder of similar construction. The drywell and pressure suppression chamber are separated by a reinforced concrete deck penetrated by 88 vent pipes. The reactor building is constructed of reinforced concrete up to the refueling floor and of structural steel and paneling at higher levels. The design is intended to limit inleakage to 100% of the building volume per day at a pressure of 1/4 inch of water during operation of the standby gas treatment system. This system, which includes provisions for circulating air throughout the reactor building, exhausts through redundant sets of double high efficiency particulate air filters and deep-bed activated carbon sorbers.

The emergency core cooling system of the GE 1969 product line incorporates several changes. The high pressure injection system has been modified to inject water through a sparger directly over the top of the core, rather than into the downcomer region via the feedwater line. Also, an electric motor drive instead of a steam turbine drive is used for the pump. This system now also serves as one of the two core spray systems. The low pressure coolant injection system has been modified to inject water from the suppression pool directly into the core region through three separate lines, each of which is supplied water by a separate pump. The maximum diameter of the reactor recirculation piping has been reduced from 28 to 20 inches.

The applicants have proposed to design the main steam lines and turbine stop and bypass valves to requirements which are substantially similar to AEC quality assurance Classification Group B. The Committee believes that the main steam lines should be designed to retain their integrity during a design basis earthquake. The applicants propose to install a sealing system, designed as an engineered safety feature, in connection with the main steam line isolation valves to minimize leakage. These matters should be resolved in a manner satisfactory to the Regulatory Staff prior to completion of construction of the station.

The applicants have studied design features to make tolerable the consequences of failure to scram during anticipated transients, and have concluded that automatic tripping of the recirculation pumps and injection of boron could provide a suitable backup to the control rod system for this type of event. The Committee believes that this recirculation pump trip represents a substantial improvement and should be provided for the Zimmer reactor. However, further evaluation of the sufficiency of this approach and the specific means of implementing the proposed pump trip should be made. This matter should be resolved in a manner satisfactory to the Regulatory Staff and the ACRS during construction of the reactor.

The radioactive waste disposal systems process high and low conductivity liquid wastes by demineralizers or evaporators and the decontaminated effluent is recycled to the condensate storage tank for reuse. Chemical and detergent wastes normally are to be processed through evaporators and, if necessary, further processed by demineralizers before discharge. The gaseous waste treatment system includes a high temperature catalytic recombiner followed by a 30-minute holdup system. The applicants will provide an additional holdup system which results in the substantial reduction of all isotopes except long-lived krypton. The applicants have stated that both the liquid and gaseous waste handling systems will be used to the fullest extent and will limit releases of radioactivity or exposures to man to values less than those specified in the proposed 10 CFR 50, Appendix I. An environmental monitoring program has been established, and the applicants have stated that it will permit the calculation of radiation exposures to man from records of radioactivity released from the plant.

The applicants have stated a system will be provided to control the concentration of hydrogen in the primary containment that might follow in the unlikely event of a loss-of-coolant accident. The Committee believes that the containment should be inerted and that the hydrogen control system should be designed to maintain the hydrogen concentration within acceptable limits using the assumptions listed in the AEC Safety Guide 7, Control of Combustible Gas Concentrations in Containment Following a Loss of Coolant Accident.

The applicants' pipe whip criteria consider both longitudinal and circumferential pipe breaks and provide for the installation of piping restraints as required to prevent damage to essential reactor coolant systems and equipment or to the containment.

Other problems related to large water reactors have been identified by the Regulatory Staff and the ACRS and cited in previous ACRS reports. The Committee believes that resolution of these items should apply equally to the Zimmer Station.

The Committee believes that the items mentioned above can be resolved during construction and that, if due consideration is given to these items, the William H. Zimmer Nuclear Power Station, Unit 1 can be constructed with reasonable assurance that it can be operated without undue risk to the health and safety of the public.

Sincerely yours,

Spencer H Bush

Spencer H. Bush
Chairman

References

1. Cincinnati Gas and Electric Company, Columbus and Southern Ohio Electric Company, and The Dayton Power and Light Company, License Application and Preliminary Safety Analysis Report (Volumes 1 through 5) for the William H. Zimmer Nuclear Power Station

2. Amendments 1 through 7 and 9 through 19 to the License Application for the William H. Zimmer Nuclear Power Station