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UNITED STATES OF AMERICA
ATOMIC ENERGY COMMISSION



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In the Matter of
DUKE POWER COMPANY
(Oconee Nuclear Station,
Units 1, 2 and 3)

Docket Nos. 50-269
50-270
50-287

PROPOSED FINDINGS OF FACT AND CONCLUSIONS OF LAW
BY THE AEC REGULATORY STAFF
(IN THE FORM OF A PROPOSED INITIAL DECISION)

Preliminary Statement

1. This proceeding involves the application of the Duke Power Company (Applicant), dated November 28, 1966, and five amendments thereto, dated April 1, 1967, April 18, 1967, April 29, 1967, May 25, 1967 and June 16, 1967 (application) for licenses under § 104 b. of the Atomic Energy Act of 1954, as amended (Act), to construct three pressurized water reactors, each designed to initially operate at 2452 thermal megawatts (Mwt), and to be located at the Applicant's Oconee Nuclear Station site in Oconee County, South Carolina.

2. The application was reviewed by the regulatory staff (Staff) of the Atomic Energy Commission (Commission) which concluded that the Applicant has satisfied all Commission requirements for the issuance of the construction permits. (Transcript (Tr.) p. 297, Staff's Safety Evaluation (S.E.) pp. 76-77). The application was also reviewed by the Advisory Committee on Reactor Safeguards which concluded

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that the proposed facilities can be constructed with reasonable assurance that they can be operated without undue risk to the health and safety of the public. (Tr. p. 397, S.E. Appendix A).

3. On July 24, 1967, the Commission issued a "Notice of Hearing on Application for Provisional Construction Permit" in the captioned matter which set out the issues to be considered and initially decided by this Atomic Safety and Licensing Board (Board), designated by the Commission to conduct the proceeding, as a basis for determining whether provisional construction permits should be issued to the Applicant. This Notice of Hearing was published in the FEDERAL REGISTER on July 27, 1967 (32 F.R. 10996).

4. On August 8, 1967, the State of South Carolina filed a petition to participate in this proceeding pursuant to 10 CFR § 2.715(c). Participation of the State was permitted by order of this Board dated August 11, 1967.

5. On July 25, 1967, eleven cities and towns,^{1/} all located in North Carolina, filed a document entitled "Protest of Piedmont Electric Cities Against Duke Power Company's Application For Unconditional Licenses Under The Atomic Energy Act of 1954 As Amended". In its

^{1/} City of Statesville, City of High Point, City of Lexington, City of Monroe, City of Shelby, City of Albemarle, Town of Cornelius, Town of Drexel, Town of Granite Falls, Town of Newton, and Town of Lincolnton.

order of August 9, 1967, this Board determined that the "protest" concerned issues which were not pertinent to and which were outside the jurisdiction of the Commission and this Board. Accordingly, this Board dismissed the "protest".

6. On August 11, 1967, this same group of cities and towns and a non-profit corporation, Piedmont Cities Power Supply, Inc., filed a joint petition for leave to intervene in this proceeding. On the same day the joint petitioners also filed a motion to dismiss Duke Power Company's application for licenses under § 104 b. of the Act on the ground that the proposed facilities were not "research and development" facilities and therefore that the Commission was without jurisdiction to issue licenses to the Applicant under § 104 b. Argument on both the petition and motion was held at the prehearing conference in this matter. By order of this Board dated August 28, 1967, leave to intervene was granted to the eleven cities and towns because of their economic interest in the proceeding; leave to intervene was denied to Piedmont Cities Power Supply, Inc., because it lacked such economic interest. By a second order of the same date, this Board denied the motion to dismiss Duke Power Company's application in regard to Units 1 and 2 (ruling that these facilities are properly subject to license under § 104 b. of the Act) and deferred ruling on the motion in regard to Unit 3 because the record, as it then stood, was not complete enough to permit an evaluation of the propriety of licensing said Unit 3 under § 104 b. This Board

referred its order relating to the motion to dismiss directly to the Commission for its review pursuant to 10 CFR § 2.730(f). By memorandum and order of September 8, 1967, the Commission affirmed the order of this Board.

7. This proceeding is a "contested proceeding" pursuant to 10 CFR § 2.4(n).

8. Pursuant to the Notice of Hearing and in accordance with the requirements of the Act, a hearing was held before this Board in Walhalla, South Carolina, on August 29-30, 1967, and September 12, 1967, to consider the issues specified for hearing as well as the issue of the Commission's jurisdiction to issue licenses to the Applicant under § 104 b. of the Act. The parties to the proceeding were the Applicant, the Staff, and the eleven cities and towns (specified above) as joint intervenors. Several persons made limited appearances, pursuant to 10 CFR § 2.715, during the hearing.

Findings of Fact

9. The Applicant is a large electric utility corporation that is soundly financed, and has plentiful resources at its command. It plans to finance the cost of construction of the proposed facilities in the same manner as it finances its conventional plants, namely, in the ordinary course of business. About 40 percent of the construction funds will be generated internally from retained earnings and depreciation;

the balance will be initially funded through short-term borrowing and will be permanently funded by sale of equity and debt securities.

(Tr. pp. 326-328; Tr. p. 437, Lovejoy Testimony p. 4).

10. The Applicant has had extensive experience in the design, construction and operation of electric generating plants. Its personnel have been involved with nuclear power generation since the early 1950s, culminating in participation in the construction and operation of the Carolinas-Virginia Tube Reactor at Parr, South Carolina. The nuclear steam system supplier, the Babcock & Wilcox Company, designed and constructed the N. S. SAVANNAH and Indian Point 1 reactors, as well as the ATR and several research reactors. In addition, Babcock & Wilcox is one of two companies presently supplying large reactor pressure vessels to industry. The Bechtel Corporation, which will serve as architect-engineer for the project, has served as architect-engineer on many nuclear projects over the last few years. The latest of these include the San Onofre, Turkey Point, Palisades, and Point Beach reactor projects. (Tr. pp. 318-321; Tr. p. 397, S.E. p. 74).

11. The site for the proposed facilities is in eastern Oconee County, South Carolina, about eight miles northeast of Seneca, South Carolina. The exclusion area will have a one-mile radius (from the center of Unit 2). The low population distance is at least six miles, and the nearest population center is Anderson, South Carolina (population 41,000) located twenty-one miles southeast of the site. All land within

the exclusion area will be either owned or controlled by the Applicant. The site is characterized by sound, hard rock foundations for structures, freedom from flooding, an abundant supply of cooling water from the future Lake Keowee, an on-site hydroelectric station capable of supplying emergency power, and favorable conditions of hydrology, geology, seismology and meteorology. (Tr. p. 338, Partial Summary, pp. 3-7; Tr. p. 397, S.E. pp. 36).

12. The Applicant has requested an initial authorization to construct and operate the reactors up to 2452 Mwt but anticipates that the reactors will ultimately prove to be capable of operating at power levels of 2568 Mwt. Accordingly, the design of the major systems and containment structures, which bear significantly on the acceptability of the facilities under the site criteria guidelines identified in 10 CFR Part 100, have been analyzed and evaluated by the Applicant and the Staff at power levels of 2568 Mwt. (Tr. p. 397, S.E. p. 1).

13. Each nuclear steam supply system consists of a light water moderated and cooled pressurized water reactor which transfers reactor heat to a turbine-generator unit. The reactors will be fueled with low enrichment uranium dioxide fuel pellets contained in zirconium rods. Each core is comprised of one hundred seventy-seven (177) fuel assemblies, each containing two hundred eight (208) fuel pins. Control of reactivity is accomplished by sixty-nine (69) control rod cluster assemblies and by liquid poison (boric acid) in the reactor coolant. The liquid

poison is used to control long-term reactivity of the core. The silver-indium-cadmium control rod cluster assemblies are used to control short-term reactivity changes and to provide rapid shut-down capability. Control rod cluster assemblies are driven by a rack and pinion assembly through a magnetic clutch. Nuclear flux level is monitored by neutron detectors external to the reactor vessel and by in-core chambers. (Tr. p. 397, S.E. p. 8-9).

14. Each containment building has the shape of a right circular cylinder with a shallow spherical dome and flat base slab. A mild steel liner is attached to the inner face of the concrete shell to provide leak-tightness. The cylinder walls are prestressed both circumferentially and vertically, and the dome is prestressed in a three-way tendon system. The base slab employs reinforced concrete. The design pressure of each containment is fifty-nine pounds per square inch and the containments are to be proof tested at 115 percent of design pressure. The initial leak rate test will be at 100 percent of design pressure. A penetration room confinement system would process post-accident leakage from most containment penetrations through a filter system external to the containment. (Tr. p. 397, S.E. pp. 37 et seq.).

15. The plant design provides protection against the consequences of a break in a primary coolant pipe of any size and at any location up to a double-ended rupture of a recirculation pipe. Assurance

of core integrity in the event of such occurrence is provided by high-pressure injection pumps, low pressure injection pumps, and core flooding tanks (accumulators) which discharge borated water into the primary system if reactor pressure drops below six hundred (600) psi. (Tr. p. 397, S.E. p. 50).

16. Assurance of containment integrity is provided by the following multiple engineered safeguard systems: (a) containment isolation system, (b) containment spray pumps which spray borated water into the containment atmosphere through redundant spray headers, and (c) emergency cooling units, each containing a fan and tube cooler for removing heat from the containment atmosphere. (Tr. p. 397, S.E. pp. 43, 55).

17. Multiple systems are provided for both emergency core cooling and containment cooling so that emergency functions can be carried out even with component failure. A multiplicity of offsite power lines is provided to assure a reliable source of power. Additional reliability in the power source is attained by the availability of power from the Keowee hydroelectric plants either through the switchyard or through an underground line. (Tr. p. 397, S.E. pp. 56-58).

18. Unlike other recent pressurized water plants authorized for construction by the Commission which have used a U-tube steam generator in which the primary coolant enters and exits from the bottom of the

generator, Oconee Units 1, 2 and 3 are designed to provide a single pass or once-through steam generator. In this design, the primary water enters the top of the generator, is cooled while passing downward through the Inconel tubes and exits from the bottom head. Secondary feedwater is sprayed into an annulus in which there are no tubes near the generator carbon steel shell. The feedwater is heated as it falls by steam which is allowed to bypass from the heated region back to the annulus. (Tr. p. 397, S.E. pp. 32-34).

19. The three units to be constructed will share certain auxiliary systems; but the principal safety systems and components, including the emergency injection and containment cooling systems, are functionally independent. The sharing of the auxiliary features by the three units will not increase the probability or consequences of an accident. (Tr. p. 387, S.E. pp. 70-71).

20. The proposed facilities incorporate design features which will require research and development in order to finalize design details. These design features include: once-through steam generator, control rod drive unit test, in-core neutron detectors, thermal and hydraulic programs, emergency core cooling and xenon oscillations. Information developed through the research and development program will be supplied to the Staff to enable it to follow the development of the final designs of Oconee Units 1, 2 and 3. (Tr. pp. 306-309; 365-371; and 397, S.E. pp. 72-73).

21. In a memorandum and order, dated September 8, 1967, the Commission confirmed a previous ruling of this Board in this proceeding that licenses for Oconee Units 1 and 2, if issued, may properly be issued under § 104 b. of the Act. This Board finds that Oconee Unit 3 is also a facility involved in the conduct of research and development activities leading to a demonstration of practical value of such a facility for industrial or commercial uses, as are Oconee Units 1 and 2. Until such time as the Commission may find that pressurized water reactors have been sufficiently developed to be of practical value for industrial or commercial purposes, pursuant to Section 102 of the Act, licenses for such reactors may be issued only under § 104 b. of the Act.^{2/} In any event, on the basis of the testimony adduced at the hearing, Oconee Unit 3 is subject to the proposed research and development program to the same extent as Oconee Units 1 and 2. (Tr. pp. 306-308; Tr. p. 397, S.E. pp. 72-73).

CONCLUSIONS AND ORDER

22. Upon the basis of the consideration of the entire record in this proceeding, and in light of the findings and discussions hereinabove set out, this Atomic Safety and Licensing Board has concluded that:

^{2/} Subsection 104 a. of the Act, which applies to facilities for use in medical therapy, and § 104 c. of the Act, which applies to facilities for use in research and testing, not designed for the generation of power, are not applicable to this application.

1. Units 1, 2 and 3 are properly subject to license under § 104 b. of the Act.
2. In accordance with the provisions of 10 CFR § 50.35(a):
 - (a) The Applicant has described the proposed design of the facilities, including, but not limited to, the principal architectural and engineering criteria for the design and has identified the major features or components incorporated therein for the protection of the health and safety of the public;
 - (b) Such further technical or design information as may be required to complete the safety analysis and which can reasonably be left for later consideration will be supplied in the final safety analysis report;
 - (c) Safety features or components, if any, which require research and development have been described by the Applicant and the Applicant has identified, and there will be conducted, a research and development program reasonably designed to resolve any safety questions associated with such features or components; and
 - (d) On the basis of the foregoing, there is reasonable assurance that (1) such safety questions will be

satisfactorily resolved at or before the latest date stated in the application for completion of construction of the proposed facilities and (ii) taking into consideration the site criteria contained in 10 CFR Part 100, the proposed facilities can be constructed and operated at the proposed location without undue risk to the health and safety of the public.

The Applicant is technically qualified to design and construct the proposed facilities;

The Applicant is financially qualified to design and construct the proposed facilities; and

The issuance of permits for the construction of the facilities will not be inimical to the common defense and security or to the health and safety of the public.

Pursuant to the Act and the Commission's regulations, IT IS ORDERED THAT, (1) the motion of the intervenors to dismiss the application in regard to Unit 3 is denied, (2) subject to review by the Commission upon its own motion or upon the filing of exceptions in accordance with the "Rules of Practice", 10 CFR Part 2, the Duke Power Company is authorized to construct the facilities in accordance with the application and with the evidence and representations entered in the record at the

hearing; and the Director of Regulation is directed to issue provisional construction permits pursuant to § 104 b. of the Act substantially in the form of Appendices A, B, and C to the "Notice of Hearing on Application for Provisional Construction Permit" in this proceeding, within 10 days from the date of issuance of this decision. IT IS FURTHER ORDERED, in accordance with 10 CFR § 2.764, good cause not having been shown to the contrary, this initial decision shall be immediately effective.

ATOMIC SAFETY AND LICENSING BOARD

John H. Suck

Rugh C. Paxton

Samuel W. Jensch, Chairman

Dated at

this day of 1967.