



INITIAL DECISION

This is an Initial Decision on the question of whether a provisional construction permit should be issued to the Arkansas Power and Light Company to construct in accordance with its application dated November 29, 1967, as amended, a pressurized water reactor to be located in Pope County, near Russellville, Arkansas and designed to operate initially at 2452 Megawatts (thermal).

An Atomic Safety and Licensing Board, established in accordance with the Atomic Energy Act of 1954, as amended, and the Regulations of the Atomic Energy Commission, comprised of three members, whose signatures appear on this document, held a public hearing in the matter on October 30, 1968, in Russellville, Arkansas, pursuant to notice published in the Federal Register on September 20, 1968. 1/

PARTIES

The Applicant and the Regulatory Staff of the Commission made timely notices of appearance as parties to the proceedings. There were no petitions to intervene and this was not a contested proceeding within the meaning of the Commission's Regulations.

LIMITED APPEARANCES

Pursuant to 10 CFR Section 2.715 (a), limited appearances were made in the following order during the Hearing:

Mr. E. F. Wilson, Director, Division of  
Radiological Health, Arkansas Department  
of Health

Dr. Howard K. Suzuki, Professor of Anatomy, University of Arkansas School of Medicine and Chairman of the Arkansas Conservation Council. (Dr. Suzuki's statement was made on behalf of himself and Dr. Joe F. Nix, Associate Professor of Chemistry, Ouachita Baptist University, Arkadelphia.)

Mr. S. Ladd Davies, Director, Arkansas Pollution Control Commission.

### SITE AND PLANT

#### Site

The site of the proposed reactor is on the north bank of the Dardanelle Reservoir on the Arkansas River. It covers about 1,100 acres and has a minimum exclusion area radius of 3430 feet. The area around the site is largely undeveloped and rural - the nearest population center having a population in excess of 25,000 is located about 55 miles south of the plant.

The site is underlain by shale and sandstones of Pennsylvanian Age, the overburden consisting of alluvial clay and silty clay that ranges in thickness from 13 to 23 feet. No identifiable active faults or other recent geologic structures exist that would localize earthquakes in the immediate vicinity of the site. The Staff and its consultants have concluded that an acceleration of 0.1 g would adequately represent earthquake disturbances likely to occur within the lifetime of the facility and that an acceleration of 0.2 g would adequately represent the ground motion from the maximum earthquake likely to affect the site. These parameters will be used in the seismic design of all Class I structures and systems.

The Applicant will design for a tornado having a tangential velocity of 300 mph, a translational wind velocity of 60 mph, and a barometric pressure drop of 3 psi in 3 seconds.

#### Plant

The proposed reactor will have a closed-cycle, pressurized-water nuclear steam system housed in a prestressed concrete containment building. The containment structure will be a steel-lined, prestressed post-tensioned concrete, vertical cylinder with flat bottom and shallow-domed roof. The plant will have a steam and power conversion system housed in an

auxiliary building and an outside electric switchyard. Additional auxiliaries include a radioactive waste disposal system, fuel storage and handling facilities, emergency power systems, and other engineered features.

The principal features and design bases for the steam supply system are similar to those of the Metropolitan Edison Company's Three Mile Island Nuclear Station.

The principal engineered safety features are the emergency core cooling systems, the containment ventilation system, and the containment spray system. A protection system monitors primary coolant and reactor building pressures and will automatically initiate operation of the engineered safety feature systems if pre-established safety limits are reached.

Although the plant is expected to operate initially at 2452 megawatts thermal, the expected ultimate capacity of this plant is 2568 (Mwt). The Applicant has designed the major plant components including the containment structure and other engineered safety features for a power level of 2568 (Mwt) and has used this power level in analyzing postulated accidents under the guidelines of 10 CFR, Part 100. The Regulatory Staff has evaluated the containment structure and other engineered safety features for 2568 (Mwt). (The thermal and hydraulic characteristics were evaluated at 2452 (Mwt)). Before operation of the reactor is permitted at 2568 (Mwt), or indeed at the 2452 (Mwt) power level, there must first be a review of the proposed operation both by the Commission's Regulatory Staff and the Advisory Committee on Reactor Safeguards.

The facility architect-engineer will be the Bechtel Corporation. The nuclear steam system will be furnished by The Babcock and Wilcox Company and the turbine and generator will be supplied by the Westinghouse Corporation. The construction contractor has not been selected.

#### GAS LINE

The site has an unusual feature in that a 10 3/4 inch O.D. gas transmission line crosses it with the closest approach being 600 feet from the proposed plant. The Applicant will reconstruct 1200 feet of the line built in 1928 so that it will meet the same specifications as the portion of the line constructed in 1962 to which it will be connected. The Applicant has examined the effect of a break in this line and

has found that even if the isolating valves on either side of the plant are not closed, the gas would create no hazard. If ignited, it would burn without harm to the plant; and if not ignited, it would diffuse harmlessly into the atmosphere.

The Board recommends that the Applicant give consideration to the dispersion of the gas under adverse weather conditions in the course of further evaluation of the problem prior to the operation of the plant.

#### IODINE REMOVAL

The containment for the Russellville nuclear unit has three cooling systems and two spray systems to remove heat under accident conditions. According to the Applicant's accident analysis either system or parts of both systems have the capacity to limit the maximum pressure of the design-basis accidents to acceptable values and to reduce the pressure at an acceptable rate. Operation of the emergency core cooling systems prevents melting of the core and no special provisions for taking out iodine was found to be necessary to keep the radiation doses within the 10 CFR 100 guidelines.

However, in consideration of the Maximum Hypothetical Accident, (MHA), which involves melting of the core, and on recommendation of the Regulatory Staff, the Applicant modified the design so that the spray would be an alkaline thiosulfate solution designed to absorb iodine from the containment atmosphere and fix it in solution. The Applicant's analysis indicated that the half-life for removal of iodine from the containment by the spray system would have to be 1410 seconds or less in order to reduce the two hour dose at the exclusion distance to 300 rem. The Applicant calculated a half-life of 90 seconds at full capacity and indicated that results of experiments, conducted at Oak Ridge National Laboratory, when scaled to Russellville conditions, gave an iodine removal half-life of 23 seconds.

The staff analysis of the MHA indicated that a dose reduction factor of 2.9 must be obtained from the spray system for the two hour dose at the exclusion boundary to be within the 10 CFR 100 guidelines. The Staff calculated a dose reduction factor of 4.1 and estimated that the iodine removal half-life used in the calculations was conservative by a factor of 4 to 8.

In the calculations the Applicant assumed that 5% of the iodine would be in an organic compound that would not be removed by the sprays. The Staff was more conservative and assumed 10% unremovable iodine.

At the Board's request the Applicant and Staff supplemented the application and the Staff's Safety Evaluation Report with written and oral testimony concerning the effectiveness of spray systems for removing iodine from the atmosphere in a containment building. The testimony included discussion of (1) the chemical action of the additive and the stability of the spray solution under accident and post accident conditions, (2) the compatibility of spray solutions and structural materials, (3) the behavior of organic iodides, (4) experiments completed and those yet to be done, and (5) methods of calculation and the conservatism included in the calculations.

The Applicant and the Staff concluded that work completed or planned <sup>2/</sup> provides reasonable assurance that an adequate spray system can be designed for the Russellville Nuclear Unit. The Board concurs in this conclusion.

#### QUALITY ASSURANCE

The Applicant will have a multi-level quality assurance program, the primary purpose of which is to insure that the codes, standards, and quality requirements of the Preliminary Safety Analysis Report, as well as those in the detailed specifications and designs, are adhered to. The quality assurance and control programs of the Applicant will be separate and independent from those of its vendors, contractors, and construction manager.

To discharge its overall responsibility for quality assurance the Applicant will give final review and approval to the designs and specifications for the plant. It will continually review the quality control programs of the contractors and vendors by examination of inspection records and by spot checks. This will be accomplished through a Quality Assurance Committee which reports directly to the Vice-President and Chief Engineer of the company.

The Bechtel Corporation as the architect-engineer and construction manager is responsible to the Applicant for

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<sup>2/</sup> "Applicant's Response to the Board's Question on Iodine Removal" (inserted after page 148 of the transcript of the Hearing), and "Iodine Removal by Sprays", prepared by Division of Reactor Licensing. (Staff Exhibit No. 3)

assuring the adequacy of the quality control programs of the contractors and fabricators. Bechtel engineers will review and approve all designs and specifications. Bechtel will have a Quality Assurance Engineer in residence at the site. A separate field inspection force and field engineers will do the inspections on site and in vendors' shops. The Quality Assurance Engineer is independent of the construction force and has authority to stop work on-site if the quality control requirements are not met. Presumably the engineers responsible for off-site inspections have similar authority. The Board is of the opinion that they should.

Babcock and Wilcox, supplier of the nuclear steam system and two fuel cores, will carry out inspections and other control measures in its own shops and in those of its suppliers. Bechtel and the Applicant, through the control program outlined above, will assure that the construction contractor, when selected, provides adequate quality control.

The qualifications and experience of the key personnel concerned with quality assurance in the organizations of the Applicant, Bechtel, and Babcock and Wilcox are reflected in the record.

Insight into the Staff's method of evaluation of the Applicant's quality assurance program and the adequacy of this evaluation is obtained from the Staff's Safety Evaluation and the questions asked the Applicant by the Staff during its review as reflected in the supplements to the application. Neither guidelines nor criteria have yet been published, or made available to the Board, although Staff testimony at this Hearing, as at some previous ones, indicates that these are being developed. The findings required to be made by Atomic Safety and Licensing Boards will be facilitated if some explicit guidelines become available against which a quality assurance program can be examined. Such guidelines, we believe, will also be helpful at other points in the regulatory process. Although explicit standards are not available, the Board is satisfied, in light of the information in the record, that the examination in this case is adequate.

#### RESEARCH AND DEVELOPMENT

The major areas of research and development relate to emergency core cooling system design including blow-down forces, and thermal shock; development of final thermal-hydraulic, nuclear and mechanical design parameters including

fuel rod failure tests, high burn-up fuel tests, and xenon oscillation studies; control rod drive unit tests; in-core neutron detector tests; once-through steam generator development and tests; development of details of iodine removal system; and development of prompt fuel failure detectors. The objectives of these programs have been defined, and a schedule for the acquisition of information prior to completion of construction of the proposed facility has been established. <sup>3/</sup>

#### TRAINING PROGRAM

The Advisory Committee on Reactor Safeguards and the Regulatory Staff took special note of the need for early training of a sufficient number of personnel for the operating staff. The Board considers it desirable to have some senior operating staff with significant experience in the operation of a nuclear power plant.

#### FINDINGS, CONCLUSIONS, AND ORDER

Conclusions of the Regulatory Staff, with respect to the required findings set forth in the Notice of Hearing are favorable to the granting of a construction permit. The Advisory Committee on Reactor Safeguards, in its report to the Commission, dated September 12, 1968, states that it believes that if consideration is given to the items discussed in its report the proposed reactor can be constructed at the Russellville Site with reasonable assurance that it can be operated without undue risk to the health and safety of the public.

This being an uncontested case the Board is required to reach conclusions on only two issues: whether or not the application and the record of the proceedings contain sufficient information and whether or not the review of the application by the Commission's Regulatory Staff has been adequate to support the proposed findings by the Director of Regulation as set forth in the Notice of Hearing. The Board finds affirmatively on each of these issues. In so doing it adopts the substance - but not every detail and exact wording - of the findings of fact and the conclusions of law proposed by the Applicant and Staff.

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<sup>3/</sup> "Applicant's Response to the Board's Question on Research and Development" (inserted after page 147 of the transcript of the Hearing).

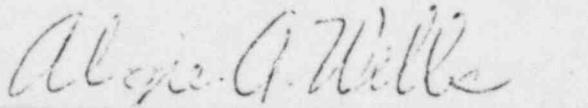
In accordance with the foregoing, IT IS ORDERED THAT:

1. The Director of Regulation is authorized to issue a provisional construction permit pursuant to Section 104 b of the Act substantially in the form of Appendix A to the "Notice of Hearing on Application for Provisional Construction Permit" in the captioned matter within ten (10) days from the date of the issuance of this decision; and
2. In accordance with 10 CFR 2.764, good cause not having been shown to the contrary, this initial decision shall be immediately effective; and, in the absence of any further order from the Commission, shall constitute the final decision of the Commission forty-five (45) days after the issuance, subject to the review thereof and further decision by the Commission upon exceptions filed by any party pursuant to 10 CFR Section 2.762 or upon its own motion.

ATOMIC SAFETY AND LICENSING BOARD

  
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R. Beecher Briggs

  
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Lawrence R. Quarles

  
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Algie A. Wells

Dated at: Washington, D. C.  
this 4 day of December, 1968

H. J. Smith

UNITED STATES OF AMERICA  
ATOMIC ENERGY COMMISSION



In the Matter of )

ARKANSAS POWER & LIGHT COMPANY )  
(Russellville Nuclear Unit) )

Docket No. 50-313

CERTIFICATE OF SERVICE

I hereby certify that copies of the INITIAL DECISION dated in the captioned matter have been served on the following by deposit in the United States mail, first class or air mail, this 4th day of Dec 1968 :

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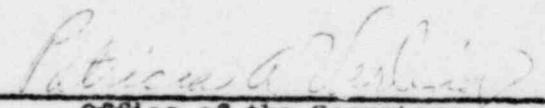
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