UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING APPEAL BOARD

In the Matter of	)	
	)	
DUKE POWER COMPANY, et al.	)	Docket Nos. 50-413
	)	50-414
(Catawba Nuclear Station, Units 1 and 2)	)	

AFFIDAVIT OF P. M. ABRAHAM

P.M. Abraham, being duly sworn, deposes and states as follows:

I. PROFESSIONAL QUALIFICATIONS

(1) My name is P. M. Abraham. My business address is Duke Power Company, Nuclear Production Department, P. O. Box 33189, Charlotte, N.C., 28242. I am the supervisor of the Reactor Safety Section in the Nuclear Production Department of Duke Power Company. In this capacity I direct the nuclear safety efforts involving safety analysis, nuclear safety event analysis, and probabilistic risk assessment within the Nuclear Production Department. Prior to becoming the supervisor of Reactor Safety in 1980, I was assigned to the Licensing Unit with the responsibility of performing the review and analysis of reactor safety matters involving transient and accident analysis, plant startup testing, core design, and generic safety issues. I have been employed by Duke Power Company since July 1974.

(2) From 1965 through 1966, I was a lecturer in physics at St. Thomas College in Kerala, India, and from 1970 to 1972 I was employed as an assistant

professor at Belmont Abbey College in North Carolina teaching physics and mathematics.

(3) I have both a Bachelors and a Masters Degree in Physics from the University of Kerala (1963 and 1965, respectively), a Masters Degree in Nuclear Engineering from North Carolina State University (1974), and a Doctorate Degree in Nuclear Physics from the University of Colorado (1970).

(4) I served on the Duke Power Company Corporate Research and Development Committee from October 1982 through August 1984.

(5) I currently serve on the American Nuclear Society Reactor Safety Division Program Committee.

II. PURPOSE

(6) The purpose of this affidavit is to describe the safety implications of the operation of Catawba Nuclear Station Unit 1.

III. IMPACT OF FULL POWER OPERATION ON PUBLIC HEALTH AND SAFETY

(7) As part of the operating license application, Duke Power Company and its contractors have performed extensive evaluation of the ability of the Catawba Nuclear Station to withstand normal and abnormal transients and a broad spectrum of postulated accidents. These analyses confirm that the operation of the plant up to full power does not pose an undue hazard to the health and safety of the public. These evaluations are documented in Chapter 15 of the Catawba Final Safety Analysis Report (FSAR), which document Duke submitted to the Nuclear Regulatory Commission (NRC) pursuant to 10 CFR 50.34.

(8) The Nuclear Regulatory Commission staff and its consultants have performed independent evaluations of the ability of the plant to operate up to full power and have confirmed that such operation does not pose an undue risk to the health and safety of the public. The NRC safety evaluation report and its supplements are public documents, published in NUREG-0954, as supplemented.

IV. REACTOR CONTAINMENT CAPABILITY

(9) As described in the Catawba FSAR, the Catawba Reactor Containment consists of a free-standing steel structure within a separate reinforced concrete Reactor Building with an annulus between the two structures. The Containment is designed to safely confine radioactive fission products that could be released into the Containment in the event of a loss-of-coolant accident. An ice condenser is provided within the Containment as a passive means of limiting post-accident pressures in the Containment. This feature results in significantly lower post-accident Containment pressures compared to the so-called "large, dry" containments. The ice condenser system, as described in Section 6.2 of the Catawba FSAR, has been tested and analyzed. A summary of the simulated ice condenser tests is given therein. Westinghouse analytical methods, which are based on the test data and approved by the NRC, were used to demonstrate that the ice condenser system is capable of fulfilling its designed protective function. While the design basis accident internal pressure is 15 psig, calculations indicate that the Containment shell can withstand an estimated internal pressure of 72 psig. (See the NRC Safety Evaluation Report on Catawba, NUREG-0954, p. 3-24.)

(10) The Catawba Reactor Containment is also provided with a distributive hydrogen ignition system to prevent Containment overpressurization from hydrogen during degraded core accidents. The system provides reasonable assurance that a significant release of hydrogen would not result in overpressurization and rupture of the Containment.

It is my opinion that, considering the ice condenser design feature, the significant margin between the design pressure and the ultimate pressure capability of the Containment, and the distributive hydrogen ignition system inherent in the Catawba containment design, the margin of safety with respect to Containment failure is about the same or better for Catawba compared to other nuclear power plants.

V. POPULATION AND METEOROLOGY CONCERNS

(11) During the emergency planning phase of the Catawba Operating License hearing, Duke Power and its consultants presented testimony and analyses regarding the adequacy of the current Catawba Emergency Planning Zone (EPZ), including the related issues of population distribution and local meteorological conditions. The testimony and analyses presented demonstrated that the meteorological conditions present at the Catawba site would not create the potential of accident consequences more severe than those contemplated in NUREG-0396, the document which serves as the technical basis for the current emergency planning regulations. These analyses also took into account the population densities associated with the City of Charlotte.

(12) In addition, the intervenors cite a figure of 24,000 early fatalities for the City of Charlotte (beyond the 10-mile EPZ) predicted by the NRC Staff in the Catawba FES due to an accident at Catawba. The intervenors fail to mention, however, that their figure represents the projected consequences of a

worst case accident with an overall probability of 1×10^{-8} per reactor-year. Furthermore, that figure was arrived at by unrealistically assuming that no emergency response was taken beyond 10 miles from the plant until a full 24 hours after the radioactive plume had passed.

VI. PRIOR TESTING

(13) At Catawba Unit 1, virtually every component in the plant has undergone prior individual testing or checkout and the major operating and safety systems have undergone further integrated testing during "hot functional testing". Also, Duke Power Company has performed startup testing and full power operations at its three-unit Oconee Nuclear Station and its two-unit McGuire Nuclear Station with no major nuclear safety problems and has gained extensive experience in the operation of nuclear power plant systems.

VII. OPERATING EXPERIENCE

(14) There are approximately 84 light water power reactors licensed to operate in the United States. These reactors have all undergone low power testing and power operation with no significant impact to the health and safety of the public. Duke Power Company currently has five reactors in operation, two of which are nearly identical to the Catawba reactors. In fact, Duke Power has been operating power reactors since July 1973 when the first unit of the Oconee Nuclear Station was placed into operation and has demonstrated its capability to operate nuclear power plants safely and reliably.

(15) Catawba is a very modern plant which is designed and constructed to the latest industry and regulatory standards and stringent safety margin requirements. The plant design and operating procedures and practices incorporate relevant operating experience in regard to nuclear safety.

VIII. SEVERE ACCIDENT RESEARCH

(16) In recent years, the NRC and the nuclear industry have conducted extensive and illuminating studies of the risks associated with accidents beyond design basis (severe or so-called Class 9 accidents). These studies have included computer simulations of several reference plants, including an ice condenser plant. Some conclusions drawn by these studies are that:

a. the probabilities of severe nuclear accidents occurring are extremely low; and

b. the current generation of nuclear power plants present no undue risk to the public.

In addition, recent studies also suggest that:

a. the fission product source terms (quantities and types of radioactive material released in the event of severe accidents) are likely to be much less than had been calculated in previous studies;

b. the risks and consequences to the public of severe nuclear accidents are significantly below those predicted by previous studies; and

c. steam explosions of sufficient magnitude to threaten primary system integrity are not physically credible.

(17) Based on my knowledge and experience, it is my opinion that the above conclusions are reasonable.

IX. CONCLUSION

(18) In conclusion, the impact to the public from operation of the Catawba Nuclear Station has been extensively evaluated and studied and found to be acceptable and within established criteria. There is reasonable assurance that the proposed operation of Catawba does not pose an undue threat to the health and safety of the public.

I, P. M. Abraham, of lawful age, being duly sworn, state that I have reviewed the foregoing affidavit, and that the statements contained therein are true and correct to the best of my knowledge and belief.

P. M. Abraham

P. M. Abraham

Subscribed and sworn to before
me the 20th day of December, 1984

Sue C. Sherrill
Notary Public

My Commission Expires:

September 20, 1989