04/20/81

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
HOUSTON LIGHTING & POWER COMPANY	)	Docket No. 50-466
	)	
(Allens Creek Nuclear Generating Station, Unit 1)	)	

NRC STAFF SUPPLEMENTAL TESTIMONY OF
WALTER L. BROOKS RELATIVE TO THE LPCI COLD SLUG

[Doherty Contention 7]

Q. Please state your name and position with the NRC.

A. My name is Walter L. Brooks. I am employed by the U.S. Nuclear Regulatory Commission as a Senior Reactor Physicist in the Core Performance Branch.

Q. Have you prepared a statement of educational and professional qualifications?

A. Yes. It is attached to this testimony.

Q. What is the purpose of your testimony?

A. The purpose of my testimony is to respond to Doherty Contention 7 which alleges as follows:

> The design of obtaining Low Pressure Coolant Injection (LPCI) core spray water from the suppression pool following exhaustion of the condensate storage tank during Loss of Coolant Accident (LOCA), Reactivity Insertion Accident (RIA), or Transient Without Scram (ATWS) is an unnecessarily high risk to Petitioner's safety and environment interests because suppression pool water is colder than reactor coolant; hence when sprayed in the core it will increase core reactivity causing high

temperature and increase possibility or actuality of fuel melt and formation of a critical mass.

Q. In the event that water from the suppression pool is injected into the core after a scram, will it result in positive reactivity insertion?

A. Only if the water in the suppression pool is at a lower temperature than that in the reactor. In that event, because the injection of cold water into the core increases moderator density, the reactivity will increase.

Q. Will the positive reactivity insertion overcome the shutdown reactivity of the inserted control rods?

A. No. General Design Criterion 26 requires that a reactivity control system capable of holding the reactor core subcritical under cold conditions be provided. In boiling water reactors such as ACNGS, the control rods are designed to be capable of maintaining the reactor subcritical by at least a one percent reactivity change at 20 degrees Celsius (68 degrees Fahrenheit) when the most reactive control rod is held out of the core.

Q. How do you know that ACNGS meets General Design Criterion 26?

A. The methods used to calculate the reactivity of cold, xenon free cores have been compared to measurements in many boiling water reactors. A summary of these comparisons is given in General Electric licensing topical report NEDO-20946, "BWR Simulator Methods Verification" which has been reviewed and approved by the Staff. These comparisons show that cold reactivities are calculated to within about 0.3 percent reactivity change. In addition, the cold critical rod configuration is measured for

each reactor during startup testing for each cycle. This configuration is compared to the predicted value and the two values are required by Technical Specifications to be within one percent reactivity change of each other. Further, the shutdown margin is required by Technical Specifications to be greater than a certain value which is cycle dependent but which is always greater than 0.38 percent reactivity.

Q. You have quoted the shutdown margin for 68 degrees Fahrenheit. What happens if this temperature were to be lower?

A. The shutdown margin would be reduced by about one-tenth of one percent reactivity change for a 30-degree reduction in temperature. Any further reduction would begin to increase the shutdown margin.

Q. What do you conclude?

A. I conclude, based on the foregoing discusion that injection of cold water from the suppression pool cannot lead to criticality in the ACNGS reactor after it has scrammed. There is, therefore, no possibility of fuel melt.

Q. This contention also expresses a concern regarding the injection of cold water from the suppression pool after an ATWS. Have you addressed this concern?

A. No. The operation of reactor systems and the condition of the reactor core following an ATWS will be addressed by the NRC Staff when it responds to the ATWS issues.

STATEMENT OF PROFESSIONAL QUALIFICATIONS OF

Walter L. Brooks

Present Employment - I joined the Nuclear Regulatory Commission (then the Atomic Energy Commission) in September of 1974. I am a member of the Core Performance Branch of the Division of Systems Safety with the title of Senior Reactor Physicist. In my position, I have primary review responsibility for core physics aspects of licensing submittals and, upon request from the Auxiliary Systems Branch, the criticality aspect of fuel storage facilities.

Education - B.A. in Mathematics, Lincoln Memorial University, 1943
M.S. in Physics, New York University, 1950
Ph.D. in Physics, New York University, 1953

Previous Employment - Gulf-United Nuclear Corporation and its predecessor companies, United Nuclear Corporation, Nuclear Development Corporation of America, and Nuclear Development Associates. My duties, during my employment from 1953 to 1974, included the following:

- Performance and evaluation of critical experiments for D_2O moderated lattices
- Performance and evaluation of light water moderated lattice critical experiments
- Performance and evaluation of fast reactor critical experiments
- Development of calculation methods for D_2O moderated reactors
- Verification and modification of a nodal calculation technique for light water reactors.

Publications

Numerous reports on the results of critical experiments and methods development.