05/11/81

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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

NRC STAFF TESTIMONY OF FELIX B.
LITTON RELATIVE TO JET PUMP HOLD-DOWN BEAMS

[Doherty Contention 50]

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

A. My name is Felix B. Litton. I am a Senior Materials Engineer with the Materials Engineering Branch of the Division of Engineering. A copy of my statement of professional qualifications is attached.

Q. What is the purpose of this testimony?

A. The purpose of this testimony is to respond to Doherty Contention 50 which basically alleges that jet pump hold-down beams will crack during operation resulting in coolant circulation degradation. A complete statement of the contention is set forth below:

> Applicants jet pumps in the coolant circulation system of the proposed ACNGS will be subject to disassembly, and/or hazardous displacement resulting in coolant circulation degradation during operation leading to reduction of the margin of safety during normal operation or design basis accidents (DBA), due to cracking in reactor internal parts for holding the jet pumps in place and the jet pump itself.

Q. Does the Staff share Mr. Doherty's concern about cracking in jet pump hold-down beams?

A. Yes.

Q. Would you briefly summarize the source of the Staff's concern with this problem?

A. On February 2, 1980 a jet pump failed at Dresden Unit 3 while operating at about 67 percent of power in a coast down mode to refueling shutdown. Pump failure was attributed to the failure of the jet pump Inconel X-750 hold-down beam. In compliance with IE Bulletin No. 80-07, "BWR Jet Pump Assembly Failure," subsequent examination at other BWR facilities showed cracked hold-down beams in nine of twenty-six plants examined.

Q. Has this problem been evident in BWR designs other than the BWR-3?

A. No. The cracks in the hold-down beams are limited to the BWR-3 reactor design.

Q. What steps did GE take in response to the identification of the hold-down beam cracking problem in the nine BWRs mentioned above?

A. The General Electric Company conducted a metallurgical investigation to determine the cause and steps for prevention of crack initiation in Inconel X-750 jet pump hold-down beams. The result of the investigation showed that intergranular stress corrosion under sustained loading was the cause of failure. Subsequent tests under simulated operating conditions demonstrated that heat treatment of the Inconel X-750 to change the distribution of gamma phase in the alloy resulted in

a substantial increase in the length of time to crack initiation in test specimens.

Q. As a result of its investigation, did GE make any recommendations for alleviation of this problem?

A. Yes. The General Electric Company recommended that the jet pump hold-down beams be heat treated at a higher solution temperature (2000°F. for 1 hour instead of 1625°F. for 24 hours) and that preload used for beam installation be reduced from 30 kips to 25 kips. A GE statistical study indicates that these recommendations will essentially double the time for crack initiation in the jet pump hold-down beams.

Q. When you say that the GE study indicates that time for crack initiation will be essentially doubled, what general time periods are you talking about?

A. GE concluded that the time for crack initiation would be extended by adoption of both of its recommendations from the range of 9-16 years to over 40 years.

Q. Does the Staff concur in GE's analyses and recommendations with regard to alleviation of the hold-down beam cracking phenomenon?

A. Yes. In fact the GE recommendations will be imposed as requirements in the Allens Creek fabrication and technical specifications.

Q. How have the design changes from the BWR-3 to the BWR-6 affected the potential for development of hold-down beam cracking in the Allens Creek facility?

A. The potential for such cracking is less in the Allens Creek BWR-6 design than in the BWR-3 design. This is because the stresses in

the BWR-6 jet pump beam are lower than in the BWR-3 design as a result of the utilization of beams with heavier cross sections.

Q. What is your conclusion with regard to the potential for jet pump hold-down beam cracking at the Allens Creek facility?

A. Such cracking should not occur during the operating life of the facility because of (1) the lower stresses inherent in the BWR-6 design and (2) adoption of the GE recommendations with regard to heat treatment and preload as fabrication and tech spec requirements.

PROFESSIONAL QUALIFICATIONS

FELIX B. LITTON

I am a Senior Materials Engineer in the Materials Engineering Branch of the Office of Nuclear Reactor Regulation, Nuclear Regulatory Commission. I am assigned to the Inservice Inspection and Component Integrity Sections and my duties involve the review and evaluation of materials and processes used in the construction and operation of components in the nuclear power industry.

My education consists of a B. S. (1936) and M. S. (1937) degree in Physical Chemistry from Virginia Polytechnic Institute, Blacksburg, Va. I have completed additional study in Material Science at the University of New Mexico and have taken special courses in Fracture Mechanics and other job oriented courses at Union College and George Washington University.

Prior to joining the Nuclear Regulatory Commission, my experience consists of metallurgical research related to the preparation, fabrication and alloy formation of new structural materials for nuclear, advanced aircraft and high temperature application. I have published in technical journals on the environmental behavior, thermodynamic stability and mechanical properties of uranium, plutonium, vanadium, zirconium, tetanium, hafrium and silicon and their alloys. Although my primary experience in ferrous metallurgy has related to the cause of material failure in service, I have managed metallurgic research on welding and welding processes.