July 20, 1981

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 No. 1)	)	
	)	

DIRECT TESTIMONY OF WILLIAM F. MERCURIO ON BEHALF OF HOUSTON LIGHTING & POWER COMPANY ON DOHERTY CONTENTION 29 BLOCKAGE OF INTAKE CANAL

Q. Mr. Mercurio, please state your name and business address and describe your educational and professional experience.

A. My name is William F. Mercurio, and my business address is Ebasco Services, Inc., 2 World Trade Center, New York, N.Y. I have previously discussed my position and background in connection with my testimony on Bishop Contentions 4, 5, 7, 9 and 10.

Q. What is the purpose of your testimony?

A. The purpose of my testimony is to address Doherty Contention 29 which alleges that,

> "there is insufficient assurance that postulated failures would [not] lead to unacceptable blockage of the submerged intake canal. These insufficiencies present a risk of meltdown of core if residual heat removal system water is insufficient after a core damaging accident."

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Q. What is your understanding of the basis for this contention?

A. It is my understanding that this contention is based on Supplement 2 to the Safety Evaluation Report in which the NRC Staff states that failure of manmade structures will not impair the minimum acceptable functional capability of the ultimate heat sink (UHS) provided that appropriate design changes are implemented.

Q. What is the purpose of the Ultimate Heat Sink?

A. The UHS provides a source of cooling water for the Essential Services Cooling Water System for safe plant shutdown in the event water would be absent from the ACNGS cooling lake.

Q. Describe the physical characteristics and operation of the Ultimate Heat Sink.

A. The UHS consists of a 50 acre submerged evaporative pond formed by excavating the floor of the cooling lake to a depth of approximately 8 ft. A canal connects the evaporative pond with the UHS intake structure. The pond will have a discharge structure and an interior diversion dike.

The normal source of cooling water for ACNGS is the 4,800 acre cooling lake and water will be supplied from this heat sink whenever it is available. In the event

of a total loss of cooling water in the lake, the submerged pond will supply the essential services cooling water system and is more than adequate to permit emergency shutdown and cooldown of the plant for 4 months.

Q. Briefly describe the submerged intake canal.

A. The submerged intake canal is a safety related underwater reinforced concrete canal approximately 35 feet wide and 100 feet long with reinforced concrete retaining walls of variable height and approximately 2 feet thick. This canal serves the purpose of channeling water from the UHS to the UHS intake structure.

Q. What structure, if postulated to fail, would be the most likely to cause unacceptable blockage of the intake canal?

A. The UHS causeway, because a postulated failure would most likely occur in recompacted earthen material.

Q. Describe the UHS causeway.

A. Access to the UHS intake structure is via a manmade earthen causeway extending from the main plant area and abutting the UHS intake structure. The causeway is designed to be stable following a safe shutdown earthquake or any other severe natural phenomena. The causeway will be at an approximate elevation of 145 feet above sea level which is 27 feet above the cooling lake normal maximum elevation.

Q. What types of studies have been performed to verify the design of the UHS causeway?

A. Studies were performed by taking a representative cross-section of the various soil strata and analyzing them to assure the stability of the causeway slope for different loading conditions.

Two general methods of analysis as described in Section 2.5 Appendix M of the ACNGS PSAR were used to investigate the stability of the UHS causeway slope under various conditions. They are:

1) The simplified Bishop slip circle method.

2) The U.S. Army Corps of Engineers sliding wedge method.

Q. Briefly describe the results of these studies.

A. Utilizing the most conservative approach, in terms of design parameters, loading conditions and assumptions, the study results yielded a minimum factor of safety well within the acceptable limits established by the Army Corps of Engineers. The results of these studies are presented in the PSAR Section 2.5 Appendix M.

Q. Why is a concrete retaining wing wall structure to be provided at the entrance to the UHS intake canal?

A. In accordance with the NRC Regulatory Guide 1.27, an analysis was performed which postulated the

failure of the manmade causeway. A cross section taken at the lake front area was investigated for the potential blockage of the waterway, should the causeway be postulated to fail in this area. The movement of the postulated failure plane was examined and found to yield a conservative soil movement of less than 4 inches. This soil movement would produce a very minor bulging type of deformation that would be experienced in the causeway along the lake front area.

As an additional conservatism and in order to provide a positive stoppage of soil movement, a concrete retaining wing wall structure will be provided at the causeway lake front area to assure a continuous passage of cooling water into the intake canal.

Q. Describe the retaining wing wall structure and its function.

A. The retaining wing wall structure consists of a pair of seismic Category I reinforced concrete walls Each wing is angled outward at approximately 45° away from the submerged intake canal to which it is attached. These wing walls direct the postulated flow of soil material away from the intake canal.

Q. Has the addition of a concrete retaining wing wall structure satisfied the NRC Staff's design change concern stated in the SER, Supplement 2?

A. Yes.

Q. In addition to the analysis of the UHS causeway, has the Applicant analyzed the stability of the slopes of the UHS?

A. Yes. Similar to the UHS causeway, we have analyzed the slopes of the heat sink. The results of these analysis are presented in the PSAR Section 2.5 Appendix M and indicate that the slopes are stable.

Q. Has this study also considered the potential effects of sedimentation in the UHS submerged intake canal?

A. Yes. The slopes of the canal have been flattened to allow the sediment to assume its natural angle of repose so that it would not flow into the UHS intake structure. A discussion of this feature is presented in Section 9.2.5.2 of the PSAR.

Q. Has any other design measure been incorporated into the UHS design to further limit the effects of sedimentation?

A. Yes. A one foot high sill will be placed at the front of the UHS intake structure to further assure that sediment will not flow into the structure.

Q. What are your conclusions concerning this contention?

A. Slope stability analyses have been performed and demonstrate that more than adequate safety factors ensure that UHS causeway slopes and UHS side slopes will not fail and cause blockage of the UHS intake canal. The additional conservatism of employing a concrete retaining wing wall on the intake canal further assures that even in the highly unlikely event that the UHS causeway slope was to fail, positive stoppage of soil movement would be assured and the UHS intake canal would not be blocked.