10/30/81

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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

NRC STAFF TESTIMONY OF
WALTER L. BROOKS REGARDING DOHERTY CONTENTION 21

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

A. My name is Walter L. Brooks. I am employed by the Commission as a Senior Reactor Physicist in the Core Performance Branch. I have previously testified in this proceeding.

Q. What is the purpose of your testimony?

A. The purpose of my testimony is to respond to Doherty Contention 21, which reads as follows:

> This Intervenor contends that the resolution of the issue of the amount of reactivity inserted by the collapse of voids during overpressure transients (see: p. 4-7, Sup. #2, SER) being generically investigated by the NRC will result in derating of the proposed plant output to the extent his environmental interest would have suffered less harm by having applicant construct a plant using either a different fuel (such as coal) or a pressurized nuclear plant. Applicant's Environmental Statement and Environmental Report show projections which indicate they expect to want to produce more power after ACNGS (that is, will want greater capacity). Hence plant derating due to the resolution of this issue will intensify the requirement for new facilities.

> Intervenor contends the amount of environmental harm caused by the proposed facility when derated plus other facilities created to make up the derated amount would be greater than the harm caused by requiring this issue be resolved before the construction license is issued and the design finalized. Further, derating for various reasons for BWR atomic plants has occurred at Browns Ferry #1 and #2, Quad Cities #1 and #2 and Pilgrim Station."

Q. Is it your understanding that this Contention has been narrowed from the above?

A. Yes, it is my understanding that the Board's order of August 12, 1981 narrowed the Contention to consideration of core power density and the adequacy of the ODYN code to demonstrate the reactor scram curve. In addition, the Board expressed concern about the statement in the staff's response of July 13, 1981 that the predictive capability of the code would be verified during the OL review for Allens Creek.

Q. Would you comment first upon the Board's concern?

A. Yes. The statement in the Staff's response should be interpreted to say that at the OL stage the Applicant will be required to perform the analyses of the limiting overpressurization transients with the ODYN code. This is not required at the CP stage since the ODYN code is considerably more expensive to run than the previously used plant transient code and it is sensible to wait until the code can be run with the "as-built" values of the sensitive parameters listed in the table attached to the Staff's July 13, 1981 response. There was no intent to imply that the ODYN code itself would require further verification.

Q. Would you comment on the probability that such analyses at the OL stage would lead to derating the Allens Creek plant?

A. Yes. The experience to date with several BWR/4 and BWR/5 reactors has shown that ODYN results do not lead to such derating. In general, the limiting plant transient that sets the operating limit on MCPR has turned out to be the rod withdrawal error at power over all or most of the operating cycle. When the overpressure transients are limiting at end of cycle, the difference in operating MCPR is small and does not lead to derating. In summary, the probability of derating due to the overpressure transients is negligible.

Q. Is a scram curve used in performing an ODYN analysis?

A. It is not. The neutronics portion of the ODYN code is a one-dimensional space time kinetics code. The scram is represented by the effect of the motion of the control rods into the core on the one group cross sections as a function of core axial position. The one group time-dependent diffusion equation is then solved for the core with the time varying cross-sections to obtain the time dependent flux and thus the time dependent power.

Q. What, then, is the relationship between the ODYN code and a scram curve?

A. The one-dimensional space time kinetics model which is included in the ODYN code may be used to generate a scram curve for use in point kinetics transients analyses.

Q. Has the adequacy of this code to generate a scram curve been evaluated?

A. Yes. As part of the verification of the ODYN code, a comparison was made between the one-dimensional model and a three-dimensional model in order to test the validity of the collapse of the three-dimensional

cross-sections to one-dimensional ones. Different initial control rod patterns were assumed and in each case the one-dimensional model was conservative (i.e., produced a smaller scram insertion) with respect to the three-dimensional model.

Q. Are there other conservatisms in the use of the scram curve?

A. Yes. If a scram curve is required for a point kinetics calculation it is calculated for the end-of-cycle-all-rods-out configuration. This ensures the maximum delay before significant reactivity is inserted (i.e., the flattest initial slope). The calculated worth is then compared to the so-called "Generic D" curve. The more conservative of the two curves is then multiplied by 0.8 and the result is used in point kinetics transient analyses.

Q. Would you comment on the effect of operating core power density on the ODYN calculation?

A. Yes. With regard to the neutronics aspects of the calculations, I know of no reason for these to be sensitive to core power density. The reactivity inserted by voids is sensitive to the change in the void volume and the void coefficient. Neither of these quantities is directly dependent on the core power density. The results of the overpressurization events are dependent on the scram characteristics but these are also not dependent on the core power density. Thus I conclude that the neutronic behavior of the core is not dependent on core power density.