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)	§	

Material Facts As To Which There Is
No Genuine Issue To Be Heard

1. Because of the configuration of the systems, it is physically impossible for SCRAM Discharge Volume pressure or Containment pressure to exert a force on a control rod drive (CRD) in a direction which drives it out of the core. (Affidavit, pp. 4-7)

2. Even assuming a breach below the CRD drive piston, the resulting rod withdrawal velocity is much less than that assumed for the design basis rod drop event. (Affidavit, pp. 7-8)

3. Even assuming that the control rod drive separates from the vessel, the resulting ejection cannot produce a reactivity insertion rate greater than that calculated for the bounding rod drop accident because the CRD can eject only as far as the gap between the CRD and a specifically provided support housing; this passive, physical restraint limits the distance and time of

rod withdrawal and, hence, the reactivity addition rate. (Affidavit, pp. 8-10)

4. The SL-1 reactor is totally dissimilar to the reactor configuration and operation of a BWR. The SL-1 incident cited by Intervenor does not provide any meaningful comparison with BWR rod ejection possibilities. (Affidavit pp. 10-11)

'80-855
EAF/COMP

Doherty Contention No. 28/
Control Rod Ejection

COST $ _____
PAID BY PLF. DEF.

IN THE UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

IN THE MATTER OF:	)	
HOUSTON LIGHTING AND POWER COMPANY,	)	DOCKET NO. 50-466
(ALLENS CREEK NUCLEAR GENERATING STATION, UNIT NO. 1)	)	

DEPOSITION OF:
JOHN F. DOHERTY

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Q. The title is "TMI-2, Lessons learned Task Force Report," and it is referenced in your contention.

A. Thank you, Mr. Riedle. I don't have a copy of that contention with me.

Q. Why don't you borrow this copy?

A. Thank you. In NUREG-0578, the statement was that they recommended that cold shutdown be achievable in 24 hours without reference to reactor type.

Q. All right. I still don't think I understand then what its relevance is in this contention. Is it just a recommendation?

A. Whatever force the Three Mile Island investigation has is reported to the NUREG-0578.

Q. But does it prove or disprove any fact relevant to whether or not ACRCS can be brought to a cold shutdown condition in 24 hours?

A. It makes no statement about ACRCS.

Q. Is the answer to my question no?

A. Yes. That's correct.

Q. Let's go into your contention on control rod ejection. This is your number 20.

Would you explain to me what can cause a control rod ejection?

A. If the conditions for control rod drop exists with separation of the control rod drive housing support, I believe it's called, then ejection is possible.

Ejection is also possible if the support is separated from the vessel.

Q. What is the support that you have reference to, and how is it pertinent to whether or not a control rod is ejected?

A. To prevent control rod ejection and, perhaps, some other accidents, there's a type of physical structure which is located beneath which actually literally will stop a moving control rod, physically stop it, impede it, block it. The failure of that physical mechanical device would stop an ejection.

Q. How is this device supposedly going to fail?

A. In the event of cracking of the metallic connection to the reactor vessel.

Q. What makes that metallic connection crack?

A. Well, part of it can be due to bulging of the reactor.

Q. What causes the reactor to bulge?

A. Certain reactivity incidence.

Q. Which do you have reference to, and what's the factual basis for that?

A. Would you repeat your question? I've lost you.

MR. BIRKLE: Would you read the last question back?

(WHEREUPON, the requested testimony was read back by the reporter.)

A. In one of the older NETC's, it cites certain types of accidents where reactivity additions can be great enough to cause bulging of the reactor which would subject the metal to stress which might result in cracking.

Q. You say there is a CE document which outlines this scenario whereby overpressurization would cause a bulging in the reactor and a stressing in the connection between the CRD support housing and the vessel itself?

A. It doesn't mention the support. It mentions the bulging, however.

Q. There is a CE document which talks about reactor vessel bulging?

A. Yes.

Q. What's the magnitude of this deflection?

A. I'm going to locate that now.

Q. Do you have the NSTC which discusses this phenomenon in your possession?

A. No.

Q. Do you have reference to it?

A. I'm trying to locate one now. Yes. It's APFD 8455.

Q. And this GE document discusses the reactor vessel bulging which you contend will cause the CRD support housing to fail; is that correct?

A. It describes bulging.

Q. And you take this description to mean that there is a mechanism whereby the CRD support housing will fail; is that correct?

A. Yes. That's one mechanism.

Q. What are the other mechanisms if they exist?

A. According to Glenn Bright who is now -- one of the licensing board members, of Nuclear Safety, volume 8, number 2, page 110, he argues that a pressure pulse from a reactivity initiated accident would be a possible mechanism for a rod

ejection event.

Q. Does Mr. Bright discuss the failure of CRD housing support?

A. I don't believe he does.

Q. But I am correct in assuming that your hypothetical control rod ejection is dependent upon a failure of this support housing insofar as we've discussed the only mechanism failure; that being the separation from the reactor vessel due to vessel bulging; is that correct?

A. There has been a second -- I cited cracks which have been found in the penetration wells of the Big Rock [illegible] nuclear station.

Q. Which penetration wells do you have reference to?

A. They are called partial penetration wells.

Q. And they connect what to what?

A. I'm unclear at this time if they connect the type of housing or safety structure which will be part of ACNGS, or whether this is an older system which does not have this type of safety device.

Q. So you don't know whether or not these penetration well cracks have been relevant to

your contention or not at this time?

A. I'm not certain they do. But I think what's important is the -- I do not know the exact term. The type of metal, age or whatever it's called that is designed to physically block that as a final safety device.

Q. We're trying to discuss ways in which that support might fail.

A. Yes.

Q. We have on the record your hypothesis that a reactor bulge will cause such a failure.

Do you have under consideration any other mechanisms for failure of this support piece, or is reactor bulging it?

A. Simply cracking.

Q. What causes the cracking beyond the bulge in a reactor vessel?

A. Distress, corossion.

Q. Is your belief that this support housing is susceptible to stress, corossion, cracking?

A. Yes.

Q. Has there ever been anything like this for these components?

A. Not to my knowledge, but I'm not certain these components ever existed before.

Q. What do you understand to be the necessary environment to induce stress, corossion, cracking?

A. Intensive heat. The presence of oxygen dissolved into liquid would be ideal for that. The presence of iodine gas dissolved would also cause that.

Q. That is your belief, or is it your knowledge that this housing support exists in such an environment?

A. It does exist in an area which is quite hot and damp. I don't believe it exists in an area of any iodine.

Q. So it's your conclusion that it is or is not --

A. I believe it's susceptible, and I believe that this should be investigated.

Q. But to your knowledge, there has been no incidence of this cracking for this component or any component located in similarity?

A. For this component, I have no knowledge of that.

Q. Are there any other mechanisms whereby this housing support can fail beyond reactor vessel and intergral stress, corossion, cracking?

A. No. I don't know of any right now.

Q. So those are the two mechanisms whereby your hypothesis will cause failure of the CRD support housing?

A. Yes.

Q. If this housing fails, how far can a rod be ejected?

A. It appears there's no limit to how far other than the floor.

Q. There's no limit except the floor?

A. Yes.

Q. So in your hypothesis, the rod can be ejected totally out of core?

A. That it can be taken out of any controlling of the core a distance of 12 feet, approximately.

Q. Is the answer to my question yes, or did you restate your answer to qualify it?

A. What was your question again?

Q. How far out can the rod be ejected? I guess more properly I asked you if it was your understanding that it can be ejected out of the core?

A. Yes.

Q. What rod withdrawal speeds is obtained

during your hypothesis?

A. I don't believe that's never been calculated for a PWR.

Q. Have you calculated a rod withdrawal speed?

A. No, sir.

Q. What reactivity addition rate is obtained with this control rod ejection?

A. Through the entire core?

Q. Any place you want to --

A. One rod.

Q. I understand.

A. All right. Between 200 calories per gram to 250 --

Q. I asked you about reactivity addition rates. I think you misunderstood me. Not energy deposition rates.

A. Give me some units that you expect in your answer.

Q. I expect units of reactivity.

A. Well, in excess of $1.

Q. Where did you get that figure?

A. Well --

Q. Did you calculate that number?

A. No, sir.

Q. Then why did you volunteer that answer? Where did you get that answer?

A. Well, all the --

Q. Presumably, that's not a rate. We'll start with that. We'll work our way along.

A. All right. All the literature that I've read speaks that if the rod ejection accident occurs, that the results would be very serious.

Q. This literature that you've read, does it address the rod ejection for BWR of the variety you have hypothesized?

A. I don't recall -- are we speaking of ACNCS?

Q. That's the only reason why we're here.

A. I don't think that's true.

Q. But I'm asking you if you've done calculations or other studies that gave you factual conclusions as to the reactivity addition rate that's to be anticipated for the control rod ejection accidents that you have hypothesized?

A. No. Not for the ACNCS system.

Q. Have you done any calculations as to the energy deposition that would result from this reactivity?

A. No.

Q. Have you read the PSAR sections or any other of applicants analysis on reactivity insertion accidents?

A. Yes. I believe I have.

Q. What do you believe to be in error about those analyses?

A. At the moment, I'm not certain that a control rod ejection accident was considered. I don't believe it was.

Q. You mean it was totally ignored in the analysis?

A. I think it was declared it could not happen.

Q. Do you recall why it was declared as incredible?

A. Because of the support structure that we were speaking of a minute ago.

Q. So your exception to applicant's analysis centers on whether or not this CRD support housing can remain intact for the accident?

A. Yes.

Q. You agree that if it remains intact, that a control rod ejection accident is impossible?

A. That's right.

Q. All right. I'd like to move next to -- well, wait a minute. Excuse me.

I believe in your contention you make reference to the fact that this control rod ejection can be pumped in by attainment pressures and SCRAM discharge volume tank pressures.

Would you explain to me how those two pressures act to eject a control rod?

A. What is the source of your believe of that?

Q. Of your contention.

A. Do you have a copy of that, or do you have a recopy of that?

Q. Here you are.

A. This is reworded. I'd like to check on it, but there is some differences in our understanding of what the contention is at this point.

Q. Okay. Maybe I can short cut it if I can have access in what you believe is the proper wording.

We are agreeing for present purposes that your contention as admitted by the Board, as you intend to litigate it makes no reference to

containment pressures or SCRAM discharge volume tank pressures?

A. No -- well, let's get our terms straight. This says the pressure from the reactor vessel. You're speaking of the containment --

Q. Yes.

A. No. Clearly there is -- that's out.

Q. Yes, sir.

A. And the other problem then is the SCRAM discharge volume.

Q. The incarnation I have of your contention makes reference to, which may be an earlier one, SCRAM discharge volume tank pressures.

A. Well --

Q. I need to know whether or not --

A. I don't believe that's relevant.

Q. So we are agreeing then that the reactor vessel and internal pressure are the only motivating force for ejecting a control rod ejection?

A. Right.

Q. And gravity?

A. Yes.

Q. All right. Now, I'd like to turn to