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)	§	
	§	

Statement of Material Facts As To
Which There Is No Genuine Issue

(1) Intergranular stress corrosion cracking has occurred in light water reactors where "sensitized" stainless steels with a carbon content of between 0.05 to 0.08% were exposed to a particular combination of stress and dissolved oxygen in high temperature waters. This phenomenon has occurred in approximately 0.6% of the stainless steel pipe weld heat-affected zones within the RCPB of operating BWRs. (Gordon Affidavit, p. 3).

(2) Two of the four lines where the bulk of the identified instances of IGSCC has occurred, the recirculation bypass line and the control rod drive hydraulic return line, have been eliminated from the ACNGS design (Gordon Affidavit, p. 3).

(3) The two remaining lines where the bulk of IGSCC has been identified and virtually all other RCPB lines within both General Electric's scope of supply and Ebasco Services Incorporated's design responsibility are comprised

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of either plain carbon steel, Type 316L stainless steel, or 316 nuclear grade stainless steel. (Gordon Affidavit, p. 4; Gunther and Malec Affidavit, p. 2)

(4) Feedwater spargers, collet cylinder tubes and recirculation pump housings at ACNGS will be made of low carbon stainless steel and the control rod drive housings will be fabricated from 316L stainless steel. (Gordon Affidavit, p. 4).

(5) This low carbon content stainless steel and plain carbon steel utilized in the ACNGS is the type which does not experience intergranular stress corrosion cracking. The specific material utilized is the result of investigation and an extensive test program. The NRC has reviewed the substitution of IGSCC resistant materials at ACNGS and accepts this design measure as a resolution of the generic IGSCC problem, Generic Task No. A-42. (Gordon Affidavit, pp. 4-5; Gunther and Malec Affidavit, p. 2).

(6) The NRC Staff has also approved the use of these materials as meeting the requirements of Regulatory Guide 1.44, which assures compliance with 10 CFR 50, Appendix A, criterion 31. (Gordon Affidavit, pp. 5-6).

79-1082
SMT/pdp

COST $ _____
PAID BY PLF. DEF.

TexPirg Contention No. 10/
IGSCC

UNITED STATES NUCLEAR REGULATORY COMMISSION	)	BEFORE THE ATOMIC SAFETY
	)	AND LICENSING BOARD
IN THE MATTER OF:	)	
	)	NO. 50-466
HOUSTON LIGHTING AND POWER COMPANY (ALLEN'S CREEK NUCLEAR GENERATING STATION, UNIT 1)	)	

DEPOSITION OF:

CLARENCE JOHNSON

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A. We've mentioned it. I don't know that that's been resolved. I would assure that probably Mr. Doherty, but I need to talk to him to be more certain about that.

Q. Let's move on to TexPIRG contention 10, which is intergranular stress corrosion cracking. Do you have that contention in front of you?

A. Yes.

Q. Did you get a chance to look at your contention?

A. Yes.

Q. Can you tell me what this phenomenon is, of intergranular stress corrosion cracking?

A. Basically, it has to do with the pipes that carry water to the reactor vessel developing cracks due to stress or corrosion, or excessive loads, and those cracks, if they remain undetected, could lead to a rupture.

Q. All right, before we break for lunch, I just want you to describe for me what it is that actually causes this phenomenon,

what's the nature of the problem in terms of it's physical source.

A. Well, our contention, as it states, is excessive oxygen levels, superposed loads, residual stresses which result in the failure of the piping.

Q. So it's your understanding that those are the physical phenomenon which lead to intergranular stress corrosion cracking?

A. Oh, no, that leads to the crack developing into a rupture.

Q. I see. Exposure to oxygen levels will lead the pipe to rupture?

A. Oh, no, I'm sorry. I had it right the first time, intergranular stress -- I was misreading the contention.

Q. So it's your understanding that this phenomenon of stress corrosion cracking is initiated by these factors mentioned in your contention, excessive oxygen levels and so on?

A. Right.

Q. Why don't we break for lunch?

(Short recess.)

(Whereupon, Tom McGuire, Tom Brock, and Lonnie Richards left the deposition room.)

Q. We were in the middle of discussion of contention 10, and what I'd like to get you to do now is to name for me, if you will, any plants where this phenomenon has occurred? Do you know of any yourself?

A. Not right offhand, I could look through --

Q. Do you want to look back at prior answers to interrogatories?

A. Yes, that might help.

Q. Why don't you look at answer number 32 in your second set of interrogatories -- in the answers to our second set of interrogatories. I don't believe you have one.

A. Okay, the response lists Millstone 1, a Pilgrim Monticello, Dresden, Quad Cities, and I would accept that that's probably the case.

Q. Do you have any personal knowledge as to whether those plants, in fact, experienced

problems with compression corrosion cracking?

A. Not any personal knowledge. At one time, I, in drawing up this contention, I did look at the N.R.C. document on stress corrosion cracking. I believe I may have mentioned some reactors. My memory is not good enough, that's been a year and a half ago that I read that document, and my memory is not really good enough to say whether I remember all those names being in that document or not.

Q. Well, let me ask you this: As many of these plants as you can name, would you list for me by plant where in the system on the plant they had a problem with stress corrosion cracking?

A. I don't know specifically what system other than, you know, pipes, but I don't know which specific pipes, if that's what you mean.

Q. All right, for example, let's take Dresden. Do you know what specific problems they had?

A. No.

Q. The same is true on all of them; you don't know any specific problem?

A. That's correct, other than it was signs of stress in respect to some sort of minor crack, you know, very small cracking involved.

Q. Do you know the type of metal that was involved in the cracking problem?

A. I'm sure it was stainless steel.

Q. Do you know what grade of stainless steeel?

A. No, I don't.

Q. Do you know what was done to repair the cracks, if anything?

A. I believe that in most, if not all of those cases, a determination was made that there was no threat posed by the crack, cracking, but I'm --

Q. Do you disagree with that?

A. That seems to be my recollection. I'm not sure that that's the case, though.

Q. Do you disagree with that determination?

A. Well, I think that any time there is any question in terms of cracking, that it should be dealt with very cautiously and carefully, and that, you know, if, in

my view, something like that should be seriously considered replacing the whole pipe so that there is no question.

Q Well, I'm asking you now if you have any quarrel with the determination that was made as to the cracking problem on each of those plants. Do you have any personal knowledge as to whether the determination was, in fact, an error, that was not a problem?

A Well, I can't make any at the moment, can't make any determination because I didn't read the specific investigation on each one of those plants, or at least it's been such a length of time ago that I wouldn't recall the details well enough to really give a very good answer to it, other than I can make the general statement that it would be my opinion if there were any cracks in any pipe, even if it's just the outside surface of the pipe, that it's probably best to replace the pipe, if technologically feasible, because that eliminates any question.

Q. Well, let me ask you this, were these cracks visible to the eye?

A. I don't know if they were or not. I know that they -- many times, cracks might not be.

Q. Do you have any expertise or training in the strength of the materials or material properties?

A. I do not.

Q. Do you have any expertise in physical chemistry?

A. No, I do not.

Q. Is it your opinion that a pipe, for example, can have microscopic cracks in it and still not withstand the design pressures to which it is designed?

A. It's possible. It would be my understanding that that's possible, even though perhaps, you know, in some cases it might not be probable.

Q. Let me ask you this, is it your understanding that a pipe can have microscopic cracks in it and still withstand the pressures to which it's designed for?

A. Oh, that it can.

Q Why?

A I know that is in many cases maybe probable, yes.

Q Or possible?

A Yes, possible.

Q Okay.

A Probable, possible.

Q And if, in fact, it's determined that even though a pipe has microscopic cracks in it but it can still withstand its design pressure, why, in your opinion, should that pipe be replaced?

A Well, I think there is -- for one thing, because humans can make errors in making determinations.

Q No, sir, I want you to assume that it's properly determined that the pipe can withstand the pressure that it's designed to, even though it has these cracks in it. Now, given that assumption, why should it be replaced?

A Well, assuming that that's an accurate case, you know, yes. It should not be replaced, yes.

Q So we can forget about talking about a

pipe having to be replaced just simply because it has a crack in it. That's not what we're worried about here; is that correct, as long as that pipe will still meet the design pressures?

A. I didn't say that was the case. I would say that if there is any room for disagreement or question as to determination, that it should be replaced.

Q. All right, but assuming that it's accurately determined that --

A. For one thing, as an example, you know, supposing a crack were found and it was determined that the crack, by itself, is not, you know, is not adequate to cause a reduction in the design strength of the pipe, there could always be the possibility that another crack has been undetected which, you know, together could change the assessment.

Q. But if it's undetected, how would you know, then, to replace it?

A. Well, in one case, the one crack might serve as a sign for the -- that the -- another may exist.

Q. So, then, it is your position that any time you detect a crack, however microscopic, and however unimportant it is to whether the pipe can withstand the design pressure, it ought to be replaced?

A. Yes, if there is any question. For instance, the question one may have gone undetected, yes. If you could say with an absolute certainty as your first question was to me that that was an accurate determination, then I could understand, you know, not replacing the pipe, but the position I would take would be one of absoluting ruling out error, a component that is crucial to the reactor.

Q. How do you absolutely rule out error in looking for these microscopic pipe cracks?

A. I think it's very difficult.

Q. How do they look for them?

A. I presume they use x-rays.

Q. Do you know how they --

A. I don't know for certain, no.

Q. All right, well, tell me how they could discover one crack and miss another, then, using x-rays.

A. Well, I think we've seen in quality assurance work that x-rays have been faked.

Q. Mr. Johnson, I am asking you now to assume that the x-rays are properly done. How is it that you could detect a crack in one instance and miss it in the other instance? Do you know?

A. I don't know. I don't know the answer to that, because I am not that familiar with the process.

Q. All right, and then, backing up again to my original question, then, about what was done on these other plants, you have no personal knowledge as to whether the decision not to replace the pipes where they detected cracks was a good decision or a bad decision; is that correct?

A. Not at the present time, I don't have that knowledge.

Q. Now, can you tell me whether you know if any of these plants have the same systems as Allen's Creek is planned to have and will have similiar problems

with stress corrosion cracking?

A. Well, they are boiling water reactors.

Q. And that's all it takes, that's good enough?

A. But that is a fair similiarity, they -- I believe they all used austenetic stainless steel.

Q. Can you spell that?

A. A-u-s-t-e-n-e-t-i-c, I believe, but I must admit I don't know the grade of the -- if the exact composition of the steel was the same. I don't know.

Q. You don't know, okay.

Do you know what specific part of the Allen's Creek plant will use metal that's susceptible to stress corrosion and cracking?

A. We haven't made any allegations with respect to any specific pipes moreso than others, we're mostly concerned, though, with the primary cooling pipes.

Q. All right, that's the main focus of your concern?

A. Yes.

Q. Do you know what those pipes were made out

of?

A. I know no more than it's stainless steel.

Q. Do you know for a fact that there has been a problem with stress corrosion cracking in stainless steel coolant pipes at other nuclear plants?

A. That's -- it's my understanding that that has been the material used in all pipes that are under high stress in almost every industry, so that's the basis I make the assumption, that those, in fact, were stainless steel pipes in the reactors we mentioned earlier.

Q. So that is your assumption, that they used stainless steel pipes in those other plants?

MR. NEWMAN: Sorry, but is it your understanding that the stainless steel piping that's used in these other plants or has been used in the other plants is the same as that which is going to be used at Allen's Creek?

A. As I mentioned, I don't know that the precise composition or grade is exactly

the same.

MR. NEWMAN: Well, how did you make the statement, then, in your contention that -- well, let me just read the whole thing. "Excessive oxygen levels, superposed loads, and stresses may result in ultimate failure of piping", and these are the words that are important, "despite altered metal content for the A.C.N.G.S. design".

Now, can you explain to us what basis you have for the statement that there is an altered metal content in A.C.N.G.S. design?

A Well, first of all, I would point out, as we mentioned in interrogatory responses, that the problem of stress corrosion and cracking is it has not been solved, you know, according to any mechanical engineer I have spoken to, and I have mentioned this particular contention to at least one mechanical engineer, that there is no hard and fast solution to the problem.

It is true, perhaps, the metal content

may be the best possible, but there is no -- that there is no solution to the problem in terms of reducing any possibility of rupture, I mean or having no possibility of rupture.

MR. COPELAND: I don't believe that's Mr. Newman's question, if I understood the question.

MR. NEWMAN: No.

A And secondly, I would mention that the time this contention was drawn up, I did speak to Gregory Miner on the phone and mentioned the changes that had been made, and read from the, in fact, from a document that Mr. Moon, at the N.R.C. staff had given me, and asked him that if, in his opinion, this made the contention no longer valid, and he said in his opinion, it did not, and that was another basis that I operated on.

MR. COPELAND: So your understanding, then, as to what the altered material content is of the Allen's Creek piping is based on that document, that's where you got the

idea that the material for Allen's Creek had been altered?

A. Yes.

MR. NEWMAN: Could you identify that document?

A. I'm not certain. I believe it was from the -- I'm not sure, I think it was from the latest G.E. whatever it's called, the --

MR. COPELAND: E-S-S-A-R, all caps.

A. I guess that's where it's from, basically, it's when we were discussing stipulations with the N.R.C. staff, Mr. Moon went through all of our contentions with us and gave us the reason for his position on each contention, and he had a document with him, and I believe it was the ESSAR, that stated that -- or it may have been -- it's possible it could have been the N.R.C. document on stress corrosion and cracking, their NUREG at that time on it, which indicated that this would be the type of solution that would be made to the problem.

MR. NEWMAN: I'm going to ask you two things. These first is as soon as possible after this deposition is over, can you identify the document and give us a reference to it? The document that I am speaking of is the one from which you spoke with Mr. Miner.

Second question I'd like an answer to is whether or not other than the conversation with Mr. Miner, you have any independent basis for the conclusion that these phenomenon will occur notwithstanding the altered metal content in the A.C.N.G.S. pressure boundary piping?

A. Well, I believe there is a Swedish study on reactor safety that indicates that the probability of rupture of a pipe greater than 3" is 10 to the minus fifth.

MR. NEWMAN: Is that due to intergranular stress corrosion cracking?

A. I'm sure it's more generalized than that.

MR. NEWMAN: Do you have any

independent basis other than your discussion with Mr. Winer for the assertion that intergranular stress corrosion cracking can occur at Allen's Creek despite the altered metal content of the reactor primary coolant boundary piping?

A. None other than what I have discussed so far, I'm not going to go back over everything I have said so far, but none other than what I have said so far, which I have expressed, well -- I'll just leave it at that. None other than what I have expressed so far in this deposition.

MR. NEWMAN: I don't know how far we can chase this. I think this is important. We're trying to prepare a case that's responsive to your contentions, and it's important that we know the source of information that you used so that we can attack it systematically, and so I think maybe it would be well for you to repeat the bases then, upon which you draw the conclusion that

notwithstanding the altered metal content of the piping at Allen's Creek, it will experience the same intergranular stress corrosion cracking as the other reactors which you mentioned which have a different metal content.

A. One is is that this is a general industrial problem that has not been resolved for industrial systems; that, in fact, face higher stress and lower stress, both, that they have been unable to, you know, completely solve the problems such as there is no probability that it's going to occur, and that includes experience -- it's my understanding that the oil industry, in refineries -- secondly --

MR. NEWMAN: You are talking in those circumstances still about stress corrosion cracking?

A. Right, stress corrosion cracking.

MR. NEWMAN: Continue.

Q. Particularly with respect to corrosion, I understand it is a serious problem, for

instance, in the oil industry, and they haven't been able to deal with it in such a way that it's no probability, and the difference is when you are talking about a nuclear power plant, your consequences of the failure is much greater than it would be in other industrial applications, usually.

QUESTIONS BY MR. COPELAND:

Q Do you know where in the oil industry they use the same kind of piping they do in this instance?

A I don't know offhand, I'd have to look at it and see, and I haven't done that.

Q Do you know any industry where they use the same kind of piping that's going to be used at this plant?

A The exact same, I don't know of any, but I assume that other industries are engaged in the latest design, too. I know they do use -- it's my understanding they use stainless steel in all applications where there is high stress and corrosion, so that would --

Q Do you know of any industry that uses the

same stainless steel pipe as being used in this plant?

A. I have already answered that, no.

Q. No, okay. Do you know where stainless steel corrosion cracking has occurred in any of the following stainless steels: ASTM 304-, 304L-, 316-type stainless steels with 20.02 percent by maximum weight carbon content?

A. No. I answer it no because I am personally not familiar with those designations.

Q. Are you familar with any other designations for stainless steel?

A. Not right offhand, no.

Q. All right, sir, then, going back to Mr. Newman's question, do you have any basis for the contention that stress corrosion cracking is going to be a problem in the stainless steel for us at the Allen's Creek plant?

A. Well, I've already mentioned the reasons I have.

Q. The only reason is because this problem, this phenomenon, occurs in other industry applications and --

A. And because I discussed the problem with an engineer who is familiar.

Q. Who?

A. Greg Miner.

Q. All right, who else?

A. I've also discussed it with another engineer by the name of Milt Anderson, who is, you know, purely not on his part in consulting work, but just discussion.

Q. What kind of engineer is he?

A. Mechanical engineer.

Q. What does he do?

A. Works for a consulting firm, I believe, an engineering firm. I'm not certain which one.

Q. Has he ever designed a nuclear plant?

A. I'm sure he hasn't. He does work, I'm sure in the oil industry.

Q. Did you ask him if he knew of any applications of stainless steel piping like was going to be used in this plant to oil industry applications?

A. It was his feeling that they would be similar because they used, for some applica-

tions in the oil industry, very high-grade and high-stress corrosion resistant piping.

Q Did you tell him what type of stainless steel is going to be used?

A No, I didn't. I did for Greg Miner, I read from the statement that Mr. Moon had given me, and I will attempt to, if I can, find that document and it's going to be basically -- hopefully, I know -- which it is possible either in the stress corrosion NUREG or else it's in the ESSAR, which would make it -- hopefully, I can find it in those documents or possibly I can call him up and see if he remembers.

Q Did he tell you why it would still be a problem at Allen's Creek?

A No, it was not his position it would be a problem. Who are you talking about?

Q Mr. Miner.

A No, he didn't. Not other than he says that -- a belief fairly similar to what I have stated, wouldn't be adequate to resolve a problem to the extent that safety would require.

Q All right, looking back at your contention,

you describe three different phenomena, pipe stress, pipe corrosion, and pipe cracking. Is your contention dealing with these as a separate phenomena or a single phenomenon?

A. Separate.

Q. These are separate?

A. Well, yes. -- well, I guess so. The cracking may be a result of the other two, to some degree, but, okay --

Q. They are separate, though?

A. Yes.

Q. All right. Are these the only phenomena affecting the pipe integrity that your contention is dealing with?

A. Yes.

Q. All right, your contention says that the excessive oxygen levels may cause failure of piping. What oxygen level do you have to reach to have a pipe failure?

A. I don't know the specific value.

Q. What types of steel does the oxygen level affect, any kind?

A. I presume so, I don't know for sure, though.

Q. You don't know? Where did you get these various factors that you claim affect the --

A. Mr. Minor.

Q. He gave you those?

A. Well, actually, I read a document that he wrote.

Q. That he wrote? What was the name of the document?

A. It's the summary of his testimony before the -- Joint Committee of Congress on Atomic Energy.

Q. Okay, and has that --

A. You are probably familiar with that document, aren't you?

Q. I think so, and is that the source of this contention, basically?

A. I'd say the source of my coming up with this is a problem that we ought to look into and one of the reasons -- and certainly one of the reasons I talked to him.

Q. But that is the basic source of your contention?

A. Yes.

Q Is his testimony?

A Yes.

Q What is a superposed load? You say that superposed loads may result in failure of piping.

A I would -- I believe that a load that exceeds the pressure, that exceeds the normal or design -- the normal expected pressure.

Q Where did you come up with that term?

A That whole -- those two factors, extreme oxygen levels and superposed stresses came from the same place.

Q All from Miner's testimony?

A Yes.

Q So if we want to find out what those really mean, we need to look at his testimony; is that correct?

A You are asking me the question -- you've already asked me the question on both of these, so I've given you the best answer I can and --

Q The fullest answer would be in his testimony as to what --

A I suppose so, yes. I haven't looked at

it in a little while, so I don't know for sure, for certain, exactly how much detail it goes into on those three.

Q But that's where you got the phrases?

A Yes.

Q Is it your contention at this point that pipe cracking cannot be eliminated or mitigated by design?

A Yes.

Q It is?

A Yes.

Q Is it your position that the problem of cracking and stress corrosion cracking has never been mitigated by design changes?

A Oh, it can be mitigated, not prevented. Mitigated in terms of reducing probability.

Q All right, and is it your position that that has not been done at the Allen's Creek project?

A That -- it's not been mitigated or it's not been --

Q That it has not been in any way mitigated from the problems that occur in these plants?

A. It might be slightly less probable than in the previous cases, but --

Q. Why would you say that?

A. Well, I am making the assumption that any changes that have been made have been based upon, you know, improvements, learning, and knowledge, but that would be the only basis I'd have to make that assumption.

Q. Would you have any reason to doubt that the design for the piping at the Allen's Creek plant meets the highest state of the arts?

A. I have no reason to doubt that.

MR. NEWMAN: One more question on that. Have you discussed with Miner the possibility of testifying on this issue?

A. Some time ago, I did, yes. I haven't lately, just because I'd like to be in a better position of knowing if we were going to be able to retain him.

MR. NEWMAN: Will you advise the applicant just as soon as you've made a decision on whether to retain

Mr. Miner?

A. Well, any witness, as soon as we retain them, we'll let you know.

MR. NEWMAN: I appreciate that.

QUESTIONS BY MR. COPELAND:

Q. Let's move on to contention number 11, which is flow-induced vibration. Can you describe for me what you mean by the term "flow-induced vibration"?

A. Basically, it refers to the fact that water is flowing within the reactor vessel through all of the components and around all of the components, and the flow of that water can cause the components to vibrate and so you might have some fatigue of the components, and a possibility of damage.

Q. Do you know if this is a problem that can be eliminated by design?

A. I don't know if it can be or not. I would think it's plausible, that it could be.

Q. All right, do you know of any situation where flow-induced vibration has actually occurred?