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) Flow-induced vibration of reactor components including jet pumps, spargers, fuel pins, fuel rods, in-core instrumentation and low range power monitors (LPRM's) has been studied extensively by General Electric. Information from the vibration tests and analyses and from experience at other plants has been used to improve the ACNGS design. (Affidavit, p. 2) For example, vibration of LPRM tubes at the Duane Arnold and Cooper nuclear plants were traced to bypass flow holes in the design of those plants. Bypass flow holes have been eliminated in the design of ACNGS. (Affidavit, pp. 6-7) Other design improvements of components will make them less likely to be damaged as a result of flow-induced vibration. (Affidavit, p. 7)

(2) The potential for vibration of ACNGS reactor internals will be further specifically assessed and remedied, if necessary, through the following sets of analyses and tests:

(a) A dynamic system analysis. This analysis, described in § 3.9.1.3 of GESSAR 238, analyzed flow induced vibration during normal operations, and is used in designing and testing of components, and for establishing pre-operational testing criteria. (Affidavit, p. 2)

(b) Flow tests, forced oscillation tests, and other physical tests of reactor internal components. These tests are used to verify design and are independent of the NRC testing requirements. (Affidavit, pp. 3-4)

(c) Prototype plant pre-operational and operational tests. Extensive vibration testing on the prototype plant (now designated Perry Unit 1) in accordance with Regulatory Guide 1.20 will be made to detect evidence of undesirable effects due to flow-induced vib.ation. (Affidavit, p. 4)

(d) Pre-operational testing at ACNGS. Testing of reactor internals of ACNGS in accordance with the provisions of Regulatory Guide 1.20. (Affidavit, p. 5)

(3) The vibration testing requirement of Regulatory Guide 1.20 for prototype 238 BWR-6 plants is expected to occur prior to operation of ACNGS. If another plant is the prototype plant, ACNGS will show compliance with Regulatory Guide 1.20 through pre-operational, non-prototype confirmatory tests. (Affidavit, p. 5)

(4) In the past, monitoring of reactor performance instrumentation has revealed vibration problems long before they are of concern.

(Affidavit, p. 6)

(5) ACNGS will have a loose parts monitoring system to detect any loose parts in the reactor. (Affidavit, p. 7)

(6) In the past, neither a loss of plant safety nor the inability to safely shut down the plant has ever occurred because of flow-induced vibration. (Affidavit, p. 7)

Doherty Contention No. 31/
Flow-Induced Vibration
of LPRM's

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STATION UNIT 1)

DOCKET NO. 50-466

DEPOSITION OF:

JOHN F. DOHERTY

Q Are there any?

A I am not certain.

Q Have you retained any expert witness or expert consultation?

A No.

Q Do you hold yourself out as an expert in design or installation of diesel generators?

A No.

Q And the same answer would then hold for the components of the diesel generator system?

A That's right.

Q Okay. John, I would like to now turn to your contention No. 31 on flow induced vibration of the LPRM's.

Now, would you explain to me what your understanding is as to the design function of the LPRM's?

A It gives information as to the power being given out at a certain location in the reactor core.

Q How does it acquire this information?

A I believe it monitors or gives the amount of radiation being emitted at that point.

Q The amount of radiation being emitted at that point?

A Well, at that locale.

Q What's the relationship between the radiation being emitted and the power level?

A The more radia. .n the more power.

Q Is it a direct linear function?

A As far as I know, yes.

Q What radiation are you talking about that it measures? Does it measure the whole spectrum of radiation inside the reactor core?

A It may only measure one product or one -- yes, but one would probably be enough. One isotope or one neutron.

Q What do you mean by one product?

A Well, one -- let's say one neutron. I'll be more clear. I think it measures neutron emission.

Q Now, you think it measures neutron emissions?

A Yes.

Q How?

A You got me. I don't know yet.

Q What is the instrument itself?

A What is the instrument itself?

Q Yes. You have any understanding of the instrument or is it to you just a black box? For example, what's its shape?

A I don't know its shape.

Q What's its size?

A It would have to be fairly small in order to fit into the fuel bundles or fit between the fuel bundles. I'm not sure of its exact location.

Q You don't know where it's located?

A Not with certainty, no. Apparently, it's located at the intersection of four fuel bundles.

Q What do you mean apparently?

A From this drawing here that I did.

Q You did this drawing?

A No. I put some -- I placed some drawings on that drawing and that's where I thought it to be.

Q You placed marks on the drawing and that revealed --

A Yes. The blue marks are mine.

Q Do I understand you to say that you placed marks on this drawing and that revealed to you the placement of the LPRM's?

A That sounds very mystical. At that time, I thought that's where they were and I put them in to remind myself of them.

Q You don't know where you got the inspiration for making these marks?

A Not at the moment, no.

Q So is it fair to say that you really don't have an idea about the location of the LPRM?

A No. It's unfair. I have some idea.

Q Okay. Where did you get this idea from?

A Apparently from reading the PSAR.

Q Do you know which PSAR section you read?

A No, I don't remember that.

Q Well, let's go back to your impression. What is your impression of its location?

A That it would be at the intersection, in a sense, of four fuel bundles, but it wouldn't be at an intersection where a control rod falls.

Q Would you describe the nature or size or shape of the geometric configuration of this inner section where the four fuel bundles would be?

A If you imagine four boxes looking down on them, each equally apart from each other, that would be it.

Q Four boxes -- you mean four square boxes? Is a reactor composed of little boxes?

A The fuel bundles are square when looked at it from above, yes.

Q What do they look like when you look at them

from a cross section?

A If you take a look at --

Q If you're looking at the reactor core in a cross section, what geometry is then revealed?

A If you look at the reactor core? In a cross section?

Q Yes. And in a longitudinal cross section.

A All right. That means up and down to me.

Q It does to me, too.

A Then you would see, depending on where you put your cut --

Q Let's put the cut near an LPRM, since it would help this discussion.

A Then you would see the fuel bundles.

Q What's the geometry of that?

A That's enclosed by a fairly light metallic sheet.

Q All right. So if you look at the core in this cross section, all you see is little cylinders; correct?

A No.

Q What else?

A You don't see any cylinders. If you follow this out, it would look like a row, I guess. It would almost look like a fence. It would have a

fence post kind of look about it, except it would be twelve feet in height and hard to see in detail unless you could stand back. Between each, you would see a small space.

Q And this small space is useful for inserting the LPRM's?

A No. Not every one.

Q How many LPRM's are there?

A I believe there are forty-eight.

Q Did you get this impression as to the number of LPRM's from the same inspiration that led you to the marks on the diagram?

A No. I don't think so, no.

Q Do you have a particular reference as to that piece of information?

A Yes. Page 7.6-27 of the PSAR.

Q That gives you information as to the number, supposedly? It gives you no information as to the shape, size or structure or geometry of the LPRM's; correct?

A Of what the LPRM itself looks like?

Q Yes.

A That page does give some description.

Q What is your understanding of the shape, size and geometry of the LPRM?

A Describe shape and size from geometry formation for me.

Q If you prefer that they not be distinguished, I'll ask just for the gecmetry.

A They have to be small enough to fit in the spaces

Q All right.

A I don't know their length, but I would have some idea of their other dimensions.

Q Your only familiarity with their actual physical appearance is that they must be small; is that the sum total of it?

A They must be small at least on two dimensions.

Q Is that the sum total of your familiarity with them?

A I have never seen one, so I think so.

Q Your contention has to do with the vibration of these particular mechanisms. Now, if you have no familiarity with their physical configuration, what leads you to the conclusion that they are susceptible to any vibration?

A There have been several -- there was testimony in regard to vibration of the fuel bundle channels given by some engineer from GE in February -- February 25th, 1976.

Q That was vibration of what?

A Of the channels as I understand it.

Q What are the channels?

A Well, the channels include the sheeting around each fuel bundle and, as far as I know, that would be the significant material that would strike an LPRM and cause any danger.

MR. NEWMAN: Does that testimony have anything to do with the LPRM's, the degradation of those LPRM's?

THE WITNESS: Yes.

MR. NEWMAN: What's the date and reference in which that testimony was given?

THE WITNESS: The date if February 25, 1976.

MR. NEWMAN: And the case?

THE WITNESS: It was testimony at the U.S. Senate.

MR. NEWMAN: Thank you.

Q (By Mr. Biddle) So the basis of your contention rests solely on this testimony given before the Senate; correct?

A As far as I know, yes. I don't have any other basis for it.

Q All right.

MR. NEWMAN: And it's your contention that that testimony deals with the degradation of LPRM's due to flow-induced vibrations; correct?

THE WITNESS: Yes.

MR. NEWMAN: Thank you.

Q (By Mr. Biddle) Can you tell me what the role of the LPRM is in preventing accidents?

A The LPRM senses deformities or whatever problems in fuel areas.

Q How does it do that?

A It picks up increased powering in a local area such that an operator can react and essentially control that area of the core without having to stop the whole contraption.

Q As I understand your answer, you say that it's used for operator information. I believe my question was: What role does it have in preventing accidents?

A Unless there was some way of sensing a local area problem, the local area problem might simply spread so that if -- if it can be detected early and in a particular place, an accident does not develop.

Q But it contributes only to the operator

information; correct?

A I think it may actually be capable of scraming the system.

Q But you're not sure?

A At the moment, I'm not sure that that alone would do it.

Q If the LPRM fails, does that mean that you have removed the capacity to scram the reactor?

A No. It means you remove the capacity to get the information in that locale.

Q If it fails, do you have -- does the operator have indicated to him the fact that he has lost that capacity?

A I believe, yes.

Q And then you -- can you indicate to me all the instances you know of where LPRM's have failed and that's led to accident situations?

A No.

Q You know of no LPRM failures?

A No.

Q You know of any LPRM failures by any cause or for any reason?

A I believe there have been some due to flow-induced vibration.

Q What makes you believe that?

A The testimony by the GE engineers to that effect.

Q Do you know for a fact that the GE engineers testified that flow-induced vibration has caused LPRM failure?

A Not for a fact, no. I am pretty certain it has, though.

Q Do you know of any other facts which led you to conclude that the LPRM's have failed because of flow-induced vibration other than by testimony by the GE engineers?

A I'm sorry. I was checking to see if I answered the first question correctly.

Q All right.

MR. BIDDLE: Would you read back the question?

(Whereupon the requested testimony was read back by the court reporter.)

A The answer is no. Not at this time, no.

Q But if you discover any through serendipity, you will inform us?

A I will inform you if I discover another situation where flow-induced vibration --

Q It's because of an LPRM failure?

A Right.

Q Does the LPRM have any role in mitigating the consequence of accidents?

A By that question do you mean the accident has already happened?

Q Yes, sir.

A Other than its information, whatever information it would make available, I don't think so.

Q And my next set of questions may seem a bit repetitive, but I want to clarify something.

Now, would you tell me what flow-induced vibration is?

A The flowing material is the coolant. It's pushed with a great deal of force with this kind of a motion (indicating). It's pretty much in's and out's.

Q Would you describe that motion for the record?

A That would be caused by the pushing of that material, that water, against fuel rod channels in such a way that they start to shake in some fairly small way.

Q Are you saying that the vibration is caused by the direct impingement on the water of the reactor?

A The word impingement sounds like a more direct word, but the movement of the water past these internals.

Q And it's just the movement of the water along the surfaces of the reactor internals which causes the vibration?

A As I want the contention to go, other things such as seismic activities, seismic events or vibrating external things would not be included in this.

Q I understand. I'm trying to understand the source of vibratory motion you're concerned with. Am I correct that this source is the flow of the water along the externals, along the external surfaces of the reactor component internals?

A Well, on the outside and through the bundles, too.

Q All right. But it's just the parallel flow that sets them vibrating; is that correct?

A No. It's not entirely true. It's all flows within that.

Q All right.

A Not all flows are parallel. There would be some hitting. It's not all in one direction.

Q Is there eddying and hitting, which I call impringement, on the LPRM's?

A There would be some, I believe.

Q How do you know that?

A I believe that the shape of the LPRM is not such that it goes entirely out of the water in the --

Q Excuse me. I thought you testified that you have no idea of what the shape was.

A When I get through thinking what you're asking, I believe that there was a top and a bottom within the reactor where the water would only have parallel contact with the LPRM.

Q All right.

A It would also be coming down on it. Not a great amount, but some.

Q It is your belief that that is true?

A Yes.

Q Is it your belief because it happens to coincide with your theory of what happens with flow-induced vibration, or because you have some idea of its shape?

A It's again sort of like a negative inference. I think I would know if an LPRM were another cylinder running the entire length of the fuel

bundle.

Q You think you would know that if it were true?

A Yes.

Q Why?

A Because I seen enough of these cross sections and never seen that.

Q So it's your belief that it's not a cylinder running the entire length?

A That's right. And it does have relevance to what I said earlier under oath.

Q If it were a cylinder running the full length, then it would not vibrate; correct?

A No. It might vibrate.

Q What would cause that?

A Well, it might vibrate because the reactor channels were vibrating. In other words, it's an attached part so it would vibrate.

Q It's attached to the reactor channels?

A It's attached to the fuel channels.

MR. NEWMAN: What's the source of your information on the design of the LPRM's, sir?

THE WITNESS: The fact on the design?

MR. NEWMAN: What's the source of

your information concerning your testimony just now regarding the dimensions of the LPRM's?

THE WITNESS: It's impossible to be specific about their appearance and so forth. I've mentioned where they would logically have appeared in drawings if they were of such magnitude. One of the things we discussed was that if that had appeared, I feel certain that I would have noticed.

MR. NEWMAN: So then your entire line of argument is based on a supposition? You don't have a reference to give to us; correct?

THE WITNESS: That's correct.

MR. NEWMAN: You don't have a text for us to look at?

THE WITNESS: No, sir. Not at this time.

MR. NEWMAN: Okay.

Q (By Mr. Biddle) If you could, John, just once more, just briefly describe for me how the flow sets the LPRM into motion.

A Okay. The flow -- it can do it in two ways. To hit the monitor itself and cause it to vibrate.

Q Does it do that?

A I believe it does.

Q All right. But you have no direct knowledge of that; correct?

A That's correct. And also hit the fuel channels to which the LPRM is attached.

Q If I might just interrupt you quickly there. Where is it attached to the fuel channel?

A Several places.

Q Along the whole length of the LPRM?

A Possibly. I don't believe so, though.

Q What is your belief as to where it's attached?

A Well, my belief is that it's not the full length of the fuel channel. My belief is it's attached -- I'm not certain where it's attached.

Q If it's not attached, then the vibration of your channel may be irrelevant to the vibration of the LPRM; correct?

A If HL&P introduces evidence that it's not attached then --

Q If HL&P indicates that they are not in contact --

A Not attached in some way --

Q Excuse me. Let me finish. Mechanical contact between the fuel channels and the LPRM would introduce vibrations; is that correct?

A Perhaps, through a spacer or a hole, or something.
Q A spacer or a holder rigging the spacer and the channel between the LPRM?
A Yes.
Q The presence of that spacer or holder would be the path whereby vibration of the fuel channel would be?
A Yes.
Q All right.

MR. NEWMAN: If that were not true, then the contention would be essentially moot?

THE WITNESS: No, because of the first part.

MR. NEWMAN: All right.

Q (By Mr. Biddle) Which is the impingement part of the flow hitting; correct?
A Yes.
Q Can you tell me how the LPRM signal is affected by this vibration?
A According to the GE engineer study, they make it unreliable. I don't know if it makes it high or low.
Q Would it make a difference?
A It would make a difference in the response to

it.

Q Which would be worse?

A I would think if it were reading low and it was high that that would be the more dangerous of the two situations.

Q Are you contending that vibration will in fact cause an erroneous low reading?

A Yes.

Q That is the basis of your contention on this signal portion?

A Yes.

Q So that if it causes a high signal, then there's no portion for your contention there; correct?

A No, there is some, but I chink the more serious problem is first.

Q What is the basis of your contention if it causes the signal to read high?

A If it were reading high, it would mean -- you know, and believed and followed as an indicator, it would mean, at least in the past, it would mean the closing down of certain areas of the core. I don't know -- I'll have to visualize a core like this. There is a balancing that apparently needs to be done. In other words, if one control rod is inserted down here

because of a problem, then the balance over here so there's the same amount of balance all around. I believe that if there was inadequate readings, readings being high when they are actually low, the reactor is being led -- the reactor crew is led into doing various acts that are needlessly moving them toward riskier consequences.

Q How do they move you towards riskier types of things?

A They may decide to shut down.

Q That poses a risk?

A I think so.

Q Why does shutting down cause a risk?

A It causes more reactions around the reactors.

Q What reactions are you talking about?

A Closing the -- shutting down. Having to look at whatever it is.

Q What risk is associated with the reactor shutting down?

A Doing reactor shut-down or start up, that is.

Q We're not talking about stored up.

A Well, you're going to have to start up after you shut down.

Q All right. Go ahead, then.

A Those are more critical times than general operation.

Q Why?

A Because that's when parts move that are normally not moving.

Q What parts?

A Control rods.

Q Control rods do not move during normal operation?

A Not that much.

Q What significance is the amount of traverse in control rod movement? Why does it pose more of a risk depending on how far the traverse?

A It's like anything else. The more operations that you have to put something through, the more possibility there is of danger.

Q The basis of your contention is that this can lead to movement of reactor parts which will wear them out?

A Wear them out or fail, whatever you want to use.

Q So that --

A It's an unnecessary use.

Q So that this contention leads to a further contention that Allen's Creek parts are not designed with a sufficient useful life?

A That's too broad.

Q Wasn't that what you just told me about what risks are associated with reactor start-up or shut down?

A Things are kind of getting far afield here.

Q Well, it's your contention, John, and I'm trying to find out what you're talking about.

A It's my belief that the unnecessary operation of the reactor just naturally brings in more risk.

Q So if I put these pieces together, you contend, based solely on testimony by the GE engineers before the Senate, that flow-induced vibration will produce LPRM failure, which will produce a risk of unnecessary operation in the reactor plant?

A Yes.

Q Is that correct, sir?

A Yes. And I will inform you of any other information.

Q All right. Can you identify for me any instances where signals from the LPRM have been affected by a flow-induced vibration?

A Not at the moment, no.

Q So you have none?

A I think there are some in that testimony.

Q But outside that testimony, you have no impression of there being any record of any such facts?

A I'm not certain.

Q You know of none right now; correct?

A At the moment I can't tell you any, no.

Q Do you want -- you will inform us if you find any; correct?

A Right.

Q What is the relevance of the radiation monitoring system listed in your contention?

A What is the relevance of it?

Q Yes. It appears to me that this radiation monitoring system just appears in the midst of the contention. It doesn't relate to anything.

A I see. This means that the LPRM's have some inaccuracy and that's the list.

Q Well, I understand the portion of the contention that has to do with the LPRM's. What is the relevance between LPRM's and the radiation monitoring system --

Well, what is the radiation monitoring system?

A The LPRM.

Q You are using radiation and LPRM synonymously?

A Yes.
Q There's no other radiation monitoring system as far as purposes of this contention --
A Yes. For purposes of this contention, yes.
Q All right. You just decided to change the name?
A I was kind of sloppy there, yes.
Q What is the relevance of 5.4 percent error which you listed in your contention?
A If that's to indicate -- that's to indicate -- it indicates the severity of any deviations caused by the flow-induced vibration that, in fact, a difference may be 5.4 percent more than the error.
Q The difference between what is -- it may be more than 5.4 percent of the error?
A Flow induced vibration -- if it has caused an error in the reading, then that reading may, in addition, be 5.4 percent off, because of the error that's involved in the normal operation of an LPRM.
Q Why is that significant?
A That makes the error possibility greater.
Q But then we're back into a discussion again that we just went through as to whether or not it gives you an error on the high side or low

side and that sort of thing; correct?

A Yes.

Q So you believe it to be just a reinforcement of your argument on signal inaccuracy and that of itself has no real importance; correct? You want to take the error by flow-induced vibration and add 5.4 percent; correct?

A When I wrote the contention, I wanted to be -- I was encouraging people to see that the error could be cumulative to the 5.4 percent.

Q What causes the 5.4 percent error?

A I don't know.

Q You have no idea whatsoever what introduced the 5.4 percent error?

A No. At the moment I don't, no.

Q Are they the same sort of thing that introduced the error by flow-induced vibration?

A I don't know for certain.

Q What's your basis for asserting that these in fact might be cumulative.

Q If the error could be 5.4 percent and none of the things that contribute to the 5.4 percent are flow-induced vibrations, then this maximum error could occur.

Q There's a double if in there. One has to

suppose that both of those if's have been true before that makes that statement correct, does it not?

A Yes.

Q Do you have any belief that either of those if's may in fact be manifest?

A There are no events where that has occurred to anyone's knowledge.

Q Not even in the testimony by GE engineers?

A I don't think the GE engineers talk about this error.

Q You just introduced that yourself?

A Yes.

Q Without any factual basis?

A Yes.

Q All right.

A That's in your PSAR report.

Q You're not certain?

A It's in there.

Q But you're certain it's in the PSAR and it says that LPRM's when operating normally are within 5.4 percent?

A I think that they were meaning that the LPRM gives a rough figure and that's the roughness of the figure.

Q So the LPRM's are normally not in error by any amount greater than 5.4 percent; is that correct?

A That seems to be what that indicated. I believe that's correct.

Q If the LPRM's are in error by 5.4 percent, what's the significance of it?

A It simply means that they are operating just out of design in some way. It could mean anything.

Q Or it could mean nothing; correct? You have no way of knowing?

A I don't know of the testing history or where they arrived at that figure, but if it's any kind of probability basing, it probably would mean that that's some very small amount of time that they would be --

Q Excuse me. You have any basis for that if?

A No.

Q Is it your understanding that the LPRM -- I have forgotten what you told me. There was a 20 to 40 in number?

A No. There are forty-eight.

Q All right. Forty-eight in number. Do they all fail together in the same method?

A Do they all fail together in the same method?
Q Yes. If one fails, do they all fail?
A No.
Q Can you tell me if anything significant occurs if one fails?
A If any significance occurs if one fails?
Q Yes, and you have forty-seven remaining.
A We're back to the information about locale. The other forty-seven can't tell you that.
Q What's the significance of losing information?
A You lose -- you lose one of your safety factors and one of the things would tell you -- it would tell you if there's a local overpower. You also lose the ability to know if there's a local overpower. If you lose an LPRM for some reason, that is.
Q Are you contending that the possibility of a local overpower can go undetected by the failure of one LPRM?
A Yes.
Q How is that?
A Well, you say could go undetected?
Q Yes.
A Oh, it might pick up a disturbance at that part -- it would pick it up later and not be as sensitive

to it and essentially would not be good information.

Q Is it your contention that when an LPRM fails, it fails totally and renders no information?

A It can.

Q All right.

A It may not necessarily. It might be better if it did, that way, you'd know. If you were running at 80 percent and it said 80 percent and dropped to zero, you would know what happened.

MR. NEWMAN: What's the basis of your statement with regard to the degradation that you just described of the LPRM's? Is that based on data?

THE WITNESS: I guess you're going to have to be a little clearer.

MR. NEWMAN: You just described various failures, modes of the LPRM's, and you described how they can degrade and what the significance is of degradation of various levels and I'm asking you what the basis is for your information concerning the mode of degradation and the failure of the LPRM at each step of the degrading mode just as you described it. I

want to know what the basis of your last statement was.

THE WITNESS: I know that they function to communicate local information in the reactor core.

MR. NEWMAN: But you have no basis for saying whether an LPRM can be partially degraded or whether as partially degraded it can still serve some useful function.

THE WITNESS: If -- I suppose it might be possible that someone would learn -- a particular power monitor in a reactor core might also run 20 percent off --

MR. NEWMAN: You're missing my point. What I'm trying to get at is the basis for the statement that you made before. You've described a failure mode. You've described the characteristics of the LPRM failures. I want to know if that's based upon your own observation, a reference to which you can refer us or an individual who might have told you about that or is this a matter that's developed out of your own supposition?

THE WITNESS: It's just a matter that's probably developed out of some reading

which I don't know at this point where.

MR. NEWMAN: You've read about that subject matter?

THE WITNESS: Yes.

MR. NEWMAN: Can you promptly furnish us a reference to the material that you've read so that we can have some help in preparing our case?

THE WITNESS: Yes. Let me see. What you want here is --

MR. NEWMAN: I want the reference.

THE WITNESS: Something that says --

MR. NEWMAN: That describes the failure mode of the LPRM's due to flow-induced vibration.

THE WITNESS: Whoa. Whoa. My understanding was that you wanted something that would -- I made the statement that they might not fail totally.

MR. NEWMAN: Correct.

THE WITNESS: And that's what you're concerned about?

MR. NEWMAN: Right. I want to know the basis of your statement as to the failure mode and the impact that the failure

mode has and the information on which the LPRM is designed.

THE WITNESS: Okay.

Q (By Mr. Biddle) Have you read the PSAR section on flow-induced vibration?

A I'm not certain.

Q You don't know whether you have or have not?

A I don't know.

Q Then you do not know whether or not they make any reference in there as to flow-induced vibration and LPRM's?

A That's right. I'm almost certain I haven't read anything about flow-induced vibration in the PSAR.

Q All right.

A It seems that I haven't.

Q You hold yourself out as an expert in this area?

A No, not now.

Q Do you intend to become an expert between now and the time of the hearing?

A Yes.

Q How are you going to establish your expertise?

A Just a little strategy that I'll have to work up.

Q Does that include reading the PSAR section on

flow-induced vibrations?

A I'll attempt to do that. I certainly should. If you assure me there is, I will.

Q All right.

A I'd appreciate a reference to that if you have one handy. It does save searching.

Q Well, we'll take that up after the deposition.

All right. John, let's turn to your contention number forty-one on water level indicators, if you would. Would you describe for me the water level indicator system at 3-Mile Island?

A At 3-Mile Island -- you know the date that I sent in that? It's really hard for me to find it.

Q It's marked as 8-10-79.

A Okay.

MR. COPELAND: Do you want to borrow mine?

THE WITNESS: Yes. I guess I should.

Q (By Mr. Biddle) Do you have the latest question in mind?

A Yes.

No, I can't describe that right now.

COST $ _____
PAID BY PLF. DEF.

TexPirg Contention No. 11/
Flow-Induced Vibration

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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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?

A. Well, the failure of the feed water S-P-A-R-G-E-R, in the boiling water reactor units from 1975 to 1976, this is -- also, I mentioned in the N.H.B. testimony before the Joint Committee on Atomic Energy, this could well have been due to flow-induced vibration, even though I don't know for a fact that that's the reason they occurred.

Q. You do not?

A. I do not.

Q. What is a sparger?

A. It's my understanding it's a pump.

Q. What happens when it fails?

A. The water flow is altered. I'm not certain of the full ramifications and consequences.

Q. Do you know what happens when the sparger failed at these plants that you mentioned?

A. No.

Q. Do you know if they took any design steps to solve the problem?

A. I don't know that, no.

Q. Do you know what kind of B.W.R. plants these were, where the problem occurred?

A. What kind of B.W.R. plants?

Q. Were they B.W.R.'s?

A. I don't think so, because there aren't any B.W.R.'s operating, as far as I know.

Q. Do you know what they determined to be the cause of the flow-induced vibration in those plants?

A. No, I do not.

Q. And you don't know what steps were taken to eliminate the problem?

A. No, I do not.

Q. Well, how could you possibly contend, then, that it's a problem with respect to the design of the Allen's Creek plant?

A. Well, it was our feeling that it should be brought up in the licensing process, and that we had brought forth sufficient evidence with sparger failures to at least require the applicant to respond to the contention so that it can be better evaluated.

Q. What if I told you it wasn't a problem?

A. Well, I would --

Q. What would you want to know?

A. I'd want to know why you say it's not a

problem.

Q. Because it was solved on the five plants. Do you deny that it was solved on the five plants that you've mentioned here?

A. I don't confirm or deny it.

Q. You don't have any idea, do you?

A. No, I don't.

Q. What's a jet pump?

A. I don't know.

Q. What's a fuel pin?

A. I don't know that, either, I know it's -- both of those are components within a reactor. I don't know.

Q. What happens if a fuel pin fails?

A. I don't know.

Q. Did it fail on one of these five plants?

A. As far as I know, no.

Q. What core instrumentation are you talking about here?

A. The instrumentation that's required to monitor the temperature and pressure within the reactor.

Q. Well, what does it look like?

A. I don't know what it looks like.

Q. Do you know the name of it?

A. No, I don't.

Q. How big is a fuel pin?

A. I don't know that, either.

Q. Have you ever seen one, do you have any idea?

A. No, I have never seen one.

Q. Where is the jet pump located inside the reactor?

A. I don't know.

Q. How big is it?

A. I don't know the answer to that question, either.

Q. Do you know where the jet pumps are located?

A. Not right offhand, I've seen a diagram which pointed it out, but I don't know that I could recall it.

Q. Are they inside?

A. They are inside the reactor, to the best of my knowledge.

Q. How big are they?

A. I don't know.

Q. What are the supports that hold it?

A. I don't know.

Q. If you don't know the supports, if you

don't know what any of these things look like or the supports which hold them, how can you contend that they have a problem with flow-induced vibration?

A. Well, if they are inside the reactor and there is some evidence that flow-induced vibration has damaged some of the elements, I think it's a reasonable assumption that other components may be damaged, too.

They could have a different lifetime and a different susceptibility to fatigue, and so I think different elements should come to the N.R.C.'s attention.

Q. Do you contend that the jet pump is going to vibrate in this plant, based on current design of the plant?

A. The contention is that there is inadequate assurance on that. I can't state that the contention says that flow-induced vibration is going to occur.

Q. You can't state that?

A. I mean is going to occur outside of what have been designed for.

Q. I'm sorry. I just don't understand. Is

it your contention that flow-induced vibration is going to occur in this plant because of its design?

A. Or that there is inadequate --

Q. No, sir.

A. -- knowledge that there is inadequate knowledge of whether it will or won't.

Q. My question is ver specific. Are you, TexPIRG, contending that flow-induced vibration is going to occur in this plant?

A. We contend that it's a possibility.

Q. Why?

A. Because of the evidence from the feed water sparger failures.

Q. Which occurred on plants that are totally different than this plant; is that right?

A. Well, they are not totally different.

Q. But they are different?

A. They are different.

Q. Do you know how the reactor core support plate was designed in that B.W.R. that is being discussed in your contention, do you know anything about it?

A. I don't know the details on it, no.

Q Do you know what, in fact, caused the physical phenomenon of flow-induced vibration to occur in those plants?

A I don't know specifically what caused it, other than -- no, I don't know specifically. I'd have to do more research to find that out.

Q So, at this time you don't know what caused it or whether it will, in fact, occur on the Allen's Creek plant?

A That's correct.

Q Let's go on to your next contention, number 12, on cable fires.

It's my understanding, Mr. Johnson, that this contention is based upon a document which was provided to the members of the board in this proceeding and all of the parties to this proceeding under cover letter dated October 30, 1978.

A Underwriter's Laboratory, right.

Q Sir, I'd like to have this marked as Exhibit No. 2, if that's the document which serves as a basis for your contention.