ORIGINAL

OFFICIAL TRANSCRIPT
PROCEEDINGS BEFORE

NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

DKT/CASE NO. 50-329 OM & OL
50-330 OM & OL

TITLE CONSUMERS POWER COMPANY
(Midland Plant, Units 1 and 2)

PLACE Midland, Michigan

DATE November 18, 1982

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

In the Matter of:		
CONSUMERS POWER COMPANY	Docket Nos.	50-329 OM 50-330 OM
(Midland Plant, Units 1 and 2)	Docket Nos.	50-329 OL 50-330 OL

Midland County Courthouse
301 West Main Street
Midland, Michigan 48640

Thursday, November 18, 1982

Evidentiary hearing in the above-entitled matter was resumed, pursuant to adjournment, at 9:15 a.m.

BEFORE:

CHARLES BECHHOEFER, Esq., Chairman
Administrative Judge
Atomic Safety and Licensing Board

DR. FREDERICK P. COWAN, Esq., Member
Administrative Judge
Atomic Safety and Licensing Board

DR. JERRY HARBOUR, Esq., Member
Administrative Judge
Atomic Safety and Licensing Board

APPEARANCES:

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C O N T E N T S

E X H I B I T S

	For Identification	Received
Stamiris Exhibit	36	9392
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CHAIRMAN BECHHOEFER: Good morning, ladies and gentlemen. Before we resume the cross-examination of Dr. Weeks, are there any preliminary matters this morning?

MS. STAMIRIS: Yes, I have a preliminary matter I'd like to raise with regard to my Contention 4, and I would like to say that both the Staff and myself have raised the issue of Contention 4 at different times and discussed it, and I think that as far as the Staff is concerned we have been proceeding in a logical and sensible manner for resolving the issues of Contention 4 by taking them on a piece by piece basis whenever the appropriate witnesses are on the stand, and the NRC has been careful to identify when they are putting witnesses on to address those parts of Contention 4. And, although we have talked around about the subject, I am not aware of a specific ruling by the Board or a specific position by Consumers Power Company as to how they plan to address Contention 4.

And the reason I say this is because I think I was operating, perhaps, on a misconception at one point when there were some Consumers' witnesses on the stand and I prefaced some of my questions by saying I'll let you know ahead of time that these questions are related to Contention 4.

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Now, whether or not that kind of statement is enough to make sure that, indeed, the questions and answers I got at that part of my cross-examination with a Consumers witness will relate properly on my findings to Contention 4 or if we need to have some kind of formal recognition of what Consumers position is with regard to Contention 4.

That's the reason I raise the issues.

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CHAIRMAN BECHHOEFER: It is our understanding that it really doesn't matter where in the record the testimony occurs or what labels are put on it, but it is relevant to a contention, and if the party wishes to use that testimony or part of the proposed findings, that is appropriate, and it really doesn't matter how it is labeled.

But it is also possible that if the system the Staff has been using will assure that they don't let anything fall between the cracks -- and I think the Staff's position is desirable in that the Board at least will know that the witnesses are addressing the particular contentions, but that does not preclude the Applicant from preparing their proposed findings based on any evidence in the record and to the extent it relates to Contention 4, their position of Contention 4 can be expressed that way.

So that, it really doesn't make too much difference to us. I think the Staff's approach makes it a little easier to derive from the record, the information concerning the contention. We haven't ordered either approach, but we did order some time ago -- I am not sure I have the order in front of me -- is that both of the proposed findings and the decision on Contention 4 would have been deferred from the first partial initial decision that we were contemplating and in which we are

not going to now issue.

But Contention 4 would be part of the soils decision that we do issue.

MS. STAMIRIS: Then should I simply use my own judgment as to whether there's a proper witness to address a part of Contention 4 from Consumers Power Company?

CHAIRMAN BECHHOEFER: Well I think you will have to -- that is about the only way you could do it.

MS. STAMIRIS: All right. Then what if there's a part of Contention 4 -- which I believe that Consumers Power Company has not provided a proper witness to answer my questions on -- or shall we cross that bridge when we come to it?

CHAIRMAN BECHHOEFER: Well the real problem is that they are not obligated to address any contentions.

If you wanted to -- if you, for instance, had a witness -- and I am sure they would respond -- but you could develop it through Staff witness or through -- and if the testimony went against Consumers' position and they didn't have a witness on it, well that's their problem.

MS. STAMIRIS: All right. But don't I --

CHAIRMAN BECHHOEFER: They would be stuck with it then. So when they put on their witnesses, they are supposed to present a pretty complete case, and presumably

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-- it is their responsibility to make sure that they can produce proposed findings on all of the contentions because --

MS. STAMIRIS: Do I not have a right of cross-examination of both Consumers' witnesses and Staff's witnesses with regard to Contention 4?

CHAIRMAN BECHHOEFER: Yes, you do, to the extent that they address it.

Your findings could say that the Board accepted a contention which says, thus, the Applicants presented no evidence on that; therefore, the decision should go in favor of your position on that because they're actually your proposed findings.

MS. STAMIRIS: Well how much weight would you give to that kind of a position on my part? I mean, are you saying that then because the burden of proof ultimately lies with the Applicant in this proceeding --

CHAIRMAN BECHHOEFER: That's right --

MS. STAMIRIS: -- that if there was a void of evidence, then I would say my contention would stand as --

CHAIRMAN BECHHOEFER: Yes. If none of the evidence in the record related to that --

MR. PATON: Mr. Chairman --

CHAIRMAN BECHHOEFER: -- that would be the result.

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result.

MR. PATON: Mr. Chairman, could I comment on this?

CHAIRMAN BECHHOEFER: Yes. But of course, the Staff's position, the Staff is presenting testimony on all of your contentions -- their evidence, but of course that would have to be taken into account, and the Applicant could rely on their evidence or you could rely on their evidence depending on how it goes.

MR. PATON: Mr. Chairman, I agree with your statement that's at the end of the record, that the Applicant or any party can go back and pick up any portion of the record they want to cite and claim that it relates to a particular contention and write their findings this way.

However, to follow a procedure in a case where we discuss issue by issue, the facts that are relevant to that issue, and to tell an uncounsel intervenor that we are trying Contention 4 and then get near the end of the case and then tell the Intervenor, Old Contention 4 is back there somewhere -- is to invite errors.

Now the Applicant has the burden of proof in this case, and I don't like following the procedure I am following. But I think that the procedure that is being followed is to invite error. I think if Ms. Stamiris goes on appeal and says, I was told we were deferring Contention 4 and told at the end of the case at which point the Applicant chose to say, Contention 4 is back there somewhere in that

8,000 pages of transcript, even though you weren't told that we were talking about Contention 4, is to invite error. I intend to proceed the way I am proceeding unless the Board rules otherwise even though I do not have the burden of proof.

CHAIRMAN BECHHOEFER: I have already commented that we certainly approve the approach you are taking; and obviously, if there's any question about whether you have been able to -- if the Applicant has not provided evidence that goes directly to whatever the point is in Contention 4, well we would have to rule either on the Staff's evidence or on a lack of evidence by the party which has the burden of proof.

MR. MARSHALL: Within the discretion of the Board at all times?

CHAIRMAN BECHHOEFER: Not discretionary. We will have a record and it will either have evidence in it or it won't.

MR. MARSHALL: Yes. The Board will make that judgment though.

CHAIRMAN BECHHOEFER: The Board certainly does not disapprove of the Staff's approach. We are not saying it is the only approach to take, but we would say -- I would say that we approve of it. I think in general we approve of it so that we are not saying that the Applicant

has to follow the same approach.

MR. STEPTOE: I have little to add to what the Chief Judge has said about this procedure; that we are in agreement you, sir.

I will simply point out that if you look at Dr. Peck's testimony -- you probably haven't had a chance to --

CHAIRMAN BECHHOEFER: Just from the stack.

MR. STEPTOE: Yes. There are footnotes throughout Dr. Peck's testimony which say -- addresses Stamiris Contention 4-A-1 and 4-A-3, so that I think Ms. Stamiris may find it easier going when she gets to Dr. Peck's testimony.

But I also don't believe this Board has ever said that we are deferring Contention 4; and therefore, Ms. Stamiris cannot ask any questions about her Contention 4.

I think what the Board said was that we are not going to issue a decision, apart from an initial decision with respect to Contention 4.

CHAIRMAN BECHHOEFER: Right, and I also think we said, don't file proposed findings from Contention 4 yet.

MR. STEPTOE: There certainly is no real restriction on Ms. Stamiris' ability to cross examine throughout this proceeding.

MS. STAMIRIS: No, but I might add --

MR. PATON: Mr. Chairman, can I take exception to that.

How is Ms. Stamiris going to cross examine on Contention 4 when she has no indication we are talking about Contention 4?

Mr. Chairman, there has been no indication that I have heard from the Board that we are treating Contention 4 any differently than any other contention. We have always, in this case, said, all right, what is the issue today? The issue today is piping or the issue today is Contention 6 or it is 7.

Now, all of a sudden, with an uncounseled intervenor, having been clearly led to believe that we are addressing other issues, there is no indication whatsoever on this particular contention that we are addressing this contention, she is all of a sudden told, it is back there somewhere.

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I am not supposed to have the burden of proof in this case, and the Board approves of what I am doing. I am putting in proof on an issue. Obviously, the Applicant has the burden of proof and I just -- I don't think this is the appropriate way to go but I am doing the only thing I can think the Staff should do.

CHAIRMAN BECHHOEFER: Right. Well as I was going to say, we approve of what you are doing. It isn't the only way of approaching it. We have not looked through Dr. Peck's testimony. It may cover Contention 4 in considerable detail.

MR. PATON: Well, may I inquire of you, Mr. Chairman, whether the Applicant is now saying that he intends to address Contention 4? Is that the contention --

CHAIRMAN BECHHOEFER: No. I understood the Applicant as having said that at least in part, Contention 4 is addressed by Dr. Peck. I have not looked at Dr. Peck's testimony yet, but the Applicant said that part of it was addressed in Contention 4 --

MR. PATON: Could we inquire whether the Applicant --

CHAIRMAN BECHHOEFER: -- which will be that week in December.

MR. PATON: Could we inquire whether the

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Applicant intends to address in the future Contention 4 in full?

MR. STEPTOE: By the end of the case, we expect that there will be an adequate record on Contention 4 and we expect that that record will include testimony from Applicant, whether it has been in the past or in the future. We expect our findings, in fact, to address every subissue in Ms. Stamiris' Contention 4.

Now in some cases, for example, today, if we could get on with Dr. Weeks' -- who is a nationally recognized expert on corrosion -- we don't believe we have to match every piece of evidence and every witness that the Staff puts in.

So all I can say is that Applicant's position is that the record will be complete.

MR. PATON: Mr. Chairman, that is a nonanswer. My question was whether or not the Applicant intends from now on to answer Contention 4 in full.

CHAIRMAN BECHHOEFER: Well I think the answer --

MR. PATON: The answer is clearly no.

CHAIRMAN BECHHOEFER: Yes, I think the answer was no, although I think they also said in large significant part, it will be answered in the future. But, I don't think they ruled out relying on other testimony as well. That is how I understood it.

MS. STAMIRIS: Judge Bechhoefer, the only thing that I am thinking of now is, since I was -- and I don't have the cite from the transcript -- but since I was told that we would defer Contention 4 until such time as we were talking about the technical issues as opposed to the QA and managerial issues we were examining last summer and in the fall, since I was clearly told that, truthfully, I put Contention 4 out of my mind to a certain extent -- well really, for purposes of this case, I put Contention 4 out of my mind at that time with the understanding that it would be addressed specifically at a later time in the proceedings.

Now if the Applicants have witnesses on -- when we were talking about issues that may in some way have indirectly related to Contention 4 when we were zeroing in on QA or management attitudes, and if he had something in the record that he was going to be relying on proving his case in relation to Contention 4, I was not aware of it at that time and I was not speaking in that way or asking follow up questions or pursuing what evidence was going into the record with regard to Contention 4, and proving my case for Contention 4.

And so, to that extent, I think I would then be, you know, there will be a certain limitation on my effectiveness in dealing with it the way the Applicant

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proposes.

CHAIRMAN BECHHOEFER: Well what I am not sure of is how much of Contention 4 will be covered in Dr. Peck's testimony. I gather they will not deal with corrosion but they are not going to -- we in effect have only one witness on most of corrosion, for instance, and you should organize your questions on corrosion for this one witness.

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MS. STAMIRIS: Well, I guess all I can do, then, at this point, because I don't have counsel or anyone to advise me on any other procedures at this point, I guess all I can do is hope that, indeed, it doesn't turn out to somehow throw the whole hearing record into question in the end.

CHAIRMAN BECHHOEFER: Right. Well, it will depend on the extent that the Applicant needs to go back to bring up other testimony on Contention 4. If 99 percent of it is still in the future, certainly from now on you should keep Contention 4 --

MS. STAMIRIS: Yes, I will.

CHAIRMAN BECHHOEFER: In fact, for this whole session, I think you have been on notice the Staff has been dealing with Contention 4.

MS. STAMIRIS: Right.

CHAIRMAN BECHHOEFER: And, certainly, for Dr. Weeks, to the extent his testimony bears on Contention 4, you ought to ask all your questions on that aspect of it.

Are there further preliminary matters?

MS. SINCLAIR: Is it possible to read the transcript during the break?

CHAIRMAN BECHHOEFER: If you have 15 minutes, you can do whatever you want in 15 minutes.

MS. SINCLAIR: Well, I need to borrow somebody's transcript.

MR. STEPTOE: Mrs. Sinclair, you can borrow ours during the break.

MS. SINCLAIR: Okay, thank you.

CHAIRMAN BECHHOEFER: If it's only yesterday's, you can borrow mine, too, but I didn't bring my others.

MS. SINCLAIR: Okay.

MR. WILCOVE: Mr. Chairman, the Staff has some supplementary direct testimony with respect to corrosion and underground piping, at which point I'd like to call both Dr. Weeks and Mr. Ronald Cook to the stand. Mr. Cook, I believe, has already been sworn in these proceedings.

CHAIRMAN BECHHOEFER: Okay.

JOHN R. WEEKS

RONALD COOK

called as witnesses by Counsel for the Nuclear Regulatory Commission, having previously been duly sworn by the Chairman, were examined and testified as follows:

DIRECT EXAMINATION

BY MR. WILCOVE:

Q Dr. Weeks, do you feel that you have any additions which you feel you need to make to the testimony that you gave here yesterday?

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A (WITNESS WEEKS) I have two, and the first one was brought to my attention that in the prefiled testimony, in the supplemental safety evaluation report, on Page 3-42, earlier in the proceedings the onission near the bottom of the page was noted. There's another omission near the top of the page.

It's in the first paragraph, on Line 9. The sentence starts out:

"The wrapping material consists of reinforced fiber glass followed by a,"

and, at that point, there's a sentence, there is a long phrase left out, and I want inserted at that point:

"Coal-tar saturated felt paper wrapping for the shop coated material --

CHAIRMAN BECHHOEFER: Can you slow up a little bit.

WITNESS WEEKS: Oh, sorry.

CHAIRMAN BECHHOEFER: I'm trying to write it down and I'm way behind you.

WITNESS WEEKS: I'm sorry.

CHAIRMAN BECHHOEFER: All right.

BY WITNESS WEEKS:

A (continuing) "Coal-tar saturated felt paper wrapping for the shop coated material, and by --"

JUDGE COWAN: Wait a minute. We can't write

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that fast.

WITNESS WEEKS: Oh, I thought you had it. That's what I just said. I thought you --

CHAIRMAN BECHHOEFER: I had only gotten three words of it.

WITNESS WEEKS: I'm sorry, sir. I will very slowly start over again.

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again.

BY WITNESS WEEKS:

A (Continuing) "Coal tar saturated salt tip wrapping paper for the shop coated material, by a --" and then it goes back to the rest of the sentence. In both cases it was simply a typist skipping a phrase when typing the page. And I didn't catch that one earlier.

My second correction or amendment is based on information given me this morning by Mr. Cook, the site inspector, and I really should turn this over to him at this stage.

MR. WILCOVE: Mr. Cook, will you first please state your full name and position with NRC, for the record.

A (WITNESS COOK) Okay, I'm Ronald J. Cook, C-o-o-k, Senior Resident Inspector at the Midland site for the Nuclear Regulatory Commission.

Q Mr. Cook, are you familiar with certain problems that have been experienced with the galvanic protection system at Midland?

A (WITNESS COOK) Yes, I am.

Q Could you please describe those problems for us.

A (WITNESS COOK) Yes. Okay, one of the problems that we have noted is that the anodes were encased in concrete.

How this was discovered was during some excavation for the water lines coming from the borated water storage

tank, at that time, I was in examining that piping and some other work going on in that area and did examine the anodes being encased in concrete, which, pertinent to my knowledge of how you would install anodes would indicate that that would reduce the conductivity capabilities of the anode with the ability to galvanicly protect the stainless steel piping.

I also noted that the lugs attaching the wires proved staimless steel piping in that area were heavily corroded. After wire brushing that, we found there was a stainless steel transition weld to a carbon steel lug. The carbon steel lug was heavily corroded, which would not be conducive for, I guess I would claim, adequate cathardic protection, as, perhaps, originally intended.

I also know that with the way the wires are laid through a construction site that you could indeed have periodic interruptions of the current because of damage to the wiring. Exact cases of this I can't describe at this time, but, you know, these are things that periodically do occur.

BY MR. WILCOVE:

Q Mr. Cook, if I may interrupt you, did you notice any corrosion of the piping due to the corrosion of the lug?

A (WITNESS COOK) No. In fact, there was oxidation

from the carbon steel attached to the piping, and, as we raked it off, if you will, brushed it off, the pipe itself had not become damaged at that time, okay? Whether it would have or not I couldn't really say, but I do know that when we removed the rust from the stainless steel pipe, the stainless steel pipe had not been damaged.

And I also can say that as I examined the rest of the stainless steel piping in that area the pieces that had been removed, they showed no sign of aggressive corrosion on them, probably because the quality of the soil is very conducive to not corroding pipings. Chemically there's very good soil in the area, at least from some of the tests that we've looked at.

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There's also one other area that we recently have noted. Our resident inspector, Mr. Bruce Burgess, came on-site in August of this year. He and a Dr. Ross Landsman were touring the site and had noted that the fuse links at the junction boxes at the north -- pardon me; it would be the south end of the Diesel Generator Building, they had noted that they had all been blown, or melted, if you will.

We examined the same box yesterday and found that they had been replaced. So we do not know at what time the links had been blown, but we do know that they're replaced at this time.

But the discovery of this or the note of this by the NRC has been since August, and we believe it was probably in the month of August.

JUDGE HARBOUR: Were these fuse links actually in the galvanized protection system?

WITNESS COOK: Yes, indeed.

I think that's just about all the conditions I remember.

BY MR. WILCOVE:

Q Mr. Cook, do you know if the galvanic protection system is currently operating?

A (WITNESS COOK) That I do not know whether it is or not. Our inspectors are checking on that now. I

hope that Dr. Ross Landsman has made it from the site to here with that information so that could be forthcoming. But I do not know that at this time, or what the status of it is.

I do know that it has been turned over to Consumers -- from Bechtel to Consumers.

CHAIRMAN BECHHOEFER: When you say that you saw no signs of aggressive corrosion, does that mean that -- did you see signs of any corrosion?

WITNESS COOK: Well, I guess I'd say no, but when you have rust overlaying in a dirt condition on top of a stainless steel pipe and then when you wire brush it off, you end up having a scuffing condition of the pipe, if you will.

I did not see anything that I would construe as being a pit or series of pits or as any wastage of the pipe.

But, you know, now, I didn't take any type of test to determine whether there had been any attack on the base metal.

CHAIRMAN BECHHOEFER: I see.

BY MR. WILCOVE:

Q Dr. Weeks, does what you have just heard from Mr. Cook change your position as to the adequacy of corrosion protection of underground piping?

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A (WITNESS WEEKS) As I stated yesterday, I believe that the -- we have three areas of protection for underground piping. The first was the quality of the fill used that would make it a relatively nonaggressive soil.

The second was the fact that either stainless steel piping, which is resistant to corrosion, was used, or that carbon steel piping with appropriate coatings and wrappings was used.

And the third was the galvanic protection system.

With regard to the galvanic protection system, I believe my testimony said that because of the other two I felt it was an additional insurance. It probably would not be serious if it were out of order for short periods of time.

I believe that's in my formal testimony.

The only thing that Mr. Cook has said that particularly concerns me at the moment is whether or not all of the anodes are buried in concrete or whether you just picked on one or whether they used a particular type of conducting concrete on purpose. I don't know that story yet. That I haven't heard about long enough to follow through with.

A (WITNESS COOK) Okay. Well, Consumers has

indicated to me that they plan on not using these anodes that are buried in concrete. There are several other ones that are buried in concrete. In fact, Consumers has a blueprint with them today that has some locations marked on them.

hem.

And they, I guess, realized that this would not be the most ideal condition for galvanic protection, so they're installing -- which I forgot to mention -- which they are installing a rather large number of anodes and different anodes throughout the site area.

CHAIRMAN BECHHOEFER: Do you know offhand whether there will be enough anodes that aren't encased in concrete to make the system work?

A (WITNESS COOK) Not at this time without thoroughly studying it, although I understand that the number is in excess of 100 anodes, which --

WITNESS WEEKS: But how many of those were in concrete?

WITNESS COOK: No, no. These are the ones that they're installing, additional ones.

WITNESS WEEKS: Oh.

CHAIRMAN BECHHOEFER: How many do they have to start out with, a total? Or don't you know?

WITNESS COOK: Oh, boy.

WITNESS WEEKS: Oh, boy. I could look that up. I don't know the number off the top of my head.

WITNESS COOK: I don't know the number.

CHAIRMAN BECHHOEFER: I'm just trying to determine what ballpark we're in.

Do you know a general estimate without --

WITNESS WEEKS: I had a number of 120 buried in my mind somewhere, but I have no idea where I found it.

WITNESS COOK: I think that's the number of additional ones.

MR. STEPTOE: Chief Judge Bechhoefer, we have staff with me here who is the site galvanic protection system engineer, and he can answer the question with respect to the number of anodes and the number that were encased in concrete. So, if that will be helpful, we can do that after these witnesses are finished.

(Discussion off the record.)

WITNESS WEEKS: I would appreciate that.

CHAIRMAN BECHHOEFER: In fact, maybe we should do that before further cross examination.

MR. WILCOVE: I think so.

CHAIRMAN BECHHOEFER: I think that would be a good addition to the record.

MR. STEPTOE: I'd like to take a couple of minutes to talk with Mr. Woodby before I put him up on the stand. Perhaps you want to continue with his cross examination and after our normal --

CHAIRMAN BECHHOEFER: It's a little early yet for that.

(Discussion off the record.)

CHAIRMAN BECHHOEFER: Maybe we should just take an early break now, because it might be useful in any further cross examination to have this information on the record.

WITNESS WEEKS: I think so.

CHAIRMAN BECHHOEFER: Why don't we take our break now.

(Brief recess.)

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CHAIRMAN BECHHOEFER: Back on the record.

MR. STEPTOE: Mr. Chairman, the Applicant would like to ask Mr. Woodby to take the stand and testify with respect to the galvanic protection system.

CHAIRMAN BECHHOEFER: Mr. Woodby?

THE WITNESS: Woodby.

Whereupon,

WILLIAM WOODBY

called as a witness by Counsel for the Applicant, having first been duly sworn by the Chairman, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. STEPTOE:

Q Mr. Woodby, would you state your full name for the record please.

A My name is William Scott Woodby, W-o-o-d-b-y.

Q By whom are you employed and in what capacity?

A I'm employed by Consumers Power Commission Plant and I serve as a test engineer for the technical department.

Q Would you briefly describe your educational background?

A I attended Michigan Technological University for four years; did not receive a degree.

Q And how long have you been in your present job?

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A I have been working as a test engineer for approximately two and a half years.

Q At the Midland plant?

A That's correct.

Q What are your responsibilities in this job with respect to the galvanic protection system?

A My function is working as a test engineer for the galvanic protection system is to do the initial inspection on it, check it out, place it in an operable condition and monitor it.

Q Can you tell us approximately how many anodes are there in the system at the present time?

A Currently installed, there are approximately 120; that is a rough estimate.

Q How many of these, to the best of your knowledge, are encased in concrete?

A I would say approximately 14. To get an exact record, I would have to go into my notes.

Q But you are confident that that number is approximately correct?

A That's correct.

Q Where are these concrete encased anodes located?

A They are generally located inside of the tank, primarily.

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Q That is near the borated storage tank?

A Yes, that is the borated water storage tank area.

Q Are any of them located in any other area?

A There are some located in front of the Diesel Generator Building which would be the south end of the building.

Q Do you have any records indicating where these concrete encased anodes are?

A Yes I dc.

Q Can you tell us how these anodes came to be encased in concrete?

A The site geotech engineer did not want to take any chances in Q-soil areas -- compaction -- so he asked for those to be put in concrete.

Q When you were installing these anodes, do you use concrete as back fill?

A Correct.

Q And this was at the request of the site geotechnical engineer?

A Correct.

Q And when did this occur?

A This occurred in the summer of '80. It was prior to me accepting this system.

Q And did that practice of using concrete as

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a backfill ever end?

A Yes it did. It ended almost as soon as it started.

Q Why did it end?

A People questioned on whether or not the concrete would act as an insulator and work as an insulator between the anodes and the piping itself.

Q And if concrete were to act as an insulator, that would defeat the purpose of the anodes; is that correct?

A That is correct.

Q Do you have any knowledge whether or not these concrete encased anodes are in fact insulated?

A The record that I have indicates that most of the anodes that are operating at -- that are encased in concrete are performing.

Q How do you know that they are performing?

A We take measurements with voltage meters and we calculate the current.

Q And if the current is high enough, then you know that the anodes were --

A If we are getting a high current, we are getting something out; if it is a very low current or very high current -- that does tell me that the anodes may either not be performing or shorting out someplace.

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BY MR. STEPTOE:

Q Are there any plans to replace the anodes that are presently encased in concrete?

A Yes, there are.

Q Could you describe them please?

A The plans are to abandon the anodes in concrete and install other anodes.

Q And can you tell me approximately the time frame when this is going to be done?

A This right now, under the current plans, will be the first part of '83 -- well the first part of -- as soon as the ground has thawed out.

Q Can you tell us how you are going to address the geotechnical engineer's concern about proper backfilling in compaction?

A The subcontractor that the Bechtel subcontractor is looking for is going to provide the information on how they plan the backfill.

Q And do you know approximately how they are going to do it?

A Currently under discussion, is the backfill -- coke breeve.

JUDGE COWAN: What?

THE WITNESS: It is similar --

MR. STEPTOE: That is an unfamiliar term, I think,

to most of these people.

THE WITNESS: Coke breeve is a type product of burning coal.

BY MR. STEPTOE:

Q And this is intended to achieve adequate compaction where the anode is being placed in the backfill?

A Compaction and conductivity.

Q Are there any plans beyond replacing these concrete encased anodes, to upgrade the galvanic protection system?

A Yes, there is. There are plans to install more anodes where we have added more utilities in the ground.

Q And aproximately how many more anodes are you planning to install?

A Currently, we have 130 anodes that are to be installed additionally, and we have just received a new design adding another 55, so we are talking about 190 in approximate number.

Q And this is going to take place in the spring?

A Again, in the spring.

Q So that will be in addition to the present system which has approximately 120?

A Correct.

JUDGE HARBOUR: Excuse me, did I understand you that approximately 190 will be added in addition to the 110

or something?

THE WITNESS: That is correct.

BY MR. STEPTOE:

Q To the best of your knowledge, -- well, Mr. Woodby, are you familiar when the system is energised and operating and when it is not?

A Yes, I am.

Q Has it ever been periodically not operating in the past?

A Yes. The last time it was taken out for any time, for any length of time it was starting from about the first part of February of '82 continuing on through August of 1982.

Q And why was it taken out of service?

A It was taken out of service for soils work and workmen's protection. The reason for the workmen's protection is that the cables for anodes are energised and the workmen have the right to say, I do not want to be working around this place, please take it out. Electrically energised.

Q To your knowledge, has the system ever been turned off for any extended length of time inadvertently due to a blown fuse or anything else?

A No.

Q And so you would know that that was during the

time frame -- during the time that you were at the plant, you would know if that was the case?

A Yes, I would.

MR. STEPTOE: I have no further questions by way of direct examination. I tender this witness for cross examination on the subject of the galvanic protection system.

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CHAIRMAN BECHHOEFER: Ms. Stamiris?

CROSS-EXAMINATION

BY MS. STAMIRIS:

Q Mr. Woodby, when you just testified that, to your knowledge, the galvanic protection system was never inadvertently off from the time that you were at the site with the present responsibilities, how -- by what method would you know if it was somehow off?

A Right now, the system is inspected twice a month. And I make an inspection just going through the plant with -- maybe every day --

Q So if --

A To say it was on 100 percent of the time, I cannot say that.

Q Have you personally been in charge of the -- I can't remember whether you said twice a month or every two months -- twice a month inspections?

A Twice a month.

Q Have you personally been in charge of the twice monthly inspection of the galvanic protection system for the time that you had the responsibilities that you described this morning?

A You mean directing activities?

Q Yes.

A Yes.

Q How long have you been in charge of inspecting the system twice a month?

A I started this around December of 1980. Prior to that time, someone else.

Q Do you know when the galvanic protection system was first operating?

A Just a second.

I have some data taken on 11-18-80, so it would be around the middle of November, 1980. That is what I have.

Q Can you tell me the source of that data? Can you give me a number for the report or letter or whatever you read that from?

A These are my personal notes.

Q All right. When you were speaking about the anodes which were encased in concrete, at the borated water storage tank and in some other areas -- well I will refer you specifically to the ones at the borated water storage tank.

Would those anodes which were encased in concrete, was that in -- I can't think of the right word -- was that in correspondence or did that meet all the applicable design requirements or technical specifications for the -- for the system at that point?

MR. STEPTOE: I will object to Ms. Stamiris

asking him for an opinion on quality assurance matters. It is just not clear what the point of the question is.

MS. STAMIRIS: Well Mr. Woodby is in charge of the galvanic protection system. I would assume that he is aware of whatever technical specifications or design requirements apply to that particular system, and that's what I'm questioning him about at this time.

MR. STEPTOE: I withdraw the objection.

BY MS. STAMIRIS:

Q Are you aware of the applicable technical specifications or design requirements for --

A Yes I am aware of them.

Q -- the installation and application of those anodes?

A Yes.

Q And did the encasement in concrete meet all of those specifications?

A Yes they did.

Q Well if it has the ability to reduce the protection, you know, if it has the potential to reduce the protection of the system by virtue of it being encased in concrete, how could that be in correspondence with the design specifications for that system?

MR. STEPTOE: I will object at this point. This is a period of time the witness testified was prior

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to his arriving on the site.

MR. MARSHALL: I agree.

MR. STEPTOE: And in addition, it seems to me to be an irrelevant path of cross-examination since in fact the witness has said that even though encased in concrete, the anodes are working; there is current going through them.

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them.

(Discussion off the record.)

JUDGE COWAN: May I ask what voltage is applied to the anodes and what current do you observe when you are testing?

THE WITNESS: The voltage will change depending on the number of anodes you have on the system and also how much of the current you want to impress on the system, and this would depend on the voltage. The voltage varied.

Right now, we are trying to place approximately one-half amp to one amp of current on each anode.

JUDGE HARBOUR: Can you tell me if you have a comparison between the concrete embedded anodes and the anodes that are in direct contact with the soil as to what the test values are?

THE WITNESS: One encased in concrete would be about .7 amps; the one not being encased in concrete, between .86 and .84.

JUDGE HARBOUR: Thank you.

BY MS. STAMIRIS:

Q I would like to go back to my question. There was an objection to my question but I feel very strongly that this witnesss, on the basis of the responsibilities that he has described to us and within the limits of the testimony that he is supposed to give this morning, should be able to answer whether the encasement of these anodes

in concrete does or does not meet the required design specifications and technical specifications for the installation application and usage of these anodes.

MR. STEPTOE: Judge Bechhoefer, the answer to that question -- what she was asking him next was how could these technical specifications and so forth come to be drawn, and that applies to a period of time when he was not present on the site.

MS. STAMIRIS: That's right: I'm sorry.

Did you answer that it did meet the design and technical specifications?

THE WITNESS: Yes.

CHAIRMAN BECHHOEFER: Well, wait a minute. In one, I thought you had said that for most of them, it did; but for some of the 14 anodes, it didn't, and maybe you can clarify that. Maybe I misunderstood.

MR. STEPTOE: I thought he was talking about the current being measured, the anodes encased in concrete appeared to be -- most of them appeared to be working.

CHAIRMAN BECHHOEFER: I want him to define a little bit what that "most" meant. Did that mean that some weren't working or that all weren't working quite well enouch or what does that mean? Were there any particular ones that you found that weren't working or aren't working as the case may be?

THE WITNESS: I can say that all those that are not working for reasons that are very obvious, that the anode lead has been disconnecred, cut, because of digging around the area.

THE WITNESS: Do you know which of the 14 of those would be-- is it possible to define in a particular area where those --

THE WITNESS: It is possible. Right now, some of them are exposed that are encased in concrete.

MR. STEPTOE: I think perhaps one might ask the witness what happens when he finds one that is not working.

CHAIRMAN BECHHOEFER: Right, then you could --

THE WITNESS: If you can find one that is not working, you make a note of it, document it and have it repaired.

CHAIRMAN BECHHOEFER: And that repair work -- did the repair work -- has the repair work contemplated the placement that you talked about or has there been ongoing repair work?

THE WITNESS: It is planned.

CHAIRMAN BECHHOEFER: I see. So those ones that are not working have not yet been repaired.

4-5 THE WITNESS: Right.

BY MS. STAMIRIS:

Q Mr. Woodby, going back to the question that I have asked you when you said that the encasement of these anodes in concrete did meet the design and technical specifications, then I ask you, to tell me why -- if you have -- I would like you to respond by disagreeing or agreeing with that statement, that by virtue of your response, that letting these anodes being encased in concrete, did meet the design and technical specifications, then we can understand that the design and technical specifications allows a condition which could reduce or negate the performance of the very system that they are meant to control --

MR. STEPTOE: Objection.

MR. MARSHALL: Exception.

MR. STEPTOE: Same objection I made before. She is asking him about the process of the design process for a period of time that he wasn't on the site, and she is asking for speculation.

MR. MARSHALL: It is within the scope of his technical knowledge and expertise.

(Discussion was had off the record.)

CHAIRMAN BECHHOEFER: We will sustain the objection but we think Dr. Weeks could answer your

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question because he is more concerned with the theoretical design of the system, and I think that is what your question goes to.

MS. STAMIRIS: Well I think my question goes to more than the theoretical. I would like to ask Dr. Weeks this question with regard to the theoretical adequacy of the system. But with regard to the specific design aspect at the Midland site, I hope -- I don't know whether Dr. Weeks will be able to answer that specifically and that is what I am interested in here. I will just add that the reason that it seems so very basic to what we are concerned about here is that if the specifications can allow that type of a degrading condition, then what assurance do we have that concrete isn't elsewhere on the site and --

(Discussion was had off the record.)

JUDGE HARBOUR: May I ask you a question Ms. Stamiris about your question, and that is, are you concerned about the construction specification allowing or not allowing the use of concrete enbediment to the anodes?

MS. STAMIRIS: Yes, I am concerned with that; or, it allowing any other possible degrading condition.

JUDGE HARBOUR: I think he is already testified

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that he has tested these and the values he gave us for one example, at least, indicates that the concrete embedded specimens was performing within the range of the ones that were directly embedded in the ground.

MS. STAMIRIS: I understand that but that address is the specific instance rather than the generic concern which I am going towards.

JUDGE HARBOUR: Do you know what kind of specifications -- can you be more specific --

MS. STAMIRIS: I would like to ask him -- no, I can't delineate what types of specifications I'm going after, but I would like to ask him --

JUDGE HARBOUR: It is very difficult for him to answer the question if he doesn't know what kind of a specification --

MS. STAMIRIS: Can I ask him what specifications applied to the installation of the anodes?

JUDGE HARBOUR: All right.

MR. STEPTOE: Judge Bechhoefer, it seems to me that if Ms. Stamiris wants to ask about whether the system is working or what our records are with respect to how many of these anodes are encased in concrete, those are questions that the witness is prepared to answer. But, she is asking him about the design process of drafting specifications especially for a period when

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he was not on the site.

It's just an inappropriate line of cross-examination. It is asking the witness to speculate. Her real concern is whether the galvanic protection system is working, which is the only legitimate concern at this point. And she can ask those questions.

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question.

MS. STAMIRIS: Well, obviously, that is my concern and my legitimate concern is whether and to what degree and when the galvanic protection system has been working. Those kinds of questions are my ultimate concern. I thought that this witness could tell me what the technical specifications are to which these anodes, this criteria to which they were installed and applied.

I would like to ask him that. And if he could tell me those, then perhaps it would give me some better idea as to how broad ranging they are to cover generic concerns.

CHAIRMAN BECHHOEFER: I think if the witness knows he may answer. He may well not know but let's find out.

THE WITNESS: Can you repeat your question, please.

BY MS. STAMIRIS:

Q Yes. What are the technical specifications or the design specifications which form the basis or the criteria for applying and installing the anodes for the galvanic protection system?

A I do not make design specifications; I test them.

Q I understand that you are not responsible for writing them but do you know what they are that applies --

A I do know what they are; I can't quote them for you right offhand because I don't have the specifications

in front of me and I do not do guesswork.

CHAIRMAN BECHHOEFER: Would you know whether or not they would have committed -- encased in concrete that actually happened?

THE WITNESS: There is a specification sheet specifying concrete encasement; I do know that.

BY MS. STAMIRIS:

Q Well, if you do not -- am I correct in understanding that you do not have any quality assurance or quality control responsibility for checking these -- no, I don't want to ask that -- to

I want to ask you what responsibilities do you have in seeing that these anodes are installed and applied in correspondence with the applicable criteria?

A Installation, I do not know that construction. I verify that the installation is correct after it has been done.

Q If you verified that installation, then do you have some QA or QC responsibilities?

A Testing is a form of QA.

Q So can you give me an idea than, what department you are in in relation to your QA or QC responsibilities?

A From the technical department.

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Q Are you a quality control engineer?

A No, I am not.

Q Are you a quality assurance engineer?

A No, I am not.

Q Do you work under a quality control --

A Yes, I do.

Q -- engineer? And who is that?

A We work -- we are under the guidance of the Midland Project Quality Assurance Department.

Q Who is your direct supervisor in quality control?

A I don't think that's the right question to ask.

MR. STEPTOE: I think what the witness is saying is that he's not a member of the quality control group and he doesn't work for them, but he works under their guidance. They check his work.

Is that what the witness is saying?

THE WITNESS: That's correct.

BY MS. STAMIRIS:

Q Well, I'm confused. Could you like walk me through what the chain of command would be from when whoever installs these anodes installs them, then who looks at them next and where you fall in this chain and where it ultimately ends up?

A I cannot go through the construction side of

the house. There are too many people there that are involved.

Q Well, can you start at who installs the anodes and then where you come in and how it gets to --

A The assistant field engineer for the construction site is responsible for that portion. Now, all he is doing is directing the work and having the work activities completed.

After that, you have your work crews that will go out and perform the work.

Q Well, who has responsibility for the correctness of the galvanic production system, you or someone in quality control or quality assurance above you?

CHAIRMAN BECHHOEFER: Are you speaking of installation now, or operation?

MS. STAMIRIS: Well, I'll say installation.

BY THE WITNESS:

A This isn't a Q-system or Class 1-E system.

BY MS. STAMIRIS:

Q Well, if it failed, wouldn't it have safety related consequences?

MR. STEPTOE: That's a question beyond the expertise of this witness on that topic. Dr. Weeks can talk about --

BY THE WITNESS:

A I think you're asking me to speculate, and I won't.

JUDGE HARBOUR: At any rate, he has testified it is non-Q-system.

CHAIRMAN BECHHOEFER: If you get a report, and when you fill out your reports on how the current various anodes produce, what do you do with the reports? Do you give a copy to MPQAD or --

THE WITNESS: No, I do not. That record is on file.

CHAIRMAN BECHHOEFER: Well, what do you do with it?

THE WITNESS: Well, it's logged int the document control center.

CHAIRMAN BECHHOEFER: Does it just stay there, then, waiting for some stray soul from MPQAD to maybe look at it? What happens when you find that one anode is not working?

THE WITNESS: If I find that one is not working, then I initiate action to get it repaired.

CHAIRMAN BECHHOEFER: I see. And that goes to where?

THE WITNESS: That goes to what we now call the general services organization, and they will repair

it.

CHAIRMAN BECHHOEFER: I see.

BY MS. STAMIRIS:

Q Mr. Woodby, is it your knowledge with regard to your expertise with the galvanic protection system that -- could this system go off for a period of time and then, you know, for some reason, and then come back on? I mean, without damage to the system?

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MR. STEPTOE: Inadvertently, you mean, Mrs. Stamiris?

MS. STAMIRIS: Yes.

BY THE WITNESS:

A What do you mean by damage?

BY MS. STAMIRIS:

Q Well, what I mean to say is if the system went off for some reason would it necessarily stay off?

MR. STEPTOE: I think Mrs. Stamiris is asking whether the thing could go on and off --

THE WITNESS: Inadvertently.

MR. STEPTOE: -- inadvertently, without your knowing about it.

BY THE WITNESS:

A No, I don't think it would.

BY MS. STAMIRIS:

Q Well, I thought you said that --

A Well, what do you mean by inadvertent? Would you clarify that, please.

Q Well, I think we could leave out the word inadvertent, if that's difficult. But could the system be nonoperating at cne point in time and then be operating at another point in time?

JUDGE COWAN: I think what she's asking is when this system, for any reason, goes off for a parity

of time, be it short or long, when it comes back on again, is it still fully functional or has it had some decrease in its abilities because of the fact that it was off.

THE WITNESS: No, if it goes off and we turn it back on it will perform the way it was.

BY MS. STAMIRIS:

Q Thank you. And to try and specify, that was part of my concern, and the other part would be, if it goes off, could it come back on again by itself?

A I doubt that very seriously, unless there's something wrong with the piece of equipment.

CHAIRMAN BECHHOEFER: I assume you mean if it goes off without having someone turn it off?

MS. STAMIRIS: Oh, yes.

JUDGE COWAN: Well, I tried to help her before; I'll try to help her again, because I know what she means.

If the thing goes off, does it have to be reset before it can come on again, or will it just come on again at some time by itself?

(Discussion was had off the record.)

JUDGE HARBOUR: Can you try to answer that question?

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BY THE WITNESS:

A If the system breaks, it will not come back on unless it's repaired. If it is taken off and brought back on, then it will come back up to the way it originally was before it went to the out condition.

JUDGE HARBOUR: Can there be periods of nonoperation, in your opinion? Do you think that this system could have periods of nonoperation without you or someone else knowing about that nonoperational period?

THE WITNESS: Yes, because I don't watch it 100 percent of the time. If I would stand out there and watch it, then I would know it was on all the time. But I don't stand out there and watch it.

JUDGE HARBOUR: But it would have to be either purposely turned off or have some problem that repaired itself, is that correct?

THE WITNESS: Uh huh.

JUDGE HARBOUR: And, in your opinion, and in your experience, have you ever seen the system develop problems which then repaired themselves?

THE WITNESS: Never.

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never

BY MS. STAMIRIS:

Q Well, could there ever be such a thing as there was some kind of an electrical short or outage for a temporary period and it was off for an hour and then it came back on?

A Yes, we do have outages.

Q Well, then, it --

A But when you get down to the outage and bring the system -- return whatever piece of equipment, it doesn't come back on.

Q Right, but, then, when you say that you cannot be assured that it was on 100 percent of the time, what I'd like to ask you now is -- all right. Because of the testimony you've just given, when you check it twice a month, that gives you assurance only for those two days of the 30, for the time you were checking it, and what assurance do you have about the other 28 days of the month as to how it was operating?

MR. STEPTOE: Judge Bechhoefer, I think that the witness responded to Judge Harbour that the system doesn't come back -- doesn't repair itself and come back on its own free will.

In addition, Dr. Weeks has already testified that the system could be off for a period of up to six months. So it seems to me that this line of

cross-examination is immaterial.

MS. STAMIRIS: Well, I do want to disagree with one thing that Mr. Steptoe just said, because his witness also said that there are power outages where it can be off temporarily and back on without direct action by the person to reset it or something else. And so then that does leave open the question of the other 28 days of the month.

MR. WILCOVE: I might also clarify that Mr. Woodby testified that he keeps track of the system to make sure that if it does go off for a period of time on his inspection he will look at it and see it's off and then take whatever corrective actions are necessary.

MR. STEPTOE: I think Mr. Woodby did say he goes through and looks at it every day, or every other day. But Mr. Woodby also, I think, disagreed with your characterization of his testimony about whether the system could come back on by itself.

BY MS. STAMIRIS:

Q Would you explain?

A What I was getting ready to say, when you said go through outages, I am notified that there is an outage coming up, and they ask me if it is okay to take that system off. So I am concurrent, or I am aware of the system being taken off.

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Q Well, can't there be outages that were unplanned?

A Yes, there can be outages unplanned.

Q Well, have you -- first you said that you checked it twice a month, and now you're saying that you look at it daily. I mean, I'm confused as to how often it is checked and what degree of assurance that check provides.

Can you add anything?

A It is checked twice a month. Data is taken, it is checked. When I'm around it, it's just to make sure the system is operating. There I go through and I check to make sure the equipment is energized and that I am placing a potential and current on the system.

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system.

Q Can you tell me why the use of concrete backfill around these anodes was discontinued and why they are being replaced?

MR. WILCOVE: I object. I believe that was already asked and answered on Mr. Woodby's direct examination.

(Discussion off the record.)

MR. MARSHALL: I see no reason why he can't answer it.

CHAIRMAN BECHHOEFER: Well, he has answered, and we'll sustain the objection.

BY MS. STAMIRIS:

Q Okay, when you know that they're performing -- you said you know this based on volt meter readings -- so, are you using the volt meter when you examine it twice a month?

A Yes, I am.

Q And does that conform to a design specification or some kind of requirement that it be examined twice a month?

A There was no design specification saying that I can monitor it twice a month.

Q Is that your own judgment as to how often --

A It came from general office asking me to monitor it twice a month.

Q Can you specify any more what the general office

is?

A General office for Consumers Power.

Q Well, do you know whether that frequency was set forth in a specification?

MR. STEPTOE: Judge Bechhoefer, this cross examination seems to me to be not really very helpful to the issues that we have before us.

What does it matter who told him to check it twice a month, as long as he is checking it twice a month.

MR. MARSHALL: It does matter.

MS. STAMIRIS: Well, I'd like to be able to pursue at some later time with the appropriate witness if there are any quality implications here, and perhaps there aren't if it's a non-Q system. But it seems like there's a relationship to safety that's very obvious with this galvanic protection system.

I don't have other questions, but I still want to ask about the volt meter readings which are taken twice a month as assuring that it is performing properly at the time you are checking it but it does not provide assurance for the in between times or the other 28 days of the month. Does it?

MR. STEPTOE: Objection. I still think that's a mischaracterization of what the witness has said. He checks it every day or every other day, and then he does

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an inspection twice a month.

Is that right, Mr. Woodby?

THE WITNESS: That's correct.

BY MS. STAMIRIS:

Q Do you check it, let's say, every other day with a volt meter?

A There is a volt meter on the rectifier itself.

Q So, then, you visually inspect that volt meter every other day?

A Correct.

MS. STAMIRIS: Okay, I don't have any more questions.

CHAIRMAN BECHHOEFER: Are your twice a month inspections -- I take it they're not on consecutive days, they're separated by a couple of weeks --

THE WITNESS: They are separated by a couple of weeks. They are scheduled activities.

(Discussion off the record.)

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CHAIRMAN BECHHOEFER: Mrs. Sinclair?

MS. SINCLAIR: Yes.

CROSS-EXAMINATION

BY MS. SINCLAIR:

Q Are you replacing all of the anodes that are already in place with this coke breeve? Or are you leaving the anodes that are encased in concrete as they are and just having coke breeve for the new anodes that you're installing?

A If you're asking if I'm going to replace all the anodes, no, I am not going to replace all the anodes. I will replace the anodes that are encased in concrete.

Q All right. Have they been performing satisfactorily to this point?

A Yes, they have.

Q What is the reason for changing, then? You know, replacing the anodes in coke breeve. If they had been performing satisfactorily, I would just like to know why you are making a change.

A With soil conditions changing the moisture content and concrete and how it acts, or can act while it's dry, as an insulator, and with the dewatering system installed, knowing that the moisture of the soil may decrease, we're not sure, we just want to go ahead and replace them so we do not have any questionable

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anodes.

Q I see. Would that raise a question about the anodes encased in concrete at the present time, then, and the performance?

CHAIRMAN BECHHOEFER: I'm not sure I understand.

THE WITNESS: I don't understand the question.

BY MS. SINCLAIR:

Q Well, he explained that the dewatering system and the soil -- and the soil conditions, as I understand it, were the reason that you are going to coke breeve for the new installation instead of concrete. Is that correct?

A I don't think that's what I said. Those are some of the words that I used. I'm saying that the dewatering system is -- it may change the soil moisture content in allowing conductivity through the concrete, or the effectiveness of the anodes.

We can't make that determination because we've never been able to operate the system under dry soil or dry concrete, and I can't go down there and look at all the anodes that are buried in concrete because they're basically buried.

Q Well, I guess I just want to know, if you're making a change to coke breeve, my next question was -- the corrollary to that is if they're making a change for

special conditions how do they know that the ones that are already installed will perform adequately?

I mean, you're making a change; there must be some reason for it.

CHAIRMAN BECHHOEFER: He has said they're not going to rely on the ones that are already installed once they change it. That's the whole point.

JUDGE COWAN: That's what he said.

CHAIRMAN BECHHOEFER: They're going to rely on the new ones.

MS. SINCLAIR: Oh, I see. I thought he said the new ones were in addition to the ones they already had.

CHAIRMAN BECHHOEFER: Well, they're not going to tear out the old ones.

JUDGE HARBOUR: But he said that -- he did testify they would abandon those that are currently embedded in concrete.

CHAIRMAN BECHHOEFER: Right.

BY MS. SINCLAIR:

Q Who develops the specifications for the anodes and how they should be handled? Do you know where they come from?

A The AE for the Midland plant?

Q Yes.

A That's who.

who

Q I see. Well, I thought they were a code of some kind; like, you know, an electrical code that everybody uses.

A No, there is not an electrical code for that.

Q Well, what's interesting is that there have been other plants built where this galvanic system had to be in place, and it seems like this seems to have been an entirely experimental way in which the specifications have been developed here, because we're not relying on --

MR. WILCOVE: Mr. Chairman, Mrs. Sinclair is testifying into the record now.

CHAIRMAN BECHHOEFER: Yes, I don't think a statement of that sort is appropriate. You can get a witness up to say that, perhaps.

BY MS. SINCLAIR:

Q Why do you expect better performance with coke breeve than with concrete?

MR. STEPTOE: I'll object. That has been asked and answered.

MR. MARSHALL: I'll take exception to it. I don't recall that she ever asked the question and had it answered.

MR. STEPTOE: I believe I asked the question and the witness's answer was that the coke breeve would provide adequate soil compaction and also adequate conductivity. I believe that's what he said. It was the last

question I asked on direct.

CHAIRMAN BECHHOEFER: Yes. I don't think the answer was in terms of better performance, but I don't think there's any intent to obtain better performance, it's just to obtain continued performance -- continued reliance that the anodes would perform.

I don't think it's a question of better. Anyway, I think those have been answered.

MS. SINCLAIR: Okay. I don't think the question is clear to me, but I have no further questions. Or the answer isn't clear to me.

CHAIRMAN BECHHOEFER: Mr. Marshall?

MR. MARSHALL: Yes, I have one or two questions, as usual.

CROSS EXAMINATION

BY MR. MARSHALL:

Q On your examination, Witness, you testified that all of this construction had taken place before your arrival upon the job. Is that true?

A That's correct.

Q Would you tell me what company had done the installation? To the best of your knowledge.

A The person that is hired for the general contractor, which would be Bechtel.

Q I didn't hear that last word.

A The general contractor, I said, was Bechtel.

Q Thank you. Now, Bechtel's done the installation, is that correct? And, as you understand, on the recommendation of some geotechnical advice they encased it in concerete, is that correct?

A It was a geotechnical concern of compaction.

Q A geotechnical expert is a soils expert, is it not?

A I'm not going to make that statement, because I can't --

Q That's beyond your scope?

A Yes.

Q Very well. Okay, now, you said something about -- am I -- I want to just -- now, I don't know and I'm wondering, is there any electrical wiring running through this -- any part of this concrete?

A Yes.

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Q Now, you told me a minute ago, if I understand it, that concrete is not a conductor of electricity?

A Depending on its condition.

Q That's right, on its condition. If it's wet it's a conductor, is it not?

A It behaves as a conductor.

Q That's exactly correct. Now -- I'm not electrical; that's beyond my scope, too, but I have stepped on it a couple of times.

The thing is I'm sure you will understand what I'm talking about. In other words, a minute ago you said -- and I'm very concerned about this so I want you to get it right down fine for me -- who hired you?

A Consumers Power.

Q And they hired you what year?

A 1980.

Q And in what capacity?

A As a test engineer.

Q And who are you responsible to down there on this examination that you make, this inspection, that was installed by Bechtel?

MR. STEPTOE: The question is unclear as to --

MR. MARSHALL: Well, I'll clear it up.

MR. STEPTOE: Are you asking if he's still responsible for Consumers or to Bechtel?

MR. MARSHALL: I want to know -- let him answer. Yes, I want to know. Let's clarify this thing. Who does he answer to, Bechtel or Consumers Power Company?

BY THE WITNESS:

A I answer to Consumers Power Company.

BY MR. MARSHALL:

Q And if a bigwig from Bechtel comes along and says to you you do this or you do that and I don't like your computations, what do you tell them?

(Laughter.)

I'm serious as all get out about this, gentlemen; very serious. Very serious.

What happens when there's a conflict of interest here and you're up against a top notch --

A The conflict will be resolved.

Q By whom?

A If it isn't resolved between me and that person I have a conflict with, it will be resolved at a higher level.

Q Well, I'll tell you right here and now, Consumers can't go that high to reach Schultz.

MR. STEPTOE: The questioner is referring to Secretary of State Schultz, who was from Bechtel originally.

MR. MARSHALL: And I'm just saying that --

MR. STEPTOE: And I object to the question.

(Laughter.)

MR. MARSHALL: I was sure you would. What took you so long?

But anyway --

MR. STEPTOE: I'm just not sure the witness knows what's going on.

MR. MARSHALL: I'm not trying to be offensive in any way to this witness, but I just -- he said that, or he testified that these things happened before he came on the job. He testified, if I recall correctly, that he worked for Consumers Power Company. And you can't help it, I've told you people redundantly I'm just a farm boy and it's hard for me to understand things. I'd like to get this confusion straight. When I'm talking to bird -- I was talking about birds the other day here, and still I was confused. And I'm serious. Don't you think I'm not.

BY MR. MARSHALL:

Q I'd like to know where the point of demarcation is between where Bechtel begins and -- or leaves off and Consumers starts.

MR. WILCOVE: Well, I think I have to object to that question. I'm not quite sure it's relevant to

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whether the galvanic protective system works.

MR. STEPTOE: The witness has already testified that he's a Consumers man.

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MR. MARSHALL: That's correct. But does he assume any responsibility for the faultiness or faulty operation or the faulty construction of this particular safety project we're talking about now?

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CHAIRMAN BECHHOEFER: No, he had nothing to do with it.

MR. MARSHALL: Well, if he doesn't, then does Consumers?

MR. STEPTOE: Consumers assumes responsibility for the safety of this plant, that's correct. But this witness -- I think that's a little bit too big a burden to put on the shoulders of this witness.

MR. MARSHALL: Well, we're getting someplace now. Nonetheless, you're clarifying things for me.

In other words, Schultz doesn't accept any responsibility at all, is that correct?

MR. STEPTOE: Not to my knowledge.

(Laughter.)

MR. MARSHALL: Well, we don't see it that way here in Midland. I'll tell you that you'd better start looking your books over. Even if we are farm boys, we look at it a little bit different.

There's a place down on Dearborn Street in Chicago where you can get your lessons, too, if you don't believe me.

(Laughter.)

BY MR. MARSHALL:

Q Witness, once more, how long, again, for the record, have you been in the employ of the Consumers

Power Company in your present capacity?

A Do you want the exact date?

Q No, just generally.

A Since 1980.

Q 1980, and this installation was done a year or so prior to your coming on the job, is that right?

A It had been taking place since '79 and '80, and, in fact, it's still under construction.

MR. MARSHALL: Very well. That's all. I have no further questions.

CHAIRMAN BECHHOEFER: Mr. Wilcove?

MR. WILCOVE: I have a few questions.

REDIRECT EXAMINATION

BY MR. WILCOVE:

Q Mr. Woodby, when oxided carbon steel lugs were found on the stainless steel pipes under last summer, do you know what corrective actions were taken?

A They were taken out. In fact, I had a couple of those carbon steel lugs on my desk. They are now down in Jackson.

Q Mr. Woodby, do you have separate controls on the voltage and the current for each anode?

A Yes, I do.

Q Do you need a higher type voltage to the same current throughout the anodes which are buried in

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concrete?

A I can't recall that at the moment.

Q Mr. Woodby, you heard Mr. Cook testify this morning that two fuse boxes were blown which controlled the galvanic protection system, am I correct?

A That is what we heard this morning, correct.

Q Am I correct -- do you have knowledge of this?

A No, I do not.

Q But, in August, am I correct in saying that the galvanic protection system was intentionally turned off?

A Yes, it was.

Q Would you know whether the stainless steel pipe that was excavated and inspected last summer was the same stainless steel pipe that was being protected by the anodes that were embedded in the concrete?

A Which stainless steel pipes?

Q Just a moment, please.

I think they were probably from borated water storage tanks that were --

A Yes, these are protected by anodes that are encased in concrete.

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concrete

Q Mr. Woodby, you testified that more anodes are intended to be installed .

A Correct.

Q Could you tell me what systems those anodes will protect that were not previously protected?

A What systems?

Q Yes; those new anodes will protect that had not previously been protected by the anodes in place.

A New systems that will be protected are domestic water lines, some fire protection water lines going to a warehouse down at the -- off the protected area of the plant site, fire water lines for the project office, and some nitrogen lines that have been added. The stuff that is being added is being installed in the plant.

Q Do you know if the volt meters are required to be calibrated?

A It is our requirement to. We do calibrate our meters.

Q How often do you do that, approximately?

Well, if you don't know, then --

A It was calibrated at checkout and probably calibrated -- I don't know the next time it's scheduled for a calibration.

MR. WILCOVE: I have no further questions.

(Discussion had off the record.)

CROSS EXAMINATION BY THE BOARD

BY JUDGE HARBOUR:

Q Mr. Woodby, in your job as a test engineer, do you have responsibilities other than those for the galvanic protective system?

A Yes, I do.

Q Approximately what percentage of your time is spent working with the galvanic protective system?

A I spend approximately ten to fifteen percent of my time strictly devoted to galvanic protection.

JUDGE HARBOUR: Thank you.

(Discussion off the record.)

BY CHAIRMAN BECHHOEFER:

Q Mr. Woodby, you testified that the entire system was not operating from February through August of '82?

A Correct.

CHAIRMAN BECHHOEFER: That's approximately six or seven months. Are there longer periods -- or are there other periods of time which are that long or longer that you know of that any one anode has been out of operation?

A There could be other anodes that may have been out for a longer time period.

Q How does that affect, first, the system as an entire system, and, second, the system insofar as that the area around that anode is concerned?

MR. STEPTOE: Chief Judge Bechhoefer, I really have no objection to him answering the first question, how does that affect the operability of the entire system. But the second part of your question, it seems to me, was almost a corrosion question that would be more properly addressed to Dr. Weeks, if I understood it correctly.

CHAIRMAN BECHHOEFER: Well, I wanted to find out before Dr. Weeks was up here exactly what the extent of outages in any major segments of this system may have been out for more than six months.

MR. STEPTOE: I'll withdraw the objection. The witness can answer.

CHAIRMAN BECHHOEFER: That's my intent, to establish a factual data base for Dr. Weeks to answer those questions.

THE WITNESS: To lose one anode would not completely degrade the operability of the protection system. To take one anode out of a section of piping that is to be installed -- all you can do is decrease the amount of protection, but you will not completely negate any protection.

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(Discussion was had off the record.)

CHAIRMAN BECHHOEFER: Are there substantial segments of the system which might have had defects or been either out of operation or had defects for longer than six month periods?

THE WITNESS: Not to my knowledge.

CHAIRMAN BECHHOERFER: So that it would be individual anodes --

THE WITNESS: Correct.

CHAIRMAN BECHHOEFER: -- but not entire segments of the system?

THE WITNESS: That's correct.

(Discussion was had off the record.)

CHAIRMAN BECHHOEFER: Mr. Steptoe, do you have anything?

MR. STEPTOE: No redirect, your Honor.

CHAIRMAN BECHHOEFER: Mrs. Stamiris?

MS. STAMIRIS: Yes, I have some.

RECROSS-EXAMINATION

BY MS. STAMIRIS:

Q Mr. Woodby, in relation to your response that you weren't aware of the problem with the melted fuse links at the TGB and, also, you were aware of the problem

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with the carbon steel lugs, and then also keeping in mind your answer to Judge Bechhoefer about the possibility of a defective anode being off for a long period of time, what I'd like to ask you is, of this galvanic protective system is a non-Q-system is there any systematic means of determining the generic implications of problems such as those I have mentioned?

MR. STEPTOE: Objection. First, the question is difficult to understand. Second, the question seems to ask this witness, whose only responsibility that's relevant today is to take care of the galvanic protection system, to address a very broad quality assurance system.

It's asking him to speculate about perhaps broader issues in the case, and he doesn't have any idea what we're talking about.

CHAIRMAN BECHHOEFER: Well, I understood the question a little bit differently.

Maybe you should not have used the word generic. Maybe you -- let me ask you whether you really were intending to ask, in any of these particular instances, how the effect on the entire -- of these instances on the entire galvanic protection system were reviewed. Is that your question?

Because, if that's your question, it is a proper one. If that isn't your question --

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MS. STAMIRIS: Well, I am interested in that, and I am also interested in how can it be determined in any systematic way whether there are further problems within the galvanic protection system.

I mean, I'm sure I can ask the question better, and I could even separate it down to one thing at a time.

For instance, the melted fuse links at the Diesel Generator Building, how can you get assured that there aren't melted fuse links someplace else in the galvanic protection system?

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A First off, there are no melted fuse links. What he is referring to, there is no such thing. Those are shunts that are used for checking the system. The only place where you would see a fuse would be inside the rectifier itself, and you could not see if it was melted or not.

Q Okay, if I didn't use the word melted but I just used defective fuse links?

A It still would not be applicable.

Q Well, was there a problem with the fuse links at the Diesel Generator Building?

A No, there was not. Not to my knowledge. And I would -- I should be aware of it.

Q Do you disagree with the testimony that the resident inspector, Ron Cook, made this morning about that?

A That's a correct assumption.

Q Well, I don't understand the details of what you are explaining, but I don't know if it would be helpful to explain it.

JUDGE HARBOUR: Are you aware of the objects, whether they were shunts or otherwise --

THE WITNESS: I think I'm aware of what he's trying to explain, okay.

JUDGE HARBOUR: But do you know the specific

ones that he's referring to?

THE WITNESS: He is referring to two junction boxes in front of the Diesel Generator Building which were pointed out to me earlier on a drawing. I guess the first thing that I'd be in contention with is in the use of fuse links or shunts. Okay?

They are not fusable links, they are shunts.

Second off, if there was any damage, it would have been made known to me and anyone -- during the time it had been inspected.

I would also have a documentation record saying that they had found it, and if they would have been replaced -- like he said, they had been replaced -- I would have a record of that being replaced. I have none of those.

JUDGE HARBOUR: Did you inspect this system at all during the six months during which it was not operating?

THE WITNESS: Yes, I did.

JUDGE HARBOUR: Still on a twice monthly basis?

THE WITNESS: I inspected up to March, and then I stopped with the twice monthly inspection.

JUDGE HARBOUR: Would your inspection have involved looking at these shunts in the junction boxes?

THE WITNESS: Yes, they would have.

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JUDGE HARBOUR: Do you have in your records an indication of the date at which you last performed an inspection where you would have looked at the shunts in the junction box referred to?

MR. STEPTOE: Are you referring to August, the period of August when you say when you last inspected, or just most recently? That is, in November?

JUDGE HARBOUR: I'll modify that. Most recent to the reported -- most recent prior inspection before the report of their having been damaged.

MR. STEPTOE: Thank you.

THE WITNESS: Okay. Can you give me an exact date of when that was inspected?

MR. STEPTOE: I believe the Staff said August was the period that they --

THE WITNESS: Okay, but if I can narrow it down inside of August.

WITNESS COOK: I can't do it without talking to the other inspectors.

JUDGE HARBOUR: Do you have an inspection then, in the vicinity of the 1st of August?

THE WITNESS: A system check was performed in August. In fact, I have dates. August 3rd through the 11th we went through and made measurements on the entire system, and we had no indication saying that we

had damaged links.

JUDGE HARBOUR: Thank you.

BY MS. STAMIRIS:

Q Do you have positive identification -- in that, I mean do you have some documentation that shows a check mark or something else that shows that those links were okay, or the shunts were okay at that time?

A I made documentation that I seen error.

Q Okay, so you are basing your assessment that no problem showed up with that system on that absence of any notation of error?

A Correct.

If I could have the exact fuse links or so stated fuse links I could tell you if I have a measurement for those.

Q I don't have any inside information.

All right, asking the same sort of question, with regards to the problem on carbon steel lugs, now, am I correct in understanding that you found these carbon steel lugs on the piping when some piping was excavated?

A I did not find it. Somebody else did.

Q Well, someone else found them?

A Correct.

Q Okay. Would I be correct in understanding, then, that there could be carbon steel lugs someplace else on piping that is still buried? Or how do you know that there can't be?

A No, that would not be a correct assumption. There was a study done back in August by Bechtel.

Q Of '82?

A Of '82.

Q Well, what did that study say about carbon steel lugs?

A It basically said that they had found all the carbon steel lugs.

Q Did they dig up all the pipe and look?

A Well, there are records that show what type of lug was attached to the pipe.

Q At the point at which you found the -- would you repeat for me on what pipes you found the carbon steel lugs and whether they were found --

A I didn't say where.

Q I'm sorry; not you personally, but on what pipes and when the carbon steel lugs were found.

A The pipes were found on borated water storage piping. The exact line number I do not have.

Q Do you have an approximate time frame?

A It would be around July.

Q Of 1982?

A Correct.

Q Did you check the records or the specifications in any way to see that -- all right. No; first I want to ask, it was not proper for those carbon steel lugs to be on those BWST lines, isn't that right?

A I don't feel that that's in my jurisdiction to make that judgment.

Q Well, were they removed?

A They were removed.

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Q Do you know why they were removed?

A Yeah, those sections of pipe were cut out to install temporary piping.

Q All right, if you had not removed the whole piping for some other reason, would you have left those carbon steel lugs in place where they were?

MR. STEPTOE: I really think that this is beyond the scope of the witness' expertise. She can ask Dr. Weeks what would have happened if those lugs had not been replaced, but it's really a corrosion question.

BY MS. STAMIRIS:

Q Well, what I really wanted to get at here, and I'm trying to go about it indirectly, is -- I'll ask it this way, although I -- I'll ask for one specific instance, although my concern goes beyond this specific instance. But, in this specific instance, do you know whether the carbon steel lugs that were found on the BWST piping was in conformance with the technical specifications or design requirements for that piping?

A That's not my responsibility.

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Q Okay. I think you said that you knew, or that Bechtel knew where the carbon steel lugs were on the site in buried piping --

A That's correct.

Q -- and then determined that by looking at their design document, is that correct?

A Their field report.

Q Or the field report. Well, would field reports always conform to as built conditions?

MR. STEPTOE: Objection. Your Honor, this cross examination is unduly prolonged. We are making no progress--

MR. MARSHALL: Your Honor, this is cross examination.

MR. STEPTOE: -- and it's really beyond the scope of this witness's testimony.

It appears that Mrs. Stamiris is trying to expand this somehow into a quality assurance contention, and what we started out here with was a question the Board raised about possible corrosion of underground piping.

Now, this witness and Dr. Weeks are capable of answering that technical concern, beyond any question.

It seems to me that this line of cross examination on the question of why carbon steel lugs were used next to stainless steel pipe is just going off down the side of the road, which is not important. And we have had

people sitting here for two days ready to start on service water pump structure testimony, and it really is unfair to Applicant's witnesses. I can't presume to speak for the NRC Staff, but certainly it's unfair for these proceedings to be delayed in this fashion by a cross examination which is not really going anywhere.

MS. STAMIRIS: Judge Bechhoefer, I'd like very much to be able to respond to that.

CHAIRMAN BECHHOEFER: You may.

MS. STAMIRIS: First of all, I don't think we can determine the admissibility or the correctness of my questions upon how tired we all are getting, because, believe me, I am getting as tired as you are. And I don't think that that has anything to do. In fact, at times it is very hard to separate the tiredness factor from the correctness factors when we're making these decisions about questions I should be allowed to ask. Sometimes I think it gets harder to get my questions in as the time wears on, and I don't feel like that is fair.

And the reason I am asking the question that I am trying -- I say the basic thing I am trying to determine, and I think I can get there quickly with this witness. And the reason I am asking him is because I think he has more site specific knowledge than Dr. Weeks has in this area. And what I am trying to determine is, because of

a possible difference in as built conditions of the piping and the design requirements for the piping, I want to know how, indeed, the determination or the assurance was gained on the part of Bechtel that there was not carbon steel lugs scattered elsewhere in the site that are buried and that we're not aware of. And if I could get a more specific answer as to how that determination was made, I'd be satisfied.

MR. MARSHALL: It is cross examination, Mr. Chairman.

(Discussion off the record.)

CHAIRMAN BECHHOEFER: I'm not sure this witness is the right witness for that type of question. Another witness you might try is Mr. Cook. I don't know to what extent, but at least he is knowledgeable about inspections that have been performed.

MS. STAMIRIS: I think at some point it would be helpful if we had a knowledgeable witness from Consumers Power Company to talk about corrosion and possibly quality assurance implications or safety, I should say, implications from that.

But I will leave that cross for now and go back to -- then ask Mr. Woodby two other questions that I have that are recross or, you know, in response to answers he gave to other people's cross examination.

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BY MS. STAMIRIS:

Q Mr. Woodby, did I understand that the stainless steel piping at the borated water storage tank was just removed in the summer of '82?

A That's what I said.

Q Okay. Is this the same piping -- all right, is this piping that -- did you say -- I'm sorry.

Can you specify in any more detail what those lines were that were removed, or what portions of them?

MR. STEPTOE: Objection, your Honor. This witness is talking about the galvanic protection system. Mr. Lewis was up here earlier this week and talking about the rebedding and replacement of the lines, and he was the correct witness to ask.

CHAIRMAN BECHHOEFER: But we didn't know about the incident that gave rise to this, so the questions could not have been asked.

Now, if Mr. Lewis wants to resume the stand, so be it. Bring him up.

Those questions could not have been asked at the time Mr. Lewis was here, so we will not hold that against Mrs. Stamiris.

MR. MARSHALL: Mrs. Stamiris has asked for them to bring him back. She already is on record as asking that.

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CHAIRMAN BECHHOEFER: This witness may or may not be qualified or may or may not be knowledgeable to answer this question, but, I think, if he knows, he can answer it.

BY MS. STAMIRIS:

Q Can you specify in any more detail which piping was removed at the borated water storage tank in the summer of '82?

A I do not have the line number, so I will not.

Q Do you know of any other piping that was removed in the summer of '82 for corrosion?

A I'm not --

Q Would this piping that was removed in the summer of 1982 near the borated water storage tanks -- do you know whether it was a Category 1 or a non -- I'm sorry; I don't know whether Category 1 and Noncategory 1. I should just use the words: Was it safety piping or nonsafety piping?

A Since I don't know the line number, I can't answer that either.

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BY MS. STAMIRIS:

Q You don't know whether it was injection piping?

A Like I said before.

Q Thank you. Now that piping, do you know whether any of that piping was the condensate line piping?

A Like I said before.

Q Now my other question is with regard to the dewatering system.

You mentioned that -- did I understand you correctly to say that the dewatering system may affect conductivity because it may -- that the dewatering system may affect conductivity because of the water content in the soils?

A Of the concrete and encased anodes.

Q So do you believe that the effects of the dewatering system would be limited, I mean, the effect of the dewatering system is due to changes in the -- the water content in the soils would only affect those anodes encased in concrete?

A I prefer to leave that to a design engineer. I can take the data and make my certain measurements, but I am not qualified to make that statement.

Q The statement that you did make about its possible effects on the anodes encased in concrete, were you concerned that the dewatering system may reduce the conductivity

because it would reduce the water content of soils?

A My basic concern was not whether or not it was the dewatering system or anything else. It was just that the concrete may act as an insulator.

Q Would it not be -- to reduce the conductivity of the soils -- I am sorry -- to reduce the potential conductivity of the concrete, wouldn't that be positive effect?

A It depends on the soil chemistry and other things in the area of strength.

Q I understood you to say that the dewatering system may affect the conductivity of the soil; and could you explain for me more precisely in what way it may affect and what your concern was --

MR. STEPTOE: Objection.

BY MS. STAMIRIS:

Q I am sorry, if you had a concern?

MR. STEPTOE: That does not cure the objection. This is really a question that should be asked of someone like Dr. Weeks.

MS STAMIRIS: Well I want to know what he had in mind when he made that statement about the effect of conductivity. I don't know in what way he meant it would affect it.

MR. STEPTOE: He was asked why the concrete encased anodes were being replaced, and he said there

wasn't -- he believed there was a concern on this subject but he did not verify, say that "I am an expert on the subject of soil conductivity, and so forth. This is really going beyond the expertise of the witness.

MS. STAMIRIS: I am not asking him about expertise or dewatering or conductivity -- I mean, for water contents of soils -- but I am asking him what he had in mind, you know, when he made that statement.

He said the dewatering system may affect the conductivity of the soils and have some affect on the galvanic protection system, and I want to know what kind of effect he thought it could have, what he had in mind.

MR. MARSHALL: Mr. Chairman, anythng he talks about on direct examination should be elaborated by him on cross examination.

(Discussion off the record.)

CHAIRMAN BECHHOEFER: I believe he may answer what he had in mind when he said there was a concern, whether it was his concern or somebody else's concern which was conveyed to him.

You can answer to that extent.

THE WITNESS: The concern was conveyed to me by someone else.

BY MS. STAMIRIS:

Q Could you tell me what that concern was that

was conveyed to you?

A I think I told you that.

MR. WILCOVE: Mr. Chairman --

CHAIRMAN BECHHOEFER: That he did.

MS. STAMIRIS: Well, I don't have any further questions.

CHAIRMAN BECHHOEFER: Ms. Sinclair?

MS. SINCLAIR: Nothing.

CHAIRMAN BECHHOEFER: Mr. Marshall?

MR. MARSHALL: No further questions.

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CHAIRMAN BECHHOEFER: Staff?

MR. WILCOVE: I don't have any recross.

MR. STEPTOE: I have no further redirect, and I would ask that this witness be excused.

CHAIRMAN BECHHOEFER: The Board has no further questions. The witness may be excused.

JUDGE HARBOUR: Thank you for your testimony

CHAIRMAN BECHHOEFER: Let's be back at 1:00 and break for lunch now.

(Whereupon a luncheon recess was had, to resume at 1:00 p.m. on the same date.)

AFTERNOON SESSION

(1:00 P.M.)

CHAIRMAN BECHHOEFER: Back on the record.

Do you wish to have the Staff witnesses to resume the stand?

MR. PATON: Mr. Chairman, could I make a statement, a preliminary statement?

CHAIRMAN BECHHOEFER: Certainly.

MR. PATON: We discussed scheduling, and because of the events today, I think we are running a little behind schedule and I think we are even more behind schedule. We have a witness that I've suggested we would like to have excused, Dr. Landsman.

He is a witness on the quality assurance issues with respect to the service water pump structure and I think we have general agreements that it isn't very likely that we will be able to cover those issues in this session which ends on Tuesday, so I would like to excuse Dr. Landsman from this session.

And in addition, John Gilray, the NRR QA witness who was to appear here Monday, I would like to also excuse him. I think the intent is that we address those issues at the quality assurance session that is to begin on January 4th.

I think the Board agree to that.

MR. STEPTOE: Applicant has no objection.

CHAIRMAN BECHHOEFER: We will have to hear from the other parties.

MS. STAMIRIS: I have no objection.

MS. SINCLAIR: None.

MR. MARSHALL: I have no objection.

CHAIRMAN BECHHOEFER: That would be, in essence, that we will not have any QA issues this week as such, or this week and early next week.

I am assured that there is plenty of material to cover those days.

MR. PATON: Thank you, Mr. Chairman.

CHAIRMAN BECHHOEFER: So we will permit that.

We're going to have that S-3 argument as well, so that is another factor.

Mr. Wilcove?

MR. WILCOVE: The Staff has no more direct examination of these witnesses, and we now tender them for cross examination.

CHAIRMAN BECHHOEFER: Before cross examination, the Board would like to ask a few questions first.

JOHN R. WEEKS

RONALD COOK

having been previously duly sworn, resumed the stand and testified further as follows:

EXAMINATION BY THE BOARD

BY CHAIRMAN BECHHOEFER:

Q To begin with, do either of you have any reaction to any of the testimony that you have heard this morning since you were last on the stand? Some of it might affect both of you, but we would like to have you comment, both of you.

Mr. Cook, why don't you lead off?

A (WITNESS COOK) What do you mean by reaction?

Q Well, with respect to your testimony, did you have any reaction to the --

A (WITNESS COOK) All right. With regard to the comments, I did use the term fuse links. The reason was because that is their appearance. Mr. Woodby indicated that they were in actuality shunts. However, we were talking about the same boxes with the same pieces of equipment in it, and, I say that may have been a technical mistake on my part as to exact terminology of the items. However, they are needed to conduct current to the anodes, whether they are called fuse links or shunts. Perhaps shunts might be a more accurate terminology of it. Whether he had any

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terminology about them being blown, if you will, well, I can't attest to that at all.

The only thing is is that I can make mention that there were three NRC inspectors that did indicate that they were blown, and that was Dr. Landsman, a Bruce Burgess and a Lon Gardner, and I would have a hard time reputing what they observed, especially being that Bruce Burgess and Lon Gardner -- instrumentation for Bruce Burgess and electrical for Lon Gardner. So for whatever reasons, I would say that they had observed that.

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Looked into the boxes this morning, and the comment from Bruce Burgess was that the old shunts had been replaced. We have feelings that Mr. Woodby is very concerned with how they did get replaced, and maybe that is a valid thing for him to be concerned about. We suggested that perhaps he could get more detail talking to Mr. Bruce Burgess at the NRR trailers.

So that is what I'm going to say is what transpired or that.

(Discussion was had off the record.)

CHAIRMAN BECHHOEFER: Mr. Wilcove, has Dr. Landsman left yet?

MR. WILCOVE: He is out in the hall; would you like for me to get him?

CHAIRMAN BECHHOEFER: It might be useful for him to at least be available with respect to this one matter in case further questions on that come up before he gets sent back.

I am not saying it will be necessary but it is possible that it would be useful.

(Discussion was had off the record.)

MR. WILCOVE: Mr. Chairman, would you wish for Dr. Landsman to take the stand or would you just

prefer to have him in the room?

CHAIRMAN BECHHOEFER: Well it depends on whether Mr. Cook is able to answer the questions.

Would you rather have Dr. Landsman answer the questions?

WITNESS COOK: The inspector?

CHAIRMAN BECHHOEFER: Yes.

WITNESS COOK: It does not really matter to me. He was available; he was with the people at the time of that -- you know, if we are getting into that depth, I am relating what they have relayed to me. He was a person that was there at the time they went in there and looked at them.

MR. STEPTOE: Judge Bechhoefer, speaking for the Applicant, we have no reason to doubt Dr. Landsman's word. If he says he saw something, I am sure he saw something.

There is a discrepancy in the record; that happens when people get on the stand. They don't always agree with each other. But it is a discrepancy on an issue that really seems to us to be collateral; and therefore, we certainly would feel no need to ask Dr. Landsman --

MR. WILCOVE: By the same token, I would note that the Staff has no reason to doubt that Mr. Woodby had

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no knowledge that any shunts were blown.

MS. STAMIRIS: Judge Bechhoefer, the only question I would want to know -- I don't know if Dr. Landsman would need to be under oath to answer it or -- perhaps Mr. Cook could answer when the NRC inspectors saw those shunts in the blown condition that they did.

CHAIRMAN BECHHOEFER: Well I think that Dr. Landsman would probably be the one to answer that. Mr. Cook, I think, said he wasn't quite sure.

WITNESS COOK: Well talking to Dr. Landsman -- I guess I will be a parts spokesman here -- is that we realized that if we could come up with an exact date, we know that we could correlate it with certain events when Ron Gardner, Dr. Landsman had come on-site -- we would have to talk with Bruce Burgess and correlate it with his events of moving in. In other words, that would tell us the particular period of time that it was.

We do know that Mr. Burgess moved into the area the latter part of August, so looking at our calendars, we could probably come up with a very close date. It is just that, just because of the circumstances when these three bodies had to be on-site during a period of time when Mr. Burgess was attempting to relocate so he would know what it was before his furniture got here or after his furniture got here -- some of these more traumatic things that a person remembers, which I don't have knowledge of.

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BY CHAIRMAN BECHHOEFER:

Q Do you have an inspection report or was an inspection report prepared?

A (WITNESS COOK) No, it would not have been an inspection report prepared on that particular item, necessary.

Number one, it was a non-Q system. We see many things -- we see three items that are non-Q systems that are not quite right, and a lot of times, we will bring it to the licensee's attention. Sometimes we forget to do that, but it would not have been an area that we would have regulatory purview over. And the fact that we know we are going to have such extensive discussions, we would have probably delved into it a bit further at that time.

We realize that the inspector that the galvanic protection system , was not -- I guess I will call it fully operational -- we knew that there had been pipes that had been excavated in the borated water storage area, the tank form area. We knew that they were encased in concrete, and that did not strike us that that was quite right, so there were many discrepancies in the galvanic protection system that ultimately would "would be" resolved -- or we thought that they would, and I have an inspection report on that particular observation.

JUDGE HARBOUR: Do you know that if at the time

that the terminal strip was observed, had been melted or damaged, whether the galvanic protection system was actually in operation or not?

WITNESS COOK: Well, to melt it the way that the inspectors had described it, there had to be some kind of induced voltage on their current, I would imagine. Now whether it was operational, we would have to coordinate with Consumers' record because they were shut down for a period of time at which was alluded to, from February until somewhere in August. So that may also bracket, where they were actually blown. I don't know on that.

CHAIRMAN BECHHOEFER: Dr. Landsman, can I just ask you, not from there, but if there is anything you think you could add to that because if there is, you can come up and do it.

DR. LANDSMAN: No.

CHAIRMAN BECHHOEFER: All right. I guess we will turn now to Dr. Weeks. Is there anything you learned this morning since you last left the stand that would either modify or change any of your testimony or the conclusions?

WITNESS WEEKS: The simple answer is no, but I think I should probably qualify that.

CHAIRMAN BECHHOEFER: Yes.

WITNESS WEEKS: It was specified that they were able to maintain approximately the same current flow

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from the anodes to the pipes for those anodes that were encased in concrete as from the ones that were not, which implies that they were at least, during the period that Scott Woodby referred to, during the jump.

It was testified that at least as of now, the system inoperable. We knew that it had -- we learned this morning -- that it had been out of commission for a period of six months. But at the end of that six-month period, the one stainless steel line was excavated in July. That was roughly the end of the period. There was no visible corrosion on that piece of piping. That was testified to this morning. Mr. Cook has told me that he looked at it and saw the same thing.

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So that I do not feel that that would affect my testimony. The third point that I think I recall having been made this morning was that occasionally, single anodes might be out of commission for a period of time.

The reason for having the anodes scattered around or through the soil area is to prevent, basically, what I would call an IR dropper, voltage drop in the pipes when the current enters the pipes at different locations.

If a single anode is missing or one or two, this is not going to have a major affect on the overall potential of the pipe. After all, the whole purpose of the whole system is to maintain the pipe as a cathode at the specified potential. So I don't think a single anode out of 100 or a few anodes out of that, are going to have a significant affect on the performance of the whole system.

As far as the reason for removing the relative advantages of concrete or these other filler materials, the soil they used to fill at the Midland site, as I have said before and as Mr. Cook has said this morning, I believe, is of high resistivity, probably almost as high as the concrete. That may be why the concrete anodes are working.

Should the site get flooded with water of higher

conductivity, then perhaps the concrete anodes would not have worked as well and it would not make sense to replace them. But I do not feel necessarily that the conductivity is going to be significantly higher in this material filled in with the coke breeze.

JUDGE HARBOUR: Would you briefly describe the properties of the coke breeze material?

WITNESS WEEKS: I think it is quite typical to cinders. It would be porous to allow air access, to allow moisture to get in to there. That would make it not very electrically conductive. It is basically clinker from burning coal. So it is like cinder ash.

JUDGE HARBOUR: Is its purpose to retain this moisture in the vicinity of the anodes?

WITNESS WEEKS: I think so.

JUDGE HARBOUR: Would it also enlarge the surface area of the anodes effectively?

WITNESS WEEKS: I don't know if it would do that, but it would certainly improve the conductivity of the soil immediately or the material immediately in contact, yes.

JUDGE HARBOUR: Dr. Weeks, do you perceive the further drying of the soil as a result of the dewatering program at the site, to have any -- to present any problems as far as the operation of the galvanic

protection system?

WITNESS WEEKS: Probably not because there's -- the galvanic protection system is operating well above the water table even at present; this is as I understand it.

You should really defer that point to Mr. Cook.

Further lowering of the water table by drying, I don't think would have a significant difference.

JUDGE HARBOUR: Mr. Cook, do you have anything to add to that?

WITNESS COOK: Well that is true, that the water table will be somewhat down below the anodes depth, ultimately. However, portions of the reasons why I think the conduct -- the reasons why I believe that the concrete acted as a good conductor was probably because of the weather condition that existed and the porosity of that concrete that was used as a backfill.

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There would be different moisture content in the soil from time to time, depending on what the weather conditions are and so forth, and it would ultimately change the conductivity capabilities of the galvanic protection system, depending on, like I say, climatic conditions, like spring or late in August without rain.

WITNESS WEEKS: But I don't feel that the differences would create a corrosion problem; let's put it that way.

JUDGE HARBOUR: That is what I was interested in.

WITNESS WEEKS: In fact, the drier the soil, probably the less the corrosion problem in the absence of the galvanic protection system.

BY CHAIRMAN BECHHOEFER:

Q Dr. Weeks, the fact that you mentioned that a few anodes out for a period of time probably wouldn't have any effect on the system, would, if you added, the certain period of time for those to be out, to the six-month period that they clearly were out, is that likely to make a difference in the effectiveness or in the corrosion resulting in the system?

A (WITNESS WEEKS) I don't think so. I originally testified that the galvanic protection system is another line of defense for protection of the buried piping; that

because of the nature of the soil, we could probably end the protective coatings that are on the pipes or the corrosion resistivity of the stainless steel which could probably do without it for periods up to six months.

Having a few out, I don't think will -- and the galvanic protection on -- I don't think will affect the overall corrosion potential of the pipe that we are are trying to protect. Therefore, I don't think this would be additive affect at all.

Q So the fact that these few anodes could have been out, eight, nine, months --

A (WITNESS WEEKS) A few, I don't believe so.

Q Which is all apparently what might have happened.

A (WITNESS WEEKS) Right.

I believe Mr. Woodby said they are now, all of them routinely checked twice a month.

Q That's correct.

JUDGE HARBOUR: I have one more question. Does the presence of carbon steel lugs in the stainless steel piping increase the possibility of corrosion of the stainless steel pipe? And if there is a time dependence, can you say something about the time dependence of the duration of the carbon steel lug being on a stainless steel pipe?

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WITNESS WEEKS: All right. In the first place, if the carbon steel lug, an uncoated carbon steel lug, which these apparently were, is on a stainless steel pipe -- it is the carbon steel lug that will corrode, not the pipe -- the carbon steel lug can give the stainless steel pipe roughly the same sort of galvanic protection that -- as a zinc anode might -- maybe not quite as large in potential -- but it could work the same way.

In some of our systems at Brookhaven, we have that combination. It is always the carbon steel that corrodes.

The carbon steel lugs, if they are on the carbon steel pipe, should be protected from corrosion the same way the carbon steel pipe is. And in one of the exhibits that were cited yesterday, the reference in which they dug up the pipe in June, Bechtel -- that was Bechtel's recommendation that these be coated similar to the way the carbon steel pipe is coated.

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coated.

I don't think it will be bad practice to use them if they were coated --

JUDGE HARBOUR: To protect the --

WITNESS WEEKS: To protect the lugs themselves. But it would not affect the stainless steel unless the lug corroded too and was no longer serving its function. Apparently, this was not the case, according to the Bechtel report.

JUDGE HARBOR: Will you describe the function of the lugs, please?

WITNESS WEEKS: Yes. The function of the lugs are to carry the current to the pipe. Remember, we have a circuit, we have a pipe, we have the anode and the pipe area is connected to a -- the pipe itself becomes a -- it acts like an electrical terminal -- we have to connect the wire to the anode.

JUDGE HARBOUR: Thank you.

JUDGE COWAN: Mr. Cook, just to satisfy my curiosity, will you describe one of these anodes, how big they are?

WITNESS COOK: Sure. A dark colored filter. It is about that long, about that big around in diameter (indicating).

JUDGE HARBOUR: Would you please explain that in words so the recorder can --

WITNESS COOK: Let's see, about eight and a half by eleven. It is about a foot long and, I would say, three inches in diameter or so.

JUDGE COWAN: How large of an embediment do you put around these cinder things?

WITNESS COOK: Well, I am not familiar with what they have planned for their cinders. Some people at the chemical plant go out about six inches away from the diameter. They just build a hole and put that conducting carbon, something in there and --

JUDGE COWAN: And the placement of this anode, the placement of the anode, just how deep it is, just exactly where it is, is that crucial?

WITNESS COOK: Yes.

WITNESS WEEKS: The distance from the anode to the pipe is specified.

JUDGE COWAN: I see.

WITNESS COOK: Well, you have to have the capability of putting whatever it is, the current is, that you need to protect the pipe.

JUDGE HARBOUR: I am not sure whether you said it and I did not hear it or whether you didn't say it, but what is the material from which the anodes are made?

WITNESS COOK: I don't really know but they appear to be some sort of carbon type material.

MR. STEPTOE: I thought the SSER says zinc protective anodes. It does in Section 3.12.1. Is that -- I believe that Dr. Weeks testified to that.

WITNESS WEEKS: We think they are supplemental, but they are not part of the cathardic system. It will take me awhile to browse through this. It is a rather thick document that I received from the Applicant.

WITNESS COOK: I am not conversant with that.

WITNESS WEEKS: It was something a lot -- all right, here it is. The design life is based on the utilization of high silicon cast iron anodes. This is a fourteen and a half percent silicon case, iron.

JUDGE HARBOUR: And what is the design life of them, please?

WITNESS WEEKS: Forty years.

CHAIRMAN BECHHOEFER: Ms. Stamiris, you may resume.

CROSS EXAMINATION

B BY MS. STAMIRIS:

Q Mr. Cook, when you said that you indicated the time frame in which the NRC inspectors had seen these shunts at the diesel generator building, that was spoke of, do you know whether the NRC took it or -- brought it to Consumers' attention in any way?

MR. WILCOVE: I object. I believe that was already answered when the Board was questioning Mr. Cook.

MR. MARSHALL: I think he can answer, can he Judge? Or, is he tongue-tied?

CHAIRMAN BECHHOEFER: I am told the question was not specifically asked, so he may answer.

WITNESS WEEKS: All right. Not that I am aware of did we tell them, but I would have to pull the information from the other inspectors that were involved to find out whether either one of those had notified Consumers. I can't say that they did not but I also can't say that they did indeed.

CHAIRMAN BECHHOEFER: Dr. Landsman, do you know?

DR. LANDSMAN: I think you should talk to Bruce.

WITNESS WEEKS: Yes, that's why I said I would have to have the other two inspectors to determine whether they had notified the licensee or not about it.

If they did not -- sometimes, like I say, we lose things in the cracks, if you will, especially when it is in a non-Q-system. We are more attuned to the potential of the Q-system as opposed to the non-Q-system.

MR. WILCOVE: Mr. Chairman, if the Board wishes, we could get Mr. Hood, the other resident inspector here, here to testify.

CHAIRMAN BECHHOEFER: Ms. Stamiris, before we

decide we need Mr. Burgess or not -- I am not sure we do -- but what exactly are you trying to prove?

MS. STAMIRIS: I really have some more questions on this. I thought that if it had been brought to Consumers' attention, that that may be significant. Obviously, the gentlemen who have knowledge of it are not aware that it was brought to Consumers' attention, and I think that perhaps if Mr. Burgess or someone at some time determined that it indeed had been brought to Consumers' attention, I would be interested in knowing.

JUDGE HARBOUR: I would assume that the repair of the strip would indicate that Consumers Power learned of this event; but whether it was through NRC notification or not, I don't know -- there's been no testimony.

MS. STAMIRIS: Well if you are asking where I am going with it, what significance it has to me, in my line of questioning, I am having some difficulty in this area because of the questions that Mr. Woodby left open about the date at which he thought that he had, by the absence of any kind of notation -- he said that his report of August, I think 3rd to 11th of 1982, that he assumed that it was okay, and I am not sure what the system is for dealing with the problems that arise in a non-Q-system.

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I don't have any understanding of the chain of command for the functioning of this, so I just thought that it would be significant to know whether or not or how it was resolved.

CHAIRMAN BECHHOEFER: I am not certain --

MS. STAMIRIS: Maybe I could ask Mr. Cook another question that would help me know whether it was something that I was interested in in pursuing further, by asking him -- Mr. Cook, what would be the safety significance, if there were, under such shunts or junction boxes that were defective in some way?

WITNESS COOK: Well obviously, the loss of these shunts means that the galvanic protection system cannot function. However, Dr. Weeks has indicated that that can happen for quite a period of time, six months or something in that neighborhood, perhaps even longer.

With the licensee monitoring it, I would have a hard time saying that there is a large safety significance to not having galvanic protection.

Where the safety significance would come in is if indeed he did induce or allow to induce a corrosion of the piping -- and you needed that piping -- during a severe accident transient.

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transient

JUDGE HARBOUR: Could I just ask one more question here. Do you know or do you have knowledge of the number of anodes that may have been out of action as a result of the building of this one strip?

WITNESS COOK: Well, as I understand it, talking to inspectors, it was melting of more than one strip. It was two boxes that were involved, and I don't have the exact number of contacts in there; but as I recollect my memory, looking at it this morning, it was like in the neighborhood of -- let me draw a picture here while I try to figure it out.

WITNESS WEEKS: At the same time, this observation was made during the period that the -- I think you have already heard, the system was not operable and known not to be operable.

WITNESS COOKS: Perhaps 40 or so might be involved, and that is a kind of a guess. I don't have the print in front of me where I could just look at the number.

JUDGE HARBOUR: But that would be more than a few as Dr. Weeks said, would have no effect on the system if it was expected to be operating. But, at the same time, it would come under the -- under which condition the operation of the system could go for periods of six months without any damage corrosion; is that correct?

WITNESS WEEKS: Yes.

WITNESS COOK: You also have to bear in mind that there was no galvanic protection to those systems until early 1980 anyway. But anyway, that is a fact, that this system was not operational at that particular time, until that particular time.

BY MS. STAMIRIS:

Q Mr. Cook, in relation to that, how shall we refer to it? A junction box at the Diesel Generator Building that you found defective?

A (WITNESS COOK) Yes.

Q All right. Would I be correct in understanding that all the junction boxes on the site are acceptable to visual checking?

A (WITNESS COOK) Yes. But, you would have to pull the cover off.

Q Did you or any of the NRC inspectors that you are aware of, look at any other junction boxes after finding that one, in the defective condition there near the end of August?

A (WITNESS COOK) The only one I am aware of are the two junction boxes at the south end of the Diesel Generator Building.

Q So if those are the only two junction boxes --

A (WITNESS COOK) I mean, those are the only two that I have knowledge that we looked at. Dr. Landsman is

shaking his head that those are the only two -- in other words, we did not do -- at that time, we did not bother to look at all of the junction boxes with regard to this type of a system. As I already explained earlier, that there were portions of the system that were dismantled. We knew they were dismantled, we knew that it had not been completely checked out -- it was a non-Q system, so on and so forth.

Q Can you tell me, and I'm sorry if it is being repetitive, approximately how many of the junction boxes are there on the site in addition to the two that you did observe at the end of August?

A (WITNESS COOK) Well, if we are talking around 120 anodes, and it seems to me that each box has about 20 of these strips in it or so, then that says that there shall be 60 of them. That is just using that logic, but I am not all that --

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JUDGE HARBOUR: Did you say six or 60?

WITNESS COOK: 60.

JUDGE HARBOUR: Times 20?

WITNESS COOK: Six times 20. Pardon my arithmetic. Anyway, six of the boxes. I am saying that just without looking at the blueprints or anything.

BY MS. STAMIRIS:

Q Now Dr. Weeks, you testified that at the time this junction box was observed in this condition by the NRC inspectors -- and let's say, roughly the last week of August, that the galvanic system was out of service, but the only testimony that I am aware of that we have had for that period of time when it was out of service was a little bit vague. It said February 1982 until August 1982, and I wondered if there is any possibility that this system could have turned on and that could have caused the melting or somehow -- you know, they attempted to restart the galvanic protection system sometime in August, and it might be related to the junction box that we are talking about.

MR. WILCOVE: I object to the question. I don't think that Dr. Weeks can speak to what Consumers did or did not do with respect to the galvanic protection system. I feel the question was rather confusing and difficult to follow.

BY MS. STAMIRIS:

Q Mr. Cook, can you be any more precise as to when in August 1982 the galvanic system was restarted?

A (WITNESS COOK) When it was restarted?

Q Yes.

A (WITNESS COOK) No. The date that you would have to go on is the date that would show up in Consumers' record. We wouldn't have any records of when they started it.

I think Mr. Woodby indicated that that was in early August, if I remember, and we do know that Mr. Burgess came on the site -- if I recollect right -- the 23rd or the 25th of August along in that period of time.

Q Well Mr. Cook, if the galvanic protection system was turned back on in early August, do you think that it is possible that the melting or the damage that you observed at the junction box -- when I say you, I mean your NRC inspectors -- towards the end of August, could have been related in any way to the restart of that system?

A (WITNESS WEEKS) It could have been. It would have taken something that demanded a lot of current to have done it.

Now, could it be the nature of the rectifier

system that is used to control this and allow that kind of current to get across the shunts and melt them, I guess I would have to say it is possible, but I don't know if it happened either.

MR. WILCOVE: Mr. Chairman, if I may just make a comment, Ms. Stamiris frequently asks the witnesses if it is possible that something happened, and I think that that throws a bit of confusion in the cross-examination because indeed, anything is possible, and I wish she would rephrase the questions "do you believe", "is it likely", or whatever, but not "is it possible?"

MR. MARSHALL: That would probably be all right.

MS. STAMIRIS: I will probably bear that in mind.

Now I don't know what to do next because obviously, Mr. Cook or Mr. Weeks doesn't have any more specific information about what further boxes may have been looked at or if it could have been, in fact, caused by something to do with the restart of this galvanic protection system.

WITNESS COOK: Well ultimately, Mr. Woodby indicates that he measured -- well my understanding was that he could use these boxes for determining what the voltage in the currents were. I don't know if he kept

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these boxes when he made his bi-weekly -- I would have to ask him if that's where his part of the information -- all right, he indicated that he got part of his information from that. That would be a logical location for a person to get information on the connections.

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MR. STEPTOE: For the record, Mr. Woodby nodded yes in response to Mr. Cook's statement that those boxes are where he gets some of his information when he does his checks.

MS. STAMIRIS: Before I try and pursue this any further, I would like to ask Mr. Cook, if indeed, the damage done at the junction box at the Diesel Generator Building was caused somehow in relation to a start up of the galvanic protection system, would that represent a significant concern to you in any way?

WITNESS COOK: Significant?

BY MS. STAMIRIS:

Q I am sorry. I will add, without going into the defense and the system that we have talked about before --

MR. STEPTOE: I object to the question. That is a part of the witness' prior testimony, that defense and the depth system, including the wrapping and so forth, it is all part of their testimony, and why they believe the undergrounding piping at the site is unlikely to corrode and that there should not be a safety problem.

She is asking the witness to throw away part of his testimony, his previous testimony with that question.

MS. STAMIRIS: I would like to just reask my question because I mean -- in regard to the galvanic

protection system alone, would the possible relationship to a start up of that system and the damage that we have been talking about, call a concern to you?

WITNESS COOK: Yes, it could if there was a condition that was allowing the shunts to melt, that would be requiring a large amount of amperage. That fact alone would cause -- it would say that there is something probably malfunctioning with the galvanic protection system.

The obvious question to a person like me would be, what about those instances when they do not melt but yet induce almost enough current to melt, and I would be worried about them accelerating corrosion attacks throughout the plant by the use of induced current similar to electroplating. That would be one of my biggest concerns.

Now if they continued, you know, having a problem of melting it at random intervals for whatever reasons -- there is always a cause -- and until that was found, that would cause me to be somewhat concerned about what it was really doing either to the system, the capabilities of the system to do its design function or the capabilities of the system to impart more damage than if there was no system. And from that standpoint, I would be somewhat concerned about that, yes.

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MS. STAMIRIS: Thank you.

CHAIRMAN BECHHOEFER: Dr. Weeks, do you have any comments?

WITNESS WEEKS: Probably, yes I do.

If the current surge was instantaneous, the sort that one gets if a fuse blows and it only for a very brief period of time, I would see no serious concern about it if it were a correctible situation and not recurring.

Now I have heard no testimony that this has occurred more than on just this one occasion. But certainly, if it is a correctible situation, then the system would be capable of performing its normal function.

Even if it were to impart corrosion, if it's only for a very short period of time, the corrosion is small --

WITNESS COOK: That's provided that they blow, that they melt.

BY MS. STAMIRIS:

Q Dr. Weeks, would you agree that the type of possible explanation or circumstances which you have just described would be going towards a less conservative possibility as opposed to a more conservative possibility?

MR. WILCOVE: I object to the question.

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question.

MS. STAMIRIS: I know, that is terrible. I will try to ask it a completely different way.

Dr. Weeks, when you are reviewing systems and making judgments about a system for a nuclear power plant, should you not place more emphasis on the worse possible cause of such problems as opposed to perhaps -- well, as oppsed to the most benign cause of that problem?

MR. STEPTOE: Objections.

MR MARSHALL: Why?

MR. STEPTOE: I think the objection is clear. She is asking the witness to draw legal conclusions from facts which are not -- there is no basis in the evidentiary record. The question is improper.

MS. STAMIRIS: What I am trying to get at --

MR STEPTOE: Excuse me. The concern expressed was the voltages and the currents throughout the plant, might be, if they were so high, they might cause corrosion in the underground piping. But that would be only if the fuses or the shunts did not burn out.

There is no testimony that indicates that that condition existed at the present time.

MR MARSHALL: But it did melt.

JUDGE COWAN: Is this a D.C. system?

WITNESS WEEKS: Yes.

JUDGE COWAN: As I understand it, if the current

were greater, would that result in corrosion in the pipe that is being conducted?

WITNESS WEEKS: Not if the current continues to make the pipe more cathardic, no. The current would have to reverse to cause a corrosion problem suggesting that it would have to come from some other unstipulated source; and beyond that, I can only speculate.

JUDGE HARBOUR: There is not a question of how high the current is as long as the polarity of the current remains the same.

WITNESS WEEKS: I think so, yes.

BY MS. STAMIRIS:

Q Dr. Weeks, can you -- since I believe that you were speculating as to the possible cause of such damage as we have been talking about at this junction box on the Diesel Generator Building, will you agree with that, that that is what you were doing, was speculating as to the the possible cause?

A (WITNESS WEEKS) That's all I could do, yes.

Q Are there other -- well, can you speculate as to other possible causes that could have induced such --

MR. WILCOVE: I object to this question as well. The witness cannot be called upon to speculate.

MS. STAMIRIS: Well, he did the first time--

MR. WILCOVE: He refused to speculate the first

time --

WITNESS WEEKS: I can't speculate but I --

MR. STEPTOE: I object to the witness being asked to speculate; obviously, anyone can speculate.

(Discussion off the record.)

CHAIRMAN BECHHOEFER: Let me ask one question. There is something that I am interested in. If the cause that has been, shall I say, hypothesized here, were not to have taken place -- and nobody has stated that it clearly was the only possible cause -- what other causes, if any, could lead to the results that we had? I mean, if it should turn out, neither of you are able to say that this is exactly what the cause was --

MR. STEPTOE: Because of what, sir? Because of the shunts burning out?

CHAIRMAN BECHHOEFER: Yes. Now, if nobody can say for sure, then there must be some other way that it could happen. There's a gap. I am trying to fill -- do you know of any other --

WITNESS WEEKS: Well, if we are back into circulation, again, sir, I have three thoughts that come to mind, but they are speculation.

The first one is that when you first turn the circuit on, there may have been a short circuit somewhere in the system.

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The second form is that perhaps these wires got short circuited to the welding ground cable; that's another speculation.

(Discussion off the record.)

JUDGE HARBOUR: It could be a bolt of lightening, couldn't it have?

WITNESS WEEKS: That was going to be my third one.

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Q Mr. Weeks, do you believe that some kind of examination of records showing whether or not other of these junction boxes were similarly affected would help narrow down this speculation as to the cause of the damage?

A (WITNESS WEEKS) It might narrow down the speculation as to the cause, yes.

MS. STAMIRIS: Well, I would like to request somehow that when Consumers or the NRC comes up with more information on this subject and the other junction boxes that we be informed in some way.

(Discussion was had off the record.)

CHAIRMAN BECHHOEFER: The Board thinks that, at the present time, we certainly aren't going to order the Applicant to do any such studies but, during the course of time, if they should do further investigations, they would normally send the results of those to the Board and the parties, at least, if it's before we render a decision. That's the normal course of NRC proceedings when an issue gets raised. Any follow up material is usually supplied to the Board and parties. So I would expect that to the extent -- we're not ordering them to do an investigation, but to the extent that there is any further investigation they do that covers any further information, we would expect it would be furnished.

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MS. STAMIRIS: Well, Judge Bechhoefer, what about the extent to which such knowledge or information may presently be available?

I did not rule out in my own mind that Consumers or the NRC could have this information already, it's just a question of somebody going and looking it up and bringing it back and letting us know. And, if that was the case, don't you think that we should be informed if there is current information on it?

(Discussion was had off the record.)

CHAIRMAN BECHHOEFER: It appears to the Board that this incident was an isolated incident. But if it turns out that the parties -- Applicant or Staff -- have any information showing that this wasn't an isolated incident, we would expect to be told about that.

And if it appears to us from what is in the record now that it was --

MR. STEPTOE: Judge Bechhoefer, we already had our most knowledgeable witness on the stand, and, as his testimony reflects, we don't have any information that this is anything other than an isolated incident.

I don't believe we have any plans to do any further investigation. If, however --

CHAIRMAN BECHHOEFER: As I said, we were not

ordering anything to be made.

MR. STEPTOE: If, however, there were a consistent problem with these kinds of shunts burning out, Mr. Woodby would let me know and I would follow the Board's instructions with respect to advising the Board and the parties.

But, absent some recurring problem, we certainly are not going to do any kind of investigation, because we believe that this is not really an important safety issue.

CHAIRMAN BECHHOEFER: Okay, Mrs. Stamiris, do you want to continue?

BY MS. STAMIRIS:

Q Mr. Cook, this morning you mentioned that when this line was excavated, at which time you -- I don't know if you personally saw the carbon steel lug which was heavily corroded -- you said there were also wire switches which were heavily corroded. And did you make any assessment as to the probable causes of that corrosion at that time?

A (WITNESS COOK) The only assessment I made of it was the fact it was carbon steel in the proximity of stainless steel, and I knew that that would, in an electrolyte environment, would corrode. And, as Dr. Weeks has indicated, and I was aware of that, so

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that's --.

Now, as far as, also, the assessment, why, we did wire brush away the -- not we, the licensee wire brushed away the rust, if you will, so that we could get a better look as to see what damage may have been done to the pipe, and there was none. So it was looked at, and that was the assessment at the time.

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Q And that would also hold -- the reasoning you just covered would also hold true for the wires that were heavily corroded?

A (WITNESS COOK) Yes. And, in fact, there was also another condition that was noted at the time, and that was one of the building ground wires was in close proximity to the stainless steel piping, and we examined that area where it may have been.

I don't want to say that it was touching, but it was indeed in close proximity. And what damage it may have induced to the pipe had not occurred, but it was examined.

Q Mr. Cook, are you aware of any other corrosion problem with metals on the plant site? And I'll give you some examples -- I'm talking about --

MR. WILCOVE: Excuse me for interrupting, but this question will have to be tied to underground piping, as opposed to any type of metal in the plant.

MS. STAMIRIS: Well, I want it as, you know -- I wanted to relate it to the corrosive -- the potential for causing corrosion of the soils, and that's why I wanted to ask him specifically if he was aware of any corrosion problems other than those where piping -- like with, say, metal beams stored on-site or metal buildings, or any other --

MR. MARSHALL: I take exception to the objection.

MR. WILCOVE: I still have to renew my objection. I don't think that in this hearing we can engage in a mass discussion of any type of corrosion that may occur anywhere at this site. I think that the -- I don't think that it would have much relevance, if any relevance at all, to the specific protection of underground piping from corrosion, especially in light of the fact that Dr. Weeks has already presented a great deal of testimony of the many facets of the protection system.

So for us to start inquiring about what other types of corrosion there might be I do not think would serve any useful purpose at all.

MS. STAMIRIS: Well, would it help the objection any if I said that I'm asking this as a background question. I mean, I don't now plan to launch into a new series of questions about corrosion on buildings or metal beams, or anything else that might be found on-site. But I'm simply asking if he is aware of any occurring or any particular problems with corrosion on the plant site other than with the piping.

JUDGE COWAN: I was just going to ask what this is background for. Where are you going?

MS. STAMIRIS: Well, to me, it would indicate --

it would give a further indication than that which has already been given about the quality of the soils at this site and their relationship to inducing corrosion.

(Discussion was had off the record.)

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CHAIRMAN BECHHOEFER: I think we'll sustain that.

MS. STAMIRIS: Okay. At this point, I'll just say, before I start my next question, that -- well, just a minute.

Okay, I'll finish up the questions that would follow on what was just asked recently.

BY MS. STAMIRIS:

Q And, Dr. Weeks, I believe you said that if an anode was out even for a considerable length of time, as posed to you in a question by Judge Bechhoefer, that it wouldn't reduce the overall corrosion resistance in the galvanic protection system. And is that --

A (WITNESS WEEKS) Significantly, yes. That's roughly what I think I said, yes.

Q Okay. And if an anode was out for six or nine months at a specific location, wouldn't it reduce the corrosion resistance of that specific pipe at that location significantly?

A (WITNESS WEEKS) It would reduce the corrosion protection to that -- from the galvanic system to that portion of the pipe slightly.

You remember the entire pipe is electrically connected, and it is the cathode, so that because of current flow there might be a slightly different voltage

in that one area, which would make it slightly less protected. But I don't think it would be a significant factor.

Q Well, can you speculate --

MR. WILCOVE: I promise you we'll object.

WITNESS WEEKS: I can always speculate.

BY MS. STAMIRIS:

Q Can you relate that answer to this hypothetical situation that if two anodes were out -- two adjacent anodes were out, say, for a period of nine months on a particular length of piping, how do you think that that would reduce its -- to what degree would that reduce its resistance to corrosion from the galvanic protection system?

A (WITNESS WEEKS) The galvanic protection system is effective against corrosion -- I'm looking for the discussion of this again in the standard classic textbook -- at any potentials below, let's say, 500 millivolts negative to that reference. We keep the pipe at 850.

It gives us a certain amount of latitude.

Q So --

A (WITNESS WEEKS) And that's why a local variation due to the failure of water to anodes I don't think is going to have a major effect.

Q Mr. Cook, we talked about the carbon steel lugs

in that now there has been some kind of action taken to see that they are coated, is that correct?

A (WITNESS COOK) That's what the words are. Really, what they're doing to the lugs, I'm not familiar with it. I haven't gone in and checked the re-repair that was -- I want to say the word concerned, but it had been discussed between myself and the licensee. It had never been documented, because we knew that there was more work that would be going on in that area, and we haven't, you know, gone into the follow up, you know, the fix, if you will, to the corroded lugs. Those pipes aren't installed right now. Of course, they can't do any excavation anyway.

Q Okay. On the subject of the carbon steel lugs and their coating, I'd like to direct you in the other time direction from when that problem was identified or when those carbon steel lugs were identified, and I understand you're saying that like from then on out they were going to be coated or protected in some way, but going back in time, do you have any knowledge or assurance as to -- do you have any knowledge as to whether the carbon steel lugs which were already in place and buried on the piping were coated or unprotected?

A (WITNESS COOK) I would say that they were unprotected just based on the degree of corrosion that had occurred on the lugs.

Q Then, because of the -- how many lugs did you find that were heavily corroded like that?

A (WITNESS COOK) Let's see. One we examined quite thoroughly, and there was -- if I recollect right, we looked at one on the northwest side also. The one we looked at in quite a lot of detail. In fact, two I can vividly recollect as to our examination of it.

I did make an attempt to look at every lug. These were a typical sample.

Q But it would be your understanding that the other carbon steel lugs already buried and on-site would have been uncoated?

A (WITNESS COOK) That would be a pretty good assumption.

MS. STAMIRIS: Okay. At this time, I have finished the questions that related to testimony that Mr. Cook has made and the combined testimony that Dr. Weeks has made today. I need to go back and start from where I left off yesterday with Dr. Weeks, and I just wondered if you wanted me to go back there or allow others to finish up with Mr. Cook.

(Discussion was had off the record.)

CHAIRMAN BECHHOEFER: Mrs. Sinclair, why don't you --

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MS. SINCLAIR: I don't have any questions.

MR. MARSHALL: Well, I have a few questions.

CROSS-EXAMINATION

BY MR. MARSHALL:

Q Just to clarify in my mind, Mr. Cook, were you inspector on the job at the time this construction work was done which we've been discussing here today?

A (WITNESS COOK) You mean when they used the lead concrete backfill against the --

Q Yes.

A (WITNESS COOK) Yes, I was on the site at that time.

Q And could you tell me of your own knowledge as to whether or not that actual work, construction work was done by the Bechtel Company men or by Consumers Power Company men?

A (WITNESS COOK) Well, that would have been done by the Bechtel Company men because they were the people that were doing -- pouring concrete, backfilling, doing soils work, so forth and so on. So --

Q Okay, fine. Now, then, this electrical work was likewise done in connection with this same operation by the Bechtel Company? And their men, I'm saying.

A (WITNESS COOK) Well, I would guess -- that part I cannot answer, whether Bechtel went out and got a

subcontractor to put in the cathodic protection or not.

Q The point with me is it was under the tutelage and direction of the Bechtel Company?

A (WITNESS COOK) I would say that's probably true.

Q All right, now, then, I would like to know, in your opinion as an inspector, and a senior inspector at that, for the NRC, if this, in your opinion, is good workmanship and material?

MR. WILCOVE: I object. I think that this --

MR. MARSHALL: The man is qualified to answer the question.

MR. WILCOVE: The man is also here to testify with respect to certain matters relevant to the corrosion of underground piping.

MR. MARSHALL: I can do worse than that. If you want, I'll come back and ask the question this way.

BY MR. MARSHALL:

Q Do you, in your opinion, believe that that is shoddy workmanship?

MR. WILCOVE: Same objection.

MR. MARSHALL: I have it right here. I'll read it to you out of the newspaper.

JUDGE HARBOUR: First of all, what are you referring to when you say this?

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MR. MARSHALL: I'm talking about this workmanship that we're talking about in regards to this piping, the question of the boxes, the electrical boxes malfunctioning here this morning.

JUDGE HARBOUR: You're talking now about --

MR. MARSHALL: General overall conversations that went on here with Mr. Cook and his testimony this morning.

JUDGE HARBOUR: With the underground piping?

MR. MARSHALL: Yes, absolutely.

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(Discussion was had off the record.)

CHAIRMAN BECHHOEFER: If you can answer the question, Mr. Cook, do so.

BY WITNESS COOK:

A The term shoddy? Well, I really don't know what he's referring to, necessarily, by shoddy. I'll throw this on, though. The fact that there was carbon steel lugs hooked to the stainless steel pipe and were unprotected, I don't really feel that that was a stroke of genius on anybody's part.

(Laughter.)

BY MR. MARSHALL:

Q Very good.

A (WITNESS COOK) The fact that they used lean concrete to backfill up against the anodes, I can understand how the geotechnical people, pertaining to only their interests, would want to use lean concrete.

However, I don't feel that they were under complete advisement as to the effects that it would have had on the ability of the cathodic protection to protect or they would have, perhaps, come up with a better design system for allowing the anodes to make better contact with the soil.

So I can't say that that showed a stroke of

brilliance either.

Q Thank you very much, Mr. Cook. Now I want to go to Mr. Weeks for one question. And understand this is not in my expertise, so that's why I'm asking you.

We have here a word anode and cathode and corrosion. I want to know if it isn't true that more corrosion collects at the cathode than it does at the anode?

A (WITNESS WEEKS) No, that is not true. The anode is the species that corrodes.

The cathode is called that because in electrolysis the cations which are the metal ions go to the cathode. That's where they are reduced to metallic metal. So, by making the carbon steel piping, the cathode, you are basically putting it in a reducing environment and preventing its comoxidation.

Q Now, let me ask you this, Mr. Weeks. If you had a series of cells a block long and you were heating brine to make chlorine gas, you had an anode and a cathode, which of those two do you think, under those circumstances under -- that that corrosion would come under, the anode or the cathode?

A (WITNESS WEEKS) It would depend, of course, on what the anode and cathode were made of, sir. If you were electrolyzing brine to make chlorine gas, you would

use a corrosion resistant anode and cathode.

Q I've always noticed in the manufacture of chlorine -- and I helped manufacture quite a lot of it -- that the cathodes always turn green.

A (WITNESS WEEKS) Well --

Q They were brass, of course, and copper, and always under electrical --

A (WITNESS WEEKS) I cannot comment beyond that since I have not made chlorine gas.

Q Okay. Now, I want to get back to -- Mr. Cook, is it?

A (WITNESS COOK) Yes, sir.

Q I would like to read and ask you if it's true or false. It supposedly quotes you. It says:

"To support the claim that Bechtel Power Corporation, the plaintiff's prime contractor, is uncooperative and seems to be running the project rather than the Consumers Power --"

CHAIRMAN BECHHOEFER: Well, Mr. Marshall, this subject is not -- we're going to be discussing that in January and --

MR. MARSHALL: Well --

CHAIRMAN BECHHOEFER: -- and he'll be back. Mr. Cook will be back.

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MR. MARSHALL: I just don't want him to run away from me. Like I said, we only have a -- we only have a tenant at will here. I mean, we don't have a tenant at will, just a life estate, and I got him here today.

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today.

CHAIRMAN BECHHOEFER: Mr. Cook will be back in January, I'm sure, when Staff puts on its QA testimony. So I think your question will be relative to that and not to --

MR. MARSHALL: I'm trying to find out if it isn't true that today's testimony that he just gave isn't -- it's no different than any other day. It's just a day at the nuclear plant. He has these problems everyday down there with the prime contractor.

Now, I didn't mention any derogatory manner or anything, Mr. Consumer Power Company. But this seems to be the problem that we keep finding all the time, seems to be problems that are -- they're not experts. They're some bums they picked up somewhere along the road. We've got good men 300 yards right across the river that could come over and explain some of these things to me.

But I got you, and that's why I'm asking you.

MR. WILCOVE: There's no question pending.

MR. STEPTOE: Judge Bechhoefer, there's no question. But we certainly would like to postpone this until January. It's a legitimate point of view being expressed by a party to this case, but can we --

MR. MARSHALL: We'll defer it, it's appropriate to do that.

CHAIRMAN BECHHOEFER: Wait until January, because

that's kind of a QA question --

MR. MARSHALL: Okay.

CHAIRMAN BECHHOEFER: -- and this will be another item in the series that we may be asking --

MR. MARSHALL: Will you guarantee that I'll have him back --

CHAIRMAN BECHHOEFER: Oh, yes.

MR. WLLCOVE: The Staff guarantees it.

MR. MARSHALL: Okay. Then that's okay. I conclude my examination at this time.

WITNESS COOK: It's nice being a wanted servant, I might add.

MR. STEPTOE: I have no cross examination for Mr. Cook.

(Discussion off the record.)

CHAIRMAN BECHHOEFER: Mr. Wilcove, do you have any redirect?

MR. WILCOVE: We have no redirect for Mr. Cook.

MS. STZMIRIS: I have one.

RECROSS EXAMINATION

BY MS. STAMIRIS:

Q Mr. Cook, in relation to the questions that Mr. Marshall just asked you, when you're talking about the use of concrete which ended up being put in around the anodes, whose responsibility was it to look beyond

just not the soils but at the overall implications of what should or shouldn't be used properly in a situation like that?

MR. WILCOVE: I object to the question. It's a quality assurance question that I think should be deferred. I don't think it's relevant to the adequacy of the means to protect underground piping or corrosion.

(Discussion off the record.)

CHAIRMAN BECHHOEFER: I think he may answer.

Well, I mean, while it is a QA question, I think since it's so close in the record to the other areas he may answer that if he knows.

BY THE WITNESS:

A (WITNESS COOK) Well, right off, I guess I would say it would be field engineering that would have brought attention to the fact that they were about ready to put fill in an area that -- for the anodes, and that should have triggered someone else, then, to make the evaluation that they dare put in that type of an installation; in other words, get more information for the geotechnical people. And, right off, I would say that that probably would have fallen under the field engineering's purview. I don't really know.

But the things the QC inspectors would be looking at is did the backfill meet their requirements

with regard to lean concrete, and in the anodes there would be no QC to speak of because it's a non-safety related system. So they would be--the concrete people would be worried about, you know, the conditions of the building where they were going to put the soil and this type of thing, and we might not even be able to recognize the fact that the anodes were really anodes, whereas the field engineer in charge of a given area like the tank farm, I would be inclined to expect him to be knowledgeable enough about the different pipes and equipment that would be in that tank farm area to perhaps have highlighted the conditions that were about to exist by putting concrete against the anode, if he was knowledgeable enough to do that.

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Q So would you say, then, that it would be the responsibility of the Bechtel project field engineer to provide some sort of interrelationship or link between non-Q and Q-areas in the type of situation which you have described?

A (WITNESS COOK) Yes.

MS. STAMIRIS: Thank you. I don't have any other questions.

CHAIRMAN BECHHOEFER: I might add whether that is actually taking place is one of the subjects that we will be considering in January. We have some testimony already on the reporting relationships that are existing, and whether they're good enough will be one of the things we're considering in January.

(Discussion was had off the record.)

CHAIRMAN BECHHOEFER: Mr. Cook, I believe you're excused at this point.

WITNESS COOK: Super.

(Witness Cook was excused.)

(Discussion was had off the record.)

CHAIRMAN BECHHOEFER: Mrs. Stamiris, you may continue with Dr. Weeks any time you want to.

MS. STAMIRIS: Okay.

BY MS. STAMIRIS:

Q Dr. Weeks, I believe I established yesterday when you looked at certain of these documents , with the exception of what I would identify as the November 22nd, 1979 condensate tank fill pipe corrosion study which you gave as No. 567177?

A That's the number I have on it, yes.

Q Okay. Well, let me review with you if I have the other two correct.

Did you say that you had Reference A to the --

A I have both References A and B, yes.

Q Okay. And you said you had Reference A in March of 1982 --

A That's right.

Q -- and I'm referring to a 1981 study on corrosion. And you said that Reference B you had just reviewed yesterday, is that correct?

A That's correct.

Q And now, with regard to what I have called the November 22nd, 1979 --

A Yes.

Q -- study, when did you review that study?

A March of '82.

Q Okay. Thank you.

A I received those two reports in the same mail.

Q Okay, thank you. Dr. Weeks, to what extent did you rely on the November 1979 and the January 1981 reference documents in reaching the conclusions that you did in the SSER with regard to corrosion on piping at the nuclear plant?

A You're asking me to what extent did I rely on these?

Q On the information in those documents, those two documents.

A I relied -- in the first place, I read the two together and took them in context, one at the other, and I relied on them only in their discussion of the soil chemistry and the pitting corrosion that had been observed that was, I believe, cited in one of your earlier exhibits.

Q Okay.

A So that would be the top paragraph on Page 3-43.

Q Would you describe -- oh, I'm sorry. Before I ask you that, I want to also ask you when did you first see this SCRE No. 12 evaluation which is Staff Exhibit 15?

A Yesterday morning.

Q Okay. Then I take it you did not rely on that in any way in forming any of your conclusions?

A No. My testimony was written last spring.

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Q Were there other documents that you were provided with upon which you relied in forming your testimony?

A Yes.

Q Can you name what those other documents were?

A I received the detailed specifications for the galvanic protection system, the detailed specifications for the protective coatings on the pipes. I made numerous telephone conversations to the people who supply the protective coatings on the pipes, to the NRC Staff, and to Consumers Power Company's staff, including in the form of Mr. Cook. I did discuss this situation with him by telephone.

Q Mr. Ron Cook, you mean?

A Yes. Plus, of course, standard textbooks and things like that that I had at my own disposal.

Q Certainly. Would you describe your analysis which forms the basis of your testimony as a review of the Bechtel/Consumers corrosion analysis, as oppcsed to a firsthand investigatory analysis of your own?

A With respect to the pitting on the stainless steel?

Q With respect to any of the corrosion issues.

A I'm not sure, Mrs. Stamiris, what you mean by an investigative analysis of my own.

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Q Well --

A I was asked by the chemical engineering branch of the NRC -- they're my sponsors in this -- to review the documentation provided to -- they were initially involved in my conference telephone conversations with the Applicant, and, yes, I would not say that this was an independent investigation of my own in that I was not at any time asked to, say, design the system.

Q No, but did you ever examine firsthand any sand samples or samples of the corrosion products --

A No.

Q -- or samples of the corroded pipe itself?

A No.

Q So --

A From this site, you mean?

Q Yes.

A No.

Q The validity of your ultimate conclusions are then dependent on the validity of the samples and data which you were provided in the documents you studied?

A From the several sources, yes. Plus my own understanding of what I consider to be good practice.

Q Were you given background information about the random nature of the fill soil at the Midland site?

A Since this is the first time I've heard that

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term, I should, obviously, say no.

Q Okay. Were you told that the fill soils were dug up from the cooling pond area, essentially?

A I was not told where they came from. I was told that they were carefully controlled so that they would not be -- provide a corrosive environment.

Q You were told that the fill soils at the Midland site were carefully controlled?

A Were selected not to cause a corrosive environment. I'm looking for my specific discussions along those lines.

I have the specifications for the backfill that was used in detail, yes. That's another document I have received.

Q Were you told by either people from the NRC or from Consumers that a lot of this case revolves around the fact that the as-built or the as-placed soil conditions were quite different than the specified design requirement --

MR. STEPTOE: Objection. I wouldn't agree with that characterization of what a lot of this case is about. My understanding of the problem is that there was a great deal of variation in the compaction achieved of this material, and that has led to settlement problems.

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I am not aware that there is any evidence in the record that says that the chemical characteristics or chemical soil properties are random or varied in any great degree. And I think that the question is without -- the question is unfair in that it did not explain that to the witness. It mischaracterizes the record.

MS. STAMIRIS: Well, I disagree. I think that Mr. Steptoe's description mischaracterizes the record to a certain extent, and I'm sure that what we're dealing with is a difference of degrees and a difference of interpretation.

I mean, he used a few qualifiers, and I would have to admit to a few qualifiers too. But I do believe that the record in this proceeding will show that there is some question as to whether the design specifications for the soil are a very valid representative of what is actually in place with the soil. And I'm talking about more than just the degree of compaction.

CHAIRMAN BECHHOEFER: Dr. Weeks, did you have any way of ascertaining whether the soils which you were -- upon which you were making your analysis, whether they chemically were at all like the soils through which the piping was going to run?

WITNESS WEEKS: The chemical analyses of the soils that I had in front of me, and the solution leachate

from them were taken from samples removed from the Midland fill.

I was not aware that there was random chemical variation among these soils.

MR. MARSHALL: It's 800 acres.

BY MS. STAMIRIS:

Q Well, I'd like to ask, Dr. Weeks, in a hypothetical that if there were like lumps of clay mixed in with the sand soil, would that affect the overall corrosive aggressiveness of the soils?

A Not unless these lumps of clay contained large amounts of chloride or were highly acidic, which I think is very unlikely from this site.

Q But I --

A I believe also that the fill put immediately around the pipes is specified in a different -- I'd have to check my notes on that one -- than just the overburden that's above it.

Q Well, do you believe that -- well, I need to preface it by saying in my reading of the two studies -- one from 1979 and one from 1978 -- which we have referred to, in each of those studies there was a reference to three sand samples. Does that agree with your understanding?

A There is a reference to sand samples in these.

7/9/3

How many, I don't recall without having to look up the report.

Q Which study do you have now?

A In front of me now, I have the January of '81.

Q Okay, I'll try and help you locate that.

A As they point out in the introduction to this one, that the trench containing the piping was backfilled with clean river sand, that was controlled, what they used, the stuff that's immediately around it.

T8fol

BY MS. STAMIRIS:

Q Well how do you know that it was controlled?

A (WITNESS WEEKS) I have some specifications back here.

Q But if there was that quality assurance breakdown which took place surrounding those specifications and those specifications were properly followed, then isn't it possible that indeed, those soils were not controlled as they were supposed to have been?

MR. STEPTOE: Objection.

BY MS. STAMIRIS:

Q Is it possible?

MR. MARSHALL: It is possible.

MR. STEPTOE: I am not aware of anything in the record that provides or supports this line of questioning with respect to variable properties of the soils that are important for corrosion. So what this amounts to is a line of cross examination which is asking the witness to speculate, that if the information that was provided to him and the soil samples that were provided to him, are all wrong, then could there be a problem.

That is not making a sound record.

MS. STAMIRIS: There are two different points to why I am going with this. I think that once we can establish that there were three samples analyzed in both

of these studies, I want to ask him whether he thinks that quantity and the extent of sampling is adequate; and secondly, I want to determine whether or not his conclusions and his reliance were based upon believing that the soils specifications that he was given actually represented the soils that he made his analysis about.

So those are the two things that I want to know about.

CHAIRMAN BECHHOEFER: Both of those things could be answered. I am not sure that some of the questions you asked leading up to that are -- because I don't think there is any support for the premise of some of your other questions.

BY MS. STAMIRIS:

Q Are you aware of a reference in the December 6th order to random fill?

MR. WILCOVE: Mr. Chairman, may I make a clarification?

I believe, with respect to the soils specifications, the concern for the density of the soil as opposed to its chemical composition, which will affect corrosion, if Ms. Stamiris wants to ask the witness whether the density of the soil -- if the density of the soil did not conform to specifications and if that could have hindered the analysis, I would not have any objection.

I think the cross examination must go in that direction for it to be acceptible.

MS. STAMIRIS: I am going beyond that. Obviously, I am not concerned just with the density or the compaction of the soil but with the actual components. I thought that it was in the record that there was random fill used; and to me, that denoted that there were different components in fill soils.

(Discussion off the record.)

MS. STAMIRIS: Judge Bechhoefer, I would be willing to drop this line of questioning for now and see when I look through some of my documents, maybe I can find it myself during a break or something like that. We could always come back to this later.

JUDGE HARBOUR: If you can find some reference that would indicate that this applies to the soil chemistry, then that would be fine; otherwise, it would have to apply to the mechanical properties -- the chemical properties of the soil.

Would you like to ask a question about the chemical properties --

MS. STAMIRIS: Well, could I see if I can talk to, maybe Mr. Kane or somebody off the record during the next break and get some better understanding of this then before I go on with the questions?

MR. WILCOVE: Staff has no objection.

CHAIRMAN BECHHOEFER: That might be useful. Perhaps we should take our break now while we are at the place. Why don't we take a 15-minute break.

(Brief recess.)

8-2

CHAIRMAN BECHHOEFER: Ms. Stamiris, you may continue.

BY MS. STAMIRIS:

Q Dr. Weeks, trying to pick up where I left off with my line of questioning, having asked some questions of Mr. Kane off the record, I am of a different understanding about soils around the piping.

Is it your understanding that when the piping was placed, that whatever fill material that was there in the general area was then carved out in some way in order to place the piping, and that the sand backfill of which you examined -- read of three samples -- was filled into that excavation for the piping?

A (WITNESS WEEKS) That's the way I understand it, yes.

Q Did the specifications that you read and reviewed in preparing your testimony talk about such backfilling of sand that was different from the random fill?

A (WITNESS WEEKS) I would have to refresh my memory on that. I think so, yes.

Q When you are refreshing your memory on that point, would you also check to see if these specifications identify whether that sand was placed just below the pipe and, say, halfway up it for support or if that sand that was placed in the excavation covered over the top of the

pipe.

A (WITNESS WEEKS) I am having to check that, I am sorry. Unfortunately, everything I find has to do with around the building rather than pipes.

As I understand it, it goes on top of the pipe as well as underneath it. I haven't found it where it specifically says those words in this document I'm looking at, which is the specification for backfill.

Q Does it have a number?

A (WITNESS WEEKS) Yes it does, Bechtel Specification 7220-Q112 Division 13.

Q Can you read me any title for that specification which would differentiate those soils from the general fill area soils?

I will try to ask it in a different way, I think I wasn't clear.

Is there anything in that specification by its name or anything else that tells you specifically this is the specification for sand fill to be used around piping? You know, the excavation that was dug and already present in the fill soil?

A (WITNESS WEEKS) They use a different term for structural backfill which was within three feet of the exterior of the structures.

Now it is the relationship to that piping that

I haven't found while thumbing through this. I may have a different -- I don't have an answer.

I would rather not hold up the proceedings here.

Q Did you consider that the quantity -- all right, assuming that the samples that were tested were accurate as far as the material contained in that sample, do you believe that three such samples are enough to base an adequate evaluation of the soils around the piping for corrosion?

A (WITNESS WEEKS) These are three in each case. There are three given in each of the two reports.

Q Yes, for a total of six.

A (WITNESS WEEKS) If I look at the 1981 report, I have one described as course sand and one described as silty sand. And the other one, I have a sample described as clean sand and then Sample No. 1 and Sand Sample No. 2.

What I find remarkable among all six of these specimens is there uniformity from the point of view of the constituents important to corrosion, that is pH, conductivity and chloride.

chloride

BY MS. STAMIRIS:

Q So do you consider that a three is an adequate number --

MR. WILCOVE: I believe six --

BY MS. STAMIRIS:

Q I am sorry, I mean three in each study.

A (WITNESS WEEKS) Yes.

Q And did one of those three represent in each study, an attempt to find sand away from the particular site of piping, kind of as a control sample --

A (WITNESS WEEKS) This is not specified in the report. It simply says "three samples of the backfill sand used at the Midland jobsite were provided". That is all it says in the report. I am looking in the 1980 report, page 7.

Q In regard to --

I would like to ask before I go on with my questions of Dr. Weeks, yesterday when I began asking these questions of Dr. Weeks, Mr. Hood was also on the stand with him, and I was wondering if I could also ask a few questions of Mr. Hood about which documents he had seen and when he had seen them, which of these documents the NRC has had previous knowledge of.

MR. WILCOVE: I am not sure what the relevance of that would be because it is Dr. Weeks who has done the

analysis of corrosion protection of the piping.

MR. STEPTOE: Judge Bechhoefer, Mr. Hood was only up there to talk about cutting the condensate lines. His testimony had nothing to do with this. It is clear that the documents came from -- some of the documents that Dr. Weeks relied on, came from Consumers Power Company and Bechtel Power.

CHAIRMAN BECHHOEFER: I can't see where Mr. Hood could add anything at this point.

MS. STAMIRIS: What I need to ask then -- and I don't know if I can ask Dr. Weeks without going into details about this, would it be possible that Dr. Weeks, as a representative or acting as a consultant to the NRC, could have reviewed particular documents and made the NRC evaluations for them without them having ever read those documents?

MR. WILCOVE: I object to the question. First off, again, anything is possible. Secondly, Dr. Weeks is the consultant. He is hired by the NRC to do this analysis, so I really don't see the point of the question.

MS. STAMIRIS: Well, Chairman Bechhoefer, can a consultant to the NRC act independent of the NRC?

CHAIRMAN BECHHOEFER: Well their investigations are usually performed that way.

MS. STAMIRIS: They are usually performed that

way?

CHAIRMAN BECHHOEFER: In reporting to the NRC.

MR. WILCOVE: It would be a waste of money for the NRC to hire a consultant for something they were doing.

CHAIRMAN BECHHOEFER: I would say in fact, among the documents that Dr. Weeks listed that he viewed, I would suspect that the NRC did not have some of them.

MS. STAMIRIS: All right.

Dr. Weeks, in regards to the testimony that you have made about corrosion, is there anything in your testimony that you had said yesterday that you would wish to change at this time?

MR. WILCOVE: I believe Dr. Weeks was already asked that question by the Board.

MR MARSHALL: I can't see any reason why he cannot answer that question. What's the objection about that?

(Discussion off the record.)

CHAIRMAN BECHHOEFER: I don't think we asked that specific question, but I think we just asked what affect it would have. I don't think I specifically -- I think I asked the question, but I'm not sure that I asked him if there was anything he wanted to change, but maybe the answer would be the same.

WITNESS WEEKS: No.

BY MS. STAMIRIS:

Q Dr. Weeks, you said that when you conducted your study, that you reviewed -- well, simultaneously, essentially, the 1979 study and the 1981 study, and compared them to each other, did you find any inconsistencies between those two studies?

A (WITNESS WEEKS) Yes. I felt the 1981 study was more conclusive and it in itself discusses inconsistencies between the two. It points out that really the findings were the same in both cases.

Q So would I judge by that that you agreed with the conclusions of the 1981 study with regard to any inconsistencies between the two?

A (WITNESS WEEKS) That's what my -- yes.

Q All right. Dr. Weeks, do you remember saying -- do you remember what you said yesterday was the ultimate depth of the corrosion in relation to the wall thickness of the condensate pipe that was referred to in the 1979 study?

A (WITNESS WEEKS) I don't remember what I said yesterday, but I have the report.

Q All right.

A (WITNESS WEEKS) I think I said it is about 75 percent through the wall.

Q I wasn't sure whether -- you said yesterday

either one-third or two-thirds --

A (WITNESS WEEKS) I think I would have said two-thirds for the maximum depth.

Q Will you agree that, according to statements in the second paragraph on page 2 of the 1979 study, that approximately three -- I'm sorry -- this is in the middle of the second paragraph, approximately three-fourths -- I am sorry, not inch -- approximately three-fourths of the pipe wall was not there because of corrosion?

A (WITNESS WEEKS) I think that's what I just said a minute ago.

Q Dr. Weeks, have you drawn conclusions -- well, I know the answer to that all right.

In drawing your conclusion that the galvanic protection system at Midland is adequate, have you also drawn a conclusion that the extent of the corrosion problems at Midland do not represent a safety problem?

A (WITNESS WEEKS) The corrosion problem as outlined in these earlier parts -- earlier Bechtel reports --

Q The 1979 report?

A (WITNESS WEEKS) And the 1981 report, were both taken on samples obtained before the galvanic protection system was put into effect, and I would consider that that amount of corrosion would be of concern, yes. Seventy-five percent through wall, I would consider that a matter

of concern, yes.

Q But you did not perform any analysis as to how extensive that type of severe corrosion might have been at the site prior to the beginning of the galvanic protection system, did you?

A Not myself, no.

JUDGE HARBOUR: Excuse me, do you mean widespread or --

MS. STAMIRIS: Widespread, how widespread it was.

Dr. Weeks, do you know whether any of the lines addressed in these two corrosion studies by Bechtel were safety grade piping?

WITNESS WEEKS: I believe the borated water storage tank is, yes.

BY MS. STAMIRIS:

Q Can you specify which pipes at the borated water storage tank were subject to corrosion?

A Not without reference to these reports -- I am sorry, these are condensate tank fill; I stand corrected. It was the borated water tanks that were inspected this summer.

(Discussion off the record.)

BY MS. STAMIRIS:

Q Dr. Weeks, the galvanic protection system applies to both safety and non-safety grade pipe, does it not?

A Yes.

Q And can you specify any safety grade pipe which were the subject of corrosion in any of the documents you reviewed?

A (WITNESS WEEKS) I do not know firsthand whether the condensate tank fill pipe is -- is considered a safety grade. I consider that outside my jurisdiction.

Q Do you know whether the -- does N_2 mean nitrogen?

A (WITNESS WEEKS) Yes.

8-5

yes.

BY MS. STAMIRIS:

Q Do you know whether the nitrogen lines or the stainless nitrogen lines were safety grade lines?

A I don't know that off the top of my head.

CHAIRMAN BECHHOEFER: At this time, I would like to put the Staff on notice that at some point, I guess this would be Mr. Hood's, but maybe somebody else, I would like to find out why the galvanic protection system effecting a Q-listed line is not itself Q-listed.

MR. WILCOVE: We will also put Mr. Hood on the stand now for that purpose. One moment please.

Mr. Chairman, Mr. Hood would not be able to answer that question, so offhand, we don't know who would be able to answer that question but we will check and find out.

CHAIRMAN BECHHOEFER: All right.

MS. STAMIRIS: Before I go any further, I think I should tell all the parties that I have quite a few questions about these reports which I studied last night and questions that would go back and forth between them.

Some serious questions and concerns arose in my mind about discrepancies between these two reports and information that was in these reports. I would like to see them go into the record and I would like to offer them as exhibits, only because of reproducing it all is

prohibitive to me because I don't have access to a Xerox machine, and I was wondering if anyone would be willing to, anyone who has access to a Xerox machine, would be willing to copy those for the sake of allowing parties to follow along with my questions and be aware of what these studies are about.

MR. STEPTOE: Applicant will copy the reports.

CHAIRMAN BECHHOEFER: Would you have enough copies so that, at least, one could be given to the Board so we could follow the questions?

MR. STEPTOE: We can't do it now.

CHAIRMAN BECHHOEFER: That is what I wondered, if you had an extra copy with you.

(Discussion off the record.)

CHAIRMAN BECHHOEFER: I guess we could do without it now. We will have to check back later.

MR. STEPTOE: All I could say is that I can simply ask if Ms. Stamiris really believes this is necessary cross examination. It is legitimate to ask about the reports that consultants used to prepare their testimony, but we have been going on corrosion now for a very long time.

We have one of the most distinguished experts in the country who has given his opinion. I would say that she is beating a dead horse but that would be

derogatory to Dr. Weeks.

If there is any way Ms. Stamiris could shorten her cross examination with the recognition that we have, for the past two days, had a platoon of engineers waiting to go on to the next subject. It just seems to me that we passed the point of diminishing returns on this subject a long, long time ago.

MR. WILCOVE: Mr. Chairman, I would like to, before Ms. Stamiris speaks, I would like to support Mr. Steptoe in this effect, that the questions that -- first off, I understand that these are complex issues, and certainly, I am in sympathy with Ms. Stamiris. But the fact remains that questions have been asked that are very basic discovery-type questions which are just not appropriate in this type of hearing. They don't expedite this hearing and they don't lead anywhere.

MS. STAMIRIS: But I haven't gotten into the report yet, so you don't know what kind of issues I am going to raise about the report.

MR. MARSHALL: That's true.

MR. WILCOVE: I recognize that we have not gotten into the report yet but all I am requesting is that the questions be streamlined and that they be up to a point as possible.

possible.

MR. STEPTOE: Judge, the Board obviously has the authority to regulate the course of the proceeding, including excluding evidence for redundancy and immateriality, and it certainly has the right to take some action with respect to cross examination that is unduly prolonged, as I believe this cross examination has been.

It really is a hardship to a lot of individuals who have been sitting here for two days. More importantly, an unduly long cross examination does not help the record. It does not contribute to anyone who will try to review that record and thus not allow the decision-maker to focus on the issues that are truly important.

CHAIRMAN BECHHOEFER: And I might add, you would have to exclude almost everything that occurred this morning because that resulted from an incident that no one knew anything about before this morning, at least we didn't.

So I don't include that as part of the cross examination of --

MR. STEPTOE: Well, I do, your Honor. I do -- this morning was really an explanation of what turned out to be just a dead end. It lacked the intrinsic safety significance to justify the time that was spent.

Now of course, this is also subject to Board discretion and I do not suggest that what Ms. Stamiris

wants to do is totally improper. I mean, this is along a proper line of cross examination but it has taken two days to get here. And just considering what we have heard so far from Dr. Weeks, is it really likely that we are going to get anywhere?

CHAIRMAN BECHHOEFER: I think we can see where we go.

MR. MARSHALL: You are in the city of modern explorers.

MS. STAMIRIS: I think as Judge Bechhoefer said, those comments are obviously -- what Judge Bechhoefer said, those comments are arbitrary without hearing what some of the things are. If the Board would rather have me give some kind of a capsule to cover as to what my bottom line is, I could do that first.

Or, if you would rather have me go to what I consider to be the heart of the matter, I would do that. But I would like to say that the reason I think these things are important is because there is attached to the SER E-12, which is Staff Exhibit 16 of a project engineering complete response on the situation, and it is a summary of the corrosion issues, and I think that this one page summary certainly leaves out so many significant issues and questions that the studies cover, that--

CHAIRMAN BECHHOEFER: Of course, that could be

handled by just putting the documents into the record --

MS. STAMIRIS: Without asking questions?

CHAIRMAN BECHHOEFER: I would think that if there were significant problems that you think have to be highlighted, certainly, that could be. You might want to summarize or just give a capsule of some of the discrepancies or some of the matters that you think raise questions in those reports.

MS. STAMIRIS: All right.

CHAIRMAN BECHHOEFER: And, how they are material to our decision on the corrosion -- on the pipes.

MS. STAMIRIS: First of all, I think they are material because they relate clearly to the question that you just asked of Mr. Hood and he was unable to answer at this time as to how we can evaluate the safety and significance of a non-Q protection system for Q -- which protects or is supposed to protect the Q system and how, if there are any failures or inadequacies with regard to the analysis of corrosion and with regard to the protection thereof, that certainly there are implications for safety impact on the safety system.

So that is where the heart of the matter goes. And then, as far as some of the specific discrepancies between these two reports, well I would just try to say this as directly as I can.

can.

The first report in 1979 addresses corrosion problems at the condensate lines, severe pitting problems that we have already mentioned, and it draws an analysis which is consistent with the second sentence in 3-12 which says that Bechtel reviewed and attributed the corrosion to chemical contamination, although I would have to say that it was done in a -- somewhat of an open-ended way, they did a lot of speculating, and they really did not specify clearly what chemical contamination, but they did leave that as their general conclusion.

CHAIRMAN BECHHOEFER: And Dr. Weeks has explained the difference, and at least he has already given his explanation of why the initial conclusion appeared in the first report and why he thought that the later conclusion was better.

Now that has already been gone over, so that's more -- what I am trying to dive at is what additionals should we have on the record.

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MS. STAMIRIS: Dr. Weeks' interpretation of that has, and I respect Dr. Weeks' expertise, certainly, and I know he is a nationally reknowned expert in this field, and I certainly am not -- I don't have much basic knowledge of any of this.

But my problem is because someone is -- when someone is such an expert that they're at really the top of their field, like Dr. Peck was in his and Dr. Weeks is in his, sometimes I think that we tend to place more reliance on their judgment because of their title and their position than -- you know, I think we get into more judgment areas than we do in areas of stating upon what facts or observations these judgments were made.

And so I would like to go into some of the details of these reports to get at some of the background facts and what may be an unconservative approach or methodology underlying the conclusions reached in the second report, because the second report, in 1981, looks at the same sorts of problems in recurring instances and seems to me to have a very preconceived notion of what it was caused by and seems to me to go to some lengths -- let's say to bend over backwards -- to make their conclusion fit their preconceived statement of what was causing it and then the interpretation and the conclusions seem to have been drawn that way.

And, as a back-up for that statement, I can point to a reference in the second -- in the first report which says that they ruled out stray welding currents as one of the probable causes because there was -- because they determined that there was no welding going on in the vicinity. And yet the second study in 1981 not only attributes its conclusion to stray welding currents but it goes back and reconcludes that the earlier study was indeed due to stray welding currents, despite the statement in the first study that there was no welding going on in the area.

Now, that, to me, is a pretty strong discrepancy between two factual statements and how we draw conclusions upon those facts.

Another thing that I would like to note is that there is a reference in the 1981 study to certain piping which it says it was -- it said it was a certain type of metal in the stainless steel piping and it should have been something else.

And then the first study says that that other type of piping actually was used, and what I can't determine in my own mind is whether or not an actual -- I have to know which piping is Q and which is non-Q, and I also have to know whether the piping in the first study was really the kind that they said it was or if they

assumed that it was that kind on the specifications when, in reality, it wasn't.

There's just some question about the actual material and composition of the stainless steel piping because of statements between the two studies.

Those are the kinds of things I would like to be able to explore.

And I might add that I would like to be able to explore them with Dr. Weeks, but I would also believe that it would be important to explore them with the appropriate witness from Consumers Power Company or Bechtel who has direct knowledge or wrote these reports or has some direct knowledge of the information in these reports.

And I think, as a final statement, the only thing that I could say that might help expedite this whole thing is if in some way you wanted me to postpone my questions until such time as you, the Board, and the other parties had a chance to take these documents and study them yourself and determine if, in fact, I am correct in any of the concerns or issues I have raised or whether there are others that I have missed --

MR. STEPTOE: Your Honor, I think that's a constructive suggestion, but I don't know what Dr. Weeks' schedule is. But I think that if we could do a rush job

9/1/4

on copying these things, then, perhaps the Board could organize the questioning in a much speedier way.

CHAIRMAN BECHHOEFER: Of course, we don't know the specific discrepancies that Mrs. Stamiris is commenting upon.

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(Discussion was had off the record.)

CHAIRMAN BECHHOEFER: Back on the record. The Board has a serious question about whether matters of this sort would be useful, but we would like to ask Dr. Weeks, having heard Mrs. Stamiris' statement, did she mention anything that you haven't taken into account or weren't aware of --

WITNESS WEEKS: No.

CHAIRMAN BECHHOEFER: -- or that you think might affect either your overall conclusion or subsidiary conclusion --

WITNESS WEEKS: No, she did not.

CHAIRMAN BECHHOEFER: So you have considered all of those questions?

WITNESS WEEKS: I recognized the same subtle discrepancies between the two reports, yes. I treated the second one as the more authoritative, simply because it had a larger sample upon which to be based.

The second report recommends two things: One, the cathodic protection system be activated, and it says consideration should be given to methods of determining the integrity in terms of freedom from the pitting of other buried stainless steel pipes.

As I understand it, last summer this

investigation was made, and that's that Reference B, I think it's called, that we referred to earlier, in which approximately from a third to a half of the piping in the borated water storage tank lines were unearthed, were inspected.

The utility took pictures, which I have seen, in which I can see no evidence of any corrosion.

I discussed it with Mr. Cook. He saw the pipes himself. He saw no evidence of any corrosion, as I believe he testified earlier.

So I think this gives us that secondary check on the current status of the remaining piping that's of safety grade.

CHAIRMAN BECHHOEFER: What about the question about the lack of welding in the area --

WITNESS WEEKS: That's the most significant discrepancy. The first --

CHAIRMAN BECHHOEFER: Well, that's the one that had impressed me, and I wondered how you considered that.

WITNESS WEEKS: The second report believes that they were both due to stray currents. It did not, however, say -- answer the question how did they now think there was stray currents in that area.

It's left open. It is a discrepancy.

MS. STAMIRIS: Judge Bechhoefer, may I respond?

9/2/3

MR. WILCOVE: First let Dr. Weeks finish.

MS. STAMIRIS: I'm sorry.

CHAIRMAN BECHHOEFER: Well, let Dr. Weeks finish.

WITNESS WEEKS: I think I finished with that specific question, yes, you just asked me.

(Discussion was had off the record.)

CHAIRMAN BECHHOEFER: Do you think there would be any additional remarks for the record that would be helpful to us?

WITNESS WEEKS: Not really. I think the subsequent inspection of the remaining -- or a substantial sample of the remaining buried piping showing no corrosion is the one piece of assurance that we have, the best assurance that we have that what's there now is satisfactory.

MS. STAMIRIS: Judge Bechhoefer, in response to that, I think that in this Reference B which Dr. Weeks is referring to as the most significant assurance that indeed this is not a significant problem or something that we need to go into, his analysis of the situation completely misses my point.

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My point is not whether or not -- my point is not in disagreeing with Dr. Weeks expert analysis that this specific amount of piping which we did look at indeed lacked serious corrosion problems, but my very serious concern is with the methodology, the process and the approach that was employed to somehow determine the generic implications of this problem. And I think it would be very apparent to the Staff, if they read it, or to the Board, the kinds of things that I'm talking about.

Now, for example, what I'd like to say is that by virtue of the conclusion in the second report, which, as I told you before, I consider a preconceived judgment or, you know, something that they really worked real hard -- and I think in science we know that you can gather -- if you want to prove a certain thing and you know what you want to prove going in, you most often can gather enough information to back up and support what you want to prove. And since that's what comes through to me in this second report, the report factor to our concern with this whole issue is that by taking the conclusion that they took and that they wanted to take, in my estimation, for the overall problem, it allowed them to pinpoint the cause of the problem as being those places where this -- the welding machines were attached,

and, therefore, if it did come out to true that, indeed, this whole corrosion problem was caused by stray welding currents, that would solve a great deal of their problems, because then it is very easy for them to go back and look at the small percentage of pipe which is likely -- most likely to be affected by stray welding currents, which, in fact, is what I believe this Attachment B does. And that misses the whole point that it could be from a completely different cause which would have random generic implications that would not be so, you know, easy to pinpoint.

So what I'm talking about is methodology, whereas what Dr. Weeks seems to be talking about is the specific examples they did look at.

CHAIRMAN BECHHOEFER: And we have also heard testimony about potential other causes, and, apparently, Dr. Weeks did consider them and ruled them out, for one reason or another, which he has already explained.

MS. STAMIRIS: Well, to me, if the Board is even considering not letting this evidence come into the record, it would be a complete turnabout of everything that I have understood that we are operating under in this procedure and what the Board has been to, you know, my way of thinking, very fair and very good about letting all the relevant information and evidence come into the

record in this proceeding up to this time. And I would find it very surprising that on the basis of the opinion of one expert that the Board would refuse to look at relevant documents and --

CHAIRMAN BECHHOEFER: I didn't say we would not accept the documents.

MS. STAMIRIS: Oh. I thought you meant you weren't even going to look at them.

CHAIRMAN BECHHOEFER: But I think we, perhaps, would not want to entertain further cross-examination on those documents --

MS. STAMIRIS: At this time?

CHAIRMAN BECHHOEFER: -- at this time. Maybe not at all, but we did not say we would not accept the documents.

MS. STAMIRIS: Well, that's possible. I'm sorry, I thought you didn't even want to look at them. And it is my understanding that the NRC may not have even looked at them, and I think they should make some kind of assessment of the overall situation.

I'm sorry, I misunderstood.

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MR. WILCOVE: Let me just say that Dr. Weeks is our consultant. It is his job, his responsibility to examine those documents. So that I don't understand what Mrs. Stamiris means when she says NRC did not look at those documents. The person whose responsibility it is to look at those documents has done so.

MS. STAMIRIS: I said the NRC may not have looked at the documents, because I don't know but I would think that some member of the NRC Staff should see the material upon which their consultant bases his conclusions.

MR. STEPTOE: Chief Judge Bechhoefer, we certainly have no objection to the admission of these Bechtel reports. I think they should be in the record after all this discussion, and we will stipulate to their admission.

Our only point is that we've reached the point of diminishing returns with respect to cross-examination of this witness at this time.

CHAIRMAN BECHHOEFER: Well, at least on this subject.

MR. MARSHALL: I think they should be bound into the record, Judge.

CHAIRMAN BECHHOEFER: Off the record.

(Discussion was had off the record.)

CHAIRMAN BECHHOEFER: The Board has decided we'll admit those documents. They could be -- Ms. Stamiris, do you know what exhibit number they would be? I'm assuming they're your exhibits.

MS. STAMIRIS: I don't know, and I think Mr. Paton might be able to help me.

MR. PATON: Just a second.

The last Stamiris exhibit number I have is Exhibit 35, so the next one, I think, is Exhibit 36.

MR. STEPTOE: 36 and 37.

CHAIRMAN BECHHOEFER: Were there two or three?

MS. STAMIRIS: I will introduce three, because I can afford to copy the two page document myself.

CHAIRMAN BECHHOEFER: Describe for the record what each of the numbers, 36, 37, and 38, will be.

MS. STAMIRIS: Okay. In chronological order, then, Stamiris Exhibit 36 will be identified as the November 22nd, 1979 study entitled Condensate Tank Fill Pipe Corrosion Study, Log No. 567177.

Is that sufficient identification for the record?

CHAIRMAN BECHHOEFER: Off the record.

(Discussion was had off the record.)

CHAIRMAN BECHHOEFER: Okay.

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MS. STAMIRIS: Stamiris Exhibit 37 would be the January 26th, 1981 stainless steel pipe corrosion study, Log No. 608177.

And Stamiris Exhibit 38 would be -- I don't know what happened to it.

It's attachment -- I think I can identify it, because it is referenced in SCRE-12, which is Staff Exhibit 15, as M and Q's report RAG-072-06, dated 7-27-82. And that would be Stamiris Exhibit 38.

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CHAIRMAN BECHHOEFER: We will accept those documents as Stamiris Exhibit 36, 37 and 38.

(The documents referred to, Stamiris Exhibit Nos. 36 through 38, inclusive, for identification, were received in evidence.)

CHAIRMAN BECHHOEFER: One caveat. We sort of remembered some other Stamiris exhibits; and if it turns out that there are other Stamiris exhibits, we may have to change those numbers.

MS. STAMIRIS: I will check on it tonight.

CHAIRMAN BECHHOEFER: We will have the record before us here, but --

MS. STAMIRIS: All right.

CHAIRMAN BECHHOEFER: Now we would like to get copies sometime today or later before we break this evening, or maybe shortly after dinner so we can look at them tonight.

MR. STEPTOE: Judge Bechhoefer, I don't believe that we will be prepared to get copies today because the Xerox service is at the site and they have probably already left. We could get copies tomorrow morning, though.

(Discussion off the record.)

CHAIRMAN BECHHOEFER: Ms. Stamiris, do you have

any other cross examination of Dr. Weeks on other subjects, because that would be appropriate now if you do.

MS. STAMIRIS: I don't think so. I will look quickly through my notes. I think it all relates to those studies. I don't think I have any other questions at this time of Mr. Weeks.

CHAIRMAN BECHHOEFER: Mr. Marshall, do you have any?

MR. MARSHALL: Only in view of the confusion, I would like to direct one question, a facetious one, of Dr. Weeks.

In view of what has transpired here, would you say you are infallible?

WITNESS WEEKS: Absolutely not.

MR. MARSHALL: Thank you, just for the record.

CHAIRMAN BECHHOEFER: Mr. Steptoe?

CROSS EXAMINATION

BY MR. STEPTOE:

Q This, I think, is more in the nature of a statement than a question, Judge Bechhoefer, but on page 3-42 of the SSER, which is your testimony, Dr. Weeks --

MR. WILCOVE: The second supplement?

MR. STEPTOE: The second supplement. I believe it is the eighth line down in the first paragraph. The phrase, "Special Quality Control Inspectors", the sentence

(Reading)

"I am informed by my client, the people who did the inspection for defects in the coating of this piping were Bechtel inspectors but were not in the quality control department".

I take it that this information appears in the SSER, but it is not based on your personal knowledge but on what somebody told you or --

THE WITNESS: That's correct.

BY MR. STEPTOE:

Q If it were in fact the case that the Bechtel inspector who did this work was not in the quality control department, would that change your testimony in any way?

A No.

Q Or your conclusions?

A I don't believe so.

MR. STEPTOE: I don't have any further cross examination.

CHAIRMAN BECHHOEFER: Dr. Weeks, I just have one question.

You state on page 3-43, the first paragraph, 3-43 of Supp2 of the SSER, that the Applicant has advised that proper grounding of field welding equipment is now in practice.

Did you hear Mr. Lewis' testimony concerning the type of grounding --

A I was not here when he was on the witness stand.

CHAIRMAN BECHHOEFER: Did you read that part of his testimony -- what I wanted to do was ask you if that was proper as you used it?

A I can't answer the question. I specifically, however, asked this question of Mr. Cook who had it, and he advised me by telephone that he had seen proper grounding in practice at the site at the present time -- or the time he called.

CHAIRMAN BECHHOEFER: I see.

WITNESS WEEKS: In other words, I got this statement from the Applicant. I attempted to confirm it through the NRC site.

CHAIRMAN BECHHOEFER: Thank you.

WITNESS WEEKS: And it was conformed by him, I should say. I am not an expert on welding.

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welding.

CHAIRMAN BECHHOEFER: Well I was referring to grounding more than welding.

WITNESS WEEKS: I know.

CHAIRMAN BECHHOEFER: That's all the Board has.

Mr. Wilcove, do you have anymore questions?

MR. WILCOVE: I have no redirect, but this is a clarification.

It is the Staff's understanding that although we will have Dr. Weeks again on the stand tomorrow, it is our understanding he will not be asked to come back at a later date to testify with respect to corrosion of underground piping.

CHAIRMAN BECHHOEFER: We may not even need him tomorrow morning, but we do not expect that he would be asked to come back.

The only thing I will reserve for cross examination is, apparently, Miss Sinclair went out to make copies and she missed her turn.

When she comes back, we will ask her if she has cross examination of Dr. Weeks because that would be appropriate either this afternoon or tomorrow morning.

Do you have any follow up questions?

MS. STAMIRIS: I don't have any questions of Dr. Weeks. If we went off the record for a short period of time, maybe someone can answer a question as to which --

or, I don't care, we don't have to go off the record -- if the N_2 line is a Category I line? Mr. Weeks didn't have that information but maybe someone else does.

MR. STEPTOE: We will supply that information.

MR. WILCOVE: Which line?

MS. STAMIRIS: The nitrogen line and the thiosulphate line.

THE WITNESS: The thiosulphate line has been retired, I have been told that. That one I can answer, so that is definitely not a Category I line at the present.

MR. STEPTOE: We're into Ms. Stamiris' question with respect to the nitrogen line. I will answer that tomorrow.

CHAIRMAN BECHHOEFER: Dr. Weeks, at the moment, you are excused. We will ask Ms. Sinclair, when she comes back, whether she will have questions. She will either ask them tonight or tomorrow, and then we will determine whether there's any further questions to be asked on those reports.

THE WITNESS: Thank you, sir.

CHAIRMAN BECHHOEFER: At this point, would the Applicant like to put on the direct testimony and make any corrections?

MR. STEPTOE: We would definitely like to do that, your Honor. Essentially, it is the same panel

for the surface water pump structure as for the Harbour questions on the Auxiliary Building with the addition of one individual.

I would ask the surface water pump structure panel to come to the stand, please.

CHAIRMAN BECHHOEFER: Two of the witnesses have not been sworn, Dr. Shunmugavel and Mr. Krause.

Whereupon,

PALANICHAMY SHUNMUGAVEL

ROBERT KRAUSE

called as witnesses by the Counsel for the Applicant, having first been duly sworn by the Chairman, were examined and testified as follows:

MR. STEPTOE: Judge Bechhoefer, you just asked me a question which I believe was why the galvanic system for Category I pipe, not itself, Q-listed, we have checked and we are not going to be able to get the answer to that question in this session but we will get it as soon as we can.

CHAIRMAN BECHHOEFER: All right.

DIRECT EXAMINATION

BY MR. STEPTOE:

Q All right, picking up what we have refered to the Harbour questions first, on page 7134 of the transcript, Dr. Harbour expressed the concern that, We would like to

add that the system for detecting structure movement must be reliable as well as accurate. Large static gaps should not exist and the instruments should not be covered up with sand.

These comments were made with respect to the instrumentation for monitoring underpinning of the Auxiliary Building.

I am going to ask Mr. Krause to address that. And first, I should ask Mr. Krause, will you please state by whom you're employed and in what capacity?

A (WITNESS KRAUSE) I am employed by Wiss, Janney, Elstner and Associates, Northbrook, Illinois.

Q What do you do for Wiss, Janney?

A (WITNESS KRAUSE) I am an engineer for the firm.

Q Could you briefly describe your professional qualifications and background?

A (WITNESS KRAUSE) I am a graduate of the Illinois Institute of Technology, a Licensed Professional Engineer in the State of Illinois and worked for the firm for roughly 22 years in the field of instrumentation and measurement of movements.

ovement.

BY MR. STEPTOE:

Q What is your responsibility with respect to the instrumentation for the Midland Auxiliary Building underpinning effort?

A I am the project manager for Wiss, Janney, Elstner on the site.

Q And that means you are generally responsible for that instrumentation; is that correct?

A (WITNESS KRAUSE) That's correct.

Q Can you address the reliability of -- well, first of all, can you tell the Board what is the instrumentation that is being used to monitor the Auxiliary Building underpinning effort?

A (WITNESS KRAUSE) The instrumentation we are using is linear variable differential transducers which is an electronic device for measuring the movement. We are also using dial gauges to measure differential and absolute movement. We have some strain gauges that are going to be installed on the structure.

There are extensometers which are a variation of LPDT which are installed on our walls to measure movements on the walls. We are doing crack inspection, and I believe that is about all. We also have therocouples down at deep-seated benchmarks to measure the temperature changes that will occur.

Q Now, these instrument systems are described in the Staff's Supplemental Safety Evaluation Report, Supplement No. 2, are they not?

A (WITNESS KRAUSE) Yes, they are.

Q And you reviewed that description?

A (WITNESS KRAUSE) Yes, I have.

Q Is it accurate?

A (WITNESS KRAUSE) It is accurate with the exception of the extensometers. I think that refers to the extensometers as being a five-foot interval, and they are actually between 11 and 20 feet in length for the Auxiliary Building which is what we are talking about.

Q Now can you address the reliability of this instrumentation, please.

A (WITNESS KRAUSE) The instrumentation we are using is actually a state of the art. It is the best possible LPDT that can be bought for the project. We are using current Hewlett-Packard Data Acquisition Systems which is of the second generation. It is the most advanced we can get for this type of monitoring.

Q Is that a computer, when you refer to Hewlett-Packard Data Acquisition Systems?

A (WITNESS KRAUSE) It is a two-part system that has a computer which is an 85 computer and it is interfaced with the Data Acquisition System itself.

Q So how is the information from this instrumentation corrected?

A (WITNESS KRAUSE) The instrument is controlled by the computer. The computer will automatically set it to scan every hour at which time it will take more months for it to run through the complete cycle of the electronic equipment and compare the data, reduce the data, compare the results with the alarms or trigger values that are provided us.

If it reaches alarm value, it will print the data out. It will also sound an alarm so that the operator in the room can transmit this data to the resident structural engineer.

Every four hours, the system automatically prints out the complete scan, regardless of whether we have an alarm value or not.

Q And this printout information goes to who at the site?

A (WITNESS KRAUSE) The printout goes to the resident structural engineer.

Q Is there anyone who monitors the operation of this Data Acquisition System?

A (WITNESS KRAUSE) We have three people right now on the site, monitoring the equipment, each one taking an 8-hour shift and monitoring it for seven days a week.

So the monitoring, during the course of the underpinning, there will be someone in the data room at all times or within hours of taking the reading.

Q Are there any procedures that this individual must follow using this information from the instrumentation?

A (WITNESS KRAUSE) Basically, we have two procedures, procedure OP-40, which is obtained, reducing and reporting of the gathered data which he follows, and we have an OP-41 which is a procedure in the event that one of the alarm values should be reached.

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BY MR. STEPTOE:

Q I will simply add that those two procedures are in fact attached to the Staff's testimony which has already been filed so that they are going to be in the record.

Could you tell me what happens if the electricity, for any reason, fails in this instrumentation or in the computer? What happens then?

A (WITNESS KRAUSE) If the electricity goes off or if we have a prolonged outage for some reason, we have back up gauges, mechanical gauges at each one of these electronic measuring points.

So we would go out and we would take visual scans on the dial gauge reading until the system was backed up again.

Q So these dial gauges do not depend on electricity; is that correct?

A (WITNESS KRAUSE) That's correct.

Q Do your procedures oblige your employees to go out and check those dial gauges if there is an outage?

A (WITNESS KRAUSE) Correct. If there is an outage, the procedure, OP-40 and 41 will tell them which ones to check and how to check them.

Q Do you believe that large data gaps may exist because of the operation of this system or despite the

operation of this data acquisition system?

A (WITNESS KRAUSE) No, I don't because the maximum time between readings is one hour regardless of whether the system, the electronic system is up or whether we are taking mechanical readings from the dial gauges.

Q Can you express an opinion as to the likelihood that instruments will be covered up with sand?

A (WITNESS KRAUSE) The instruments are all out of the construction area. And in addition to this, they have a heavy metal cover over them. There is no reason why they should be covered up at all. No, I don't think that they would be covered up.

Q Do you expect that they might be degraded due to anticipated environmental conditions during the underpinning effort?

A (WITNESS KRAUSE) I don't think they would be degraded in any manner because we check both the electronic against the dial gauges so that we can pick up any deviation that may occur.

MR. STEPTOE: This concludes our direct examination with respect to the instrumentation.

I thought I would then proceed to ask Mr. Burke about the next set of Dr. Harbour's questions.

BY MR. STEPTOE:

Q Mr. Burke, can you describe what is the plan for arresting structural movement if that should occur during the underpinning effort?

A (WITNESS BURKE) Well quite simply, it will take the form of jacking additional loads into the tiers and underpinning that has been installed today.

Q What basis is there for believing that it is possible to jack additional loading into the tiers?

A (WITNESS BURKE) The loads that are imposed on the tiers during the underpinning operation are quite low with respect to the capability of the underlying soil, and it appears themselves to carry this load.

And the jacks will also have an excess capacity much beyond their safe limit.

The Auxillary Building, the electrical penetration area will be supported first by the grilled system beams which will project underneath the extreme tip of the electrical penetration area and this grilled system which is supporting tiers and columns has been designed for a capacity of some 4,000 tips were load. And with that level of load, they will be able to support the entire end of the electrical penetration going off the main part of the control tower.

BY MR. STEPTOE:

Q Is it conceivable that you would need to jack in a place where you did not have appear to arrest the structural movement?

A (BURKE) The one area that something of that sort might be required is in the lining of the tunnel underneath the end of the electrical penetration wing. And in order to put in the grillage and the posts and to support that grillage, there will be a period of time in which the tunneling will expose the end of the electrical penetration wing to settlement. And during that period, there will be on the site, a plan and materials to provide posts and bearing pads which will be supported on the underlining fill in the tunnel area and these will be activated by jacks which will press up against the underside of the electrical penetration wing and provide a reaction.

And these reasonably small pads can be installed in a very short time during the work, if need be, because of settlement.

Q Is there a procedure which has been written which addresses the need for corrective actions of this kind?

A (WITNESS BURKE) There is a plan, and I believe Mr. Boos could speak on that.

Q Mr. Boos, will you identify what that plan is?

A (WITNESS BOOS) That plan is a specification, C-200 and it outlines, among other things, a variety of events which have been developed with the review between construction, by designers, the consultants as well as the subcontractors performing the work.

And in addition to listing the events, you list the recommended actions to arrest the condition.

MR. STEPTOE: I will simply state that that specification has also been filed as an attachment to the Staff's testimony.

Mr. Burke, based on your experience in underpinning, can you express an opinion as to the likelihood that there will be rapid structural movement during the course of the underpinning of the Auxiliary Building that would constitute an emergency requiring very quick action?

A (WITNESS BURKE) No. My experience from the type of construction in the large area involved in this structure that is being underpinned, these settlements that take place will be occurring at a gradual rate; and certainly, there will be ample time to perform some corrective measures.

Q Mr. Boos, can you identify who is the individual who at least in the first instance, is responsible for determining that corrective actions need to be made

under Specification C-200? Who is the person at the site who is interpreting the data and making the initial decisions?

A (WITNESS BOOS) With respect to the furnishing of data from Wiss, Janney as Mr. Krause has indicated, this goes to their resident structural engineer who has defined specification C-200 as a rigor, if you will, of evaluating the data and certain criteria; and as appropiate, instituting action and/or notifying other personnel to institute action.

In the unlikelihood of a substantial movement in this specification as a Category I event where there could be rapid movement, or endangerment of personnel, the subcontractor is authorized to take immediate action to state a condition and there are conditions for follow-up evaluation for impact on the substructure and charges to -- program the changes to take care of the situation.

BY MR. STEPTOE:

Q In the more unlikely event that the movement is very slow, as Mr. Burke said, who makes the decision --

A (WITNESS BOOS) It is, again, it is hard to answer your question because it determines where one is against several predetermined limits. If you are less than the limit, then we are looking for what we call trends, and the resident structural engineer is the key in all these cases. He would be looking for this data to feed back to the design engineers supported by the consultants to recommend potential changes.

If one is exceeding a term called the alert limit, then this is heightened and there are provisions, more formal provisions for notifying other personnel. But once again, the primary involvement of the resident structural engineer has is to involve the engineering designers back for the consultant to develop a plan of action.

Q Mr. Boos, who have had some discussion about alarm limits and alert levels. Are there not in fact two criteria -- are there not two sets of criteria, alert levels and action levels in Bechtel C-200?

A (WITNESS BOOS) Yes. There are two levels -- there are actually three levels for the Auxillary Building.

There is an alert level, and an action level and a requalifying level which the witness referred to as.

And in the case of the service water pump structure, there is an alert and action level.

Q Sticking to the Auxillary Building, these -- would you please explain what the significance of each level is? Start with the alert level.

A (WITNESS BOOS) If it is acceptable to the Board, I think that ought to be referred to --

Q All right. I was not asking you how they were derived; I was just -- what happens when you get the alert level?

A (WITNESS BOOS) I'm sorry, do you mean from an administrative point of view?

Q From a managerial and administrative point of view.

A (WITNESS BOOS) This is, again, depicted in the flow charts that are attached to specifications. But with respect to the alert level, which is the level below, well below a point where the structure would be endangered, the resident structural engineer evaluates it for a possibility of corrective action. And as is required by the specification, he notifies the Bechtel project engineering personnel within 24 hours to kick off an evaluation upon their part as to any other required

actions that may be necessary.

It may be that no changes are necessary, I can emphasize that. But it kicks off a formal evaluation.

Now in the case of the action limit, we are still at a point where the structure is not endangered but we are getting closer, if you will, to the working capacity of the structure than we are with the alert limit.

And there, what we have is a situation where we exceed the action level where once again, there is a requirement on the part of the resident structural engineer to notify the engineering department. And by generally speaking by the fact that there will be a trend of data, it will be anticipated as evidenced in the appendix to the specification under the events that certain already spelled out plans of action, like Mr. Burke's description of including jacking force, could be instituted. The ultimate, of course, could be to stop the work. That is one possibility, or stop the work in a locale.

The specification also requires when we exceed the action limit, that we notify the Consumers Power Company so that the NRC can be notified that we have exceeded the action level.

BY MR. STEPTOE:

Q Dr. Shunmugavel, can you explain how these criteria for the alert level and action level were determined?

A (WITNESS SHUNMUGAVEL) We have analyzed the building for construction time and seek more constructive consulting in terms of deflections, what is the tolerable deflection for the structure.

We can say that and show it to the NRC for them to review. And then, we have come to an understanding of what they are willing to accept mutually based on what we call action limits.

Most of the time, we take most of the alert limits. I would point out that these limits are based on a very conservative -- the ability of a structure. So in reality, the structure can tell us a lot more than what we have in the limits. And also, once we get these limits -- we do review some before we put out criteria. That is based on mutual agreement with the NRC Staff. And basically, that's how we come up with our limitations, alert action limits for deflections.

Q Can you explain how you come up with alert and action levels for strain?

A (WITNESS SHUNMUGAVEL) Like Mr. Krause said, we have monitoring systems, at locations which are called

vertical locations in the building, using extensive measures. Once we have these measurements, we have our limits. So with those, we get the strains. So the same instrument gives us the amount of strain on the structure. We have two ways of coming up with allowable strain. One is what the structure can tolerate based on a calculation, and another one would be strain one could expect. Then again, we mutually discuss these things with the Staff. Most of the time, we come up with a limit based on a typical meaning like, for example, we would settle two-thirds of the yield strain of actionable limits. About half of that, which is one-third of yield strain, remains at the bottom half, alert limit.

Q These action limits, Mr. Boos, these action limits and alert levels are tied directly to what Mr. Krause is measuring on his instruments; is that correct?

A (WITNESS BOOS) Yes. The location of the instruments and the values are included in the Bechtel design drawing, and the requirements for taking the data pertinent to those instruments for that type of data is provided for in Mr. Krause's procedure.

Q So there is no step of calculating in between what the instrument's reading is and knowing whether you have exceeded an alert level or an action level; is that

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correct?

A (WITNESS BOOS) Well let me respond to that.

Mr. Krause may wish to elaborate. The information which is obtained by Wiss, Janney is given to the resident structural engineer in a reduced or completely usable form. He is not involved in any data reduction.

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Q Dr. Shunmugavel, I may have made a mistake. Is there any alert level or action level for the Auxillary Building based on strain?

A (WITNESS SHUNMUGAVEL) As far as I know, there isn't any.

Q The alert and action levels for the Auxillary Building are based on displacement, is that correct?

A (WITNESS SHUNMUGAVEL) Right. Also crack monitoring.

Q So the strain instrumentation is just a back up system, is that correct?

A (WITNESS SHUNMUGAVEL) Yes.

Q Dr. Shunmugavel, I'm going to ask you to address the concern that Dr. Harbour raised on Transcript Page 7125 with respect to the possibility of the Turbine Building rotating towards the Auxillary Building due to tunneling under the Turbine Building during the underpinning effort.

Could you address that subject, please?

A (WITNESS SHUNMUGAVEL) Okay. The way I'm going to address that question, because for me it is difficult to guess or estimate how much the buildings are going to rotate during an underpinning operation, but I'm going to address how much we have in terms of clearance within the two buildings, and also how much we need during an earthquake, like safe shutdown.

To explain that I need to report the figures, set up figures. If it is okay, I am going --

Q Yes, go ahead.

Well, perhaps -- I'm sorry; we seem to have misplaced that exhibit.

JUDGE HARBOUR: Is that in the testimony?

MR. STEPTOE: No. We were going to put it in. If you have just two copies, give it to the Board.

BY WITNESS SHUNMUGAVEL:

A (Continuing) If I may continue, these set of five figures manage to give you the amount of clearance, and I will explain not all of them, because I'm going to take a lot of time. I'm going to explain with one example.

The Figure No. 1, first sheet, shows the plan view of the Auxillary Building, and also the Turbine Building south of that Auxillary Building. In the Figure it is at the bottom.

Q What is at the bottom in this figure? The Turbine Building?

A (WITNESS SHUNMUGAVEL) Right. The second sheet, entitled Sketch No. 1, shows the cross section of both Auxillary Building and the Turbine Building.

If one looks at buildings as shown on the figure, there is two inch gap or clearance between those

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two buildings. Then, on a floor elevation like 695 in the Turbine Building, which is on the left side, we have gratings, and those gratings are very flexible compared to the concrete floors. So in case Turbine Building comes in contact with the Auxillary Building, they will crush or collapse. So, really, for structural clearance, we have a total of eight inches within those two buildings at that level, 695, as shown on the figure.

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On the right-hand side of the figure I will set up numbers showing the deflection of Turbine Building and Auxillary Building during safe shutdown earthquake. At Level 695 we see a deflection of 2.12 inch for the Turbine Building and .58 inches for the Auxillary Building. And we assume during an earthquake these two buildings won't traverse each other, which is the worst possible case.

We will have a total deflection of 2.7, as shown. And that clearly shows that we have extra clearance, because what we have is eight inches. What we need is 2.7.

Q Dr. Shunmugavel, is the SSE in this table the FSAR, SSE, or the 1.5 times the FSAR/SSE?

A (WITNESS SHUNMUGAVEL) It is FSAR/SSE.

Q Do you have an opinion, if you analyzed this structure for the larger earthquake come up whether there would be adequate clearances?

A (WITNESS SHUNMUGAVEL) Well, let me qualify that. In the larger earthquake, if you mean site specific earthquake for this project, and if it is the case, the Turbine Building allows the same deflections as 2.12, the reason being the Turbine Building is so flexible at that frequency level FSAR/SSE and site specific SSE our site specific SSE is lower.

As far as Auxillary Building, I have checked that analysis of Auxillary Building for site specific earthquake.

Here again the number didn't change, for the same reason it is in such a frequency range wasn't sensitive to the type of response spectrum.

Q When you're referring to this site specific earthquake, are you referring to the site specific response spectrum that is being used for the seismic margin evaluation by Dr. Kennedy at Structural Mechanics Associates?

A (WITNESS SHUNMUGAVEL) That is correct.

Q And, therefore, it is your opinion that even with this larger earthquake the clearances are adequate?

A (WITNESS SHUNMUGAVEL) Yes.

Q Referring down to the concrete floors at Elevation 659 of the Turbine Building, could those be shipped back if it were necessary to provide additional clearance at that elevation?

A (WITNESS SHUNMUGAVEL) Yeah, if it is necessary, it can be done.

Q Do you have an opinion whether that would be necessary?

A (WITNESS SHUNMUGAVEL) No. My opinion is based on the figures at 659. I have two inches clearance within

the two buildings. What I need is .9 inches.

Q So that you don't believe that would be necessary?

A (WITNESS SHUNMUGAVEL) Yes.

Q Could you address what, if any, monitoring instrumentation there is to detect any such rotation of the Turbine Building towards the Auxillary Building?

A (WITNESS SHUNMUGAVEL) Right. I have seen drawings and I've been told these instruments have been already installed and operational.

There are three deflection measuring devices at the 695 level.

Q Of the Turbine Building?

A (WITNESS SHUNMUGAVEL) 695 level, and it is installed between the Turbine Building and Auxillary Building.

Q And those measure horizontal or vertical deflection?

A (WITNESS SHUNMUGAVEL) They measure horizontal deflection between these two buildings along both east-west and north-south directions.

Q Mr. Krause, are you familiar with those instruments?

A (WITNESS KRAUSE) Yes, I am.

Q Are they installed?

A (WITNESS KRAUSE) They are installed.

Q Are they capable of detecting any such horizontal deflection that would indicate a rotation of the Auxillary Building -- or, I'm sorry, a rotation of the Turbine Building towards the Auxillary Building?

A (WITNESS KRAUSE) Yes, they can.

I would like to make one correction, though. There are three locations up there. Each location has two extensometers on it, so there are actually six meters up there. At each location there is a meter measuring a north-south direction and one measuring in the east-west direction. So that we do have coveration of the building

in both directions.

Q Finally, Dr. Shunmugavel, would you just describe what the construction of the Turbine Building is?

A (WITNESS SHUNMUGAVEL) The Turbine Building is a typical industrial building of size about 440 feet long along east-west direction and about 135 feet wide along north-south direction. And, as shown on the figure, it's about a hundred feet tall. And a major portion of the building is made of steel frame structures. And the foundation is mat foundation, concrete mat foundation covering the entire plant dimension of the building.

Q Does that complete your response, Dr. Shunmugavel?

A (WITNESS SHUNMUGAVEL) Yes.

Q Referring to the second page of what will be Applicant's Exhibit No. 27, the five page drawings, the deflections shown in that table, are they the same as the corresponding numbers found on Page 3-5 of the Staff's Supplemental Safety Evaluation Report No. 2?

A (WITNESS SHUNMUGAVEL) They are essentially same, but they are different.

Q Could you perhaps point the Board to the --

CHAIRMAN BECHHOEFER: Pardon me; one question. When you referred to the second page, don't you mean the third page, which is marked Sketch 2?

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MR. STEPTOE: Well, there's a Sketch No. 1, which is the second page.

CHAIRMAN BECHHOEFER: Which are you talking about now? We were talking about the previous page.

MR. STEPTOE: I guess I'm talking to the tables -- the deflection tables which appear on Pages 2, 3 and 4, which are -- I'm sorry; Sketch Nos. 1, 2, 3 and 4 all have tables in them. The purpose of this cross-examination is to point out a minor discrepancy between some of the numbers which appear in this table and the SSER.

CHAIRMAN BECHHOEFER: Okay.

JUDGE HARBOUR: Would you identify the table in the SSER that we're comparing these with?

MR. STEPTOE: It's Page 3-5.

BY MR. STEPTOE:

Q Dr. Shunmugavel, do you have a copy of the SSER with you?

A (WITNESS SHUNMUGAVEL) Yes, I have.

Q Could you identify the numbers in the SSER and the corresponding numbers on these sketches where there is a difference, solely so that we can all keep pace with you.

A (WITNESS SHUNMUGAVEL) If everyone looks at Page 3-5 of the SSER, the very first paragraph --

JUDGE HARBOUR: Excuse me. That's not the

supplement, that is the SER --

MR. STEPTOE: No, it is the supplement.

WITNESS SHUNMUGAVEL: Supplement.

JUDGE HARBOUR: Oh, it is Supplement 2, Page 3-5?

WITNESS SHUNMUGAVEL: Correct. The first paragraph of that page, about the seventh line, starts like this --

MR. WILCOVE: Excuse me. Which paragraph?

WITNESS SHUNMUGAVEL: First paragraph, right on the top.

MR. STEPTOE: It's the carry-over paragraph at the top of the page.

MR. WILCOVE: Thank you. I'm sorry for interrupting.

WITNESS SHUNMUGAVEL: It's the middle of the sentence. It starts a 3.1 inch movement between the Turbine Building and control tower at Elevation 704 feet.

If one compares that number with the numbers shown on the Sketch No. 1, the numbers shown on the Sketch No. 1 are slightly smaller. It's like compared to 3.1 we have 2.7.

Maybe this a right time, I can point out why they are different. The numbers on the SSER are based on the deflection of the Turbine Building available few months ago, somewhere around July of this year. During that time we haven't finished the Turbine Building analysis, so the numbers given in the schedules are based on the latest analysis of the Turbine Building.

BY MR. STEPTOE:

Q So that those are to be preferred over the numbers in the SSER, is that correct?

A (WITNESS SHUNMUGAVEL) Correct.

Q Is the number in the SSER, the 3.1, is that the only number that is -- where there's a discrepancy, or is the number on the line below also different?

A (WITNESS SHUNMUGAVEL) Yes. The number on the following line, which starts -- the line I'm quoting:

"The calculated relative movement between the Turbine Building and the EPA was 2.6 inches at Elevation 695 feet."

That would correspond to the Schedules 2, 3 and 4, and let's look at the Sketch No. 2. At Elevation 695 the deflection required is shown as 2.84 inches versus 2.6 inches in the SSER.

Again, the difference is because of the latest Turbine Building analysis.

Q Now, the origin of the numbers in the Staff's Supplemental Safety Evaluation No. 2 is Bechtel, is it not?

A (WITNESS SHUNMUGAVEL) It is.

Q And what you're saying is that more recent analysis have changed those numbers by perhaps a quarter of an inch or so?

A (WITNESS SHUNMUGAVEL) That's correct.

MR. STEPTOE: That concludes all the direct examination we had on the Harbour questions. I thought it would be useful to put it in the record now so people could read it and then decide what kind of cross-examination they would like to conduct.

(Discussion was had off the record.)

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BY MR. STEPTOE:

Q Dr. Shunmugavel, is the five page exhibit which you have been referring to, which consists of five drawings -- is it a correct and accurate representation of what is purports to show?

A (WITNESS SHUNMUGAVEL) Yes.

MR. STEPTOE: I move that this five page exhibit be accepted into the record as Applicant's Exhibit No. 27.

CHAIRMAN BECHHOEFER: Any objection?

MR. WILCOVE: Staff has no objection.

CHAIRMAN BECHHOEFER: Mrs. Stamiris, do you have any objection?

MS. STAMIRIS: No.

MR. MARSHALL: No objection.

CHAIRMAN BECHHOEFER: Without objection, the exhibit will be entered into evidence.

(The document referred to, previously marked Applicant's Exhibit No. 27 for identification, was received in evidence.)

(Whereupon an adjournment was taken in the above-entitled cause until Friday, November 19, 1982, at the hour of 9:15 a.m.)

NUCLEAR REGULATORY COMMISSION

This is to certify that the attached proceedings before the

NUCLEAR REGULATORY COMMISSION

in the matter of: CONSUMERS POWER COMPANY (Midland Plants Units 1 and 2)

Date of Proceeding: November 18, 1982

Docket Number: 50-329 & 50-330 OL & OM

Place of Proceeding: Midland, Michigan

were held as herein appears, and that this is the original transcript thereof for the file of the Commission.

Pauline James & Associates

Official Reporter (Typed)

Pauline James

Official Reporter (Signature)