ORIGINAL

OFFICIAL TRANSCRIPT
PROCEEDINGS BEFORE

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

TITLE CONSUMERS POWER COMPANY

PLACE Midland Plant, Units 1 and 2
Midland, Michigan

DATE November 17, 1982

PAGES 8973 - 9192

FR&I

ALDERSON REPORTING
(202) 628-9300
440 FIRST STREET, N.W.
WASHINGTON, D.C. 20001

8211230042 821117
PDR ADOCK 05000329
T PDR

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

Wednesday, November 17, 1982

Evidentiary hearing in the above-entitled matter was resumed, pursuant to adjournment, at 9:20 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

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

APPEARANCES:

On behalf of the Applicant, Consumers Power Company:

MICHAEL MILLER, Esq.
PHILIP STEPTOE, Esq.
REBECCA LAUER, Esq.
ANNE WEST, Esq.
Isham, Lincoln & Beale
One First National Plaza, 42nd Floor
Chicago, Illinois 60602

On behalf of the Nuclear Regulatory Commission:

WILLIAM PATON, Esq.
NATHENE WRIGHT, Esq.
MICHAEL WILCOVE, Esq.
Office of the Executive Legal Director
1717 H Street, N.W.
Washington, D.C.

On behalf of the Mapleton Intervenors:

WENDELL H. MARSHALL, Esq.
RFD 10
Midland, Michigan 48640

Appearing Pro Se:

MS. BARBARA STAMIRIS
5794 North River
Route 3
Freeland, Michigan 48623

MS. MARY SINCLAIR
5711 Summerset Street
Midland, Michigan 48640

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

C O N T E N T S

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

CM/DW
1, 1/1

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

P R O C E E D I N G S

CHAIRMAN BECHHOEFER: Good morning, ladies and gentlemen. Are there any preliminary matters which parties wish to raise?

I might point out that we had given the parties, particularly Mrs. Sinclair, an opportunity to reply to the Applicant's motion concerning the contention on Table S-3. We tentatively planned to hear that on Friday morning. If it turns out that it looks like Friday is too pressed because of witnesses, then we may postpone it till Monday.

MR. MILLER: This is on Table S-3?

CHAIRMAN BECHHOEFER: Yes.

MR. MILLER: We'd be prepared, I think, to discuss it today, if the Staff is agreeable.

MR. PATON: Mr. Chairman, could I make a suggestion in that regard? We have read the policy statement as three, and it seems -- I don't know how much more clear it can be, but it seems that the Commission is directing licensing boards and appeal boards to continue their reliance on S-3.

I'd like to request that we hear sooner than Friday whatever arguments Intervenors have as to why that contention should be litigated, in the event that we need any time to give it any thought.

I mean, to me, it's so overwhelming that I just

CM/DW
1/1/2

don't know what response would be required, but I would request that if Intervenors are prepared to make their arguments on that that they go ahead and make them and then we'd be given a day or two, if necessary, to consider those arguments. But it seems so clear to me that I just don't know, I can't imagine what their argument would be that would say we would litigate that contention.

CHAIRMAN BECHHOEFER: Well, I was going to say we have a tentative conclusion, but we do think the Intervenors should be able to address the question at least, and we thought Friday would be plenty of time. If we decide that further argument is necessary, you'll have the weekend to develop it.

MR. PATON: Fine.

CHAIRMAN BECHHOEFER: We'll be here next week.

MR. PATON: Fine.

CHAIRMAN BECHHOEFER: We were just looking over the schedules, and I see quite a bit of material for today, and I'm not positive we can finish everything today that you have scheduled for today, or that the parties have scheduled for today. We are starting with a panel that was supposed to be on yesterday, so --

MR. PATON: I agree. I think we're beginning to get a little behind.

CHAIRMAN BECHHOEFER: Well, that's why I wanted

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

/1/3

not to do it today.

Tentatively Friday, and if it looks like Friday is too busy I might even wait until Monday. But I do think we do want to hear if the Intervenors have any other view of the matter. I, too, think this Commission statement is reasonably clear, but maybe I'm not seeing something in it. So we want to give you an opportunity.

We do have to live by that statement, irrespective of whether that statement is consistent with MEPA. That statement is our order, so you have to focus on that.

MS. SINCLAIR: I'd appreciate the opportunity to prepare a statement. I could have it, probably, by tomorrow, if necessary, but Friday would be a little better.

CHAIRMAN BECHHOEFER: Yes. Well, let's schedule it for Friday and see what happens.

Are there other preliminary matters?

MS. SINCLAIR: Yes. I have a statement based largely on our experience so far in this hearing.

Some significant flaws and problems in the conduct of these hearings so far deserves the Board's attention. One important problem is the very narrow categories of subject matter being heard which severely limit the range of questioning which would properly place the issues in the full context of what these hearings are

about; that is, the soil settlement problems, in particular, and the relationship of these problems to the overall safety of the Midland Nuclear Plant.

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

1-2,pjl
ants.

Limiting questions to such narrow categories has the effect of blocking questions and the full disclosure that should be the real goal of these hearings.

A second failure is the fact that some witnesses are very limited in the scope of their understanding of the problems to which they are testifying, and, therefore, we get little information and, in fact, bad information and misinformation from this type of source.

I refer to the testimony and cross examination of Mr. Lewis yesterday. For example, in attempting to get some background in the record on the seriousness of the corrosion problem, particularly in the nuclear industry, I asked him several questions about its implications. He did not seem to realize it was important at all, and, in fact, minimized the problem.

Mr. Lewis should have admitted he had no expertise in that area, as he did in other areas.

It is discouraging to have the Applicant represented by someone with such limited knowledge who is filing their testimony on such an important potential problem as corrosion.

To provide some information on corrosion just briefly, let me point out that Dr. Roger Staley, an internationally known expert on corrosion and the former editor of Corrosion Magazine, wrote a series of editorials on

these problems several years ago and warned that it would seriously limit the full term operation of nuclear plants and greatly reduce the cost effectiveness as an energy source.

CHAIRMAN BECHHOEFER: Mrs. Sinclair, let me interrupt for a minute. There will be a witness here today, Dr. Weeks, who is a Staff witness, and he has quite broad knowledge -- it's my understanding, at least -- of corrosion, so that my guess is that at least the subject matter that you describe would be appropriate to ask that witness.

This particular issue arose in a somewhat strange way that is not a specific contention, and the Board did direct it -- rightly or wrongly, we directed our request to the Staff to provide the witness, and I can't say that if we had reconsidered we might not have asked the Applicant as well, but, be that as it may, we asked the Staff to provide a witness and the Applicant provided a further witness with some supplementary information, but not the basic witness on that subject. So that witness will be here today, and --

MS. SINCLAIR: I understand, but we were trying to get out what the importance of corrosion was yesterday.

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

J/DW
/1/1

MS. SINCLAIR: Well --

CHAIRMAN BECHHOEFER: That witness will be here today.

MS. SINCLAIR: I understand but we were trying to get out what the importance of corrosion was yesterday.

CHAIRMAN BECHHOEFER: Well you can do it today.

MS. SINCLAIR: I read this testimony, and there is nothing in the testimony that indicates what the nature of the problem, and why it is important, important to safety; and therefore, it is to easily minimized, these problems and to slide over them, and this is the reason I decided to write it down. (Reading.)

"Corrosion in piping has serious safety implications. The corrosion products, can move through pipes and cause blockage. They can build up pressure in pipes and can jam valves by gathering in the seat of values. If they gather on the stem of valves, they can cause expansion to prevent its expected operation.

"Several years ago, the NRC issued a major report on corrosion problems in reactors which said that corrosion, cracks, dents and leaks are slowly crippling a greater number of the country's nuclear power plants.

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

/1/2

"These were unforeseen problems and only detected after the plants were in operation for some time. They resulted in a repair bill for Consumers that ranges in the hundreds of millions of dollars.

"Unless these kinds of issues are fully aired and given their rightful importance in forums like these where the public has its few opportunities to meet experts, we will not see the useful focus on these issues that we should have in this country.

"It was my hope that the discussion of corrosion and piping would focus on these issues and perhaps indicate improved technology had been sought and put in place at the Midland site to overcome the kinds of problems that had been experienced elsewhere.

"I would hope this Board would allow relating these narrowly defined issues to their broader connections with the systems in the nuclear plant that is necessary if we are going to begin to assess the safety of the plant in a realistic way."

I have a copy if the Board wants it.

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

/1/3

MR. MILLER: Judge Bechhoefer, might I just respond briefly.

I think you already expressed the rather limited evidentiary presentation that the Board was expecting from the company in this regard.

But as I understand Ms. Sinclair's statement and the questions yesterday, apparently, she believes that we ought to be considering the entire question of corrosion in nuclear power plants in the context of this hearing.

The statement that she read from Dr. Staley, I believe, refers to corrosion of piping in the reactor systems themselves, corrosion that ordinarily occurs from the inside out, not as we have been considering here with respect to the buried piping from the outside in.

To suggest that this Board should now launch into an investigation and into an evidentiary presentation on all forms of corrosion and what the company is doing and Staff is doing to minimize its effect at the Midland plant, is an expansion of the issues in this case, probably by a hundred-folds, and I would, on behalf of the company, vigorously resist any attempt to turn this hearing, dealing with underground piping, into some broad range inquiry into corrosion of piping, generally, of the nuclear power plant.

MR. MARSHALL: Mr. Chairman, at this time, again, I would like to call attention to the manner of speech

given at this particular time by chief counsel for Consumers Power Company in which he uses the word in regard to a Bechtel witness, speaking as an Applicant's counsel, the company.

/2fol

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

ompany

I take exception to that. I want you to define the company you are talking about. The Bechtel Company said under oath that they put in this piping. They furnished the material. Are you saying that Consumers Power Company, Applicant, is doing this now? Are you trying to lead us all to believe that? The man from Bechtel said they did.

CHAIRMAN BECHHOEFER: I believe the witness will testify on behalf of the Applicant where he is employed.

MR. MARSHALL: I am interested and concerned in knowing who is responsible for this corroded pipe and who put it in, whether it wad Bechtel who put it in -- or a contractor -- or did Consumers put it in. Who's man did it? Who's expertise did it?

CHAIRMAN BECHHOEFER: That is not what is before us because the company is responsible for everything.

MR. MARSHALL: What company?

CHAIRMAN BECHHOEFER: Consumers Power Company is responsible for --

MR. MARSHALL: Well that is the question which I mean to address at some future time.

CHAIRMAN BECHHOEFER: Consumers Power Company, they rely on Bechtel for certain matters, certain expertise; but Consumers -- it is Consumers's application and Consumers is responsible for that.

MR. MARSHALL: That is true, I agree with that.

The Applicant is one thing. But as to the expertise, that is something else.

The material, workmanship, material, that is an entirely different matter. I don't like to see them intermingled.

MR. PATON: Mr. Chairman, may I respond to Miss Sinclair's statement?

CHAIRMAN BECHHOEFER: Yes.

MR. PATON: Her statement is similar to the statement that she made before in this proceeding which I don't think are inappropriate.

We went through a long process of determining what the issues in this case are going to be, and there are certain issues in this case. Miss Sinclair seems to think that if she gets in an anonymous call or if she gets a piece of information here or there, that that then should become an issue in this case.

And I would just like to suggest to her that if the Board followed that proceeding, we would have chaos nothing but disorder. There has to be some discipline in this proceeding, and I suggesting to her that there are issues in this case, and that is what the Board is here to litigate, not every thought that may happen to come along.

MR. MARSHALL: Mr. Chairman, once again, I wish

to say to this -- and I heard yesterday the position that you took in regard to the hearing board, and I was here.

Once again, I did want to go on record as saying, if there's no one present who wishes, on the NRC's part, or on the part of the Applicant that wishes to explore that situation, that I personally will take it upon myself, if they will say that, here and now, to have a Joint Congressional and Senatorial Investigation into the matter.

CHAIRMAN BECHHOEFER: Mr. Marshall, I think what you don't understand is that the Board --

MR. MARSHALL: I understand your position perfectly.

CHAIRMAN BECHHOEFER: Well, we have certain issues before us. The Staff is the one which is primarily responsible, the NRC Staff, for reviewing the Application.

MR. MARSHALL: I qualified that by stating that if no one wishes to explore the allegations made here regarding safety, that then I would go -- if they will say they won't do it or don't want to do it -- I will then agree to go ahead and see that it is done from a different source. But I want them to say they won't do it.

CHAIRMAN BECHHOEFER: Well, all I would say is that the Staff should be given the opportunity first; and if it developed into an issue that should be heard here, maybe that could happen. But the Staff should be given the opportunity to look at these things first.

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

/3/1
w
ir

MR. MARSHALL: Well I agree and I want somebody to say yes, we will address that ourselves. I just want -- not to say as he just said, I don't think we want to get into this -- I understand that this is not subject to cross-examination here now, but I don't think that safety allows it to be going on unnoticed and swept under the rug.

CHAIRMAN BECHHOEFER: I think what Mr. Paton was saying was that the issues before a Board like ours are fairly well defined and they are the subject of contentions. That doesn't mean that the Staff is not looking at a far broader way of the safety implications of the plant. The Staff is responsible for reviewing the entire facility.

MR. MARSHALL: Well I believe that the Staff has -- knows where Detroit is, and I think that if they don't, they can get it directly from our senator up there. They can find this place that he speaks of and see what the hell the invoices say about this. But what did they buy; what did they use?

MS. STAMIRIS: Judge Bechhoefer, I would like to respond not to Ms. Sinclair's statement this morning but to Mr. Paton's response and specifically in reference to the charges of anonymous allegations that were brought to her and she brought before this Board yesterday.

I understand how the NRC works and that the

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

/3/2

investigation branch of Region III will be the proper branch to look into it. But given that sometime is allowed for them to evaluate the importance of the very, very specific information that she provided about significant quality assurance or welding and corrosion related problems yesterday, I think that they, in the end, will have a place in this hearing in relation to the contentions relating to quality assurance and in relation to contentions -- well whether their contentions or however the issues were raised, the issues of corrosion and piping, that are raised based on the questions that Judge Decker put into the record and asked for a response on.

I think that those very specific things she raised yesterday will definitely find a place in this proceeding at some time.

CHAIRMAN BECHHOEFER: Well corrosion in piping is an issue which we are going to consider today. It is just with respect to piping as Mr. Miller pointed out -- underground piping --

MS. STAMIRIS: If I remember right, she said it did relate to underground piping, the welds on the underground piping.

MR. MILLER: I don't believe there were any specifications to what Ms. Sinclair had to say yesterday of where this alleged quality grinding took place.

MS. STAMIRIS: She was asked and that was her answer, that --

MS. SINCLAIR: It was the information, the information was that it was going on for a period of four years, which included underground piping.

My point is this. It seemed like the only place to get this information before the Board -- I thought it was pertinent. I expected you to direct somebody else to look into it. But I need direction when I get information like this as to how to go about it. Now should I just call Mr. Keppler? In the past, he has told me to call him directly, so I can do that. But it seems that --

CHAIRMAN BECHHOEFER: Yes, I think you should or one of the people who work for him, either one.

MS. SINCLAIR: But it seems as though so much of the Staff is here and we are talking about corrosion in piping, it seemed appropriate to discuss it with you at this time.

I also got another --

CHAIRMAN BECHHOEFER: It would seem to me if we considered that type of thing in all of them, we might want to consider it at the same time we consider some of the other affidavits which are before Region III right now.

MS. SINCLAIR: Well I just got another phone call within the last week or so and it is on a totally

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

/3/4

different subject. It is about the qualifications of engineers. What should I do about that? Just call Mr. Keppler in spite of the fact that there are always Staff people here? Do I just go to that office?

CHAIRMAN BECHHOEFER: Well you could talk to the Staff people here, but we ourselves cannot do anything until we get either an issue or a contention before us.

/4fol

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

us.

To litigate -- we don't run investigations for NR -- we don't have any staff to do it, for one thing, and we can't go down and interview people and we don't -- we don't have the authority to do it, the Staff does.

MS. SINCLAIR: If you could be the one to direct the Staff as to what you want them to do, I guess that was the reason I --

CHAIRMAN BECHHOEFER: Well, so many of these things come up, that we cannot be directing the Staff how to perform their job. But I think the Staff should be given the information first. But I might say, if we explore these matters, it is very likely we would have to have the testimony of the people who are reporting it to you, maybe in camera. Maybe their identifies could be protected that way, but we would have to have their testimony.

MS. SINCLAIR: It seems to me that the information provided is so specific and the person wants to really remain anonymous because he either fears for his job, and rightly so -- Consumers has not been careful about that -- that if you have adequate information where you could look-- if he tells you exactly where to look or what has to be found, then I think the NRC ought to be able to look to determine for themselves.

CHAIRMAN BECHHOEFER: Well, I don't think we could really explore the allegations adequately without having

the person on the stand subject to cross examination.

Now his identity can be kept from the public, at least, and we could direct the Applicant's counsel not to make it available to their employees or, only a limited number -- there are a number of protective devices we could use, and right now, we don't have an issue to litigate. If we had an issue to litigate, and that testimony were required, measures can be taken to protect those individuals, and it should start with Mr. Keppler or some of the investigators who are working for him.

Perhaps we will get referred to the Washington investigation office; but be that as it may, that is not the place to start.

MS. SINCLAIR: All right.

MR. MARSHALL: Well, it is a serious matter, Mr. Chairman.

CHAIRMAN BECHHOEFER: Weyl, if it is, it will be appropriately dealt with.

MR. MARSHALL: I understand your position, it is well taken, but it is still a very serious matter and somebody is not going to do their job -- if somebody tells me they are not going to do their job, I will get the job done for them.

CHAIRMAN BECHHOEFER: Well, in that --

MR. PATON: Mr. Chairman, this constant

repetition about safety measures and not getting the job done, I do want to remind everyone that the Staff is committed to refer this information specifically to Region III and get a response and report back to the Board.

MR. MARSHALL: That's good, well done. That satisfies me.

CHAIRMAN BECHHOEFER: Are there further preliminary matters? Mr. Paton, do you wish to call your panel.

MR. PATON: Yes. Mr. Wilcove will call the panel.

CHAIRMAN BECHHOEFER: All right.

MR. WILCOVE: The Staff calls Dr. Chen and Mr. Kane to the stand, both of whom have already been sworn in this proceeding.

CHAIRMAN BECHHOEFER: How about Mr. Hood?

MR. WILCOVE: We don't plan on putting Mr. Hood on the stand right now although if questions do arise where his being on the stand would be useful, we will be happy to place him on the stand at that time.

CHAIRMAN BECHHOEFER: His name was listed with the panel, and that is why I asked.

MR. WILCOVE: I believe that Dr. Chen and Mr. Kane will be able to answer all the questions posed.

Whereupon,

WELLINGTON CHEN

JOSEPH KANE

called as witnesses by counsel for the Staff, having been previously sworn, were examined and testified as follows:

DIRECT EXAMINATION

BY MR. WILCOVE:

Q Dr. Chen, would you please state your full name and place of employment for the record.

A (WITNESS CHEN) My name is Wellington Chen, and I am employed by Rockwell International.

2-5

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

J/DW
/5
nter-
at'l

BY MR. WILCOVE:

Q Mr. Kane, would you do so?

A (WITNESS KANE) My name is Joseph Kane and I am with the NRC Regulatory Staff as a geotechnical engineer.

Q Dr. Chen, what portions of the Staff's safety evaluation report and second supplent do you wish to sponsor as your testimony?

A (WITNESS CHEN) SER Sections 1.12.10, and Section 3.9.3.1, the last two sections of the second paragraph and the fifth, sixth and seventh paragraphs.

The SSER, Section 3.9.3.

Q Dr. Chen, do you have more?

A (WITNESS CHEN) No, that's it.

Q Dr. Chen, do you have any changes you wish to make to those sections?

A (WITNESS CHEN) Yes I do in the SSER --

Q And please refer to page numbers you make the changes on.

A (WITNESS CHEN) On Page 3-34 of the SSER, the first paragraph, the second to last line -- no, the third to last line, it should read "It has been disconnected", and the second to the last line in the first paragraph "will be recentered", should read "and has been recentered".

And on Page 3-36, where it says "settlement strain

gauge and flow measurements", "and flow measurements" should be removed.

On Page 3-37, the word is spelled wrong.

On 3-38, .48 percent should have been .48.

On Page 3-40, Item No. 7, the second line, "8 inch, 1 inch BC-2" should be "8H1HBC-32."

On Page 3-39, the fourth to the last line of that item where it says "all applicable code criteria" some amendment might have to be made there depending upon discussion which we might have later.

CHAIRMAN BECHHOEFER: Is not the Staff approval based on the sentence as written?

A (WITNESS CHEN) Yes, but I think some of the initial requirements has been imposed, and it has to do with the site's specific response spectrum versus the FSAR response spectrum.

Strictly speaking, based on the initial specifications for the piping, the code criteria has been satisfied and the specifications call for .12 response spectrum. An additional requirement has been imposed on the Applicant.

I have no other corrections or additionals at this time.

BY MR. WILCOVE:

Q Mr. Kane, what portions of the SER in the second

/5/3

supplement do you wish to sponsor as your testimony?

A (WITNESS KANE) I would like to sponsor Section 2.5, .4, .4, .5.

Q This is the second supplement?

A (WITNESS KANE) That is correct, Supplement No. 2. Also, Section 2.5, .4, .6, .2, Section 2.5, .4, .7, Section 2.5, .4, .8.

And in addition, Table 2.8, which appears on Page 253 and Figure 2.1, which is on Page 2-37, they are the sections.

Q Mr. Kane, do you have any changes you wish to make in those sections?

A (WITNESS KANE) Yes, I would like to make one change. It appears on Page 239. The second paragraph from the top on Page 239, the third line in the second paragraph, the word "four" in the middle of the sentence should be changed to "six", at six locations. They are the changes I wish to make.

/6fol

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

/6/1
w
o make

BY MR. WILCOVE:

Q Mr. Kane, have you examined Table 2 of the testimony of Donald Lewis offerred into evidence yesterday?

A (WITNESS KANE) I have viewed it, yes.

Q Do you have any reactions to that table?

A (WITNESS KANE) The table is the attempt of the Applicant to identify the load that would be permissible -- to identify the loads that would be permissible -- permitted to be placed over the underground piping during plant operation.

The first time that we have seen these loads are in the testimony. It is an item with respect to the technical specifications. The Staff have questions as to the basis of how these loads have been arrived at and what foundations and conditions are adopted in arriving at the magnitude of these loads.

We considered this to be an issue that we will resolve at the expected time.

MR. WILCOVE: That concludes the direct examination.

CHAIRMAN BECHHOEFER: Mr. Wilcove, what about the other sections that were listed in your letter of October 18th concerning underground piping? Is anyone going to sponsor them?

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

MR. WILCOVE: It was the intent of that letter, basically, to earmark sections which would be appropriate, to review for this hearing. I believe the letter said that Staff will sponsor those sections. I feel that that may have caused a little bit of confusion. The witnesses have just listed the sections that they now wish to sponsor, the sections that they feel are necessary.

Certainly to the extent that there are any questions regarding those other sections, or to the extent that they may become testimony, this Staff will of course sponsor those sections.

CHAIRMAN BECHHOEFER: Well let me ask you specifically, is Dr. Weeks going to sponsor Section 3.12?

MR. WILCOVE: Yes sir.

CHAIRMAN BECHHOEFER: All right, because I had some questions on that.

MR. WILCOVE: He will be sponsoring that section on corrosion.

CHAIRMAN BECHHOEFER: All right.

The documents have already been admitted into evidence, so we don't have to formally take any further steps.

I believe the witnesses are available for cross-examination. Ms. Sinclair.

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

/6/3

CROSS-EXAMINATION

BY MS. SINCLAIR:

Q I was just wondering if there was any method of monitoring the pipes during underground piping, during operation. Are the methods of monitoring after --

A (WITNESS KANE) There is monitoring that is being required for the underground piping. It is both monitoring for settlement and monitoring for strain.

Q Even after it is in operation?

A (WITNESS KANE) Yes.

CROSS-EXAMINATION

BY MS. STAMIRIS:

Q I've a few questions --

A (WITNESS KANE) Let me continue on that.

There are also provisions for monitoring the rattlespaces of the building penetrations.

Q I don't know if I should direct this to one or the other, but if it is all right, I will ask a question and let you decide which one is best suited to answer it.

With regard to the monitoring system for settlement strain and rattlespace of the underground piping, am I correct in understanding that all three of these could conceivably be terminated at the end of five years on the basis of evaluation that is performed then?

A (WITNESS KANE) I will attempt to address

2/6/4

settlements which I am involved with. I think Dr. Chen would want to address strain.

I think the possibility of, after five years of eliminating all settlement line, is remote. But what I would foresee is based on the five years of records of making a determination of increasing that interval of observation, if we have had two years of minimal movement, then we may go through the process of recording that movement. But in my estimation, it is unlikely that we could terminate all settlement monitoring at the end of five years.

3fol

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

Q With regard to the settlement monitoring at the end of five years, are there criteria that are established at this time upon which you will base those decisions?

A (WITNESS KANE) It would be an engineering judgment based on what has been observed during that five year period.

Q Dr. Chen, with regard to the measurement of strain, are there any acceptance criteria established at this -- well, no, first let me ask, with regard to the measurement of strain, would there be an evaluation at the end of five years to determine how it will continue or if it will continue?

A (WITNESS CHEN) I think the same comments apply to strain monitoring as they do to soil settlement.

Q Then I would be correct in assuming that there is a possibility of strain monitoring stopping at five years but --

A (WITNESS CHEN) Not stopping, I think, but possibly monitoring periods would be extended -- or interval, rather, being extended.

Q Okay. Are you saying to me, then, that there is no possibility that strain monitoring measurement will stop at the end of five years on the basis of what you have observed up to that time?

A (WITNESS CHEN) That is correct.

CHAIRMAN BECHHOEFER: At this point, let me interject a little question. Is it the usual practice of operating license specifications to provide just a limited time period, such as five years, for this type of monitoring and then leaving it open for later negotiation? Or, alternatively, would there be a requirement that -- or should there be a requirement that some monitoring will take place over the life of the plant but after five years the intervals or even the locations may be reconsidered?

WITNESS KANE: To my knowledge, there would be no regulation that I could go to that would define in very precise terms what we should be doing after an interval. It is a matter of engineering judgment based on what has been observed, based on the safety consideration, which would guide you in determining whether it should continue or not.

It's my feeling that if it were necessary in the beginning to put this monitoring system in, that concern would last for the plant life.

It's just that you will react to the information that you're observing, and if you're recording it on a monthly basis or a three month basis and it's not moving or changing, then there is a basis for increasing that interval period but it would be that type of decision.

CHAIRMAN BECHHOEFER: Well, would you prefer to

have the type of provision which I understand is in here now, which at least legally would seem to allow for the possibility of no monitoring at all? Would you prefer that, or would you prefer a provision which says there shall be monitoring but after a certain period of time the Staff can have leeway in determining the extent of such monitoring?

MR. WILCOVE: Mr. Chairman, I think Mr. Hood would be a better person to answer these questions, and at this point I would like to put him on the stand for that purpose.

CHAIRMAN BECHHOEFER: Fine. I probably shouldn't have interrupted Mrs. Stamiris, but --

MS. STAMIRIS: That's all rght.

Whereupon,

DARL HOOD,

called as a witness by Counsel for the Regulatory Staff, having previously been duly sworn by the Chairman, was further examined and testified as follows:

CROSS EXAMINATION

A (WITNESS HOOD) As we have noted in our testimony, the technical specifications review is a matter that is still in front of the Staff. I think the testimony we've heard both from Mr. Kane and Dr. Chen has expressed their technical opinion of what they would anticipate on the basis of their professional opinion where we would be,

for example, at the end of five years, and they've noted it is unlikely that we would be at a point where all monitoring of underground piping would be suspended.

suspended

I think the significant point, though, is that the Staff will determine that point once that data is available to them.

CHAIRMAN BECHHOEFER: Well, again, which would you prefer? Would it be better to have a provision requiring monitoring for the life of a plant but after five years allowing the Staff discretion to determine intervals for the extent of the monitoring but requiring some monitoring at least, again subject to the Staff's discretion?

The way it is now, it looks like there would have to be some agreement with the Applicant, or else you might not have the authority to impose to continue the monitoring.

WITNESS HOOD: No, sir, I don't think that I agree with your last statement.

Technical specifications are written by the Staff. True that the Applicant has input into that process, but it is not necessary for the Staff to have agreement from an applicant to write the technical specifications, which, after all, is part of the licensing.

I might add, in response to the first part of your question, I have no problem with leaving it open at this point and reserving that decision until we have a chance -- and I have no trouble with what we're talking about as a staggered type of inspection frequency. I feel confident that the NRC has every mechanism that it needs to assure

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

that an appropriate specification is reached at that point in time.

BY MS. STAMIRIS:

Q Mr. Hood, to follow up on that line of of questioning -- and it is the very issue that I am concerned with -- wouldn't it be simpler and more effective to simply make some sort of regulational provision that monitoring will continue over the life of the plant and it will vary depending on the judgment of the proper experts at the evaluation time?

A (WITNESS HOOD) Ms. Stamiris, I don't have any problem with that, but I don't really see it as necessary.

Q Well, if you don't have any problem with it and it would provide the added assurance to members of the public and to this Board in reviewing the safety matters that are being reviewed today, then why wouldn't it be done?

MS. LAUER: Chairman Bechhoefer, if I might interrupt at this point. In Mr. Lewis' testimony it is shown that we have committed to keep monitoring at least once a year for that period, from year five to the end of the life term of the plant. So there will be permanent monitoring in that sense. There will be monitors measured every year. All we're asking is at the end of the five year period there be a review conducted in cooperation with the Staff to see if that is adequate, based upon

the past history for those five years.

A (WITNESS HOOD) May I comment?

CHAIRMAN BECHHOEFER: Yes.

WITNESS HOOD: I believe what she is saying is consistent; however, I'm recognizing that technical specification as it exists now is a proposal by the Applicant.

The true technical specification is in the future, and it will be determined after the Staff has completed its review of the Applicant's proposed technical specifications.

BY MS. STAMIRIS:

Q Mr. Hood -- well, I'll ask Mr. Kane, because, Mr. Kane, when you were testifying, you said that in regard to Mr. Lewis' Table 2 identifying permissible loads on underground piping that the Staff had some questions as to the basis for these, that the Staff will resolve this at the technical specification time.

Can you estimate for me what is the technical specification time? When will this resolution come about?

A (WITNESS KANE) My estimate would be -- we have a schedule for hearings for the next several months, but then, following that, we would be going back to our -- what I would consider our normal type review, and technical specification is one of the issues to be resolved. It must be resolved, in my opinion, before the plant would go into operation.

Q But it would not necessarily -- well, does this SSER and the issues that are covered not constitute an approval by the Staff of the issues that are in SSER?

A (WITNESS KANE) It indicates the approval to the extent that approval has been reached or agreed upon, but I think I can refer you to one of the tables where I indicate that this technical specification still remains to be resolved.

Q So --

A (WITNESS KANE) I'll refer you to Page 253, Table 2.8, and it indicates remaining review items and for underground piping and conduit it talks about a technical specification covering restriction on placement of heavy loads over buried piping and conduits.

It has also been brought to my attention that this also appears on Page 16.1 of the SSER under technical specifications.

Q Okay. Since this proceeding has been termed and is a combined OM/OL proceeding, can you give me some assurance -- or perhaps you already have -- but is there any further assurance that you can give me that these issues will not be somehow left in a gray area before the operator's license is granted for this plant?

MR. WILCOVE: I object to that question. I think it's too vague. Inevitably, there are many fine

/3/2

points, details that will be worked out after the hearing and before the plant is licensed.

I wish Mrs. Stamiris would specify more specifically what she is referring to.

MS. STAMIRIS: Okay.

JUDGE HARBOUR: Mrs. Stamiris, I would also appreciate your clarification of what a gray area is. It's not clear to me.

MS. STAMIRIS: All right.

BY MS. STAMIRIS:

Q Mr. Kane, for instance, on the issue of permissible loading over the underground piping, you said that this would be resolved before they received an operator's license, and I would like to ask you whether that presents any conflict in your mind with the fact that this is an OM/OL proceeding for piping?

A (WITNESS KANE) It doesn't present any problem to me. The way these hearings are conducted often raises questions in my own mind.

It's my understanding that it's combined OM/OL because we're essentially trying to cover those stretches which have been affected by the settlement problem. It's my understanding there will be OL hearings later on.

In my estimation, a technical specification would rightfully be an OL consideration and not something that's

connected with the settlement problem.

A (WITNESS HOOD) May I comment, please?

Ms. Stamiris, I thought it might be helpful to point out that the way the Staff is organized we do have a special group whose primary responsibility is the development and approval of technical specifications. Now, that is not the only group that is involved with technical specifications. They coordinate, they do their job deriving input from the technical staff, and that's an ongoing process. The process begins at the point at which we begin reviewing a FSAR. However, it is intensified in the advance stages of that review.

It is most intense approximately the last six months of the review. The reason for that, that's when you can most efficiently prepare the technical specifications because the plans are well developed at that point.

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

So there's a very intense period of technical specification review, and that is the point at which this special group that is charged with the review of technical specifications is the most active.

The point I'm making is that the development of the finer points of the technical specifications -- for example, the monitoring frequencies, and things of this nature -- will most likely be culminated during the last six months of the review prior to the issuance of the operating license.

With respect to your earlier comment about the gray zone or something failing into the crack, the inclusion of that information in the SSER is a high degree of assurance that it will not fall in the crack.

MR. WILCOVE: Excuse me, if I may interrupt for a moment. I would also like to further clarify Mr. Kane's last response by saying that the soils remedial issues are combined in the OM and the OL proceeding and will be resolved through these hearings.

See, the word ,qucte, OL hearing will only deal with, as I understand it, the contentions that have been raised, and, to my knowledge, there is no contention about tech spec or soils minulation. So, basically, issues concerning soils remedial work will be dealt with at these hearings now.

/4/2

CHAIRMAN BECHHOEFER: That's certainly correct, but I might say that we have the authority to require that a certain type of tech spec be imposed---

MR. WILCOVE: Absolutely.

CHAIRMAN BECHHOEFER: -- governing such things as monitoring, and that would properly come up now. So --

MR. WILCOVE: Yes.

BY MS. STAMIRIS:

Q Mr. Hood, I'll try and ask you for a last brief statement in this regard. Now, an assurance that I was given by Mr. Kane at one point in the previous hearings which had to do with something to do with the cooling pond dikes, and his response was that no matter what label or box they're put in or what categories and procedures are followed, that somehow the issue would be resolved and will not go past the NRC. And, Mr. Hood, could you give me the same assurance that regardless of how they are handled the issue itself will be handled regarding these unresolved areas at this point?

A (WITNESS HOOD) That is true. If you're referring to the issue of the dikes as an example of this case, the information is in the SSER.

Q Yes.

A (WITNESS HOOD) We have not yet reached agreement with the Applicant on some of the finer points of

how the dike is to be protected. That will probably be acknowledged in this hearing when we get to a discussion of that issue.

I believe we did say that that particular issue was an OL issue, and I would expect there will be some further discussion of that in this hearing.

But the information as to status of where we are is acknowledged in the SSER. It's identified as an issue which remains open.

Q But it will be resolved -- all of these unresolved issues will be resolved before plant operation, is that correct?

A (WITNESS HOOD) Yes.

Q Thank you. Now, going back to the first statements I asked about the possibility of elimination of the monitoring system, and in regard to the part of the Applicant's testimony that was pointed out by their counsel, Mr. Kane, do you still believe that it's possible that after five years that all monitoring would be eliminated regarding settlement?

A (WITNESS KANE) I thought I had answered that, in my opinion, it would not be, that settlement monitoring would continue.

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

Q You said it was probable and most likely, but you don't see any possibility of complete stoppage at this point?

A (WITNESS KANE) No. Actually, I think I should indicate that the five year appears in the Applicant's testimony. It does not appear in the Staff's SSER. They're calling our attention to the fact that they want to re-evaluate it at the time, but the Staff is not giving the five years as the time we will change it.

Q I wasn't aware of that. Then, lastly, with regard to rattlespace, Dr. Chen, would the same principles apply, that you would re-evaluate your monitoring process but not stop that monitoring process after five years?

A (WITNESS CHEN) Yes, that is correct. I'd just like to bring your attention to the fourth item on Page 7 of the Applicant's testimony, for example, where monitoring is required after a seismic event. Okay.

I would suspect that if a seismic event does not happen in the first five years monitoring will still continue past that.

(Discussion was had off the record.)

CHAIRMAN BECHHOEFER: Mr. Kane, one further addition. The SSER states that the Applicant will provide by the fall of 1982 a plan for long term monitoring of

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

/5/2

settlement. Has the Applicant's plan been submitted yet?

WITNESS KANE: To be truthful with you, I do not know. I know an amendment to the FSAR has come in with respect to tech spec. Whether it addresses the long term settlement monitoring program I do not know because I have not reviewed that aspect of it. It has only been recently that it has gotten to my analysis.

MS. LAUER: Chairman Bechhoefer, we have been told by our people that that tech spec does address that issue.

WITNESS HOOD: That's consistent with my understanding.

CHAIRMAN BECHHOEFER: I was reading from Section 2.5.4.6.3 from the SSER.

BY MS. STAMIRIS:

Q Mr. Kane, when you pointed out that the Staff had not necessarily set five years as the period -- as the time period at which all of these systems, monitoring systems will be re-evaluated, do you foresee anything different than the five years or have any other plans that would indicate that it would be either sooner or later than that five year period? And how would the Staff's approach be different than the Applicant's in that regard?

A (WITNESS KANE) It's my understanding that we have an agreed upon monitoring program for five years, and

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

that will be carried out.

At the end of five years there will be a re-evaluation by both the Applicant and by the Staff to see whether it is reasonable -- excuse me, Mr. Marshall --

MR. MARSHALL: That's all right.

BY WITNESS KANE

A (Continuing) -- whether you could use good engineering judgment to decide whether that frequency of reading could be increased and still have good assurances that the monitoring program is doing its job. So we have a set program for five years. At the end of five years we're both going to look at it and see if reasonable changes could be made.

CHAIRMAN BECHHOEFER: Didn't you mean to say decreased?

JUDGE COWAN: Frequency decreased.

WITNESS KANE: That is correct. Instead of once every three months we may go to once every six months or something to that effect.

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

effect.

BY MS. STAMIRIS:

Q Would I be correct in assuming that there are provisions that if the frequency of monitoring at a time during this five year period so indicated that the frequency would then be increased if, in your judgment, it needed to be?

A (WITNESS KANE) It is my understanding that the present program allows for that.

Q And how often will the NRC be monitoring what the Applicant is monitoring during that five year period?

A (WITNESS KANE) Fact monitoring of the record in the field is the responsibility of the regions. I think that question should be asked of them.

Q Okay.

Mr. Kane, do you consider that because of the nature -- well, I want to ask you a different way.

Due to the nature of the underground piping being the only safety system that is totally unobservable in a visual sense, what importance do you attach to this monitoring and settlement problem and all of the other problems that are related to the soils issues?

MS. LAUER: Objection. That's very general and vague.

MR. MARSHALL: It was within the scope of the geotechnical engineer to answer it, and I would take

exception to her objection.

CHAIRMAN BECHHOEFER: Could you be a little more specific about what you're driving at?

MS. STAMIRIS: Well, I just wanted some assessment of its relative importance of the overall piping system, safety piping issue in comparison to the other safety structures that we are analyzing because of soil settlement problems.

MR. WILCOVE: If I may clarify, is Mrs. Stamiris asking if there is any added concern because the piping is underground?

MS. STAMIRIS: Yes.

MR. MARSHALL: Precisely.

MR. WILCOVE: That I think would be a proper question, if Mr. Kane can answer it.

BY WITNESS KANE:

A There is added concern because what we are monitoring is not visible, such as a piece of equipment would be, in a structure.

I think it should be recognized that the work that has been done to date has identified the problem areas and remedial measures because of those problems, such as reinstallation of the 26 inch and the 36 inch pipe, has been carried out.

So the investigations have shown areas that

have needed correction, and they have been carried out.

Now we're relying on the monitoring program in those areas where the Staff has confidence that what is there or will be placed there by replacement operations is satisfactory, and we do place importance to the settlement and more particularly to the strain guage monitoring as the means that we can assure ourselves that nothing is happening that we have not anticipated.

BY MS. STAMIRIS:

Q Mr. Kane, would you -- go ahead.

CHAIRMAN BECHHOEFER: I was going to ask, just in addition to that, yesterday Mr. Lewis mentioned that the company would be continuing throughout the life of the plant's procedures for checking the accuracy of the monitors. Does the Staff have any program for seeing that that is done properly and that the monitors are, in effect, accurate guages, et cetera?

WITNESS KANE: The program I think we would be referring to would be conducted by the region, and that is they would be observing the records that are being taken and the reasonableness of those records. And if, in their inspection of those records, they felt something was questionable, then I would anticipate that they would follow through and resolve whether it has to do with the accuracy of the instrument or the manner of the readings.

But I would expect the region to resolve that.

CHAIRMAN BECHHOEFER: Well, for instance, if a reading were identical for the years, would that indicate enough concern to check the instrument, or aren't you familiar with that type of thing? As distinguished from a very major variation, where you might suspect that something either is wrong or something has happened.

3-7

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

appened

WITNESS KANE: With my experience with readings, I'd be very surprised if it were remaining constant.

You would have other pieces of information -- and that is other instruments in that area -- telling you whether that particular reading is reasonable. And we also have a check between the strain gauges and the settlement. It's not a direct check, but their behavior should be compatible, and we would be checking one against the other in that manner.

Perhaps Dr. Chen would like to add to that.

WITNESS CHEN: I think there are provisions for redundant gauges which could pick up that kind of thing.

CHAIRMAN BECHHOEFER: I see.

BY MS. STAMIRIS:

Q Can you direct me to the section of the SSER that deals with redundant gauges?

A (WITNESS CHEN) I don't believe it is spelled out specifically there.

Q I remember some talk of this before, and is there any danger in having redundant gauges that if you get one gauge that reads whatever it's reading and like show some concern or danger, then if you have another one there, that it would be a temptation to -- and that other gauge was not monitoring the same concern or danger or whatever is being monitored -- could it work in reverse that there

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

would be a temptation to rely on -- I mean, how would you know which one was correct? The one that says there wasn't a problem or the one that says there was a problem?

A (WITNESS CHEN) I don't think you'd just rely on the gauges in the one location to tell you whether or not you've got a problem or not. You'd have to look at the entire picture, I think, in that vicinity.

Q But if you had -- do you have redundant gauges -- if I remember right, there are redundant gauges at a specific point for measuring settlement or not for settlement. Are there redundant gauges for measuring some other factor?

A (WITNESS CHEN) They measure the strains, which are then converted to ovalities.

Q And are there redundant gauges at a specific point?

A (WITNESS CHEN) I believe that that is the case.

Q Then I still don't understand. If one gauge registered a problem and the other gauge at the same point didn't register a problem, how would you know which gauge to believe at that specific point?

A (WITNESS CHEN) What do you mean by a problem?

Q Well, whatever you're measuring. If you're measuring strain and one of the gauges showed a significant strain and the other gauge didn't --

A (WITNESS CHEN) Yes?

Q -- how would you know which gauge was correct?

A (WITNESS CHEN) I say you look not only at those two gauges, but the gauges upstream and downstream of that gauge as well as the settlement markers, I think, to determine whether or not anything is really happening or not.

3-8

Q Okay, but it doesn't answer my question for that point precisely, the point at which the two gauges are giving a different reading. It would be an engineering judgment?

A (WITNESS CHEN) Yes, that would also be involved.

JUDGE HARBOUR: May I ask just one quick question. Is there an elevation monitoring point at every place where the strain gauges are installed, or at each place where the strain gauges are installed?

WITNESS CHEN: No, that is not the case.

(Discussion was had off the record.)

CHAIRMAN BECHHOEFER: Should there be, or would it be useful to have that?

WITNESS KANE: It's my understanding that at every settlement monitoring location there are strain gauges but there are not settlement markers at every strain gauge location.

JUDGE HARBOUR: Are there some of the strain gauges that are not underground?

WITNESS CHEN: There are strain gauges at building penetrations. Now, whether or not you want to call it underground or not I'm not sure.

WITNESS KANE: There are strain gauges on the pipe that are underground.

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

JUDGE HARBOUR: But, I mean, are there strain gauges on the pipes that are above the ground in exposed locations?

WITNESS CHEN: At rattlespaces, yes.

JUDGE HARBOUR: All right, thank you.

BY MS. STAMIRIS:

Q Dr. Chen, I'll try and put the same concern to you in a different way, because at least I didn't understand or I didn't get a clear answer from my concern that I was raising with that question. And I'd like to ask you whether you think that -- or what assurance do you have in your plan against the possibility of the Applicant getting two different readings in strain at one point and then just going to the one that gives the more favorable reading and dismissing the one that gives them a more negative reading?

MR. WILCOVE: I object to the question.

BY WITNESS CHEN

A I believe that both results have to be recorded.

(Discussion was had off the record.)

CHAIRMAN BECHHOEFER: What is the objection?

MR. WILCOVE: I'll withdraw the objection.

(Discussion was had off the record.)

/8/3

CHAIRMAN BECHHOEFER: The witness may answer.

BY MS. STAMIRIS:

Q I'm sorry; I didn't hear your answer.

A (WITNESS CHEN) I believe that all such incidents would be reported, I think. The gauges would actually be identified.

Q But I asked a little while ago how closely would the NRC be reviewing or monitoring what the Applicant is monitoring, and I was told that the region would be doing that, and it's my understanding that the typical procedures that are followed is that the regional inspectors only can cover about five percent of the work, at the most, that's being done at the plant. So that's kind of a spot check, and I just wondered if you had any other plan for this contingency if it should occur, that there would be a temptation to go to the good reading instead of the bad reading?

A (WITNESS KANE) There would -- there could be a temptation. We would rely on the professional ethics of the people taking the readings not to give in to that temptation.

If they were to give in to that, that condition could only last a period of three months, because if they have said this reading is erroneous and the device is faulty and we'll accept this other device, they are required to go and replace that faulty device.

/9fol

/9/1
w
evi e

Q Well, when we're talking about the tremendous, you know, very real every day pressures which involve millions of dollars when you're talking about making these judgments --

MR. WILCOVE: Mr. Chairman, I think that a question should be phrased.

CHAIRMAN BECHHOEFER: I think she's starting to do that.

BY MS. STAMIRIS:

Q I think that some plans and specific criteria, or procedural criteria should be in place to guard against errors in professional judgment should such a contingency occur, particularly since we've had problems with that in the past, and I'd like to ask whether the three months that you referred to -- I mean, what if the NRC was not aware of it and it went beyond that three months?

A (WITNESS KANE) All of us are limited by our resources; the Applicant, you and we. The way we are presently set up, the way that the region conducts their business. They have limited resources, and we have limited resources.

It's felt at this time that that system is adequate. If it is demonstrated that it is not, then I think the NRC would react and provide the resources to

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

improve upon.

WITNESS HOOD: May I add to that?

MS. STAMIRIS: Okay.

WITNESS HOOD: Mrs. Stamiris, you seem to have a very large number of questions that are going to areas that are primarily the responsibility of Region III. I believe Dr. Landsman is here today.

A VOICE: He left.

WITNESS HOOD: If you have many more of these type of questions, I would suppose that we might want to supplement the panel.

BY MS. STAMIRIS:

Q Okay. Well --

MR. WILCOVE: If I may --

MS. STAMIRIS: Well, I do have one more question that I think would get to the heart of my concern in this case, and I would like to know what the NRR approach to this would be, and then I would also like to ask the Region III approach to this later.

BY MS. STAMIRIS:

Q And I'd like to ask Mr. Hood, wouldn't it be a relatively simple thing for NRR to require Consumers that in case they should get divergent, dual readings at any particular location for whatever they're monitoring that they be committed to notify the NRC of that at once?

CHAIRMAN BECHHOEFER: Well, did you not say that all readings are reported to NRC?

WITNESS KANE: The technical specification would require them to be recorded. That would be available for NRC inspection.

It's not my understanding that they would be directly submitted to the NRC.

JUDGE HARBOUR: Would all readings in which an excedence of the tech spec criteria will be reported to the NRC?

WITNESS KANE: They would have to be reported to the NRC.

JUDGE HARBOUR: Regardless of whether the source was instrument error or unidentified or might have been a change in a strain in the pipe?

WITNESS KANE: I would say this detail is something that we would have to iron out in the technical specification.

JUDGE HARBOUR: But does technical specification exist currently, today?

WITNESS KANE: If it does exist -- and I am told that it does -- we have not reviewed it yet.

MS. LAUER: Judge Bechhoefer, if I can clarify this somewhat, the proposed tech spec that has been submitted would provide that if the allowable strain

/9/4

was reached on any one particular day, even where there was redundancy of gauges, that would immediately be reported.

JUDGE HARBOUR: And that is in the current proposed technical specifications?

MS. LAUER: Yes, it is.

/10fo

is.

MS. STAMIRIS: That answers my question. Thank you. I don't have any more questions at this point.

(Discussion off the record.)

CHAIRMAN BECHHOEFER: Mr. Marshall, do you have any questions?

MR. MARSHALL: Yes, about three questions is all, and I don't know which one to direct them to, so whichever one wants to respond, it's perfectly all right with me. I think that would be reasonable.

CROSS EXAMINATION

BY MR. MARSHALL:

Q The question is you have several differences, as I understand it, in diameter of piping out there. That's my understanding, that several of the pipes are larger than others, they're not uniform.

I'm wondering at what depths are they buried underground?

A (WITNESS HOOD) The depths of the pipes vary in depth.

Q What depths underground are these pipes, is this underground piping buried? How deep are they?

A (WITNESS HOOD) Some of the larger pipes, like the 26 inch, are about elevation 600, I believe. Thereabout at the natural soils level.

Some of the smaller pipes -- for example, for

diesel fuel oil lines -- are as shallow as two to three feet beneath the surface.

Q Two to three feet?

A (WITNESS HOOD) In some cases, yes.

Q Which pipes are those that you say that are two to three feet?

A (WITNESS HOOD) The diesel fuel oil line is about two to three feet below the surface.

Q And that would be 36 inches, correct?

A (WITNESS HOOD) No, that is not correct. The diesel fuel oil line is --

CHAIRMAN BECHHOEFER: He meant the depth.

BY WITNESS HOOD:

A (Continuing) Oh, I'm sorry. I was referring to -- I thought you were referring to the diameter.

BY MR. MARSHALL:

Q No, I'm talking to the depth. You said two to three feet. I'm very limited in my math, but up here we say that's about 36 inches, is that correct?

A (WITNESS HOOD) Three feet is 36 inches.

Q The larger in diameter pipe, at what depth did you say that was buried?

A (WITNESS HOOD) I said it varies, but --

A (WITNESS KANE) I think most of the service water lines are on elevation 625, 626.

BY MR. MARSHALL:

Q For feet?

A (WITNESS KANE) Elevation, --

Q I want it in feet.

A (WITNESS KANE) Okay. It's at elevation 625, plant grade is at elevation 634.

Q Are you saying six feet?

A (WITNESS KANE) I'm saying nine feet.

Q Nine feet; that's better. Okay.

Now, the rest of those pipes, how many of them are at 36 inches? How many?

A (WITNESS KANE) I think the ones that Darl was referring to are the diesel fuel oil lines, which are small diameter pipes --

Q Very well.

A (WITNESS KANE) -- one and a half, two inch diameter, and I understand they are at depths from two to three feet.

Q I see. Now, are those uniform at depths, at uniform, 36 inches uniform?

I'll ask Mr. Kane that question. I think he is the geotechnical soil expert on this.

A (WITNESS KANE) If the question is are the diesel fuel oil lines, the smaller diameter pipes, all at the same depth, the answer would be no.

Q Would be yes, you say?

A (WITNESS KANE) No.

Q They're not uniform?

A (WITNESS KANE) It is my understanding there is a slope to the line.

3-11

line.

Q All right. Well, what I'm trying to get at is are all of those pipes, regardless of slope, 36 inches down?

A (WITNESS KANE) I think it has been indicated that it could be as shallow as two feet. So it would be 20 -- two feet to three feet.

Q As shallow as two feet. And what are you running through those lines?

A (WITNESS KANE) Diesel fuel oil.

Q Diesel fuel oil. Now, what kind of pipes are those?

A (WITNESS KANE) I would ask Dr. Chen to answer that.

Q I would like to know from anybody that knows What are they? What type of material?

A (WITNESS CHEN) I believe that that's addressed in the SSER. Hang on a minute.

A (WITNESS HOOD) Page 3-34.

A (WITNESS KANE) I believe that those are carbon steel lines.

Q Carbon steel?

A (WITNESS KANE) Yes.

Q Now, what effect -- whichever one of you is able to answer this question for me -- what effect does ice have on carbon steel?

A (WITNESS CHEN) Are you referring to the piping at Midland or in general?

Q You'd better believe I'm talking about the piping at Midland.

A (WITNESS CHEN) The underground piping at Midland? The underground piping at the Midland Plant?

Q Yes.

A (WITNESS CHEN) I am not aware of any problems with -- of any effects of ice on these lines.

Q Will you say that there is no effect of ice from stress or any other reason on these lines?

A (WITNESS HOOD) At that depth?

Q At that depth.

A (WITNESS CHEN) Could you repeat the question?

Q The question is: Would you say that there is no effect of any kind or nature whatever -- I'll put it that way -- from stress or anything regarding ice on these lines?

A (WITNESS CHEN) Mr. Marshall, may I attempt to clarify? I think Dr. Chen is responding to your question about ice on the pipes.

MR. MARSHALL: Yes.

WITNESS KANE: But is your concern with frozen ground and --

MR. MARSHALL: You'd better believe that.

WITNESS KANE: Okay. That's something different, I think, than what Dr. Chen is addressing.

BY MR. MARSHALL:

Q Okay, and, as I said, anyone could respond to this what wanted to. Go ahead.

A (WITNESS KANE) There is a concern for depth of those diesel fuel oil lines. That concern is not the same as your concern, in that the concern that has been expressed by the Staff in the past is whether they are deep enough for adequate missile protection.

Q Exactly. Exactly.

A (WITNESS KANE) I thought you were going after frost.

Q No. Well, I am going after frost, in a way, because, you see, we have specs in the City of Midland that allows those lines to be buried at 42 inches. But this is still inside the City of Midland. I wonder why it's so different inside the plant than it is outside across the road.

WITNESS HOOD: Before you continue the question, I'd like to supplement Mr. Kane's reply with respect to the missile situation.

Staff has addressed in Supplement No. 1 to the SSER the fact that two feet of soil is not perceived as a sufficient missile protection. It is acknowledged

there that the Applicant has committed to provide a concrete slab over the diesel fuel oil lines to provide for that missile protection.

BY MR. MARSHALL:

Q Very well. And that's going to be uniform?

A (WITNESS HOOD) Are you referring to the concrete slab?

Q Well, such as a mat or -- over all the areas covering these particular pipes?

A (WITNESS HOOD) I would expect it to be uniform.

MR. MARSHALL: Very well. I have no further questions.

CHAIRMAN BECHHOEFER: I think before we proceed with Applicant, we'll take a morning break. 15 minutes.

(Brief recess.)

t4

CHAIRMAN BECHHOEFER: Back on the record.

MR. MILLER: Before Miss Lauer conducts cross examination of the Staff Panel, I have a statement I would like to make for the record with respect to the underground piping testimony that has been submitted so far.

MR. WILCOVE: Excuse me, Mr. Chairman, could we just hold off until Mr. Paton comes into the room. Miss Wright will go get him.

CHAIRMAN BECHHOEFER: All right.

MR. MILLER: Yesterday in his testimony, Mr. Lewis identified certain underground piping that is going to be rebedded or reinstalled. And in response to questions from the Board, identified the seismic criteria which that pipe analyzed. That criteria was .12G.

The Applicant is currently reanalyzing that pipe to current seismic criteria and expects to have those results in two to three weeks.

It is the Applicant's expectations that that pipe will meet those seismic criteria. I would like the opportunity to supplement the record by presenting in written form by way of a letter or an affidavit, the results of the seismic reanalysis and have it accepted as evidence in the record by the Board.

(Discussion off the record.)

CHAIRMAN BECHHOEFER: I might say, the Board

won't have any objection to that, but I would suggest that if any of the parties had questions they wished to raise, you may have to bring Mr. Lewis back at some point to answer those questions, Mr. Lewis or someone else.

MR. MILLER: I understand that that is a contingency. Perhaps when the results of the analysis are presented as I suggest, the parties will decide that they have no further questions and it will simply be accepted into the record without any cross examination.

MR. MARSHALL: I have no objections.

MS. STAMIRIS: Would you repeat for me what is the new criteria that will be applied in the ongoing evaluation?

MR. MILLER: The current seismic -- the SSRS, in some instances, a proxy for that at one and a half times PSAR, force generated by the .12G, earthquake PSAR, is used as a proxy toward the ESAR.

But the analysis would demonstrate that it meets current seismic criteria.

CHAIRMAN BECHHOEFER: All right. What if it doesn't?

MR. MILLER: Well, there has been no -- the pipe has not been dug up yet. It has not been reinstalled physically yet. Changes in the design as necessary to meet the requirements would be made. Obviously, it has

to meet regulatory requirements, and it will do so.

MR. PATON: Mr. Chairman, I have another response to your last question, and that is that I think that that is an appropriate way to proceed and the Staff would intend to put on the record, either something in writing or do a witness, to indicate that we have reviewed this information submitted by the Applicant and we would agree with it.

MS. STAMIRIS: I would not object to doing it in that manner with the understanding that if there were questions that arose, that we would be able to address the appropriate witness.

MR. MARSHALL: We reserve the rights.

CHAIRMAN BECHHOEFER: I think that is an appropriate way to proceed. You might want to turn it in under affidavits. And then, if there are no questions we will just accept it into the record.

MR. MILLER: All right. And I take it that Staff would have another affidavit or comparable piece of writing that would indicate their concurrence with --

4-2

KJ/DW
4/2/1
with-

MR. PATON: I was trying to leave the option open to myself, that if I happen to have a witness here, we would either do it -- if there is a witness here who could testify to that, a piece of paper, one way or the other.

We would intend to submit to the Board something that we would offer into evidence that would indicate our reaction to the submittal by the Applicant.

CHAIRMAN BECHHOEFER: Well we won't define exactly how it has to go in, but --

MR. PATON: Thank you, Mr. Chairman.

MR. MARSHALL: As long as it is appropriate.

WITNESS HOOD: For the record, Mr. Chen would like to relate the current discussion to his prior remarks.

WITNESS CHEN: These are two discussions that I was referring to earlier relative to Page 3-39 SSER. Some amendments might have to be made to this based on the future submittals.

At this point, I leave it as it is.

MS. STAMIRIS: Judge Bechhoefer, I have one question I would like to ask Mr. Chen about that change, and it is one that honestly slipped my mind before, and then this discussion made me remember. May I ask now or should I wait until later?

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

CHAIRMAN BECHHOEFER: Well before Ms. Lauer starts, why don't you.

MS. STAMIRIS: All right.

Dr. Chen, when you said that this analysis that is -- will you point out again which sentence it was in effect that you said might need to be changed on 3-39?

WITNESS CHEN: That is Item 3, and it is the fourth line from the bottom where I speak of an old applicable code criteria.

MS. STAMIRIS: I thought you said it wasn't --

MR. MILLER: Subparagraph 3.

MS. STAMIRIS: Subparagraph 3, four lines from the bottom -- all right.

My question is, the change from the .12G which this is based upon to the SSRS earthquake standard, took place sometime ago. Why is it that that SSRS earthquake standard was not applied when you performed your evaluation?

WITNESS CHEN: I have not specifically looked at the input of the program as far as the seismic response spectrum is concerned. But I do know that the .18G, or the 1.5 times the FSAR response spectrum, was utilized in calculating the soil contents for that analysis.

MS. STAMIRIS: Well then when the new, more conservative seismic data is input which had come from the

/2/3

studies that are now being performed, you expect that if that study comes out favorably, that then would make your overall analysis complete and valid at that time?

WITNESS CHEN: Yes, but I would like to point out for the record that there are actually two seismic analyses under consideration.

There is a response spectrum of analysis and a BC-TOP-4 kind of analysis, and these are referenced in the Applicant's testimony. Hang on a second.

There's a footnote on Table 4 for Line 36 OHBC-15. The Footnote 2, which is value shown, is based on dynamic seismic analysis.

JUDGE HARBOUR: Would you give the sheet number which appears at the bottom of the page?

MR. MILLER: I believe it is Sheet 2, Judge Harbour.

MS. STAMIRIS: Dr. Chen, am I correct in understanding that these two different types of seismic analysis are still outstanding with respect to the new analysis that is going on by the Applicant?

WITNESS CHEN: That is correct.

MS. STAMIRIS: Thank you.

/3fol

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

CHAIRMAN BECHHOEFER: Ms. Lauer.

CROSS-EXAMINATION

BY MS. LAUER:

Q Dr. Chen, isn't it true that the type of strain gauges that will be used in the Midland plant are hand-held strain gauges?

A (WITNESS CHEN) No, that is not the case.

Q I'm sorry. Isn't it true that they can be calibrated against hand-held strain gauges?

A (WITNESS CHEN) The gauges can be checked by means of some hand-held vibrating device in that sense, yes.

Q And this check checks the calibration; is that correct?

A (WITNESS CHEN) That is correct.

Q Could this type of check on the calibration of strain gauges be done every time a reading is taken?

A (WITNESS CHEN) Yes it can.

MS. LAUER: No other questions at this time.

CHAIRMAN BECHHOEFER: Should it be?

WITNESS CHEN: Those concerns were discussed earlier.

MS. LAUER: Chairman Bechhoefer, that is part of the procedure every time they take the reading.

/3/2

CROSS-EXAMINATION BY THE BOARD

BY JUDGE HARBOUR:

Q I have one question for the panel or a few questions for the panel.

In the case of monitoring differential settlements of the varied pipes where the pipes pass over buried utilities, that might be hung up, will there be, both strain gauges and elevation measurements markers, vertical settlement markers at those locations?

A (WITNESS KANE) Does someone have a copy of the Applicant's testimony?

I think Judge Harbour is referring to the criteria that was identified yesterday?

Q That's correct, on Page -- my question started from Page 5 of the -- Mr. Lewis' testimony yesterday.

A (WITNESS KANE) I think it is necessary on my part to try and clarify.

What Mr. Lewis has done on Page 5 is give the guidelines for installing the vertical settlement markers. He is saying, a settlement marker was installed when it was compared to this criteria.

I think what you are referring to is No. 2 where he is indicating, they would install a vertical settlement marker at locations where high differential settlements could potentially occur due to underlying

utilities. So he has given the criteria for the installation of the settlement marker.

The settlement marker that is actually being installed is not capable of measuring differential settlement. It is capable of measuring settlement at that location, but we don't have instruments that would give us differential settlements at those locations.

Q But will there be strain gauges also located at those points?

A (WITNESS KANE) That is correct, wherever we have the settlement markers, we have the strain gauges.

Q And on all the utility crossings, they will have a vertical settlement marker; is that correct?

A (WITNESS KANE) No, that is not correct.

At every location where we have utility crossings, we do not have a settlement marker.

Q At every location where there is a possibility of differential vertical settlement resulting from being hung up, so-called, by underlying utilities, will there be a vertical settlement marker?

A (WITNESS KANE) Could you repeat your question please.

Q In those cases where there is a question of high differential settlement, if those locations resulting from crossing of utilities, will there be a vertical

/3/4

settlement marker?

A (WITNESS KANE) Our examination of the soil profiles has resulted in our calling for a settlement marker to be installed where we would anticipate large settlements or large differential settlements.

Q What was the basis for your anticipation?

A (WITNESS KANE) A review of the soil profiles and the behavior of the pipe as indicated by the pipe profiles.

I think Mr. Chen wishes to say something.

/4fol

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

/4/1
omething
w

A (WITNESS CHEN) I believe some correlation was attempted between where a piping crossed duct banks and differential settlements in those areas. No meaningful correlation was made there.

I think it was explained to me that the duct banks as well as the piping contained within the fill, would settle on the way to the fill; and hence, there would really be no hang up over the duct banks as such.

Since our entire fill is settling under its own weight in all of this piping -- the piping and the duct banks are contained in the fill, entirely would settle as a whole. They would hang up over duct banks and such.

CHAIRMAN BECHHOEFER: Could you explain that? Are you telling me that the duct banks will settle along the fill?

WITNESS CHEN: Along with the fill. That was what I was told, yes.

CHAIRMAN BECHHOEFER: Would that affect the duct banks -- apparently, it would be hooked up at the end or something. So wouldn't that affect the amount that the duct bank is likely to settle

WITNESS CHEN: In principle, that is true, I think, but I believe that most of the settlement that is anticipated over the life of the plant, has already occurred at this point.

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

BY JUDGE HARBOUR:

Q My next question then, and you may not be able to answer this because it is not in your testimony; it is in Mr. Lewis' testimony, but was the origin of the guidelines, 1 and 2 which appear in his testimony, from the NRC?

A (WITNESS KANE) The guidelines resulted from discussions between the Applicant and the NRC. It is my understanding, after discussions about what the Applicant felt were the areas of concern and our expression of concern, these guidelines resulted.

So we did not impose them; it was a result of discussions.

Q And Dr. Chen, are you saying then that the Guideline No. 2 is not necessary to be -- is there no criteria required as a result of that guideline?

A (WITNESS CHEN) Yes.

Q I also have a --

(Discussion was had off the record.)

WITNESS CHEN: Judge Harbour, might I point out also that difference in settlement effects have been considered indirectly in selecting the strain gauge monitoring locations as reflected in the profiles.

/4/3

BY JUDGE HARBOUR:

Q What is the nature of those locations? What would cause, potentially cause, differential settlements at those locations?

A (WITNESS KANE) One of the reasons we asked for profiles to be developed along the alignment of the pipes was to try and understand from the borings that had been completed, whether we could identify softer zones than in other areas. We would do that by looking at the blow counts that are recorded in the borings.

And where we felt the blow counts were of a level to where we could potentially have settlements in that area, it required a settlements marker to be installed.

We also asked for settlement markers to be installed at the locations where the service water piping is coming from the service water pump structure to the Diesel Generator Building. We had an area that was surcharged at the Diesel Generator Building and a part that was unaffected. We asked that settlement markers be placed in the surcharge area and outside the surcharge area to verify that future differential settlements are not a problem because of that difference in loading.

/5fol

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

/5/1
oading
w

BY JUDGE HARBOUR:

Q Are there any identified pockets of soft material that might be bridged by a duct which underlies a pipe so that the pipe -- the duct bank would not settle with the soil uniformly?

A (WITNESS KANE) It is felt, based upon the results of the profiling of the pipes, that we do have bridging in some areas. In other words, where borings would indicate a softer material, the change in the piping alignment is not real pronounced, and we could conceive that the pipe is bridging those soft areas.

Q So you are saying the piping is within the soft area?

A (WITNESS KANE) Yes sir.

Q I have another question based on the testimony that was given yesterday.

I believe you have Mr. Lewis' testimony there. And in the Reference 1 which follows the text on Page 2 in the third paragraph of that reference, the statement: (Reading).

"Any bending moment" -- and we are talking here about the soil settlement and its influence or lack of influence as a result of an elbow immediately, external to the structure -- "any bending moment developed due to soil settlement will be transformed to an equal part

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

/5/2

value."

Do you agree with that statement?

A (WITNESS CHEN) Yes, I do, in the sense that the bending moment would now be converted into a torsional moment.

Q Is that the only degree of freedom that one would be concerned with of the buried pipe parallel to a structure in which the structure was settling and the soil contained in the pipe was not settling?

A (WITNESS CHEN) Would you repeat the question, please.

Q Is there another degree of freedom that you would consider in the analysis at this elbow other than the bending moment of a buried pipe in the soil adjacent to -- parallel to the structure where the structure was settling and the soil was not? I will put --

Is there a translational moment to be considered at the elbow or a translational differential?

A (WITNESS CHEN) When the monitoring program is intended to make up changes in longitudinal stress that is associated with bending of the pipe and if the translation does induce bending stress, then they would be picked up.

Q I don't believe that this had to do with bending of the pipe so much as the statement which says that there is no affect on the annulus appearance of the wall

penetration, and that is my --

A (WITNESS CHEN) May I point out that the rattlespace is actually going to be monitored at that location?

Q I did not understand that.

A (WITNESS CHEN) The rattlespace is going to be monitored at that location.

Typically, the strain gauge is at penetrations which are placed just inside of the building and before an anchor. Because the location of the pipe approaches the penetration parallel to the wall, it will be difficult to pick up any bending stresses --

Q That is why I was asking about the possible forces from the translation of the longitudinal axis of that pipe being -- resulting in a change in the annulus --

A (WITNESS CHEN) There are provisions there to measure the annulus.

(Discussion was had off the record.)

M/DW
/1/1

JUDGE HARBOUR: How had this been monitored? Is this a visual check and measurement?

WITNESS CHEN: I believe that that is what is intended.

JUDGE HARBOUR: That's all the questions I have.

(Discussion was had off the record.)

WITNESS HOOD: Chairman Bechhoefer, it has come to my attention that there is an additional errata that should be made. Perhaps this would be an appropriate point to make it.

CHAIRMAN BECHHOEFER: Fine.

JUDGE HARBOUR: To what document?

WITNESS HOOD: Figure 2.11, which is on Page 2-37 of the second supplement.

WITNESS KANE: The correction that has been brought to my attention is on Page 2-37, and in Detail 1, in the upper right-hand corner just left of the Valve Pit No. 2 there is a service water line which is identified as 10 inch OHBC-27.

Has it been located by the Board?

JUDGE COWAN: Yes.

WITNESS KANE: As indicated by the legend, there is a portion of that pipe which has been rebedded. As shown on Page 2-37, that rebedding stops at the intersection

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

with the 8 inch 2HBC-310 pipe. The correction should be that that rebedding should -- the rebedding for pipe 10-OHBC-27 should continue along its alignment until it intersects the pipe 80 to the valve pit. The correction is there is a length of pipe which should be indicated to have been rebedded which is not shown on this drawing.

JUDGE HARBOUR: This would be indicated by a missing dash dot symbol, then, continuing south and then bending east until it meets the pipe coming from the valve pit?

WITNESS KANE: That is correct.

MR. WILCOVE: So the rebedding would not then turn the corner?

WITNESS KANE: The rebedding does turn the corner.

MR. WILCOVE: Does turn the corner. Okay, I see. Thank you very much.

WITNESS HOOD: The rebedding continues until it intersects Line 260HBC55. That's the only correction.

CHAIRMAN BECHHOEFER: Just in general for the panel -- I'm not sure which one should answer this -- there are many pipes -- not the rebedded pipes, but many of the pipes that are in place have been predicted to settle another three inches in the course of the plant's life, and I note that the Staff has found that to be acceptable.

/1/3

From where does the acceptability of that stem? Is that a particular code or criteria or some REG guide?

WITNESS KANE: No, Judge Bechhoefer. What the three inches is resulting from is an attempt to estimate what is the largest amount of settlement that we could anticipate for these pipes just under its own weight to occur in the future.

We do not expect the pipes to settle that amount. But what has been done is we have set that limit as a conservative limit of settlement to be used in design to show that even if that amount of settlement would occur that the pipes would not be overstressed because of that large conservative amount that has been allowed.

/2fol

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

allowed

CHAIRMAN BECHHOEFER: How can that be reconciled with the -- I think it was approximately two and a half inches which was set at the construction permit stage?

WITNESS KANE: I think the two and a half that you're referring to is rightly the settlement that -- the range of settlement that was estimated for the diesel generator building and not for the pipe.

CHAIRMAN BECHHOEFER: I see.

WITNESS KANE: There may be some confusion about the two inch tolerance that occurred when placing the pipe, but it was not expected that the pipe would settle two and a half inches, initially, if the fill had been properly compacted.

CHAIRMAN BECHHOEFER: Does NRC have any particular provision which would say that pipes will not settle more than an even amount or the plant will be shut down if they settle more than a given amount?

WITNESS KANE: What the Staff would attempt to do is to make sure that the foundation conditions with both the natural soil and replacing fill are placed in a condition where we would not be getting acceptable settlements, and we would be demonstrating for the natural soils by laboratory tests that it won't, and we would be requiring for compacted fill a high degree of compaction that it would not. And that's how we would attempt to avoid this.

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

If there are conditions where we anticipate settlement, then we would be estimating that amount of settlement, allowing for it to be safely taken care of in design, and then assuring us that it's not being exceeded by monitoring.

That is the normal process we would go through.

CHAIRMAN BECHHOEFER: But thre's no specific regulatory limit, for instance, which says no more settlement, if it reaches, that's all?

WITNESS KANE: No, sir. It would be site specific depending on the materials that we're working with.

CHAIRMAN BECHHOEFER: I see.

(Discussion off the record.)

CHAIRMAN BECHHOEFER: Mr. Wilcove, do you have any --

MR. WILCOVE: The Staff has no redirect.

CHAIRMAN BECHHOEFER: Mrs. Stamiris?

MS. STAMIRIS: I do.

RECROSS EXAMINATION

BY MS. STAMIRIS:

Q Mr. Kane, in response to -- I'll start with the last part first that Judge Bechhoefer was just questioning you about, the expected maximum settlement of three inches for piping. I'd like to try and have you clarify more precisely your definition of maximum settlement, and, in

so doing, would you differentiate between maximum settlement and total settlement of piping at the plant, if there's a differentiation?

A (WITNESS KANE) With respect to this three inch which we are identifying as a maximum settlement, the way this figure was arrived at was we had instrumentation for the Boris Anchor which permitted us to view the amount of settlement with depths in the fill.

We were able to understand what the fill settled with depth where it was not loaded by a structure. And we have a record of that settlement with time. And what was done was that settlement trend of several instruments -- I think there were six, six or seven -- that was measuring just this settlement of the fill, was extrapolated over the 40 year plant life. And that value is not three inches, but -- and many of the values, most of the values except, I think, one, were well below the three inches. All of them were below three inches. Most of them were well below it. And one was a value which, if you added on the fact of dewatering and other considerations, would indicate a maximum settlement less than three inches.

So the Applicant set as a design condition they will design these pipes for a maximum settlement to occur in the future during that operation.

BY MS. STAMIRIS:

Q Then, if this is -- if I'm understanding you correctly, this means maximum -- this three inches refers to an expected maximum further settlement?

A (WITNESS KANE) It's further from the time those plots for the Boris anchors, and I think Mr. Lewis indicated that it was -- I think it began from November of 1981.

Q Okay, that is my question, then, that you do have spelled out someplace in order to define the term precisely at what point in time that expected maximum settlement begins from?

A (WITNESS KANE) The technical specification which will address the long term settlement line of the underground piping will clarify this.

As it will be, it will be from the time the instruments that are going to measure that settlement are installed and -- and from that time this settlement will not exceed three inches.

Q Is there any point in your review, the NRC's review at which you identify what the total settlements--- arrange for what the total settlements are expected to be from the initial placement of the piping?

A (WITNESS KANE) In this particular instance, the use of the term total settlement would be the settlement

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

that is developing from the time we began our initial reading. So we would install at a certain elevation and we would come back periodically and measure the settlement.

The amount that it has settled from its original reading would be the total settlement. Each of those readings would be the total settlement. That total settlement is the one that would not be permitted to exceed the three inch maximum settlement.

Q I understand the way you have described that previously, but what I am asking is is there any point in the NRC's review where you address the total settlement since the initial placement of that pipe, say, for instance, if that pipe was installed in 1975?

A (WITNESS KANE) In our review, yes, we have addressed the settlements which have occurred, and we have done that by first having the pipe profiles established, which tell us that settlement which has occurred from the original intended design invert of it.

Then, with those settlements, use those in an analysis which attempts to identify the cause of those settlements what stresses have been induced in the pipes.

Because of the uncertainties with the original design invert elevation, the Applicant has proposed and the Staff has accepted the check on the stressing of the pipe to a criteria which is the strain in the ovality.

5/3/3

That criteria has resulted in the removal or the calling for the removal of pipes because of that settlement and that straining which has been identified.

Q And, I'm sorry, but I want to repeat and see if I understood correctly in response to Judge Bechhoefer that there were no original specific settlement limitations for piping at this plant?

A (WITNESS KANE) There were no limits set that if the pipe exceeded a certain value you would do something, that is correct.

Q Were there limits set of -- I shouldn't say limits, but were there in any of the design documents expected settlement figures for piping at this plant?

A (WITNESS KANE) There would be expected limits of settlement for the piping and structures.

PSAR, to my recollection, and the earlier addition of the FSAR identified those anticipated settlements.

Q Can you give me some range for what the expected settlements were, or does it vary too much from one point to another?

A (WITNESS KANE) With respect to the PSAR and the FSAR, I feel confident that if I went back and checked I would not see a limit for pipes.

5/4fol

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

Q No; I mean an expectation of settlement for pipes.

A (WITNESS KANE) It does depend on the amount of fill that is beneath the pipes. So if you have 10 feet of fill you may expect some value. If you have 25 feet of fill, you would expect another value.

To answer your question, the magnitude of settlement that we would have expected is nowhere near what has been indicated by the pipe profile.

Q Can you remember what the upper bound of expected settlement was?

A (WITNESS KANE) Without being able to go to the documents and find something written that says this is our anticipation, I cannot give you what it was at that time.

Q Was the greatest settlement of any piping at this plant -- I remember, and I can't remember what pipe it was, but I'm quite sure I remember reading that some pipe had settled 21 inches -- and would the addition of a possible three more inches to that then give you what the total and most extreme settlement of the piping has been at this plant?

A (WITNESS KANE) It's my understanding that the pipe -- that it has settled to the extent that you have indicated, the 21 inches -- was between the Turbine Building and the Diesel Generator Building. It was in the

/4/2

area of the surcharge, which may be an additional reason for that large settlement, which was not anticipated when the plant was designed. It was not anticipated that the surcharge load be placed.

It is not now correct to add three inches onto that 21 inches, because that specific pipe was excavated, cut and refitted.

CHAIRMAN BECHHOEFER: One follow-up question. You mentioned that the three inches would stem from whatever date certain instruments -- well, I couldn't decide whether you said were installed or will be installed. Is that a future date or is that a past date?

WITNESS KANE: The settlement markers are to be installed. They are not yet installed.

CHAIRMAN BECHHOEFER: What would happen if there's some sinking between or settling between now and the date those markers are installed? Are you really not saying something more than three inches is then acceptable?

WITNESS KANE: The period that we're in now -- and that is the period where they're not installed and settlement could be occurring -- we have a check on that by the same Boris anchors that we have used to evaluate the three inch settlement. And they're indicating that this settlement has leveled off and is not significant, and it would not approach the three inches.

CHAIRMAN BECHHOEFER: But if you added it to the three inches that might occur in the future, would that be significant?

WITNESS KANE: There's some confusion, and I could understand it, because when we say the three inches of settlement is conservative, what we're saying is when you use it in design and you allow for that large difference in settlement, and you make the structure safe because of that settlement, that's being conservative. But as used in the Applicant's testimony is that a conservative limit of three inch has been set. It's not quite the same.

If we had estimated five inch and you took 75 percent of five inches, it would be more than what we're doing now. So what I'm indicating is the larger you make that settlement for a criteria in a tech spec is not conservative.

What is conservative is the three inch -- is the maximum that we could possibly anticipate that the pipes will settle under their own weight.

CHAIRMAN BECHHOEFER: Right. But what I was trying to get at is should the three inches start from a period of time like in the end of '81, for instance, when certain readings were taken, or should it start -- if you started it during the last year of the plant life, the three inches wouldn't be very meaningful.

At some point you've got to get a starting point and determine that three inches from that point, or whatever that starting point may be, three inches beyond that doesn't present a significant safety hazard.

WITNESS KANE: The three inches is the difference in settlement which is being allowed in design to occur between pipes that are in the fill and pipes that may be connected to the structure. And it's being demonstrated because of that three inch that these pipes are acceptable.

To answer your question, is it better to add additional settlement or to subtract from the three inches of settlement because of the time we're not measuring? Do I understand your question?

CHAIRMAN BECHHOEFER: No, my question is should the three inches stem from, say, the period of time in -- I think October '81 was the date that one of the witnesses supplied for certain measurements. Maybe it should stem from then, which would mean that your alert levels and action levels might be initiated earlier than otherwise

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

would be the case. That would be more conservative.

WITNESS KANE: It would be my understanding based on what I have seen of the Boris anchors and the settlement that's now occurring that the amount of settlement that has occurred between the time we made our estimate and the time when we anticipate these devices to be installed, that magnitude of settlement is of so small a value that it is within the extra allowance which has been put in the three inches.

CHAIRMAN BECHHOEFER: I see. Thank you.

JUDGE HARBOUR: I think you may have answered this, but the three inches is a design value, is that correct?

WITNESS KANE: That is correct.

JUDGE HARBOUR: And that applies to pipes to be rebedded or reinstalled or newly installed, is that correct?

WITNESS KANE: It is not with respect to the 36 inch and 26 inch pipes which are being installed.

Well, there is a condition of a one and a half inch which I was attempting to address. That is the difference in settlement between the new fill and the old fill.

It is my understanding with respect to the reinstallation of the 36 inch line and the 26 inch line

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

that they have analyzed a three inch settlement between the pipes that's in the old fill and the pipes that's in the new fill.

WITNESS HOOD: Dr. Chen, would you comment on that, please?

WITNESS CHEN: Okay. For the 26 and 36 inch lines in the vicinity of the service water pump structure those portions of the pipe which are founded on the old fill from the three inch differential -- the total settlement was considered and the areas founded on the K-KRETE of one and a half inches was considered, so the three inch was considered for piping to be rebedded or replaced. But I think three inches was considered in the analysis for the 26 inch lines which are going to be monitored.

JUDGE HARBOUR: I have one other question. Is the three inches that we're talking about applicable to pipe which is not going to be or will not be rebedded or reinstalled as a design value?

WITNESS CHEN: If the piping in the vicinity of the Diesel Generator Building which subjected to the surcharge load, no. For other piping founded in the old -- what I'm going to call the old fill, yes.

JUDGE HARBOUR: And that would be an additional three inches or a total three inches?

/5/4

WITNESS CHEN: I think it was considered from the -- the three inches was taken as a differential in settlement for such pipes.

/6

BY MS. SINCLAIR:

Q Mr. Kane, I hate to, but I must pursue this further, because with the questions from the Board I'm getting a different understanding than I had from your answer about the three inches in the first place, and I'd like to preface this by asking you to answer your questions as much as possible minus the factual input of data but to concentrate your answers on the framework, you know, like the semantics of the words or the framework of the procedures that are involved instead of telling me about the data input.

So, when I ask you, I want to ask the three-inch acceptance criteria or --no, I should say expected maximum future settlement to which you have referred, I thought you told me it began -- no, I'm sorry. All right, the three inch expected maximum settlement figure, in order to be valid, must have a very specific point in time at which you are beginning that measurement, mustn't it?

A (WITNESS KANE) It depends, and I'm sorry I can't be specific, but it depends on for what purpose you plan to use it.

With respect to the pipes in the fill, the settlement that's being estimated to occur during the 40 year plant life is three inches from a date that I think the Boris Anchors were installed and read.

So that is more than three inches.

When we're talking about design and we're talking about differential settlement between the structure where it may be supported as it enters the structure and out in the fill where the pipe is in the fill and we're allowing three inches maximum settlement to be analyzed in design and evaluate the stresses on that, that, in my estimation, is two conditions of where we're using the three inches.

Q Okay. Would I be correct to refer to this three inches as three inches of expected maximum future settlement?

A (WITNESS KANE) I do not feel anyone expects it, but you used the word expected.

Q I don't mean -- when I said expected maximum, I don't mean to imply that you think that that is going to be reached but that -- you know, I'm concentrating on the word future settlement, or should I say further settlement, or it seems like this maximum settlement starts from two different points and times. One point -- and I heard you say it again just now -- you're talking about three inches of maximum settlement for pipe in the original fill from the point of time that the Boris Anchores were placed in 1981. Then, at another time, I thought I heard you say to Judge Bechhoefer that you were talking about three inches of maximum settlement from when some Boris Anchors would be placed at some future point in time. And, if the

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

latter is true, then I think that it means nothing unless you know what that future point in time is.

Can you clarify my conclusion?

A (WITNESS KANE) Actually, to clarify something that you said, the Boris Anchors are already installed. We're talking about installing the settlement markers on the pipes, and that's when this settlement will begin, this settlement monitoring will begin. The settlement monitoring on the pipes will begin the day the markers are installed on the pipe.

Q And your expected maximum, or your upper bound for settlement of three inches starts from whenever the settlement instruments are placed?

5-7

/7/1
w
laced

(Discussion was had off the record.)

WITNESS HOOD: May I comment?

My understanding of this discussion is what the Staff is saying is that the intervening time from October of '81, or November of '81 until the measurements start is insignficant. That is a presumption on our part. We will know whether or not it is insignificant from the measurements we get from the Boris anchors.

If for any reason that is not the case, that is assumption is not correct, then I believe that you are correct that that amount of settlement would be taken out of the criteria.

Mr. Kane, you can correct me if I'm mistaken.

WITNESS KANE: I think it would be helpful if you would ask your question again. It would be helpful for me to understand your concern.

MS. STAMIRIS: I'll try and ask it one more time.

BY MS. STAMIRIS:

Q If I'm understanding you correctly, the three inches upper bound settlement will be measured -- let me try and ask it this way. Would I be correct in assuming from your answers that you do not consider, or would not consider a possible variation in installation time of up

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

/7/2

to, let's say six months -- no, I'll say a year from now -- as crucial to that three inch upper bound settlement?

A (WITNESS KANE) I would not consider it crucial because our observance of the Boris anchors is indicating during this time that the settlement of the fill under its own weight has leveled off and the settlement is not significant during this period.

Q Then would I be correct in understanding that the beginning time for the measurement of that three inches upper bound settlement would be acceptable to you if it took place anytime before plant operation?

A (WITNESS KANE) Your question is would I be concerned if it settled three inches from the time we began reading the Boris anchors up until the time the markers were installed? Is that your question?

CHAIRMAN BECHHOEFER: Were you not referring to the beginning of the three inch measurement?

MS. STAMIRIS: Pardon me?

CHAIRMAN BECHHOEFER: Were you not referring to the time period --

MS. STAMIRIS: Yes.

CHAIRMAN BECHHOEFER: -- when the three inch measurement would start?

You're asking the witness if he thinks that if it started anytime up to plant operation that would be

satisfactory?

MS. STAMIRIS: That's what I'm asking him.

BY WITNESS KANE:

A No. We would be concerned if we had three inches of settlement --

CHAIRMAN BECHHOEFER: No, no. That wasn't the question. Whether the measurement of three inches started anytime between now and plant operation. If it extended until the time when the plant was ready to operate, would that concern you if the time period in which the three inch measurement starts were delayed however long it will be till the operating license is acted upon?

WITNESS KANE: Based upon my knowledge of the Boris anchors and the behavior, it would not be a concern, but I would want to look at those continual readings of the Boris anchors to confirm that nothing is being indicated that I should be concerned about.

JUDGE COWAN: I think I have a right to ask one question.

Mr. Kane, you heard Darl Hood's explanation of what would be done about this intermediate sinking business. Do you in any way disagree with the explanation which he has now given us at least twice, maybe three times?

WITNESS KANE: No, I do not.

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

JUDGE COWAN: And you essentially are saying the same thing that he was, is that correct?

WITNESS KANE: Yes.

/8/1
w
es

BY MS. STAMIRIS:

Q Mr. Kane, you do expect that the settlement instruments will -- that you referred to for starting this settlement measurement of three inches will be installed prior to plant operation?

A (WITNESS KANE) I do expect that, yes.

I think we have muddied it enough that I should try and clarify.

I think your concern is, with the settlement that has already occurred and is going to occur in the future, is there a concern. And the settlement markers are being installed pretty much as a redundant system to the strain gauges.

We have measured the ovality of the pipe, which is a reflection of the settlement that has occurred, and that is at a certain level, and the additional settlement that's going to occur is thought, if it does occur, would affect that ovality. And the real criteria on the effect of the settlement is the strain gauges and the ovality.

The settlement markers are not intended to recapture the initial history, because that is reflected in the ovality measurements that have been made.

Q I see. Thank you.

Dr. Chen, I believe that you answered in response

to some questions from Judge Harbour about annulus measurements of parallel piping outside buildings. With that description, do you know what discussion I'm referring to?

A (WITNESS CHEN) Yes, I do.

Q And your response was that there would be a visual check for this kind of -- or a monitoring of this possible movement, and I thought we were just talking about underground piping. Could you explain that?

A (WITNESS CHEN) Well, where it enters the building --

Q Oh.

A (WITNESS CHEN) Do I need to say any more?

Q No.

JUDGE COWAN: That's real communication.

MS. STAMIRIS: I think I understand that.

BY MS. STAMIRIS:

Q Are there predetermined criteria at this point for measuring the kind of possible movement that Dr. Harbour was asking you about?

A (WITNESS CHEN) Could you repeat the question, please?

Q Are there predetermined acceptance criteria at this point in time against which the kind of potential movement we're talking about will be monitored?

A (WITNESS CHEN) Yes. There are limits for strain and ovality.

Q Are those in the technical specifications?

A (WITNESS CHEN) I think they will be, but I think we have essentially come to an agreement with the Applicant as to what those limits should be.

Q So, before the plant operates, there will be specific limits set down in black and white?

A (WITNESS CHEN) That is correct.

Q Thank you. When you were discussing, Dr. Chen, the -- well, I'm not sure who was discussing the criterion by which placement of monitoring devices were set for, where you assumed that the points of highest stress would be located in the piping. When you were making that decision of where to place the monitoring devices, did you take into account possible voids in the soils?

WITNESS HOOD: Do I understand your question to be directed to the strain monitoring locations?

MS. STAMIRIS: Yes.

BY WITNESS CHEN:

A Firstly, we did not select the locations; the Applicants did. We reviewed them.

BY MS. STAMIRIS:

Q Okay.

A (WITNESS CHEN) The question of voids, I think

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

that's addressed indirectly when we consider difference in settlement effects.

Q Do you believe that there is a possibility of the existence of unknown voids in the fill soil at the Midland plant site?

A (WITNESS CHEN) Repeat that for me, please.

Q Do you believe there is a possibility of the existence of unknown voids, unknown locations of voids in the plant fill soils?

A (WITNESS CHEN) Yes.

CHAIRMAN BECHHOEFER: Do you think it's likely? I mean, you said it was possible, but anything is possible. Is it likely?

WITNESS CHEN: Let me answer the question this way. I believe the monitoring program is such that no matter what the cause for stresses in the piping, whether they be due to voids or -- I think yesterday the possibility of dewatering, you know, raising and lowering of the level of the water level under the plant, or whatever other causes -- okay, the stresses could be attributed to, that the stresses will be picked up by another monitoring program.

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

J/DW
/1/1

WITNESS HOOD: That question predominantly should be addressed to Mr. Kane. He has testified already about the likelihood of voids in the soil.

BY MS. STAMIRIS:

Q I believe Mr. Kane testified already about the relevance of the possible existence of voids to bearing capacity analysis, but I am concerned with the possible existence of voids out in the plant fill, not under a structure.

I wanted to ask about piping and -- I want to ask Dr. Chen, first, could the existence of -- it is hard for me to qualify because I don't have any idea, but I will start with a six foot by six foot void in the soil.

Could a void that large in the soil produce significant stress on piping?

A (WITNESS CHEN) I believe if such a void did exist in the soil, one would get arching action in the soil. I might point out also that the Applicant's performed a two under one analysis which a washing out of a Noncategory 1 piping beneath Category 1 piping, was considered -- to the extent of the void, there was -- the washer, apparently, was much larger than what you are talking about and the column of soil was placed above the piping which extended all the way to the surface, which I think is even more spread out than what you are talking

about. The analysis shows that there was no problem, as far as the Category 1 piping was concerned.

JUDGE HARBOUR: Does that mean that the Category 1 piping would simply bridge that --

WITNESS CHEN: That is correct.

BY MS. STAMIRIS:

Q Well if the Category 1 piping is that sound, why are we having all these monitoring devices?

A (WITNESS CHEN) We are talking about a differential source problem and not the kind of problem that you are talking about. The monitoring referred to was put in more different soil settlement effects.

Q I will ask this question to Mr. Kane since I know, from previous questions that he is aware of the existence of voids in the soils underneath the Administration Building.

And since we have been aware of voids found in the soils of the plant fill, do you have any concerns that there could be a void which you have not located which could put a strain or any other -- could create any other problem with safety piping that would be necessary to pick up by monitor?

MS. LAUER: Objection, I believe it has been asked and answered.

BY MS. STAMIRIS:

Q Let me try again.

Are there any -- is there any concern within the NRC that the placement of the monitoring devices has not located all of the possible weak spots that could be under the piping, due particularly, to the existence of voids?

A (WITNESS KANE) There is no concern because of what has been done, and that is the type of profiling to identify those areas where we feel it has been most effective by the settlement, and we feel we have conservatively required monitors wherever there can be a potential problem.

Q And when you were describing how the soils were monitored and that at points where there was a soft area, there were certain places with the piping that your judgment was that indeed, the pipe was bridging that soft soil and being supported at some other ends, either by structure or something else; is that correct?

A (WITNESS KANE) That is correct.

Q In such a situation, what would be the point of high stress on that piping?

A (WITNESS KANE) Where the pipe is bridging?

Q In the pipe bridging, soft material, yes.

A (WITNESS KANE) Well if the pipe -- if there is a

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

/1/4

soft spot there and it is not supporting the pipe, the pipe can either deform, and if it did deform because of that soft spot, we would have picked it up with our profile.

If it hasn't deformed and it is bridging, then what are the stresses resulting because of that bridging?

Q Yes.

A (WITNESS KANE) That should be answered by Dr. Chen.

/2fol

Chen.

WITNESS CHEN: It really depends on how the pipe is supported passed the soft spot. I would say that it would occur in the middle of the soft spot.

Q All right, Can you specify the places in the plant piping where you have determined that it is likely that the pipe is indeed bridging a soft spot?

A (WITNESS CHEN) I will defer this to Mr. Kane.

A (WITNESS KANE) The term "soft spot" is a relative thing in that if we have borings indicating very dense field and we get to a point that indicates less than those conditions, it is softer but it does not necessarily mean that it is soft to wear you'd have a problem.

What we have done in our conservativeness is where we have this change in appearance of denseness is because of our borings, we have installed the settlement markers but that does not mean we think there is breathing there. We just recognize the foundation conditions are such that they are softer but not necessarily a problem. They could, they will be supported entirely by the material as it exists there now.

Q Did you not say earlier that you thought there were places where piping was bridging a soft spot?

A (WITNESS KANE) I think I indicated that it is conceivable because of the difference in that foundation that bridging is occurring, yes.

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

Q Where do you think on the plant site are the most likely places thst bridging is occurring?

A (WITNESS KANE) At the places where the borings are indicated, material less dense than in other places.

Q You don't have any specific locations of piping in mind by certain buildings or other --

A (WITNESS KANE) What I would have to do is go to the profiles that would indicate my estimations. The change in denseness as indicated by the borings is such that there is a potential location.

Q Mr. Kane, would you agree with Dr. Chen's assessment that if pipe was bridging a soft spot, but the likely point of high stress would be in the middle at the point of potential deformation? He didn't say that, I am sorry. I should take off that "potential deformation".

MS. LAUER: I believe that's the answer to the question that Mr. Kane deferred to Dr. Chen previously.

CHAIRMAN BECHHOEFER: That is probably not in his expertise. I will sustain that.

BY MS. STAMIRIS:

Q Dr. Chen, it seems like you are not completely sure, and that is why -- I am sorry, I didn't mean to be disrespectful -- but would you state your certainty by your expertise as to where that strain would be likely to be the greatest?

A (WITNESS CHEN) It depends really on how soft

a pocket is relative to adjacent areas.

Q When you said -- I will go back to Mr. Kane -- when you said that in determining your criteria for placement of the monitoring, the strain monitoring devices, that you took into account the softs, did you then place your monitoring device above the center of that soft spot or did you place it at where you think it may be supported at either end of its bridging? Who else can answer the question.

A (WITNESS CHEN) Is your question, at locations where we considered a potential for soft spots that exist for strain gauges located at the center of the soft spot?

Q I would like --

A (WITNESS CHEN) Is that your question?

Q Yes.

A (WITNESS KANE) The soft spots that we are referring to are the ones that have been identified by the borings; is that correct?

Q Yes, that is what I am referring to.

WITNESS KANE: In looking at a profile which presents the self service information by the borings, if we were able to detect a change in denseness because of those borings, we would put the marker at the location where the boring has indicated to be the less dense.

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

BY MS. STAMIRIS:

Q If you thought that the pipe was bridging a soft spot, would there also be a monitor placed at where on which ends that pipe could be supported if there was some nonstructural underground utility or entrance to a building, would the end of that bridging distance also be monitored?

MS. LAUER: Objection; this is getting entirely hypothetical and repetitive. I don't know how much more we are going on with this.

MS. STAMIRIS: I might add, I don't have any further questions on this subject.

CHAIRMAN BECHHOEFER: I believe the witness can answer it if he can.

WITNESS KANE: The locations of the instruments, the settlement strains were not located because of the bridging which was there, so there was no bridging criteria which resulted in a marker being identified.

The markers with respect to strain were based on the profiling of the pipes and what that indicated in the way of stress to the pipe. If there were voids there, if there were soft spots there and it had an impact on the pipe, then it would have been reflected in the settlement profile and we would have put the strain gauge there.

BY MS. STAMIRIS:

Q I would like to ask Mr. Kane, to what extent was

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

/4/2

piping affected by the Diesel Generator Building preload?

A (WITNESS KANE) That question, as I understand it, is one of your contentions and I understand that we are going to take the time to respond to your contentions.

Q All right, then I will address that later.

MR. PATON: That's correct, Mr. Chairman. I would expect to do that this afternoon.

MS. STAMIRIS: I have no further recross.

CROSS-EXAMINATION

BY MR. MARSHALL:

Q Just two or three reverse questions.

I have heard quite a lot about voids. I want to address this question to Mr. Kane from his long years of experience.

We have heard quite a lot about voids, but no one seems to know how they got there. I assume that Mr. Kane how they got there. That's my question in reverse. You have spoken, both of you, and you have put the depths of those pipes at 36 inches in that part of the particular drain. What I want to know was what affect it will have on stress from the reverse upheaval of grounds at that point on those pipes at any place during that span. What would stress, unusual stress --

MS. LAUER: Objection. What is the foundation of the upheaval question?

MR. MARSHALL: The foundation is that there are 42 inches at the cross lines at that particular point and they are above the cross line, all the way above the cross line, all of their pipe. That is why I am trying to find out what's going to happen?

CHAIRMAN BECHHOEFER: You may answer that insofar as frost is concerned.

WITNESS KANE: Maybe Dr. Chen can follow what I am saying, but it is my understanding that the pipes that are shallow or the diesel fuel oil line which are very small in diameter, are very flexible, and it is my understanding that the Applicant has addressed the impact on these lines because of frost action.

It is my understanding that that was evaluated and considered not to be a problem. But it is my understanding that it is those same pipes because of the shallowness or the ones which are being addressed because they are not deep enough for adequate protection.

BY MR. MARSHALL:

Q Are you stating that the flexibility of those pipes are flexible? Is there a give in those pipes to allow for upheaval?

A (WITNESS CHEN) Yes, those pipes are flexible. Whether or not the movements between the end points are due to frost heaving or to differential source settlement

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

/4/4

is immaterial.

Q Very good. Then are the pipes going to be able to take any upheaval, that they will be called upon to take -- they will be able to do it; is that correct?

A (WITNESS CHEN) Yes.

MR. MARSHALL: No more questions, that's all.

CHAIRMAN BECHHOEFER: Ms. Lauer?

CROSS-EXAMINATION

BY MS. LAUER:

Q Mr. Chen, would you look at Pages 5 and 6 of Mr. Lewis' testimony.

A (WITNESS CHEN) Yes.

/5

5/5/1
dw
es

BY MS. LAUER:

Q On the technical specifications that have been probed, do you have an opinion on whether the plan to report to the NRC Staff and to increase monitoring and to institute an evaluation is adequate to insure safe function of the pipe, if it would reach the point where future allowable strain was reached or 75 percent of three inch settlement was reached?

A (WITNESS CHEN) I do have an opinion, and the opinion is that this reflects the agreements that had been reached with the Staff and is adequate to the Staff.

Q And do you have an opinion about the strain of piping which remains within the acceptable limits and the pipe settles up to the maximum three inches, do you have an opinion whether that pipe will perform safely at the plant?

A (WITNESS CHEN) When you talk about the maximum three inches, are you talking about locally or uniformly or what?

Q I am referring to the three inch maximum limit that has been referred to, that would be uniform settlement, the strain will stay within acceptable limits.

A (WITNESS CHEN) Permit me to answer this way. Regardless of how much settlement we get, so long as the strains are below the limits they are going to be imposed,

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

the pipes will function adequately.

MS. LAUER: Thank you, no further questions.

CHAIRMAN BECHHOEFER: The Board has no further questions. Mr. Wilcove.

RECROSS-EXAMINATION

BY MR. WILCOVE:

Q Settlement of the fill decreases over time, does it not, the rate of settlement over the fill decreases over time?

A (WITNESS KANE) Without any change in condition -- I am talking about inducment of loading, you are correct.

MR. WILCOVE: Thank you. No further questions.

CHAIRMAN BECHHOEFER: All right. Does anyone else have any further questions?

RECROSS-EXAMINATION

BY MS. STAMIRIS:

Q I have one question. It is based on a statement that the Applicant made about immediate notification, if there was a difference in two gauges, and I would like to ask one question about Mr. Hood's -- it is something I should have asked sooner but I forgot --

CHAIRMAN BECHHOEFER: Ask your one question.

BY MS. STAMIRIS:

Q Mr. Hood, if the Applicant is committed by technical specification to the NRC to immediately notify

/5/3

you of a difference in reading between two gauges at a specific point, would you understand that immediate notification to take place within 24 hours?

A (WITNESS HOOD) I don't think I can answer that question. I think the question goes to the significance of that difference as to whether or not it comes under the special reporting requirements that the Staff has for it, potentially, under safer conditions, and I really don't know if this would be considered in that same respect or not as opposed to a condition where a more routine type of reporting might apply.

Q Well how would any possible confusion in your interpretation and the Applicant's interpretation of what might be proper and prompt enough notification, be resolved if you don't have a specific time limit?

A (WITNESS HOOD) I don't know if I am saying this right. As I sit here, right now, I am not prepared to say that a reading that is different would come under those special requirements for immediate reporting.

Q Then if it did come under whatever the requirements were for special reporting, if it did meet that part of the criteria, then would you consider immediate notification to mean notification within 24 hours?

A (WITNESS HOOD) If it would mean to come under

/5/4

those special requirements, the Applicant would be required to follow a verbal report with the resident spectrum within 24 hours and he would be required to file a written report within 30 days.

Q And those specifications which you are referring to which would determine whether or not it meets severe enough criteria will be set forth in writing?

A (WITNESS HOOD) Would you state that again, please.

/6fol

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

/6/1
w
lease

BY MS. STAMIRIS:

Q You referred to if it met the requirements of the specification -- in other words, if it was a severe enough difference that it would be reported within 24 hours in the way that you described.

What I want to ask you is, would the criteria --

JUDGE HARBOUR: I don't think you quite characterized his response.

CHAIRMAN BECHHOEFER: I think it is required by regulation as well.

BY MS. STAMIRIS:

Q I understand now that the timing does fall under 55-E requirements. What I want to know is the criterion which the Applicant -- the Applicant will apply to that reporting of difference, and measurement of these gauges will be set forth in writing; is that correct?

A (WITNESS HOOD) Yes.

MS. STAMIRIS: Thank you.

CHAIRMAN BECHHOEFER: Mr. Wilcove do you have anything further?

MR. WILCOVE: Staff has nothing further.

CHAIRMAN BECHHOEFER: All right. At this time, this witness panel will be excused.

(Whereupon a luncheon recess was taken until 2:15 p.m. on the same date.)

7fol

A F T E R N O O N S E S S I O N (2:15 p.m.)

CHAIRMAN BECHHOEFER: Back on the record.

MR. MILLER: Mr. Chairman, Miss Lauer has a statement she would like to make for the record concerning the post-technical specifications.

MS. LAUER: Just to clarify that situation, I would like to read that section of the proposed technical specifications for the parties at this time to the extent that I may have said anything inconsistent as far as what the technical specifications read.

CHAIRMAN BECHHOEFER: Fine.

MS. LAUER: The applicable paragraph reads (Reading)

"If either of the allowable strain average as mentioned by the minimum of two gauges is reached at a monitoring station, or if 75 percent of the vertical settlement criteris is reached, then a special report shall be prepared and submitted to the Commission to reflect the technical specification, 16.6, .9, .2 containing an engineering evaluation of the situation and a description of the remedial actions.

"Additional notification shall be by telephone within 24 hours and confirmed by telegraph, mailgram or facsimile transmission no later than the first working day following the event.

"The special report shall be submitted within 14 days following the event. Supplemental reports may be required to describe the final resolution.

"Strain gauges which are determined to be providing faulty data will be recalibrated or replaced within 90 days during the first five years of monitoring".

That's all.

MR. PATON: Shall we proceed, Mr. Chairman?

CHAIRMAN BECHHOEFER: Yes.

MR. PATON: Mr. Chen, will you take the stand, please.

WELLINGTON CHEN,

called as a witness, having been previously duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. PATON:

Q Mr. Chen, state your full name and your employment, please.

A My name is Wellington Chen and I work for Rockwell International.

Q Have you reviewed Stamiris Contention 4-A-4?

A Yes, I have.

Q Would you tell us your understanding of that contention and your response to it, please.

A All right. I understand the contention to be what the effects of preloading the diesel generator building would be on underlying pipes, conduits and nearby structures, and it would only address the underlying piping at this point.

Q Fine.

A The piping in the diesel generator building is identified in D-10.1, Figure .11 of the SSER, page 37. The figure indicates that some of the lines were profile -- soil has been rebedded, some have been verified, some are going to be rebedded and others just monitored.

In addition, the rattle space that are going to be monitored, and the strain gauge locations of those, near those rattle spaces which are going to be monitored, they are also identified.

I believe that the remedial action is associated with all of these lines are identified in the SSER. The diesel fuel lines inside the building were not replaced during the surcharge program; and hence, they will not be affected.

Q You say the remedial action associated with the lines are identified in the SSER.

A That is correct.

Q Could you tell me where?

A Under Section 3.9,3.1.

Q 3.9.3.1?

A That is correct. For example, on page 3-30, beginning on page 3-38, on the 3.9.3.1.4, the resolution of all concerns associated with the service water piping is discussed, and I think some of the lines in the vicinity of the diesel generator building are also discussed there.

8-2

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

there.

BY MR. PATON:

Q Dr. Chen, please keep your voice up so the reporter can hear you and I can hear you.

A If I could go down with you, in the vicinity of the diesel generator building, there are four lines which are shown there. They are 8 inch .BC, 3-10 and 3-11, 8 inch 2HBC81 and 82. These lines have been verified. Both the current ovality about these lines is less than five percent which is accpetable.

In addition, the rattle space that is associated with these lines as they enter the diesel generator building are also going to be monitored. The criteria there will be 4 percent on ovality and .40 percent on strain.

The 26-inch lines in which these four lines connect are going to be monitored for ovality and strength. Where these lines enter the valve pit to the west of the diesel generator building, the rattle basis will be monitored.

On the north side of the building, the 8-inch 1-inch BC, 81 and 82, have been rebedded.

JUDGE HARBOUR: Excuse me. I am looking for a north arrow on my map -- all right -- those are shown on detail No. 1 on Figure 2.11?

THE WITNESS: Yes. These lines are the largest settlement. These lines have been cut loose, recentered

in their rattle space, rattle spaces and rebedded.

The 8-inch, 2-inch BC, 3-10 and 3-11 lines will be rebedded and the 10-inch OHBC and the 27 and 28 lines have been rebedded.

The diesel fuel lines are shown in about the middle of the page towards the left. All of these lines were not in place at the time that the building was surcharged; and hence, would not be subject to surcharge.

BY MR. PATON:

Q Does that complete your direct testimony on Contention 4-A-4?

A Essentially, but I would like to add that the monitoring problems that I just mentioned and the various remedial actions I described, address the concerns associated with the preloading -- well, with the preloading effects in this area.

CHAIRMAN BECHHOEFER: One clarification. In the rebedding of which you spoke, did all of that occur after the surcharges, the removal of the surcharge?

THE WITNESS: That's correct.

BY MR. PATON:

Q Is it your testimony that any impact that the preloading program may have caused on piping has been acceptably remedied?

A That's correct.

MR. PATON: Mr. Chairman, I'll go on to -- I plan to do four -- two parts of Contention 4, as part of Warren Contention No. 3, and I will proceed with that unless you would prefer we have cross examination on Contention 4-A-4.

CHAIRMAN BECHHOEFER: Why don't you proceed with that.

8-3

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

BY MR. PATON:

Q Dr. Chen, do you have with you a copy of Stamiris Contention 4-C, which I will suggest was last amended on April 20, 1981. It is the one that ends with Subparts, related underlying piping. Do you have that?

A Yes I have that.

MR. PATON: Again, I just want to say for the record what Dr. Chen is addressing is Stamiris Contention 4-C-s.

BY MR. PATON:

Q Please state your understanding of that contention.

A I understand that this contention concerns the seismic loading zone of underground piping and conduits, and the part of that which I am going to address is on underground piping.

Q Proceed.

A As was stated this morning, the -- I could break this up into several areas. Let me start off with the 26- and 26-inch lines in the vicinity of the service water pump structure.

The Applicants have committed performing that dynamic seismic analysis and the BC-TOP for type of analysis based on the site's specific response spectrum. These analyses -- there will also be analyzes available

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

in a few weeks. At that point, we will evaluate them.

The Applicant is further committed to making whatever fixes that are necessary to that pipe line to assure that they do meet the criteria based on the site's specific response spectrum. On all other lines, the Applicant has performed an analysis based on the one and a half times the FSAR response site spectrum which essentially envelopes the site's specific response spectrum.

The analysis here indicates that the additional information, associated with the response spectrum I just described, are small relative to existing ovalities in the piping; and hence, that the piping would be able to sustain without damage, the one and a half -- the site specific response spectrum earthquake.

Q Dr. Chen, I believe you stated that one and a half times the FSAR earthquake would essentially envelope the site specific response spectrum.

Can I leave out the word "essentially"?

A For the piping, yes.

Q Does that complete your testimony with respect to Contention 4-C-s?

A That's correct.

Q Would you turn to Warren Contention 3.

Mr. Chairman, I would like to ask that Mr. Hood

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

to join Dr. Chen on the stand for this examination.

CHAIRMAN BECHHOEFER: Fine.

Whereupon,

DARL HOOD,

called as a witness, having been previously sworn, testified as follows:

MS. LAUER: The Applicant asks that the contention be read.

MR. PATON: Yes, I will be glad to read the contention. (Reading.)

"Preloading" -- it is short -- "preloading procedures undertaken by Consumers Power have induced stresses on the Diesel Generator Building structure and have reduced the ability of this structure to perform its essential functions under that stress.

"Those remedial actions that have been taken have produced uneven settlement and caused inordinate stress on the structure and circulating water lines, fuel oil lines, and electrical conduits."

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

conduit

BY MR. PATON:

Q Now I will state that the Staff does not plan at this time to address the last two words of that contention, the electrical conduit.

Does either member of the panel disagree with that?

A (WITNESS CHEN) I don't.

A (WITNESS HOOD) No.

Q Doctor -- either witness, please respond to Warren Contention 3. I think that Dr. Chen, you have a response with respect to fuel oil lines; do you not?

A (WITNESS CHEN) Well, as I stated earlier, the fuel oil lines were not in place during surcharging; and hence, would not have been affected.

Q And that completes your answer; is that correct?

A (WITNESS CHEN) That's correct.

Q Mr. Hood, can you respond to the portion of the contention that concerns the circulating water lines.

A (WITNESS HOOD) Yes. The circulating water lines are not seismic category lines, they are not related to any safety function.

They are of special interest to the Applicant because they are required for operation of the plant. In other words, they are used to cool the main condenser; and for that reason, special provisions have been taken

for operational standard points, to provide for inspection capabilities for that line for the inside.

Staff has reviewed this line from the standpoint of the consequences of the failure of that line on the dewatering system. I should point out that these lines are about 96 inches in diameter. They are located in the -- the center of the line at elevation 606.

You can see the line profile in Figure 3 of Dr. Hendron's testimony presented Monday, I believe. It is my understanding that the lines have been inspected from the inside since the surcharge program, and that there has been no indication of any sign of stress as a result of the surcharge.

Q Does that complete your resoonse, Mr. Hood?

A (WITNESS HOOD) Yes, it does.

I would point out that the previous review to which I referred with respect to dewatering is addressed in SER Section 2.4.6.3.

MR. PATON: Mr. Chairman, there are other -- that does not complete the Staff's testimony with respect to Warren Contention 3, but that -- what I am trying to do is address whatever portion of it I can with the witnesses that are available, and that completes what we can do with Warrent Contention 3 today.

So I have completed our testimony on those

those portions of contentions.

CHAIRMAN BECHHOEFER: Is this the completion of the direct testimony?

MR. PATON: Yes, that is the completion of our direct testimony with respect to the older contentions, yes.

CHAIRMAN BECHHOEFER: All right, Ms. Sinclair.

CROSS EXAMINATION

BY MS. SINCLAIR:

Q First, regarding Contention 4-A-4, when you talked about the lines just north of the Diesel Generator Building, -- I should refer you to Figure 2-37 -- am I correct in assuming that the top of the page is north for this drawing in Detail 1?

A What figure did you --

Q I wanted to draw your attention to Detail 1.

A (WITNESS CHEN) Yes.

Q And the lines I was saying north of the Diesel Generator Building, they are at the top of the page; is that correct?

A (WITNESS CHEN) That's correct.

Q All right. What are these lines in addition to the numbers that are listed there, 8-inch 1HBC81 and 82, what is another name for these lines? Is there another name for these lines?

A (WITNESS CHEN) There is a service water line.

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

/5/1
w
ater
ine

BY MS. SINCLAIR:

Q These are service water lines. And you indicated that these lines had been cut loose. Can you tell me when they were cut loose in relation to the preload?

A (WITNESS CHEN) After the preload.

Q They were cut loose after the preload?

A (WITNESS CHEN) Yes.

Q Well what damage was done to those lines as a result of the preloading?

A (WITNESS CHEN) If I am correct, one of these lines show the 21 inch lines recorded earlier on. The Applicant, I think, did an analysis of these lines found that profiles of the 21 inch caused very large stresses. And I think, when the line was uncovered and examined, it was found to be, visually, to be okay. It was then cut loose, I think, and recentered in the ground spaces.

Q Did you say it was not found to be okay or it was found to be okay?

A (WITNESS CHEN) It was found to be okay.

Q Do you know the basis for that visual determination that it had not been damaged before it was cut?

A (WITNESS CHEN) No, I don't, but I will add this, that the settlement stresses, I think, as was discussed in the previous hearing, were essentially secondary stresses.

/5/2

In cutting the piping loose, it would essentially remove any stresses which are induced by the settlement.

Q Well if there was --

A (WITNESS CHEN) I am not finished yet.

These stresses that would remain on the pipe would be small and, in fact, are not accounted for or not acquired to be accounted for any of the coded analysis.

Q Did the fact that these pipes were connected somehow in the building when they experienced their 21 inch settlement, your testimony -- do you know whether there was any damage done in the rattlespaces or in any other way because of this differential settlement?

A (WITNESS CHEN) On penetration of the Diesel Generator Building walls, I think those lines come vertically up against the wall in some kind of a pit area and go across, go into the Diesel Generator Building. That portion of the line was not in place.

JUDGE HARBOUR: A portion of the line --

WITNESS CHEN: Was not in place.

JUDGE HARBOUR: So it had three ends inside the Diesel Generator Building?

WITNESS CHEN: Essentially, yes.

BY MS. SINCLAIR:

Q To your knowledge, did the Diesel Generator

/5/3

Building or any part of it or parts connected to it hang up on this piping at any point?

A (WITNESS CHEN) Not to my knowledge.

Q To your knowledge, did the existence of this piping restrain the settlement in any way of the Diesel Generator Building?

A (WITNESS CHEN) No.

Q Can you tell me, Dr. Chen, if the condensate lines are depicted somewhere in Detail 1 are the same?

A (WITNESS HOOD) I do not believe they are depicted on this figure. The figure predominantly shows two listed pipes. There are some exceptions, but this is not one of the exceptions.

You did ask about the circulating water line?

Q No, the condensate line.

A (WITNESS HOOD) I'm sorry, I answered the response to the circulating water line.

The condensate line, as shown in Detail 1, it goes beneath the Diesel Generator Building.

Q Does it go under the building then at some point?

A (WITNESS HOOD) Yes, it does. It avoids the center. It goes from the left and to the right of the center along the north-south axis.

9fol

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

JUDGE HARBOUR: Could you identify the line on that detail, please? Is there a number or other identification?

Can you identify the condensate line on the Diesel Generator Building drawn in detail, or detail drawing?

WITNESS CHEN: It's the dashed line which extends the north-south direction directly north of 8H1HBC311.

BY MS. STAMIRIS:

Q There is just that one condensate line under the Diesel Generator Building, Mr. Hood?

A (WITNESS HOOD) I understand there were two.

Can I get a copy of Figure 3 of Dr. Hendron's testimony?

JUDGE HARBOUR: Excuse me, Mr. Hood. Dr. Hendron had two pieces of testimony, if I recall. Will you identify which testimony it was that you're referring to to find the figure?

WITNESS HOOD: I'm looking for a figure that shows in profile the borings --

MR. PATON: I'm told it was his testimony on seismic shakedown.

JUDGE HARBOUR: Yes, in Figure 3. It's in the second part of that. Have you got it?

WITNESS HOOD: Yes, I do.

If you look at Figure 3 you'll see that there are two condensate lines that passed beneath the Diesel Generator Building.

BY MS. STAMIRIS:

Q Mr. Hood, are both of these condensate lines non-Cateory I?

A (WITNESS HOOD) That is correct.

Q Okay. Have you evaluated whether there is any potential impact on any safety systems if there were potential failure of these lines?

A (WITNESS HOOD) We have looked at the consequences of the -- its influence on the dewatering system from a failure of those lines. We've addressed that in the SER or SSER No. 2. We find that result to be acceptable.

Q Is my understanding that is already in the record that there were certain consultant recommendations to cut this condensate line prior to the preload but it was not cut, and then there was some misunderstanding on your part about thinking it was cut when it wasn't cut. I'd like you to discuss what the damage was to the condensate lines that could have been avoided had they been cut.

MR. PATON: I object to the question, Mr. Chairman. There's an awful lot of -- I think the record

shows it was cut -- not cut and you were confused whether it was cut, et cetera, et cetera.

I don't mind the question if Mrs. Stamiris will start by asking if the witness agrees with her rather lengthy premise. But I don't want her to force that on the witnesses without asking them whether or not they agree.

BY MS. STAMIRIS:

Q Mr. Hood, did you believe at some point in time that either one or both of these condensate lines had been cut when, in fact, they weren't prior to the preload?

A (WITNESS HOOD) The prior discussion that I recall to which you have referred was in connection with the effect of the piping on the structure. I recall a discussion that indicated that there was some confusion on our part as to whether or not it had been cut on both sides of the structure, as opposed to just being cut on the south side of the structure.

And the other part of that discussion I recall was whether or not the pipe had been cut right after the recommendation was first made or whether or not there was some length of time before that cut was made. The pipe was ultimately cut. If I recall, it was cut just on the south side of the structure, not on the north side of the structure, as we had earlier thought to be the case.

And there was a length of time between the original recommendation that it be cut and the time it was actually cut.

Q Were both pipes cut at the south side of the structure?

A (WITNESS HOOD) I do not know.

Q Do you know that at least one of the pipes was cut --

A (WITNESS HOOD) At least one of the pipes was cut.

Q And you're not sure which one that was?

A (WITNESS HOOD) No. I do know that there was one of the condensate lines that the elbow had an indication of high stress. That was the one that was cut.

Q When was that one cut in relation to the preload?

A (WITNESS HOOD) It was after the removal of the preload.

Q Did that pipe in any way restrict or affect the settlement of the Diesel Generator Building during the preload?

MR. PATON: Mr. Hood, could I interrupt before you provide that answer?

WITNESS HOOD: Yes, you can.

MR. PATON: Mr. Chairman, Mr. Kane has indicated to me that he has some disagreement with Mr. Hood about where the lines were cut, and I'd like to ask that he join the panel and possibly confer on this historic event.

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

7/2/2

Maybe they can get their recollections together.

CHAIRMAN BECHHOEFER: Okay, fine.

Whereupon,

JOSEPH KANE,

called as a witness, after having been previously duly sworn, was examined and testified as follows:

WITNESS HOOD: I believe the point is well taken. As I think about it, that line was disconnected at the time of the preload.

I remember also there was observation of the measurement of the rattlespace between that line and the concrete encasement during the preload.

MR. PATON: Before we go further, Mr. Chairman, could I ask Mr. Kane to state what it is he thought he heard that he disagrees with?

WITNESS KANE: It's my understanding that Mr. Hood had indicated that the lines were cut on the south side. It's my understanding on previous discussions with the Applicant that the lines were cut only on the north side. And it's my understanding that there was some confusion as to whether these pipes were going to be cut initially, and there was a postponement in that decision but eventually they were decided to be cut on the north side before the surcharge took place.

WITNESS HOOD: That is correct, according to my

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

current understanding. The point that had confused me is that the point of high stress that ultimately developed was on the south side, and the pipe had been cut on the north side.

Thank you for the correction.

JUDGE HARBOUR: Excuse me. Had both pipes been cut on the north side?

WITNESS KANE: I'm sorry, but I'm going on memory?

It's my recollection that both those pipes that are shown on that figure of Dr. Hendron's do not go through, that only one goes through.

By "going through," I'm saying going under the Diesel Generator Building, and it was that pipe that was cut.

I may be wrong, but that's my recollection.

WITNESS HOOD: That's not consistent with my understanding.

MR. PATON: Mr. Chairman, we will determine the current information and get it back to the Board tomorrow. We'll resolve this dispute.

CHAIRMAN BECHHOEFER: Otherwise, they could each put in some proposed findings.

MR. PATON: No, I don't want to do that.

JUDGE HARBOUR: May I ask a question to identify

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

/2/4

the pipe on Detail 1 on Figure 2.11. Is that identified as a 20 inch IHCD169?

WITNESS KANE: Yes, it is.

JUDGE HARBOUR: I think the record should indicate that Figure 2.11 in the SSER indicates only one condensate line going from the condensate tanks underneath the Diesel Generator Building, whereas the profile, the cross section in Dr. Hendron's testimony indicates that there are two condensate lines under the Diesel Generator Building, and that is the issue which will be resolved as to whether there are two lines or whether there is one line, condensate line.

WITNESS HOOD: I would further note that there is no line shown leaving one of the condensate lines. That's honestly not a correct representation.

(Discussion was had off the record.)

/3fol

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

record.)

CHAIRMAN BECHHOEFER: Back on the record.

WITNESS KANE: Can I make a suggestion? The one most familiar with the pipes should be the Applicant. Could they be asked to indicate whether there is one or two lines going beneath the Diesel Generator Building?

MS. LAUER: Could you give us just a moment, please?

Chairman Bechhoefer, if I can point out this -- the same line of questioning has already been gone into in prior hearings in this proceeding concerning the two condensate lines and where they were cut, if they were cut. That's all been covered before.

MR. PATON: I'd like to address that, Mr. Chairman.

Apparently, we have a disagreement with the Applicant on this matter. We go through this whole proceeding addressing specific issues and contentions, et cetera, and all of a sudden we get to Contention 4, and there has never been any identification in this proceeding that we are addressing Contention 4, and the Applicant says, "Oh, we're not going to talk about Contention 4. It's back there somewhere."

Well, Mrs. Stamiris has not had an opportunity to cross examine on Contention 4. I submit that our bits and pieces of Contention 4 which permeates the whole

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

case that we have covered, and we could spend an awful lot of time going back in review and say "Well, maybe we covered this issue, maybe we covered that issue.

Now, it is difficult, but I feel the need to address Contention 4. Apparently, the Applicant does not.

I submit that his procedure would introduce reversible error in the case if Mrs. Stamiris decides she would like to know when she had the opportunity of cross examination. So I think saying well, we touched on this before is no answer.

MR. MILLER: Well, just to respond briefly --

CHAIRMAN BECHHOEFER: At one point, I remember, we deferred Contention 4 until later on.

MR. MILLER: Well, that very well may have been, but Mr. Hood specifically was examined on this very issue. The question of which contention we happen to be addressing, it seems to me, is beside the point. Either the record contains the information that deals with this -- Mrs. Stamiris has certainly not been restricted in her cross examination on any issue to any significant degree. I think the Board has been quite lenient in letting her explore issues as they arise.

What we object to is going over the same ground over and over again with the same witnesses simply because this time it's in the Contention 4 box rather than the

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

management attitude box, which is when this issue was addressed last time by Mr. Hood.

MR. PATON: Mr. Chairman, I am willing to go along. If the Board wants to rule with the Applicant and say that we are not going to further address Contention 4, I personally believe that's the Applicant's problem. I would not like to take a chance like that.

Mrs. Stamiris has never been told that we are addressing her contention, Contention 4. She went to the trouble of introducing it into the proceeding. We have never recognized in this proceeding that we are addressing Contention 4.

Now, I agree it's very inconvenient, and I don't like carrying this ball all by myself.

If the Board wants to rule that we will not further address Contention 4, then so be it. I wouldn't do that if I were the Applicant.

MR. MILLER: And, not only that, Mrs. Stamiris filed a proposed finding on this very point of cutting the condensate lines in her earlier submission.

MS. STAMIRIS: Now, when I submitted Contention 4 -- in fact, I remember deferring Contention 4 until the technical part of the proceeding, which is what we're involved in now.

Mr. Miller, this is the significant difference in approaching Contention -- or, not Contention 4, but the significant difference -- he's not listening -- the significant difference in addressing the issue of the condensate lines now is that I'm addressing it in regard to what the NRC's final evaluation is of the effect of that in relation to their signing off on the preload. And we didn't have any commitment by the NRC one way or another as to how the condensate lines affected their overall safety assessment of accuracy related to the preload at the Diesel Generator Building when I was asking these questions before. Now we do, and so they have a different meaning in that respect now, and they have a

/4/2

specific and a proper meaning to Contention 4 at this time.

MR. MILLER: Well, just for the record -- I don't want to prolong this any further, because the questions could have been asked and could have been answered.

The Staff's proposed Finding 73 is as follows:

"With respect to the alleged failure to cut the condensate line, the Staff testified that it understood that the lines had actually been cut. The Staff therefore concluded that the cut lines did not cause additional stress to the Diesel Generator Building."

And there's a citation to Staff testimony on Contention 2 at Page 18.

MR. PATON: Mr. Chairman, I'd like to ask, is the Applicant proposing that we do not address Contention 4 further? Because, if that's his motion, I'd like to understand it.

MR. MILLER: No. My proposal is that we not go over the same ground that these very witnesses have been examined on before.

MR. PATON: May I ask if that is in the light of the fact that Mrs. Stamiris has never been advised that we are addressing Contention 4? Is that your position?

MR. MILLER: Excuse me. Mr. Chairman, my understanding of this process is that there is an

7/8/3

evidentiary record that is created, and as factual issues arrive the parties are free to examine or cross-examine as they see fit.

Once that record is created, it is then up to the parties to present proposed findings of fact and conclusions of law, the Board to evaluate them and reach its own conclusions.

It is our belief that the record contains or will contain by the time all of our technical witnesses have taken the stand the facts from which this Board can make findings concerning each of the contentions that are at issue here. And the fact that we now categorize something as dealing with Contention 4 and go back over the same ground is the basis for my objection.

/5fol

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

objection1.

Now, having said that, we have a specific objection to asking Mr. Hood about cutting the condensate lines when he was examined by Ms. Stamiris on this same thing over a year ago. But I'll abide by the Board's ruling and we'll go forward.

MS. STAMIRIS: I just might add that to help all the parties zero in on what I want to know specifically at this point in time is I want to know when they were cut. And my recollection of the factual data that's already in the record differs from what Mr. Kane remembered about them being cut prior to the preload, and I would hope that we can -- I would like to see the Staff, since they've already made a commitment to come back and clarify exactly where these condensate lines are and which ones extend where and get some diagram that shows that, I would also like a clarification of when the condensate lines were cut that were cut.

(Discussion had off the record.)

CHAIRMAN BECHHOEFER: The Board believes since there may be some conflicting testimony here we really would like to know both how many lines there are and when they were cut.-- whether they were cut. I assume they were cut. And when they were cut, and I, for one, can't remember whether that's in the record earlier or not, but there seems to be some differences of opinion, and it

would be desirable to have it clarified, I think.

MR. MILLER: Well, I have the company's responses to the 5054F questions that were asked by the NRC Staff, and in answer to question 19, at page 19-2, indicates that-- and that's the revision of February 1980 to 5054F questions-- indicate the condensate lines were cemented at the Turbine Building to present a stress buildup due to differential settlement between the Diesel Generator Building and the Turbine Building. And the Table 19-1 indicates that there are, in fact, two condensate lines.

CHAIRMAN BECHHOEFER: So, from the date of that, that would indicate that they were cut before the surcharge?

MR. MILLER: I can't draw that --

CHAIRMAN BECHHOEFER: Did you say that's February '80?

MR. MILLER: It is a February 1980 document.

(Discussion off the record.)

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

/6/1
w
ff the
ecord
isc.

MR. MILLER: Mr. Chairman, perhaps I can shed a little bit more light on it. The prepared testimony of Darl Hood, Joseph Kane, Frank Rinaldi and Gene Gallagher on Stamiris Contention 2, which is bound into the transcript for July 16th, 1981, states at Page 17 that:

> "The Staff was advised by a 50-55-E Interim Report No. 4, the Management Corrective Action Report 24, dated February 16th, 1979 and forwarded by cover letter dated February 23rd, 1979 of the preloading progress and that the two condensate lines have been cut."

So at least as of that date, in February of 1979, the lines had been cut.

We can get more specific information, I'm sure, if the Board wishes it.

CHAIRMAN BECHHOEFER: Well, let me ask the witnesses in case we need to rely on a date.

Does that accord with your recollection?

WITNESS HOOD: Yes, it does.

WITNESS KANE: That part of the testimony was sponsored by Darl Hood. It was before my involvement with Midland.

BY MS. STAMIRIS:

Q Regarding the Figure 2.11 on Page 2-37, would I

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

7/6/2

be correct in understanding that this figure represents the effects of that -- I'm sorry; I'll change that introduction.

I'd like to ask whether your testimony about the piping at the Diesel Generator Building so far today addresses all of the effects of the preload on safety piping at the Diesel Generator Building?

MR. PATON: Mr. Chairman, could I have the question read back, please?

(Record read as requested.)

WITNESS HOOD: In the question have we addressed all of the Seismic Category 1 lines in the vicinity of the Diesel Generator Building?

MS. STAMIRIS: Yes, with regard to the effects of the preload.

BY WITNESS CHEN:

A That is correct, but I think I'd like to add also that the effects of failure of Nonseismic Category 1 lines on seismic category lines have been considered.

/7fol

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

considered

Q If this is not the proper time in the testimony to address this, I'm sure you will tell me, but have you also addressed the effects of all piping, whether it's Category I or non-Category I, on its interaction with Diesel Generator Building or the settlement as a result of the preload?

A (WITNESS CHEN) I cannot speak for the building, I can only speak for the piping. And I think that's what this response was limited to.

Q Yes. What damage was done to the circulating water lines under the preload at the Diesel Generator Building?

A (WITNESS HOOD) To the best of my knowledge, none.

Q Were there any other non-Category I pipes or any pipes that are not shown in this diagram on Detail 1 that were affected by the preload at the Diesel Generator Building?

A (WITNESS CHEN) I had drawings which indicated all the piping in the vicinity of the Diesel Generator Building. I don't have that with me here now. But I know that the worst case relative to failure of a non-seismic Category I line on seismic Category I lines were examined throughout this whole area.

Q Okay. Do you remember what that worst case was?

Which lines it was?

A (WITNESS CHEN) No, I don't remember now, but I think it had to do with the depth the non-seismic Category I line beneath the seismic Category I line, and also the depth of the Category I line beneath the surface. That was that analysis I referred to this morning relative to voids.

MS. STAMIRIS: Just for procedural clarity before I leave my Contention 4, I believe that Dr. Chen referred to it as a contention regarding seismic loadings on piping, and I'd like to state that that contention addresses more than seismic loadings, although I don't have any specific questions on other aspects at this point. Thank you.

7-8

CHAIRMAN BECHHOEFER: Mrs. Sinclair?

MS. SINCLAIR: No, I think Barbara covered everything. I have no questions.

MS. STAMIRIS: Oh, excuse me. Chairman Bechhoefer, just so we understand, I don't have any further questions from this panel on my Contention 4. I do have further questions -- well, that's all this panel is addressing, isn't it; is Contention 4?

Then I don't have any other questions.

CHAIRMAN BECHHOEFER: Mr. Marshall?

MR. MARSHALL: No questions.

MS. LAUER: No questions.

(Discussion was had off the record.)

JUDGE HARBOUR: I believe it was stated that the failure of the condensate line under the Diesel Generator Building would not have an unfavorable effect on the Diesel Generator Building. Is that correct?

WITNESS HOOD: I believe I said I was addressing the effect on the dewatering system, whether or not that would give rise to a liquifaction potential. That subject is addressed in the SER at Section 2.4.6.3.

JUDGE HARBOUR: Can you tell me the basis for that conclusion that would have no effect on the dewatering system?

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

WITNESS HOOD: I'm speaking from memory now, without reviewing what I'm saying in 2.4.3.

I think the significant point I recall was that the condensate -- the volume of the condensate tank is of limited capacity.

JUDGE HARBOUR: 300,000 gallons, is that correct?

WITNESS HOOD: That is correct. And it recognized the flow pattern from that and the connection of the underlying soils to the deeper natural sand in the area.

I believe the analysis took all that into account. And I concluded that there would be no rise of the water level to the extent that liquifaction would be a concern.

WITNESS KANE: This aspect you're referring to would be covered under the wording by Mr. Ray Gonzales. It was his input that I was referring to. But it's my understanding that what was allowed was to consider a break of those lines and then to conservatively allow for it to go to the foundation of the Diesel Generator Building within a very conservative restricted area and then to evaluate how high the water would rise when that would occur. And the computation that resulted from that indicated that it would not rise to the level of concern, which is Elevation 610.

7/8/3

So, even assuming that event were to occur and the water were to rise, it would not -- all the water going to the bottom of the Diesel Generator Building would not cause a rise that gave us a liquifaction concern. And it felt that if it is seeping into the ground it would begin to be picked up by the dewatering system.

JUDGE HARBOUR: Do the analyses include the rupture of the line and the draining of the entire contents of the condensate tanks into the soil in the vicinity?

WITNESS KANE: It's my understanding it did.

(Discussion was had off the record.)

7/9fol

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

7-9.1
dw
record

JUDGE HARBOUR: What is the elevation of the condensate line in the vicinity of the Diesel Generator Building?

WITNESS KANE: The condensate line?

JUDGE HARBOUR: Yes.

WITNESS HOOD: The bottom elevation of that line is shown on Figure 3 of Dr. Hendron's testimony. It occurs at Elevation 620.

JUDGE HARBOUR: And the elevation you were concerned with was 610?

WITNESS KANE: It is recognized that the soils below Elevation 610 are not susceptible to liquifaction.

Perhaps the confusion, Dr. Harbour, is that when the line is being assumed to have broken the dewatering system is functioning and has maintained the water level at Elevation 595. So to pour in that amount of water over a given area to make it rise above 595 would not take it up above Elevation 610.

JUDGE HARBOUR: Are these calculations given anywhere in the FSAR or in the SER, or is there some place where one might examine that calculation? Or do we have a witness who might explain how this calculation was made present?

WITNESS KANE: I would think both the Applicant and the Staff witness, who would be Mr. Gonzales, would

be able to explain it.

JUDGE HARBOUR: My concern is that 300,000 gallons is about seven-tenths of an acre foot of water, I think, or nine-tenths of an acre foot of water, and at 25 percent porosity that would have the effect of that volume of water filling four times that number of cubic feet, and it sounds as if that volume of water were introduced fairly rapidly just from the head from the condensate tanks, that it could saturate the ground faster than the dewatering system could remove it.

That was my concern. I don't know that there is any basis for that concern, and, if possible, I would like to hear some witness.

MS. LAUER: Judge Harbour, Mr. Pharris should be able to answer your question on that.

(Discussion was had off the record.)

JUDGE HARBOUR: Very good. Thank you very much.

CHAIRMAN BECHHOEFER: I'm asking a question now that really doesn't belong here this afternoon, and I should have asked it this morning. What kind of controls will be placed over the heavy loads crossing underground pipes? Like if a train crosses an underground pipe, will there be some limits as to the amount of

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

time that load could be over the pipes? Or what kind of controls, if any, I should say, will be placed on that?

WITNESS KANE: For consolidation settlement to occur, there has to be drainage, and with a cohesive material the load has to be held there long enough to cause the water to be squeezed out. So that there is a time element that the load has to be maintained there.

here.

It's my recollection this was covered in the previous hearing, and the answer given at that time was any movement of trains or heavy cranes over it would not be considered to be a problem because it's not being held long enough to cause the settlement.

But if it were to be stopped and parked there for a period of days, then we would be concerned. And it's my understanding that we will cover this in a technical specification.

CHAIRMAN BECHHOEFER: All right. I just wondered, since that latter reference was in some of the testimony before us yesterday or today, do you have any knowledge of what the controls will be? Will it be like a time limit of several days, or something like that?

WITNESS KANE: In my opinion, it will be on the order of a week. If it's going to be there longer than a week, then we ought to be addressing its effect on settlement.

MS. STAMIRIS: I'd like to ask a follow-up question to those that Judge Harbour asked about the condensate line.

BY MS. STAMIRIS:

Q And I'd like to ask Dr. Chen if you have identified what you believe to be the point of highest stress in that condensate line? I'm not talking about like where it was cut north of the building. You have already

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

addressed that. But if there was some point of stress to where it was connected or under the Diesel Generator Building south of the building itself?

A (WITNESS CHEN) That line is not a seismic Category I line.

Q I understand that.

A (WITNESS CHEN) And we assumed, at worse, that it did fail. We looked at the effect on the seismic category I lines.

Q Okay. Will that line be monitored in any way over the life of the plant?

A (WITNESS CHEN) It is not part of the monitoring program that had been discussed here so far.

WITNESS HOOD: Mrs. Stamiris, the level in the tank can be monitored.

MS. STAMIRIS: Well, if it was determined, after Judge Harbour completes his questions, that there is some question as to whether or not the dewatering system could adequately handle that 300,000 gallons of water that's in that tank --

JUDGE COWAN: Maybe we should wait until we get this testimony.

CHAIRMAN BECHHOEFER: Yes, I think that would be better, after we see what the facts are, and then --

MS. STAMIRIS: Right. Okay. I don't have any

other questions.

CHAIRMAN BECHHOEFER: I forgot to ask the Staff if you had any redirect.

MR. PATON: No, I do not.

CHAIRMAN BECHHOEFER: Any further questions by any parties?

MS. LAUER: No.

CHAIRMAN BECBHOEFER: Then this panel is now excused.

(Witnesses excused.)

CHAIRMAN BECHHOEFER: I think we'll take a break, 15 minutes, and then we'll have Dr. Weeks.

(Brief recess.)

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

CHAIRMAN BECHHOEFER: Back on the record.

MR. WILCOVE: Before Dr. Weeks testifies, Mr. Hood tells me that there is something that needs to be clarified, or a question that needs to be cleared up.

WITNESS HOOD: Before the break, there was some question as to the number of condensate lines, a question as to whether or not the condensate lines passed all the way under the Diesel Generator Building. There was a question as to when the condensate lines were cut.

During the break, I had conferred with the Applicant and refreshed my memory, and I agreed with the Applicant.

In the response I got from the Applicant, there are four lines associated with the condensate tanks. There are two 20-inch lines -- one per tank -- and there are two six-inch return lines -- one per tank. All four lines passed beneath and completely under the Diesel Generator Building on the way to their respective condensers within the Turbine Building. All four lines were cut before the surcharge program.

CHAIRMAN BECHHOEFER: Thank you. Do you --

MS. STAMIRIS: I thought you said -- if there is a total of four lines, that would be inconsistent with the two 20-inch lines per tank and two six-inch lines per tank.

WITNESS HOOD: There are two tanks. Each tank has a 20-inch line and a six-inch line for a total of four lines.

MS. STAMIRIS: Thank you.

CHAIRMAN BECHHOEFER: Mr. Wilcove?

MR. WILCOVE: Dr. Weeks has not yet been sworn in these proceedings.

(Witness sworn.)

Whereupon,

JOHN R. WEEKS,

called as a witness, was sworn and testified as follows:

DIRECT EXAMINATION

BY MR. WILCOVE:

Q Dr. Weeks, would you please state your full name and place of employment for the record.

A My full name is John Randell, R-a-n-d-e-l-l, Weeks. I am employed by Associated Universities, Incorporated at Brook Haven National Laboratory.

Q You have in front of you a piece of paper entitled Professional Qualifications of John R. Weeks.

A That's right.

Q Will you verify that those are your professional qualifications?

A I will.

10.1/3

MR. WILCOVE: I offer Mr. Weeks' professional qualifications into the record as if read.

CHAIRMAN BECHHOEFER: Do you have copies to pass around?

MR. WILCOVE: I did give them to the parties; I believe I have yet to give them to the Board. My apologies.

CHAIRMAN BECHHOEFER: Any objection to the statement of the qualifications being entered into the record as if read?

MS. LAUER: No.

MS. STAMIRIS: No objection.

MR. MARSHALL: None.

CHAIRMAN BECHHOEFER: That statement will be inserted into the record as if read.

(The documents referred to, the statement of John R. Weeks, and the professional qualifications of John R. Weeks, follow:)

XXX
XXX

PROFESSIONAL QUALIFICATIONS

OF

JOHN R. WEEKS

I am currently a Senior Metallurgist at Brookhaven National Laboratory, (BNL), where I have been employed since 1953. My present title is Leader, Corrosion Science Group, in the Department of Nuclear Energy. My current responsibilities include experimental investigations on the mechanisms of stress corrosion cracking and pitting corrosion of stainless steels and Inconel, and providing technical assistance to the U.S. Nuclear Regulatory Commission (NRC) in the area of materials performance and corrosion and coolant chemistry in light water reactors. I have been a participating consultant on the three Pipe Crack Study Groups. I also am a member and former Chairman of the BNL Reactor and Critical Experiments Safety Committee.

Since joining Brookhaven, I have performed and supervised research on materials behavior in both liquid metal and water cooled reactors. From 1970 to 1972, I headed Brookhaven's program on liquid sodium technology. I have been materials advisor to the Reactor Divisions at BNL since 1959. I was keynote lecturer in 1966 at the International Atomic Energy Agency Symposium on Alkali Metal Coolants, and served in 1967-1969 as a U.S. delegate at the U.S.-U.K. information exchanges on corrosion of reactor materials. I was a consultant to Aerojet General on the SNAP-8 project.

I was an adjunct associate professor of materials science at SUNY - Stony Brook in 1962-1963, and am currently an adjunct professor of Metallurgy and Nuclear Engineering at the Polytechnic Institute of New York. From 1972 to 1974 I was on assignment to the U.S. Atomic Energy Commission as a senior metallurgist in the Materials Engineering Branch, Directorate of Licensing.

My academic qualifications include a Met. E. degree from the Colorado School of Mines in 1949, a M.S. in 1950, and a Ph.D. in 1953 in Metallurgy from the University of Utah. I am a member of the American Society for Metals, for which I have been Chairman of the Long Island Chapter and Chairman of the Nuclear Metallurgy Committee, the National Association of Corrosion Engineers, the American Nuclear Society and the Electrochemical Society. I am the author or co-author of approximately seventy publications in the areas of my research.

10.1/4

BY MR. WILCOVE:

Q Dr. Weeks, what portions of the second supplement to the Safety Evaluation Report do you wish to sponsor as your testimony?

A Section 3.12, Corrosion Control on Buried Piping.

Q I call your attention to Section 3.12, 11, the very last sentence of the first paragraph which reads: (Reading.)

10/2fo

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

reading) "An independent check of the pipe drafting will be possible when the 36-inch pipes are excavated and replaced before startup of the plant".

Do you have any clarification you wish to make with respect to that sentence?

A I think the sentence is clear. My only comment would be it will be an opportunity to inspect what, if anything, could have happened to these pipe draftings. I do not know if this has yet been excavated.

MR. WILCOVE: Thank you. I have no further questions.

CHAIRMAN BECHHOEFER: Should we start with Miss Stamiris?

MS. SINCLAIR: I have to leave early.

CROSS EXAMINATION

BY MS. SINCLAIR:

Q Could you tell us what kind of materials will be carried in the underground piping?

A Inside the piping?

Q Yes.

A Well, the service water from the Borcast water tank. Primarily, those are the two that I know of.

Q Will any of the underground piping also carry low level radioactive waste?

A I don't know whether they will or not.

Q Wouldn't that be important from the point of view of corrosion protection for underground piping?

MR. WILCOVE: I object to these questions because Dr. Weeks is here to testify on corrosion of the outside of the piping going inside as opposed to corrosion of the inside of the piping, extending outward. How does that take exception to that?

(Discussion off the record.)

CHAIRMAN BECHHOEFER: The witness may answer the question if he is able to, so long as it is the underground piping that we are referring to.

THE WITNESS: May I ask to have the question repeated.

BY MS. SINCLAIR:

Q I asked you if you knew if some of the piping will be carrying low level radioactive waste.

A My answer to that was I did not know. They may be, I don't know.

Q So my next question would be, wouldn't there be a significant difference in the corrosion protection required for pipes that were carrying low level radioactive waste as against pipes carrying surface water?

A I really don't believe so because there is not to me, no particular corrosive species that might be in

the -- this would be low level radioactive waste.

If we do have some high level active waste, if we have some more aggressive coolants, presumably, the selection of the material in the first place would be made on the basis of what they are carrying on the inside.

Q We have in the environmental statements, a list on page C8 of Corrosion and Activation Products that would be liquid affluence from the Midland Plant, and it concerns some questioning about the piping carrying these corrosive and activation products that I was trying to get at.

A I do not, at the present, have a copy of that in front of me. If I could, I would be glad to discuss it with you.

JUDGE HARBOUR: May I ask what the page reference was again?

MS. STAMIRIS: C-8.

MR. WILCOVE: Mr. Chairman, at this point I would like Mr. Hood to take the stand as well.

CHAIRMAN BECHHOEFER: Fine.

DARL HOOD,

called as a witness herein, having been previously duly sworn, testified further as follows:

WITNESS WEEKS: Yes, now, the question is, "Do I see anything in these quantities that is likely to be

corrosive", and the answer is no.

BY MS. SINCLAIR:

Q All right, thank you.

A (WITNESS WEEKS) There are very small quantities.

10-3

BY MS. SINCLAIR:

Q It has been known that nuclear plants are subject to many more corrosion problems, and the reason for it has been given as the radioactive environment of much of the equipment that has caused extensive corrosion problems in nuclear plants, and that is why I ask this question.

Is there a difference --

A (WITNESS WEEKS) My answer to you -- may I address what you have said because I think the impression you have just stated is perhaps incorrect.

I do not think there are significant effects of radiation on corrosion processes unless the seals are extremely high such as one occasionally gets in the core of a reactor. And even then, the effects of radiation are not more than a factor of two.

I think the reason we hear about the corrosion difficulties in the nuclear plant is because they are a nuclear plant; there might be a radioactive coolant inside; and therefore, it receives public attention. But I do not believe that corrosion problems are significantly different.

Q I don't have the references with me, but I cited them in my statement this morning. Dr. Roger Staley, who is an expert --

A (WITNESS WEEKS) I know him well --

Q -- has written a number of editorials on corrosion, and specifically mentioned the high level of corrosion rate in nuclear power plants and how this was going to affect the cost effectiveness and their longevity, which indicates that there is a greater corrosion problem with nuclear plants. That is the source of my information.

A (WITNESS WEEKS) I, without having Dr. Staley's specific reference in front of me, I know he has been, for some years, a leader as a consultant to the utilities. But I believe what he is saying is that because they are nuclear plants -- and I know this has been my position for some time -- the constraints on the operator of the plant for controlling corrosion are much tighter than they would be elsewhere; and therefore, an amount of corrosion that would be of no concern whatsoever at a chemical plant or an oil place, does become a matter of both public and safety concern in a nuclear plant.

I believe that is what he is saying; I don't believe he is saying that the nuclear radiation itself is accelerating the corrosion process.

Q But the impact could be greater.

A (WITNESS WEEKS) The impact could be --

Q This is what we are talking about, the safety.

10/3/3

A (WITNESS WEEKS) The impact, yes, but not the effects on the rate of corrosion.

Q I don't have his papers with me either, but that is not my understanding, that just because it is a nuclear plant.

It is from my reading -- it was the fact that the radioactive environment did increase corrosive possibilities.

MS. LAUER: We object.

MR. WILCOVE: Mr. Chairman, Dr. Weeks is here to testify about corrosion at the Midland plant. It seems to me that this line of questioning is becoming a general discussion of corrosion, not necessarily even related to underground piping.

I am not quite sure exactly what type of corrosion Ms. Sinclair is referring to.

MR. MARSHALL: Then why are you objecting?

CHAIRMAN BECHHOEFER: Because the answer will be meaningless unless we know, and the witness is here for one subject, underground piping. So that --

BY MS. SINCLAIR:

Q Perhaps you could tell -- someone could tell us if the corrosion and activation products that are listed on Page C-8, that are the radioactive releases from the Midland plant, will be carried in underground piping.

10/4fol

A (WITNESS HOOD) I am not aware that these products involve underground piping.

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

piping.

BY MS. SINCLAIR:

Q How would they be carried, then; do you know? Above ground piping?

A (WITNESS HOOD) I need to look at the documents a little closer.

A (WITNESS WEEKS) If I could volunteer my opinion, I think I have already said that those would not affect the corrosion rate if they were.

Q Well we --

A (WITNESS WEEKS) If that helps clarify the --

Q Sir, we are reading the English language, and it says here: (Reading)

"Corrosion and activation products" -- and they are separated from the rest of the product to indicate that these are corrosion products that are carried, and it is that --

A (WITNESS WEEK) Yes, they are corrosion products that enter the reactor coolant through the various -- if there's any leakage, could enter the right-of-way system. But these are corrosion products from corrosion occurring. We never say that no corrosion occurs.

Q No, these say these will be routinely discharged. These corrosion products -- it is not just an accidental thing -- these will be routinely discharged, and there could be others. I was just trying to determine --

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

A (WITNESS WEEKS) But they will not affect the corrosion in the piping through which they flow.

Q What corrosion will they affect then?

MR. STEPTOE: Objection.

MS. SINCLAIR: If they are corrosion products, they may corrode something.

MS. LAUER: We object.

CHAIRMAN BECHHOEFER: They are products of corrosion -- well let the expert answer.

WITNESS WEEKS: Thermodynamically, the metal is an unstated phase. It is protected by a series of protectives oxides between itself and the environment. And there is some corrosion, some dissolution of these oxides. They have a finite solubility, particularly, say, in the high temperature, primary and secondary coolant of the reactor.

Now some of those corrosion products that dissolve in that coolant get carried into the core of the reactor where they may become activated to form this species shown in the tape. At some stage or another in various reactor coolant cleanup systems, or by leakage through gaskets -- some of which is unavoidable, and it occurs in all the plants -- these get into the right-of-way system.

But, they are the products of a very low corrosion

rate over a very wide, large surface area that occurred somewhere else in the plant. They are not affecting corrosion in these, say, low temperature waste pipes through which they flow.

They might play down on the surface and improve the corrosion resistance of those, but they certainly won't make it any worse.

MS. STAMIRIS: May I ask a question here out of turn?

CHAIRMAN BECHHOEFER: Yes.

MS. STAMIRIS: I would like to ask Mr. Hood, do you believe that the reason for that being included in this Table C-4, these corrosion and activating products, is because these products of corrosion could be of safety concerns because they become radioactive as opposed to the converse that they are of concern because they could cause corrosion?

WITNESS HOOD: You are slightly correct. The items are radioactive.

BY MS. STAMIRIS: But they are carried through the --

A (WITNESS WEEKS) They could be; I don't know, but they could be. It would not worry me if they were, let's put it that way, from the corrosion of that buried piping point of view.

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

BY MS. SINCLAIR:

Q The other reference that I have about the increased corrosion in the nuclear power plant compared to other plants is in the NRC report that was published a number of years ago, and it specifically pointed out the corrosion in nuclear plant is accelerated compared to other industries.

A (WITNESS WEEKS) Can you give me that reference?

Q I can't give you the NRC report reference, but I will try to get it to you by tomorrow.

A (WITNESS WEEKS) I appreciate either one or both of those. I am probably aware of them and would be happy to discuss them with you.

Q All right.

Are there various types of techniques for protecting piping on the outside?

A (WITNESS WEEKS) Yes.

Q Here it says that you have commercial, standard commercial practices for protecting carbon steel piping from ground water attack.

Would this be as good a quality as would be available?

A (WITNESS WEEKS) I believe so, yes.

Q I see. Are there better qualities than what are being used here?

10/5/2

A (WITNESS WEEKS) Not that I can tell. Both the Coppers and the Tapco Company, very reputable concerns, been active in the field for a number of years.

Q When you talk about the independent check, does that mean in even --

A (WITNESS WEEKS) Which paragraph are we looking at?

Q In the first paragraph, last sentence.

A (WITNESS WEEKS) Yes, all right, the sentence I was just asked to clarify. Go ahead.

Q Does the independent check mean that there's a third party check of that or does that --

A (WITNESS WEEKS) No, what I mean by that is we have had these coated pipes in the ground in the Midland site for three or four years. Given the coating, given the galvanic protection system, I don't expect anything significant to have happened to them.

Now we are going to take some of these up and replace them at some time. I do not know the precise schedule. At that point, some corrosion person, whether he be for the Staff or a Staff inspector or for the utility, has an opportunity to look at the type and determine, which is still a third, what I would call independent, check in the system. This protection has in fact been valid. That is all I meant by that.

Q I see. Apparently you are just testifying as Mr. Wilcove has said, primarily about the corrosion on the outside.

A (WITNESS WEEKS) That was the understanding upon which I based my response to the Board's questions, yes.

Q Is there any special consideration that was given to the fact that you are also in a very highly chemical environment here, as far as specifying what the corrosive protection would be?

A (WITNESS WEEKS) Not per se that you are. I was given the analysis of this, say the river water. The more corrosive species that one worries about in terms of underground piping are chloride, oxygen and pH, that's hydrogenized.

From the point of view of hydrogenized, both the cooling pond and the soil leach water are slightly on the alkaline side. The pH is slightly on the alkaline side.

From the point of view of chloride, there is a fair amount of chloride in the cooling pond, although I don't quite know how that would get on the outside of the pipes. The leach from the chloride from the soil was not high. According to the classic textbook by Romanoff on underground corrosion soil in which the leachables have a

conductivity -- we do not have by itself an environment unique to this community that I would classify as highly corrosive.

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

BY MS. SINCLAIR:

Q Well of course we just had the practical experience of living here and we know that the cars in the town rust very fast, expecially if they are down in the parking lots near the plant. And the paint job on our houses go fast --

MS. LAUER: Objection. We don't see the relevance.

MS. SINCLAIR: This is just an example of a --

MS. LAUER: What are the grounds --

CHAIRMAN BECHHOEFER: Well, she has not asked the question yet.

MR. MARSHALL: She does not know what she is objecting to yet, either.

MS. SINCLAIR: I am just laying the groundwork for the fact that we know that we live in a highly, more corrosive environment than would be usual because of the presence of huge chemical complexes, so I am just asking if in any way this was considered in the decisions that were made on the type of corrosive protection.

MR. WILCOVE: I believe that Mr. Weeks answered that question a moment ago.

MR. MARSHALL: Well, she is just asking it from the standpoint of synergistic effects, now.

MS. SINCLAIR: No, no.

In his answer, he said that he saw no difference in the environment, and I am pointing out to see if he

knows about the difference in a chemical environment --

WITNESS WEEKS: Again, I don't know what it is in the atmosphere that is causing it. I just don't have that information.

However, if it is high in chloride, I think it would have been observed in the analyses I have seen of the pond water or of the fill used.

In any case, we not only have in this instance a non-corrosive or mildly corrosive soil. We have a protection system in the form of a painting and wrapping on the carbon steel pipe. And, we have redundant to that, a galvanic protection system which presents -- would prevent corrosion should there be flaws in the protective coating on the pipe or, it should prevent corrosion in the stainless steel pipe which is buried uncoated.

BY MS. SINCLAIR:

Q All right.

A (WITNESS WEEKS) So I think that even though you may have a more corrosive environment developed because of the locale, these other systems are adequate to prevent corrosion. They would be adequate to prevent corrosion in a much more aggressive soil than I have seen in analysis here.

Q I see. My other source of information is from corrosion experts at Dow itself, and I know they have

great corrosive problems there.

A (WITNESS WEEKS) Yes, they have.

Q They have great corrosion problems; that's why they need to go to corrosion experts, and this is the reason I think this kind of thinking ought to perhaps be applied to this plant.

It says something in the first paragraph on page 343. It talks about some pitting, and it says the utility consultants have suggested that these corrosion pits were caused by stray current resulting from improper grounding during field welding of other components at the site.

Can you tell me what the basis for this conclusion was that that was the reason for the corrosion, for the corrosion, the corrosion pit and not anything else?

A (WITNESS WEEKS) The basis of their conclusion was that the analysis that they performed of this soil and of the leachables in the soil, simply would not have produced an environment sufficiently agressive to stainless steel to cause the extent of the pitting that they did see, and this is a period of a few years.

Again, referring to these standard books, in soil of this category, up to 15 years, I think I marked a maximum pit depth of three-tenths of a million, which is almost nothing.

This is not in Midland soil, of course. This is a standard textbook, but I tried togget the closest match up to the leachables that were present in the soil here. This is just not what would normally be considered an aggressive environment to stainless steel.

Q I see.

CHAIRMAN BECHHOEFER: Was the pitting and corrosion at Midland in that order of magnitude?

WITNESS WEEKS: Yes. It was very severe on one side of the piping, in a very localized area.

CHAIRMAN BECHHOEFER: I mean, beyond the thing you gave?

WITNESS WEEKS: Oh yes. I could give you a dimension if you will allow me to consult my notes.

CHAIRMAN BECHHOEFER: Certainly.

WITNESS WEEKS: It is about a tenth of an inch deep or more, a third of the way through the wall. That is a fairly significant amount of pitting.

BY MS. SINCLAIR:

Q In your last paragraph on Page 343, you talk about the possibility of the galvanic protective system becoming inoperative.

Under what condition would that become inoperative?

A (WITNESS WEEKS) Electrical connections can

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

break down, wires, power failures can occur. But the corrosion rate we are talking about is sufficiently small, so this would probably not be serious for an extended period of time. That is why I wrote that paragraph.

Q All right. You said for periods of up to at least six months. Is there any monitoring that goes on so that you would know whether that galvanic system was working?

A (WITNESS WEEKS) I was advised this morning -- I was discussing this with a representative of the Applicant, a Mr. Woodby, who tells me that they inspect the voltage and the current of the rectifiers on the galvanic protection system twice a month.

Q All right.

A (WITNESS WEEKS) They are operable at the present time. That is what he advised me.

Q Could you explain the protection of the zinc annals that you talked about in your last paragraph.

A (WITNESS WEEKS) The zinc, being electrically positive, is much more readily corroded than the iron. It serves the same purpose as the voltage that one gets in a normal galvanic protection system, so if they are redundant, they would have the seame effect. The zinc would corrode at the expense of the iron.

MS. SINCLAIR: All right, thank you very much.

10/7/3

That is all I have.

CHAIRMAN BECHHOEFER: Ms. Stamiris.

CROSS-EXAMINATION

BY MS. STAMIRIS:

Q Dr. Weeks, in response to questions by Ms. Sinclair, I believe when you were referring to a sentence on Page 3-22 at the end of the first paragraph, referring to this independent check of pipe wrapping which will come up when the pipes are excavated, that you did not expect to find significant corrosion because of the protection system and the galvanic protection system.

A (WITNESS WEEKS) That's right.

Q How long has the galvanic protection system been in operation?

A Approximately two years. I have the date, but I am not sure it is in this official testimony. I can get you the date if that is of any help, but I believe it is September 1980 which comes to my mind. I know I asked this question of the utility at the time I was preparing -- here's the folder. September 22nd, 1980 it was activated.

10/8fol

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

0/8/1
w
cti ated

BY MS. STAMIRIS:

Q Does this galvanic protection system which was activated on September 22nd, 1980, protect all piping at the Midland Nuclear Plant?

A (WITNESS WEEKS) It protects all of the buried piping of the carbon steel and stainless steel lines that I know of.

Q Do you know whether or not it in fact protects the nonsafety as well as the safety piping from the corrosion?

A (WITNESS WEEKS) I do not know that off the top of my head, no.

Q Do you know, Mr. Hood?

A (WITNESS HOOD) No, I do not know.

MS. LAUER: Chairman Bechhoefer, our understanding is that it does.

WITNESS WEEKS: If it is grounded into those lines, it would do that; if it is not grounded, it would not do that.

WITNESS HOOD: I heard about some of the piping, but I can't say all of it.

BY MS. STAMIRIS:

Q If I remember yesterday, there was some question as to whether or not there would be -- whether an Applicant witness would come back on the subject of

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

piping, and I would like to have information of some kind, a diagram or a table, if either Mr. Hood or the Applicant could let me know sometime, where there would be information as to how extensive the galvanic protection system is and what the locations of it are.

Mr. Hood, would you have access to that information?

A (WITNESS HOOD) I am just a little bit confused. I thought I just heard the Applicant say that it was all of it. Did I misunderstand?

Q I thought they said they thought it was. I would like to see a diagram or some kind of table to confirm that.

MR. MILLER: We are going to have to see if we can develop that information.

MS. STAMIRIS: When you develop that information, I would also like to know what the locations of where it is attached since there was some testimony yesterday to the effect that you looked at the most likely areas for stray welding current, and I think that had a relationship.

WITNESS WEEKS: That was the welding ground waters, not the galvanic protection --

BY MS. STAMIRIS:

Q All right. Dr. Weeks, when you say that this

galvanic protection system was begun, to the best of your knowledge, in September 1980 or you confirmed that it was indeed --

A (WITNESS WEEKS) This is what the utility advised me that it was, in response to a direct question that I gave them in preparing my testimony.

Q Are you aware -- how many instances of this pitting corrosion that you talked about that was attributed to stray welding currents, how many incidents of that were you informed of?

A (WITNESS WEEKS) I know of the two failure analysis reports that were done by Bechtel in 1979 and 1980 -- 1980 or 1981.

How many instances those actually covered, I just don't recall.

Q Are those two reports, would they be the same as the reports that are referenced on the last page of SER, which was introduced yesterday as Staff Exhibit 15? Would you like to see a copy of that?

A (WITNESS WEEKS) I have one; it is in the back of the room. The last page of this?

Q Yes, at the top, there are two references, A and B.

A (WITNESS HOOD) Perhaps there is a difference in the arrangement of the pages. Will you identify the

page that you are referring to by some kind of number other than identification, please.

Q Yes. There is a number in the upper left-hand corner. I can't read the first figure, but the ones that are legible are 85312.

A (WITNESS WEEKS) Reference A is one of the reports, and that's the leader of the two that I reviewed, yes.

yes.

BY MR. STAMIRIS:

Q Did you also review Reference B?

A (WITNESS WEEKS) I believe Reference B was the -- I did not, and preparing the testimony -- I believe that is the one I reviewed this morning.

Q Well, could you --

A (WITNESS WEEKS) Reference B I have also reviewed, as of now, yes.

Q When did you review Reference A approximately?

A (WITNESS WEEKS) Last March when I was preparing this testimony.

Q All right. Could you summarize your review of Reference A?

A (WITNESS WEEKS) Yes. Reference A is a Bechtel failure analysis report on piping with pitting corrosion on it removed from the Midland site. They describe it as an analysis -- an analysis reading abstract was done at several pitting failures in buried stainless steel pipe in the Midland jobsite.

Q Did you reach any conclusions upon your completion of the review of this study?

A (WITNESS WEEKS) Yes. I concluded that in my opinion, at least, the soil, as analysed in here and in an earlier report, this was not expected to be sufficient aggressive because of the expensive printing -- highly

localized -- but still extensive in terms of depth that did occur.

By eliminating chemical and normal, what I call chemical roots of such a problem or causes of such a problem, the Bechtel people suggested that stray welding current, from improper grounding could have caused it.

My conclusion was that, yes, they are right, it could have caused it. I don't say they prove that it did cause it but it could have caused it. And by lack of anything else in the environment that would be likely to have caused this affect, I concurred that it was a reasonable explanation.

Q So am I to understand that in your professional expertise, you did not think of anything else which --

A (WITNESS WEEKS) That's correct --

Q -- that could have caused it.

A (WITNESS WEEKS) That's correct. And, I have had several of my colleagues at Brookhaven review the same report with the same conclusion.

Q Did this report take place in January of 1981, the date of when the study was done to correspond to the date of the record?

A (WITNESS WEEKS) I have no idea. I presume the report was written after the experiment, after the failure analysis was completed. The pipe that they examined was

removed during the summer of 1980, and by the time -- that is what the opening sentence of the introduction says -- by the time that pipe was shifted to Bechtel and they cut it up and did their failure analysis and conducted a report, it was January of 1981.

Q Was there any reference to Bechtel's -- first of all, I'd better establish that Bechtel had at some time, and I believe it is on the first page of their SER 12, Staff Exhibit 15, the second sentence in the top box notes that in the first instance: (Reading)

"Bechtel reviewed and attributed corrosion to chemical contamination."

Did you see any Bechtel studies or review, regarding chemicals and contamination?

A (WITNESS WEEKS) I saw the first -- as I said, there were two Bechtel failure reports. The one that is referenced later on is, I think, reference A that we were just talking about. It is the second of those two.

10-10

0/10/1
w
wo

The first one did not attribute a cause. They saw there was pitting and they simply stated that there was pitting. The second report went a little bit deeper. Discussed the analyses that were done the first time as well, pointed out very clearly that there was no difference in the results of the two investigations. The experimental findings of the second investigation did not differ with those from the first one. They clearly state that.

The difference is perhaps -- well there were different people working on it. I cannot answer why, in 1981, they come up with this suspected stray current attack.

They did state in the 1981 that construction procedures have been observed in the field which could give rise to such occurrences.

Q And is that stated in the report --

A (WITNESS WEEKS) In Reference A.

CHAIRMAN BECHHOEFER: Are you saying that Bechtel, which you have reviewed, did not attribute corrosion to chemical contamination?

WITNESS WEEKS: That's right.

CHAIRMAN BECHHOEFER: Could there have been some other documents that did -- this seems to refer clearly -- or, attribute pretty clearly --

WITNESS WEEKS: I have the two Bechtel documents

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

here, and the first one, I guess, I should --

CHAIRMAN BECHHOEFER: What I was trying to say, are those the only Bechtel documents which might be involved?

WITNESS WEEKS: To my knowledge, they are. This earlier Bechtel report is the only one that is referenced in Reference A.

MS. STAMIRIS: Judge Bechhoefer, I would like you to excuse my inability to know exactly if this is proper procedure, but I would like to ask the Board to have either the Staff or the Applicant provide for us, References A and B and any other studies that were done by Bechtel regarding corrosion, particularly, which form the basis for the second sentence in Paragraph 1 of SER-12 that Bechtel revealed and attributed corrosion to chemical contaminants because I think, without seeing the reports themselves, it is very difficult to know if we have been given the whole picture and to what extent the different factors come into play regarding corrosion.

I would like to ask the Board for some assistance as to the proper way or timing by which I could see such report and have the parties in this proceeding to see this report.

(Discussion was had off the record.)

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

MS. LAUER: Chairman Bechhoefer, these are the only two reports that we know of. We have them here. The copies aren't the best but we can have them copied and distribute them. We have no problem making them available.

We would with the understanding that they would be reviewed overnight and this issue would be closed up sometime tomorrow then.

CHAIRMAN BECHHOEFER: Would you look at that tonight?

MS. STAMIRIS: I would be happy to. The only question that I still have, I would like the Applicant to check the file or find out in some way the basis of the report. The possible reports are the basis for the second sentence that Bechtel initially reviewed and attributed to corrosion to chemicals.

WITNESS WEEKS: I have that paragraph in front of me. But if the Board, if it is going to be distributed, there is no need for me to read it. What it says was -- may I?

CHAIRMAN BECHHOEFER: Yes.

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

yes.

WITNESS WEEKS: (Reading)

"Based on the severity" --

this is the first Bechtel report, the one that talks about chemicals and I am going to read a short paragraph.

BY MS. STAMIRIS:

Q May I ask you then, is this an excerpt from the first Bechtel report?

A (WITNESS WEEKS) I am reading from the summary and conclusions of the first Bechtel report, page three for those who have copies of it. (Reading)

"Based on the severity of the pitting attack, our first thoughts were directed toward stray electrical current induced corrosion. Discussions between the Ann Arbor office and field personnel indicates there were no known electrical sources in the vicinity of the corrosion section of this pipe.

"There were no adjacent buried pipes or power lines or any field welding performed in the immediate vicinity of the corroded specimen. It is possible that the pipe was damaged during the shipment or storage by inadvertent contact with the corrosive environment",

and they give you a possible example of that. (Reading)

"As previously mentioned, the corrosion attack appeared to be oriented along the vertical axis of the pipe. Such an attack could result" --

see, they speculate --

"from the splashing of a corrosive fluid against the side of the pipe after installation. Since the top three feet of the buried pipe was not attacked, it seemed unlikely that the fluid leached down from the ground."

And then they go on to other possible things such as sources of chloride, human urine, to be precise, but it is to say the least, speculative. The second report -- and by the way --

BY MS. STAMIRIS:

Q Excuse me, Dr. Weeks, will you again identify the report from which you just read, please.

A (WITNESS WEEKS) All right, this is Log No. 567177, Condensate Tank Fill Pipe Corrosion Study, prepared for R. L. Castlebury, Project Engineer.

The second one which is Reference A, was prepared for a different project engineer, whom I happen to know personally is a first-class corrosion person. There may be a difference as to why that report is a little definitive than the first one as to what they think could have caused it.

MS. STAMIRIS: I would like to be able to review references -- the reports which are References A and B, and also what Dr. Weeks has referred to as the first Spectral Report Log 567177, if I got the number correctly.

WITNESS WEEKS: That's the number that I have for it.

(Discussion was had off the record.)

CHAIRMAN BECHHOEFER: Does the Applicant have a copy of the latter report that could be at least lent to Mrs. Stamiris overnight?

WITNESS WEEKS: I could lend her mine.

(Discussion was had off the record.)

MS. LAUER: Let the record reflect you have all three reports, Ms. Stamiris.

MS. STAMIRIS: Thank you. Well, I will review that tonight.

CHAIRMAN BECHHOEFER: You can save further questions on that until tomorrow.

MS. STAMIRIS: Yes, okay.

CHAIRMAN BECHHOEFER: Dr. Weeks, let me ask you one question. When you talked about effects of soils on piping insofar as corrosion is concerned, did you include, or were you including ground water effects?

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

relevant.

MS. STAMIRIS: I think it is an important question, and I think if it's in his expertise to answer that it would certainly be relevant for him to quantify in some way, as best he could, how much margin of error, let's say, that we have with the background soil conditions.

(Discussion off the record.)

CHAIRMAN BECHHOEFER: I think we will rephrase the question in terms of what we think the witness --

JUDGE HARBOUR: I think that the witness can answer so long as he is simply expressing what he believes the possible error limits may be on his own analyses.

WITNESS WEEKS: I believe that the coating and galvanic protection system would be adequate in almost any ground water.

In other words, a factor of 20 conductivity -- I'm looking at resistivity of ground waters at various sites around the country, and they range from 100 to 5,000 ohms. We're in the 5,000 ohms area here. This would probably work in the 100 ohm ground water with the galvanic protection and the coating system that was installed.

BY MS. STAMIRIS:

Q I'm sorry not to understand your precise terms. You said that you were in the 5,000 ohms range and it would become, you think, sufficient to consider even in the 100 ohms range?

WITNESS WEEKS: Yes, I was. I was considering that this piping, as I understand it from previous testimony, is above the water table, so we're considering reasonably well drained soil at this point. And that was what I was considering.

That's beneficial, by the way, as opposed to being underneath the water table, from a corrosion point of view.

CHAIRMAN BECHHOEFER: Right. If the ground water system, or the dewatering system should fail, would that affect the --

WITNESS WEEKS: We still have this redundant galvanic protection system plus the coatings on the outside, which, in my opinion, would be adequate.

CHAIRMAN BECHHOEFER: All right.

BY MS. STAMIRIS:

Q In the second paragraph on Page 3-42, about six or seven lines from the bottom, is this sentence that leaching tests on sand samples from the backfill used at the Midland site have shown only trace amounts of chlorides and a pH greater than neutral.

Now, is this what I would call the background conditions upon which you have drawn your conclusion of overall safety against corrosion?

A (WITNESS WEEKS) Well, it is certainly one of the

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

several factors that I took into account, yes.

Q Okay.

A (WITNESS WEEKS) But I believe I testified earlier that even in a much more aggressive environment the galvanic protection and coating systems would be, in my opinion, adequate.

Q Okay. Could you specify how much more aggressive an environment they would be adequate against?

A MR. WILCOVE: Mr. Chairman, I object to the question. I don't think it's relevant in that Dr. Weeks has testified that the galvanic protection system would work in the soil at Midland. So to speculate as to whether or not it would work in any other soil situation I do not believe is relevant.

WITNESS WEEKS: Yes, that's what happened -- in other words, a factor of 20 to 40. You asked me for a factor, and that's the number I come up with.

Q In other words, as the number of ohms decreases its corrosive ability would increase?

A (WITNESS WEEKS) The corrosiveness of a soil is a function of the amount of oxygen present, the electrical conductivity of any water that's present, because we have to complete the electrical corrosion cell, and -- or resistivity they're reciprocal of one another -- and the acidity and the chloride content. In three of those four, the Midland soil is good. The chloride is low, the acidity is low, and the resistivity is high.

Q The resistivity?

A Yes.

JUDGE COWAN: Let me get my two cents worth in. Would you characterize the system as adequate to take care of a much more aggressive environment than the environment that you have studied?

WITNESS WEEKS: Yes. That's what I think I was trying to say. Yes, Judge Cowan.

BY MS. STAMIRIS:

Q Perhaps I should have gone to this first, but in the FSAR -- I'm sorry; in the FES, on page 5-12, it continues from a section which started on page 5-11, about

the cooling pond, and at the top of the page, the second sentence says: (Reading)

"Elevated chloride concentrations in portions of the pond are also likely to adversely affect fish," and so on.

Have you evaluated what those elevated chloride concentrations are in the pond water?

WITNESS WEEKS: This is chlorine, not chloride. Chlorine as chlorine gas is added as a bactericide to a lot of domestic waters.

9-3

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

Q Then chlorine did not affect --

A (WITNESS WEEKS) Chlorine is not itself going to affect the corrosion. When it reacts to foreign chloride it will, but I think the fish are much more susceptible to it than the metals.

Q Okay. On Page -- I have to check my notes here. Just a minute, please.

WITNESS HOOD: I might point it out, the more appropriate reference in the FES to the cooling pond treatment appears on Page 4-5.

BY MS. STAMIRIS:

Q I did not review the Section 4-5, but I did review the section on Page 5-3 talking about chemicals, and I believe that these were chemicals which would be discharged to the river. Therefore, I assume that they were also in the cooling pond, or at least in the underground piping at the plant. And would any of the chemicals listed in the top paragraph -- sulfate, chlorine, sodium, phosphate, phosphorus ammonia -- or the interactions between the chemicals in that water be of concern for corrosion?

A (WITNESS WEEKS) No, I don't see anything here that would be necessarily corrosive to a carbon steel pipe. These are all commonly present in the pond water and the service water that was going through the pipe, in

any case.

JUDGE HARBOUR: Is that true also for stainless steel?

WITNESS WEEKS: Yes.

JUDGE HARBOUR: And what about chlorine in the sodium hypochloride form?

WITNESS WEEKS: This would be an oxiding agent. It would probably contribute to the passivity of this stainless steel. I don't think it would be harmful.

JUDGE HARBOUR: All right, thank you.

BY MS. STAMIRIS:

Q Does your judgment take into account that these elements would not be of concern for corrosion even if they were of a significant concentration?

A (WITNESS WEEKS) I'm trying to determine what is the significance in seeing if there's anything here.

This says the total dissolved solids will not exceed 500 milligrams -- that's 500 parts per million. That is not -- for corrosion of carbon steel piping at ambient conditions, I don't think that's significant.

Q But would not that 500 milligrams per liter represent an averaged out concentration of these, whereas one particular chemical could be added, a very high concentration, and another one could be at a low concentration? Or does that mean --

9/3/2

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

CHAIRMAN BECHHOEFER: Well, let me interrupt for a moment. The permit, apparently, will limit an instantaneous release to 750 milligrams per liter, and why don't we ask if that would have an effect.

WITNESS WEEKS: I don't think so.

BY MS. STAMIRIS:

Q But does that milligrams per liter, the way it's worded here, say to you that that is a combined effect?

A (WITNESS WEEKS) Of all of the total dissolved solids, yes.

Q So, within that, you don't perceive or understand that there could be a detrimentally high concentration of any one of those elements noted?

A (WITNESS WEEKS) I do not believe so, no.

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

JUDGE HARBOUR: Is it possible to relate -- let's say an absolutely worst case -- a 750 milligram per liter concentration on any one, single one of the species which are discussed to a factor such as resistivity?

WITNESS WEEKS: Well, the worst would be if it was all sodium chloride.

JUDGE HARBOUR: Is sodium chloride one of those listed in the --

WITNESS WEEKS: Sodium and chlorine are there. So, assuming that sodium and chlorine -- the sodium is added, if I read the footnote, as sodium hypochlorate. That will react with organics to form sodium chloride. It's an oxiding agent.

I think the chances that that would reach the 750 for an extended period of time is just -- is remote. Nevertheless, I don't think that much sodium chloride in a neutral solution, which all of the other testimony says that this cooling pond water is -- all of my information says the cooling pond water is slightly on the alkaline side.

I don't think that's going to be very corrosive.

JUDGE HARBOUR: Thank you.

BY MS. STAMIRIS:

Q Mr. Hood, is it also your understanding that the cooling pond waters will be slightly on the alkaline side?

9/4/2

A (WITNESS HOOD) I don't have any knowledge of that one way or the other.

Q I remember reading a reference to the pH of the cooling ponds, and I can't remember where it was.

A (WITNESS WEEKS) That's in -- no, no. I thought that was in my testimony, but it's not.

CHAIRMAN BECHHOEFER: Mrs. Stamiris, how much longer do you have? We're trying to figure out a good time to quit.

If you just had three or five minutes, then we might wait till you're finished and then come back tomorrow with the Applicant or Mr. Marshall.

MS. STAMIRIS: I think I might have -- I can't remember. I think about maybe 10 minutes.

(Discussion was had off the record.)

CHAIRMAN BECHHOEFER: Would you object to having to continue tomorrow?

MS. STAMIRIS: Oh, no, not at all.

WITNESS HOOD: May I make a statement in regards to my last response?

CHAIRMAN BECHHOEFER: Oh, sure.

WITNESS HOOD: Reading from a document addressed to a member of the NRC in our corrosion engineering department, a document dated June 29th, 1982, it reads as

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

follows. This is in reference to Midland. It says:

"Their pond water pH tends to be neutral to alkaline (around pH 8.29). The river at the Midland site averages 65 parts per million chloride with a possible concentration of 2.3. By evaporation in the pond, the service water would contain chloride up to 200 parts per million."

MS. STAMIRIS: I'm sorry, but I don't get a transcript. Will you give me again the source that you were reading from?

WITNESS HOOD: Reading a letter from John Weeks to Mr. Bernard Turoblin. It's dated June 29th, 1982. Mr. Turbolin is with the chemical engineering branch of the NRC.

MS. STAMIRIS: Thank you. I will continue these questions tomorrow.

(Discussion was had off the record.)

CHAIRMAN BECHHOEFER: We're prepared to adjourn now, unless anyone wants to raise any issues. We'll be back at 9:00 tomorrow.

(Whereupon an adjournment was taken, to resume on Thursday, November 18, 1982, at the hour of 9:00 a.m.)

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

NUCLEAR REGULATORY COMMISSION

This is to certify that the attached proceedings before the

NUCLEAR REGULATORY COMMISSION

in the matter of: CONSUMERS REGULATORY COMMISSION

Date of Proceeding: November 17, 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)