ORIGINAL

OFFICIAL TRANSCRIPT
PROCEEDINGS BEFORE

NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

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

TITLE CONSUMERS POWER COMPANY
(Midland Plant. Unit 1 and 2)

PLACE Midland, Michigan

DATE November 16, 1982

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

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

Midland County Courthouse
301 West Main Street
Midland, Michigan 48640

Tuesday, November 16, 1982

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

BEFORE:

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

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

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

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C O N T E N T S

E X H I B I T S

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PROCEEDINGS

CHAIRMAN BECHHOEFER: Good morning, ladies and gentlemen. For preliminary matters, the Board would like to announce that at some point before we leave this week and a half session, we will let you know which of Mrs. Sinclair's contentions are accepted and which aren't. We won't have an order issued but we will announce our ruling.

In addition, we have received copies of the new policy statement on Table S-3, and I assume that all the parties have received copies, both from the Applicant and from the Staff. It is our inclination that that policy statement requires us to dismiss the contentions, the proposed contentions, but we will allow you to make a statement. We will not call upon you to do it right now, maybe tomorrow morning or the next morning to give you a little advanced notice before we actually rule, unless you agree that it requires us to dismiss this contention.

MS. SINCLAIR: I certainly don't.

CHAIRMAN BECHHOEFER: We would give you an opportunity to address that, though we have not heard from the Staff about the merits of that, either.

So at that point, sometime later this week, we will hear that. As I say, it is our initial inclination that the Applicant is correct in its motion which it

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filed, and the contention should be dismissed, however, we would not hold you for timeliness or anything like that. But our initial inclination is to do that, but we will listen to you and any other thoughts that you might have perhaps tomorrow morning or one of the mornings. I won't require you to do it now because we didn't give you any notice.

Are there further -- I notice that Mr. Miller is not here yet, and we will postpone our discussion schedule until he does arrive. The Board also will not know its schedule until the 13th of December. We will not know that until probably this afternoon so that it might be better to delay the scheduling discussion until after that point.

Are there other preliminary matters this morning that any parties wish to raise?

MS. SINCLAIR: I just want to point out that I brought the exact quote which I discussed yesterday that witness Kane had made. The reference is Page 4209 of the transcript settlement hearing, and the exact statement that he made was, this is by Chairman Bechhoefer: (Reading.)

> "Mr. Kane can answer the question if 20-20 hindsight, would removal and replacement have been a better option in 1978, and they were returned to the diesel generator building".

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The witness Kane said this: (Reading.)

"The answer must depend on the facts that must be addressed when you are considering it from the standpoint of safety alone. It is my opinion that removal and replacement is a better solution. But if you are considering the other facets, that is, the costs, the impact on schedule and these are facets that engineers must address, then it may not have been the superior option".

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I just thought for the exact clarification, you would realize that this is the kind of philosophy that apparently has been required of the geotechnical people, and I understand from Dave Sedrick, of the Saginaw News, who called me on this issue this morning, that Chairman Paledino has severely criticized this approach of considering costs and impact of schedules to the detriment of quality. I had given this quotation to Dave Sedrick as proof that this is the kind of philosophy that has gone into this project. That's my statement.

CHAIRMAN BECHHOEFER: Well, you are welcome, of course, to ask Mr. Kane, as I guess you did yesterday, whether bearing capacity had anything to do with that recommendation because that's what he was talking about. He will be back today, so you are certainly welcome to ask him that question.

MS. SINCLAIR: That is what I did. I said, "To what extent," --

CHAIRMAN BECHHOEFER: So he can answer that for you, certainly, when he gets up here.

MS. SINCLAIR: All right.

CHAIRMAN BECHHOEFER: Mr. Paton?

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

CHAIRMAN BECHHOEFER: Yes.

MR. PATON: The response is that the requirement is that a safety structure meets all NRC's safety requirements. If spending a million dollars on a structure will allow that structure to meet NRC safety requirements, that is what is done.

If spending four more million dollars on that structure will have it not only meet the safety requirements but be three percent safer, we don't do that. We have very stringent safety requirements, so talking about money in the context in which Miss Sinclair is doing, it is, in my opinion, very very misleading. We have very very strict safety requirements, and the plant must meet those requirements.

I think the discussion that she has introduced here is misleading and does not contribute to the record.

MS. STAMIRIS: Judge Bechhoefer, I would like to contribute also.

I think it is difficult talking about what is already in the record. I think the record will speak for itself as to what is there. But I think Mr. Paton is either misinterpreting or at least my understanding is very different than his understanding of what led up to those statements by Mr. Kane, and it was just the reverse of what Mr. Paton was saying because we weren't talking about how the NRC will use some judgment on asking that

the Applicant spend millions of more dollars if it only increases the factor of safety by a very small percentage, but we were talking about the converse. We were talking about how the NRC has certain safety requirements. But when they look at those safety requirements and their end results of the analysis, instead of answering the question in terms of safety alone, that those safety requirements are compromised, are flexible and are a little bit in the gray area -- they are not black and white requirements because there are certain PSAR specifications that were set out for the compaction of the failing in the first place, and it is in the record that the NRC said to Consumers before they ever started the preload, you will have to meet these specifications.

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Now when the preload was done and everything has come to pass and the millions of dollars has been spent and the requirements cannot be met in the black and white form that I thought they were in in the first place, those requirements can be interpreted and the wording was we will now evaluate whether it meets the intent of those requirements. So my problem, and I think Ms. Sinclair's problem is when safety requirements can be affected in this gray area because of cost considerations on the part of the NRC, the NRC isn't supposed to worry about cost considerations in that respect, according to my understanding.

MS. SINCLAIR: I also want to make this further statement, that I disagree with Mr. Paton also, specifically because of the history of this particular case. After all, Consumers Power Company has admitted in their findings of fact that in hindsight, they made the wrong decision and for going ahead with the construction of the safety-related buildings on purely compacted soil and that this would have been a favor to Consumers Power Company if the NRC had insisted that soil compaction be done properly, that specifications be met before they went ahead with the building of these buildings.

As it is by being last and by letting cost and construction schedule affect the decision-making process,

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they actually have gotten the utility into a terrible, terrible bind which is one of their inspectors said, is without precedent in the whole country.

And so I think that there has been very definitely this kind of thing that has affected the decisions that have been made by the NRC and certainly, the utilities as is very glaringly demonstrated in this project.

MR. MARSHALL: I would like to add by that a little bit by saying that I take exception to what Mary said in regard to the questions of the NRC contributing to the compaction, the lack of it. The thing that I want to say here, I want to know where is the point in demarkation, how do we know when you are paying too much for your requests of the ratepayers' money, because I happen to be one, and I am a captive audience in that respect and I certainly am interested.

And like I said, I disagree with Mary that it was the NRC who allowed it knowingly to happen in the first place. I think Bechtel did it.

CHAIRMAN BECHHOEFER: Those gray matters are not for us to consider at all, but the Public Service Commission can decide what percentage goes to the rate base and what does not. It is not for us to --

MR. MARSHALL: We are a captive audience, captive

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ratepayers and we don't want to be paying for something that was the fault of the Bechtel Corporation just because --

CHAIRMAN BECHHOEFER: No, what I'm saying is that we are not the ones to decide whether that will happen or not. There are public utility commissions that say that certain construction activities which are not done properly should not be taken into account.

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MR. MARSHALL: Well, I can state this --

CHAIRMAN BECHHOEFER: I don't know what Michigan is, but it's up to Michigan.

MR. MARSHALL: I'm going to say this, that we're going to have a new ball game in Lansing right after the first of the year, and it's not going to be the same old game, I'll guarantee you that.

CHAIRMAN BECHHOEFER: Mr. Steptoe, do you care to add --

MR. STEPTOE: Well, I think this discussion really does go to the ultimate issues in this case, and it's a discussion that I'm sure that all the parties will carry on in their briefs and their findings of fact on whether there has been any compromise in safety in this case.

It is the Applicant's position, of course, which is set forth in great detail in particular in the testimony of Dr. Peck, is that there has been no compromise to the safety of the Diesel Generator Building by Applicant's remedial measures. And, indeed, all of our testimony is meant to establish that there is reasonable assurance of the safety of the structures.

I don't think I need to respond much more to the argument that's going forward on how economic costs do or should affect the NRC's Staff or the NRC's judgment

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with respect to the safety of structures and the adequacy of remedial measures. I think the Staff has stated it well.

The only other thing I would like to say is that I believe that Mrs. Sinclair did not accurately state what we conceded in our findings. The only statement along the lines that Mrs. Sinclair suggested that I can recall is a statement that the administration -- our interpretation of the administration grade beam failure as being an isolated case was, in retrospect, in error. But I do not believe that we have ever conceded that the surcharge program for the Diesel Generator Building was a mistake. In fact, it remains our position that that was the best solution to the situation as it existed in 1979. And it has resulted in a structure which is structurally safe and meets all NRC requirements.

That's all I need to say. I'm sure we'll all --

CHAIRMAN BECHHOEFER: That, of course, is one of the matters we will be considering with Dr. Peck and --

MR. STEPTOE: Well, that's right. I don't mean to suggest that this argument is unimportant. It really does go to the ultimate issues in this case which the Board eventually will have to determine. But perhaps it's premature to go into it further at this time.

MR. MARSHALL: Mr. Chairman, I live so close to

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that that if they're wrong I won't even have time to stop to collect my insurance.

(Discussion had off the record.)

CHAIRMAN BECHHOEFER: I note now that Mr. Miller has arrived.

MR. STEPTOE: Yes, sir.

CHAIRMAN BECHHOEFER: We have postponed all discussion of scheduling. I had announced earlier this morning that the Board will not know about its scheduling until this afternoon.

Now, whether you want to delay the subject until then or go into it now --

MR. MILLER: I would prefer to delay it until this afternoon, if that's satisfactory to everybody else.

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else.

MR. PATON: Mr. Chairman, I'd like to respond to that.

In considering schedule, I think one of the factors that is going to have to be taken into account is the projected construction completion date of the facility and whether there has been any change in that. And I'm just suggesting that if that information is available, if Mr. Miller wanted to announce it now, we would all have that information and be able to consider our own thoughts on schedule a little better.

CHAIRMAN BECHHOEFER: Yes, I think that might be desirable, because whether we are aiming for a June '83 decision, which would be about 30 days before the projected completion date, or whether we're aiming for something a lot later in the year will make a lot of difference as to, perhaps, our future scheduling and whether we would be inclined, for instance, to put QA into January, for instance, and it would depend on when the OL hearing has to start, and that type of thing.

MR. MILLER: Yes, sir. Well, I think I can at least shed some light on that issue, and the Board and the parties know, pursuant to the Board's April 30th 1982 order and the specific work release procedure that was agreed to by the company and the NRC Staff in August of this year, which I believe is also an exhibit in this

record, any soils remedial work that is undertaken by the company must be the subject of specific written authorization by the NRC Staff.

As of November 1st, the NRC has approved no new work with respect to the remedial soils work for six months.

Now, the delay in these approvals and carrying out the underpinning activities at the Auxiliary Building and service water pump structure make it impossible to complete construction by July of 1983.

Now, there are a number of milestones that the company uses for its own internal planning, and, obviously, those include both fuel load date and the commercial service break of the two reactors.

Those milestones for project completion are not going to be changed by the company pending further construction progress and schedule analysis. The company is going to base any revised schedule estimate on two factors, the detailed planning it has done so far for the proposed remedial work, but, perhaps more importantly, its actual experience during the first few months of constructing the underpinnings. At that point in time we'll be able to evaluate just what the construction completion time is.

The company plans on issuing a new schedule for

these project milestones sometime in the first quarter of 1983, but, as we sit here today, no new fuel load date has been established and it remains in July of 1983.

CHAIRMAN BECHHOEFER: Well, are you telling me that there's a possibility that you would finish by July '83?

MR. MILLER: No, sir.

CHAIRMAN BECHHOEFER: I mean, is that --

MR. MILLER: No, sir. I think the company recognizes that construction of the underpinning work cannot physically be completed by July of 1983. And, accordingly, I think if your question is what is the impact of that on fuel load date, then the fuel load date has slipped beyond that date as well, beyond July 1983.

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The extent of that slip, though, is something that just won't be known until actual construction of the underpinning work has begun. The company hopes that this underpinning work will begin in the next few weeks. But, until that begins, as I say, a firm schedule simply can't be established.

CHAIRMAN BECHHOEFER: Mr. Paton, do you have any comments on that?

MR. PATON: Yes, I do.

Mr. Chairman, although I think I can understand how difficult it would be to put a new projected date for construction completion, I think that type of information is very important to this Board in determining the pace to establish for this hearing.

The Applicant has stated that they know that it will be impossible to complete construction by July '83, so we know that there will be some minimal delay. I would think the Applicant -- and then the Applicant says we won't have a new schedule until the first quarter of '83. I, frankly, don't think that that's very satisfactory to this Board. Even though the problem is very difficult, I think this Applicant should come up with some estimate of the minimum amount of delay that would be involved.

I just don't think that "We know July '83 is impossible and we'll tell you in the first quarter of next

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year what the new schedule is--" I just can't imagine that the Applicant can't give you a better time estimate than that.

CHAIRMAN BECHHOEFER: Does the Staff's -- I don't know the name of it --

MR. PATON: Forecast panel?

CHAIRMAN BECHHOEFER: Forecast panel, yes. Has it decided whether it's going to make an estimate in the near future or --

MR. PATON: The Applicant has indicated to us that they would prefer that the forecast panel not visit the site for some period of time.

If you want the details on that, Darl Hood is familiar with it. But they have indicated that they would prefer that the forecast panel not visit the site in the immediate future, so we just aren't going to have any information ourselves until that forecast panel does visit the site. And right now I think -- I think we have agreed to hold off for some short period of time on having that forecast panel visit the site.

MS. STAMIRIS: Judge Bechhoefer --

MR. PATON: Mr. Hood indicates that that much is correct. If the Board wants any more information, we could have Mr. Hood take the stand.

MR. MILLER: I'd like to just --

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MS. STAMIRIS: Excuse me.

MR. MILLER: I'm sorry. Go ahead, Ms. Stamiris.

MS. STAMIRIS: I would like to respond for myself and on behalf of the public. I just want to stress that because I think it's so important that the public be given some indication of what's going on here, and I don't think that exceptions should be continually granted Consumers on what have been adopted schedules and routine schedules. Consumers was granted a six months addition to their annual self-evaluation by Mr. Keppler, and it was extended from a year's period to a year and a half in order that they could tell us what their most recent improvements are. And the same thing is happening with the case load forecast panel. It is overdue since approximately July of 1982, and everyone is waiting, but Consumers is being allowed to just sit on these cost estimates and schedule estimates that everybody needs to get some idea of.

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I would think that Bechtel has probably made some internal guesstimates to Consumers, and I think that that's something that's done all the time, that they say if the NRC allows us to go forward by such and such then our completion schedule would be such and such.

I mean, maybe they can't give us an exact deadline, and they have never been able to or never been expected to. No one expects someone to tell you precisely when it's going to be done. But, in the past, we have always made allowances for looking at the different factors that are involved in making a best estimate and maybe a worst case estimate. But somehow this Board and the public deserves to have some indication of what is going on with the construction schedule of this plant. And we can't just let it go into 1983 when, I'm sure, from their point of view, hopefully, underpinning work would be underway.

It's like they're not going to tell us how long it's going to take or what the full implications are until they have been allowed to get a start on their underpinning work. Well, that's the important point. If they're allowed to get a start on that underpinning work, then we're kind of in a whole different situation, and it really is irreversible work, as far as I'm concerned, once it's started. And I just think we should be given some indication of what the implications are before the

first quarter, you know, or the end of the first quarter of 1983, if that's what it would go to.

CHAIRMAN BECHHOEFER: I might say, on behalf of one statement you made, the Board views our April 30th order as not contributing to any delay at all. In fact, we think it's likely to make the work be completed sooner, appropriately.

MR. MILLER: Well, if there was any implication that the Board's order was the cause of delay, let me hasten to say that that was not the thrust of my comments at all. I'm simply stating as a fact that since that order has been issued and since the specific work lease program with respect to remedial soils work has been adopted by the company and the NRC Staff, there has been no significant remedial work authorized by the NRC Staff.

I'm not attributing any blame in that statement. It is a neutral one. It is simply reporting as a fact what the status of the construction is.

CHAIRMAN BECHHOEFER: Have there been any requests that have not been responded to?

MR. MILLER: I'm sorry, sir; requested by the --

CHAIRMAN BECHHOEFER: By the company to initiate construction.

MR. MILLER: Well, I believe that the pacing item right now is the requalification of quality control

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inspectors, which is intended to MPQAD taking over the quality control function at the Midland site from Bechtel. And it has been the extensive requalification efforts involving written examinations, which also had to be reviewed and passed on by the NRC Staff, which is currently the reason that no remedial work has been undertaken.

I can't state for a certainty whether there have been any requests specifically that have been denied by the Staff, but if I might just have a minute --

CHAIRMAN BECHHOEFER: Or just not acted upon, as the case may be.

MR. MARSHALL: Mr. Chairman, while Mr. Miller is still here and talking, I would like to ask, just for the record, I'm a little confused as to which company he's asking the delay for.

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I would like him to qualify it, which company is he speaking for. There are several companies involved in this construction.

MR. MILLER: If there's any misunderstanding, I'm speaking on behalf of Consumers Power Company.

MR. MARSHALL: That's what I wanted to know.

MR. MILLER: And let me just say that there was prior -- I think during this summer and up to the time that the SSER was issued by the NRC Staff, I believe it was the Staff position that no remedial work could begin until the SSER was issued. And, as the Board may recall, that date slipped a little bit as well.

I am informed that there are some requests that are outstanding that have simply not been acted on, and it's the company's understanding, Consumers Power Company, that the reason for that is the Staff's perception that requalification of the QC inspectors is the first priority.

If I might just respond to some of the comments that were made, I think that the Board's interests, and, indeed, the parties interests in completion dates really has to do, as I think you said, Judge Bechhoefer, with the question of when hearings should be scheduled, how the Board and the parties should arrange to get the work of this hearing done.

To my knowledge, there is not a contention, nor

could there be, with respect to the completion date of the facility. That's simply not an issue here other than as it affects our schedule.

CHAIRMAN BECHHOEFER: That's correct.

MR. MILLER: I think that what -- well, we from the company and the company's lawyers have sat down and looked at the contentions in the operating license that we have agreed should be litigated. We've tried to make some reasonable estimate with respect to those which we and the Staff oppose but which are the subject of pending rulings by the Board, and we --

CHAIRMAN BECHHOEFER: By the way, I announced earlier this morning that the Board will not issue an order but we will tell you which of Miss Sinclair's contentions we are accepting and which we aren't before we leave this session.

MR. MILLER: Oh, I see.

CHAIRMAN BECHHOEFER: We won't have a written order out, but --

MR. MILLER: Well, my point is that those issues strike me as involving at least some that are complex from a technical standpoint and are going to require quite an extensive evidentiary presentation on behalf of the Applicant, and, I'm sure, the Staff as well.

In addition, the contested quality assurance

issues, those dealing with the allegations put foward by the Government Accountability Project, the allegations put foward by the ex-employees of the Zack Company, are also going to, in my judgment, take quite a bit of hearing time, as well as preparation time.

At the Staff's request, we have deferred discovery on those issues until the Staff's investigation is concluded.

CHAIRMAN BECHHOEFER: That's January now, I understand.

MR. MILLER: We certainly hope so. But my basic point is simply that without even looking at the work the three of you must do once the evidentiary submissions are complete, I think that we should schedule hearings as we can in the beginning of 1983, to use the time that is available to us to litigate as many issues as possible.

The company is simply not able at this point in time to make a guess. It has some hope that perhaps when the construction of the underpinning work goes forward that it will go smoothly and that some of the time that has been lost out of this schedule can be made up. But it's not going to know that until constructon actually begins.

I simply have no knowledge from which I can even venture a guess at this point in time with respect to a construction completion date.

CHAIRMAN BECHHOEFER: Well, our problem is that if July '83 were really legitimate, we would, as a matter of policy, like to get a decision out 30 days before -- just because of the Commission's review schedules, we would like to get a decision out one way or the other 30 days before the fuel load date, and that would mean we'd have to close the record in about February or March, which is, to me, a very difficult task, and the planning involved in that would be a lot different than if we knew it were, well, even October, which was the previous forecast panel's estimate, or towards the end of the year. There would be much more leeway.

That's my problem in terms of immediate scheduling.

MR. MILLER: I'd like to confirm that the company did, in fact, ask the case load forecast panel to visit, and the reason is the same one that I stated, that absent some at least significant initial work on the underpinnings, the case load forecast panel would not have all the facts available to it in order to make an informed opinion.

This is not any effort to hide the ball or to keep things from the Board, the Staff or the public. It is simply -- it has been in a position, for whatever reason, for about six months now of marking time.

I think, Judge Bechhoefer, as my first remarks may have indicated, that the July 1983 date is simply one that we don't believe can be achieved.

I don't believe that it is physically possible to compress the amount of work that needs to be done on the underpinnings between now and July 1983.

(Discussion had off the record.)

CHAIRMAN BECHHOEFER: Yes, how is the rest of the plan coming, absent underpinning work?

MR. MILLER: I think that there are numbers of systems that have been turned over for preoperational testing, but the precise status of it, I'd have to get additional facts and provide them to you.

CHAIRMAN BECHHOEFER: I take it that absent underpinning you could make a July date?

MR. MILLER: I think that the underpinning work is definitely the pacing item in terms of completion of construction.

Let's see; I believe that of 850 subsystems in the plant 509 of them have been completed and have been turned over to Consumers Power Company for preoperational testing. But, beyond that, in terms of the detail of which systems are yet to be turned over, I simply can't say today.

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CHAIRMAN BECHHOEFER: I take it, though, absent underpinning, you probably could make your July '83 date?

MR. MILLER: I believe that's true.

MS. STAMIRIS: I'd like to ask Mr. Miller if in making that statement that he's taking into consideration like the reinspection of the cables that's supposed to take six months, is my understanding.

MR. MILLER: I'm sorry, I don't have the information to be able to answer that.

MS. STAMIRIS: Okay.

MR. MILLER: If the Board is interested, I'd be happy to attempt to get that information before the end of this hearing date.

CHAIRMAN BECHHOEFER: No, the Board is only interested insofar as we set our scheduling.

(Discussion had off the record.)

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CHAIRMAN BECHHOEFER: I guess we probably should defer -- Mr. Paton, I was going to say we should defer any decisions on the specific motion that the Applicants have concerning their QA testimony until we know more this afternoon.

MR. MILLER: I must say that that motion -- well, obviously, it has some impact on the overall schedule. It is, in a sense, unrelated to any potential slip in completion of construction. There was --

CHAIRMAN BECHHOEFER: Well the only relationship is if we decide -- well, like a two-week period in January would be a good time to set aside for 100 percent QA. Maybe that is a good way of handling it. But I might say that I don't think we can handle QA in January if we were aiming for a June decision. I just don't think we could do that.

It is possible, but then we might have to hear something else in December. But if we can postpone until March or April, then there would not be any problem. We also have to -- we would like to write a soils decision, before we write an operator license instead. Now whether that is possible -- I am hoping it is.

MR. MILLER: Well what I would like to suggest at some point today or tomorrow, is perhaps, off the record, informally, we ought to see what weeks are

available for next year for resumption of the evidentiary hearings even if we are not precisely able to identify which issues should be taken up at that point in time.

CHAIRMAN BECHHOEFER: That might be desirable. We could set aside some dates.

MS. STAMIRIS: I would like to ask Mr. Miller one question. Has Bechtel submitted internal schedule forecasts to Consumers Power Company?

MR. MILLER: Not to my knowledge.

CHAIRMAN BECHHOEFER: I take it you don't have even a best case forecast of everything -- if you are authorized to start, like within the next two weeks --

MR. MILLER: No, sir, I don't.

CHAIRMAN BECHHOEFER: Because that would at least present a most favorable date that we could aim for.

MR. MILLER: I think that the reason I don't have one is that the company has made projections in the past that have not been achieved. I think that in recognition of the company's part, is that the underpinning work is relatively complex, both from a technical standpoint and from the degree of detail of supervision overview by the NRC that's going to be involved. So it beings, it simply is not going to be in the position to say how quickly or how much time is going to be taken in the process. So I am sorry, I simply can't --

CHAIRMAN BECHHOEFER: Is weather likely to be a problem in the underpinning operations?

MR. MILLER: I don't believe so.

MR. PATON: Mr. Chairman, could I respond?

CHAIRMAN BECHHOEFER: Yes.

MR. PATON: I think your suggestion or statement was -- went right to the mark. The Applicant has said that the underpinning work is the basing item. Now I just really cannot imagine that a corporation like Consumers Power doesn't have a schedule, an optimum schedule for that work because they have previously not met their schedules. I just can't imagine that; that they say, gee, we didn't meet our schedule before so why make a schedule. That's just -- I just have difficulty with that.

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I will suggest to the Board that if they don't have such an optimum schedule, that the Board ask them to make one. I would not think that would be unduly burdensome, and that would be a starting point. I mean, in other words, if everything went reasonably well, how soon do you think you could complete the underpinning? I just can't imagine that that would be unduly burdensome or impossible to do.

MR. MILLER: Mr. Chairman, I would just like to respond very briefly.

The company is devoting the technical resources that it has to getting this QC inspector for the requalification program complete and to doing whatever else is required to be able to begin the underpinning work itself with the current NRC Staff.

The same individuals who are involved in that effort at a management level would also be involved in making an estimate of the schedule that would be required. I am not trying to deprecate the importance to the Board or the parties of having a schedule in mind what we are making plans for early next year. But I think it would really just be counterproductive to insist that people not do the technical work required to get the remedial work started. And instead, make an estimate of the schedule.

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The company is simply not able to say right now what the schedule is for planning purposes. I think the Board can assume that the schedule -- the construction has been put off some months beyond July 1983.

And as the Chairman has said, if the July '83 date were still a valid one, we would have to impress the issues that we have left to resolve in a relatively brief period of time. All I am saying --

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saying--

CHAIRMAN BECHHOEFER: Let me describe to you another difficulty that comes out of all of this. I am not sure what can be done about it, but every month -- I guess it is going to be every three months from now on -- we have to tell Congress both what the Applicant's completion date is and what the date we are estimating our hearings are. And if we set it up that July is the Applicant's date and we are not estimating we will be through until October or November, we get a letter back from the Committee saying, what's going on? -- and that puts us in sort of an embarrassing situation. I don't like to say that I have been throwing it in that I will finish by July. If I make schedules that make it impossible, I hate to be sending that up. I do it once a month.

I have also noted that I have been using the Staff's previous caseload forecast date which is, I think, October, as a more realistic date. But Congress still wants to know about the Applicant's proposed date. That leaves us in a little bit of a problem because, frankly, on the reports that I have been sending up, we are not going to meet that date.

MR. MILLER: Mr. Chairman, I think that I have just stated that the July 1983 date is not the Applicant's current estimate for completion of construction.

CHAIRMAN BECHHOEFER: Is there any way of getting that date out of the regulatory system?

MR. MILLER: I will confer with people who are responsible for that sort of communication to see what we can do.

MR. PATON: Mr. Chairman, I think -- I just discussed it with Mr. Hood and I told him that I didn't think we could possibly continue to report July 1983 because Mr. Miller has just stated that it would be delayed "some months", so I think we are, at least now at the point of some months later than July 1983. So I am going to ask Mr. Hood to put that into our reporting system immediately. So where we are --

CHAIRMAN BECHHOEFER: Maybe that will take care of the problem, at least. I am not sure.

MR. PATON: I don't know what happens to the December 1983 date, but --

MR. MARSHALL: Chairman, again we have projections being played back and forth by what is -- by what is referred to as the Applicant on one hand and the company on the other, and yet, it speaks in two phases here and I get confused.

It seems to me that we have Schultz's company and then we have another company watching Schultz' company, and these companies have to report --

CHAIRMAN BECHHOEFER: Schultz works --

MR. MARSHALL: I get confused on who is telling who when they are going to have a date to do this construction.

MR. MILLER: Schultz works for us now --

MR. MARSHALL: You are asking him what is going to happen. You have to report to Schultz when it is going to happen. He talks to Congress; it's a round robin.

JUDGE HARBOUR: I think we are getting a little bit too involved in bureaucratic details here. I think we should go on to something more substantive than that.

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MR. MARSHALL: I am so confused about the company.

MS. STAMIRIS: May I ask Mr. Miller his clarification on one statement he made about the construction schedule information?

When I asked -- when the question had been asked whether such estimates -- to whether he had such estimates and I asked about internalizing estimates for Bechtel, and Mr. Miller's response was that he doesn't have that information. Is that one in the same as saying that information is not in existence?

MR. MILLER: I simply don't know.

CHAIRMAN BECHHOEFER: Well I think we will find out a little more this afternoon about our schedule. Really, there is a proposed hearing that Dr. Harbour may be involved in that one week in December. If we have no information on that, we have to assume that there will be one. The parties there were supposed to submit some sort of supplement proposal by a certain date. If they haven't, we will have to assume that they can't settle.

So that's all I can say. We will find out this afternoon.

MR. STEPTOE: All right.

CHAIRMAN BECHHOEFER: Are there further

preliminary matters before we -- I guess the first witness, by the way, should be Mr. Kane on Ms. Stamiris' Contention 4.

MR. PATON: I do have a preliminary matter, Mr. Chairman.

CHAIRMAN BECHHOEFER: Fine.

MR. PATON: Mr. Chairman, I just handed out to the parties two proposed stipulations. One concerns the service water pump structure; one concerns the Diesel Generator Building. Those proposed stipulations are similar to ones that have been executed by the Applicant and the Staff in the past.

I discussed them both with the Applicant. I am not sure what their position is but I would ask the Board to ask them, say, right after lunch, if they could state what their position is with respect to those two stipulations.

CHAIRMAN BECHHOEFER: Who generated these stipulations?

MR. PATON: I typed them but they are very, very similar to stipulations we have filed in the past. What they relate to is the Applicant agreeing not to contest that as of, for example, as to the service water pump structure, Consumers Power agrees not to contest that as of December 6th, the NRC Staff has insufficient

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information to evaluate the service water pump structure and that insufficient information constituted a basis for the order.

The effect of these, Judge Bechhoefer, is to have Consumers Power -- we have discussed this before -- consent to the jurisdiction of the Board with respect to this particular structure. The point is, we can then address the adequacy of the remedy, and we don't have to spend a lot of time going back to what happened on December 6th, 1979 to contest whether or not the insufficiency of the information justified the Staff issuing the order, and we have agreed on, I think it was the Auxillary Building, that we would -- that the Applicant would not contest those facts so that we would not have to spend a lot of time on history and we could go right in and start talking about the adequacy of the remedy.

So that two proposals are very similar to the ones we have filed in this case in the past.

JUDGE COWAN: These are proposals. Are they proposals that have been discussed informally with the Applicant or are they just servicing at this point?

MR. PATON: No, no. I have discussed them with the Applicant and they said they would consider them and I have not discussed them with the other parties because the stipulation is between the Applicant and the Staff.

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JUDGE COWAN: That I understand. So that when they respond this afternoon, they won't be completely cold on --

MR. PATON: No, no. I think they are very familiar with the situation.

CHAIRMAN BECHHOEFER: I think it could either be this afternoon or, if you need a little more time, just sometime before the service water pump structure --

MR. MILLER: I would like to be able to respond more readily concerning the service water pump structure stipulation and perhaps, the Diesel Generator Building proposed stipulation.

CHAIRMAN BECHHOEFER: It might be desirable to have that, though, before we start hearing testimony on this.

MR. MILLER: I think we could do that.

MR. PATON: We would like it, as soon as we can because it affects other -- for example, if we fail to get a stipulation in either event, then we are going to have to devote some time and energy in preparing our testimony on what was the situation in December 6th of 1979 and what was the specification for issuing the order. And that is going to involve some time and expenditures of resources.

So we would like to get the Applicant's response

as soon as we can.

MS. STAMIRIS: Judge Bechhoefer, I have a preliminary matter that perhaps, if I could raise it now, we could have an answer by this afternoon.

With regard to that discovery deadline of November 18th for my cost benefit contention discovery, I would like to request that -- I would like to propose two alternatives.

As I said, I had most of that ready to go at the time that I received the Applicant's motion, and then I put it on hold. And now because the hearings are starting, I can't take it out again and there's trouble with the typing. So if you want me to address that part of the contention, I would request that I be allowed to have until November 26th, a few days after the hearing ends, to submit those questions. And I would also like to have an alternative proposal to ask that if I was given a week and a half after the hearing, which would take me to December 2nd, it would give me time to analyze the information that is in this NUREG document that may have information on cost and schedules that you gave me yesterday, and bring all of the things together and submit one unified response on December 2nd.

If you would rather have me submit what I have on November 26th, then I would also ask that I be allowed

to submit a little bit more on December 2nd. Discovery questions to the Applicant. I don't think I will have any other stand.

CHAIRMAN BECHHOEFER: Well I would ask the Staff what they use in developing the cost benefit analysis. The Staff is responsible for that; not the Applicant.

MS. STAMIRIS: I have just --

CHAIRMAN BECHHOEFER: The Applicant supplies information, but the Staff doesn't --

MS. STAMIRIS: Most of my questions have to do with the information that was applied to the Staff.

CHAIRMAN BECHHOEFER: I see. I won't run your discovery program for you.

MS. STAMIRIS: Well I won't limit myself to say that I don't have discovery of the Staff because I do have questions about this analysis.

CHAIRMAN BECHHOEFER: Well do the parties have any reaction to this proposal, the two alternatives that have just come out?

MR. PATON: Mr. Chairman, since the discovery is going to be directed more towards the Applicant, I would defer the Applicant.

MR. MILLER: We have no objection.

CHAIRMAN BECHHOEFER: To which one?

MR. MILLER: To the 26th.

MR. PATON: I think Ms. Stamiris indicated that she would also like to ask questions on the document that is being handed out and that she would prefer to submit all discovery on December 2nd.

MR. STEPTOE: Well it is not Applicant's document.

MR. PATON: Well I don't want to get into that argument, she is just asking for December 2nd. Either you agree or you don't agree.

MR. MILLER: No objection to the 26th.

MS. STAMIRIS: Do you object to me submitting a discovery submittal on December 2nd?

MR. MILLER: If I understand the Board's ruling, it originally sets November 18th as the discovery cut off date --

CHAIRMAN BECHHOEFER: That was 15 days, if I counted correctly.

MR. MILLER: Right, and I think that November 26th is adequate.

CHAIRMAN BECHHOEFER: The delay was caused by the motion which we have sent for reconsideration.

MR. PATON: Mr. Chairman, the Staff does not object to December 2nd, and I don't see that it interferes with the proceeding. Yet there was some reason to think that it would interfere with the schedule in some way, I would object. But we are talking about another few days.

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CHAIRMAN BECHHOEFER: The Board will give you until the 26th for what you had decided already. We will give you until December 2nd only for further discovery of that one document.

MS. STAMIRIS: All right.

CHAIRMAN BECHHOEFER: Since you said you had it all ready to go anyway, I think it would be better to get it in the hopper and get it before the parties as early as possible. You may ask further questions on that one document to the extent you have any by the 2nd.

Now it is a Staff document. When I gave a copy to the Applicant, it may have been the first time they saw it.

MS. STAMIRIS: All right.

CHAIRMAN BECHHOEFER: It happened to circulate across our desks in Washington. We will grant that: We won't issue a formal order.

MS. STAMIRIS: All right.

CHAIRMAN BECHHOEFER: Are there any more preliminary matters?

Actually, I think we will take a break and then we will come back with Mr. Kane, I think.

MR. PATON: We would like to talk about that. That is what we had intended to do, proceed with Mr. Kane on Contention 4-A-1.

CHAIRMAN BECHHOEFER: That's correct. Then if you prefer to start with Mr. Lewis, that is all right, too.

MR. PATON: That is what we are going to talk about.

CHAIRMAN BECHHOEFER: I don't think we have any strong feelings one way or the other, so we will come back in 15 minutes, and whatever witness is up, then we will know how you came out.

MR. PATON: Thank you.

(Brief recess.)

CHAIRMAN BECHHOEFER: Back on the record. Have the parties decided which witness they will start off?

MR. PATON: We would prefer to proceed as we had intended, with 4-A. But before I do that, Mr. Chairman, I have a brief preliminary matter.

CHAIRMAN BECHHOEFER: All right.

MR. PATON: Mr. Chairman, you had indicated to me recently that you wanted the Staff to bring a witness during the quality assurance hearing, and I want to make very certain that I understand exactly what your request is and I want to say it and ask you if I have it right.

As I understood your request, you wanted an NRC witness who can address NRC enforcement policy with respect to quality assurance issues. I believe you stated to me that you will have facts before the Board presented

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by Region III, possibly NRR, and you want a witness who can testify to this Board on NRC enforcement policy with respect to those facts that relate to quality assurance.

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assurance.

That is what I understood your question to be.

CHAIRMAN BECHHOEFER: Well, it is a little different from that. What I had in mind, it was my understanding that the responsibility for determining what an adequate QA program is, is maybe it is not completely transferred but it is at least shifting from NRR to I&E headquarters' offices; and that therefore, someone ought to be here to discuss what the current Commission policies with respect to adequate QA plans are.

MR. PATON: Mr. Chairman, let me direct your attention.

You said program. Now I would distinguish it as we always have in this proceeding. I would make a clear demarcation between program and implementation. We are going to be talking mainly about implementation.

CHAIRMAN BECHHOEFER: That's correct. What I should have said --

MR PATON: You did say program. I want to make sure, do you really want us to limit it to program or --

CHAIRMAN BECHHOEFER: That was a slip. Program plus implementation policy, policy toward implementation. If my understanding is wrong, I have seen some documentation and I understand that there have been several papers before the Commission dealing with this but I don't have anyparticular references. So it was our thought that

someone from headquarters ought to be able to speak on whether given QA, both programs and the likely implementation of it, will meet current NRC standards.

MR. PATON: Now you said given the program and the likely implementation. I am wondering now, I had understood your request to be, in light of the facts that are given to this Board on what has happened -- in other words, we are going to present a lot of testimony to the Board on QA implementation as it has been implemented. In other words, this is our inspection report. This is what we have found. I understand you want a witness who can take into account both the QA program and the history of implementation, recent history of implementation and address NRC enforcement policy with respect to those quality assurance matters. Is that more accurate?

CHAIRMAN BECHHOEFER: Enforcement or maybe acceptance.

JUDGE HARBOUR: The standards.

MR. PATON: Are you indicating that when I use the word "enforcement," that the implication that something has gone wrong, is that the correction you are making?

CHAIRMAN BECHHOEFER: Well, I don't want to necessarily imply that there is something going wrong on the future.

MR. PATON: Let me try it one more time.

The question is, the witness should be able to take into account the QA programs and recent QA implementation and determine from an NRC policy point of view, is that acceptable.

CHAIRMAN BECHHOEFER: That's correct. We were just not positive whether the NRR representative who will be here, can now speak to that. If he can, then you need not produce anybody. If he can't, it may be desirable to bring something from I&E headquarters.

MR. PATON: I appreciate that, Mr. Chairman. I think that would be helpful to others to be able to --

CHAIRMAN BECHHOEFER: There are other headquarter divisions which may have responsibility. Now I am not really sure what is going on, but in terms of responsibility for this type of thing --

MR. PATON: It is helpful, I think, if we have this on the record and the people involved can sit down and read the precise words and make their decision. But I appreciate your help on this.

CHAIRMAN BECHHOEFER: Right. Direct testimony need not be presented, but maybe somebody can be here to answer questions.

MR. PATON: Fine.

CHAIRMAN BECHHOEFER: With the other QA witnesses

that you have.

MR. PATON: Yes. Thank you, Mr. Chairman.

Shall we proceed with Mr. Kane?

CHAIRMAN BECHHOEFER: Yes.

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MR. PATON: Mr. Kane has been sworn.

Whereupon,

JOSEPH D. KANE,

called as a witness herein, having been previously duly sworn, resumed the stand and was examined and testified further as follows:

DIRECT EXAMINATION

BY MR. PATON:

Q Mr. Kane, would you state your full name and your position with the NRC.

A My name is Joseph D. Kane and I am a geotechnical engineer with the Nuclear Regulatory Staff.

Q Mr. Kane, do you have with you a copy of Stamiris Contention 4-A-1?

A Yes I do.

Q Does the subject of bearing capacity relate to the allegations in Ms. Stamiris' Contention 4-A-1?

A In my opinion, it does.

Q Tell us your understanding of that contention and how those allegations relate to bearing capacity.

A The contention, and I would like to read it to explain the terms later on, states that: (Reading.)

"Preloading of the Diesel Generator Building does not change the composition of the improper soils to meet the original PSAR

specifications."

When we are referring to the PSAR specifications, it is my interpretation what is being intended is requiring 95 percent of maximum dry density, according to the modified composition test.

This contention states that preloading of the Diesel Generator Building does not change the composition of the soils to meet those specifications. It would be the Staff's position that preloading did change the composition of the soils. In accelerated consolidation, it increased density of the cohesive materials. And after preloading, the soils are in a condition which we have established their engineering properties by taking borings and performing laboratory testing to establish their shear strength properties and their complexibility characteristics.

The shear strength is one aspect of the soil after preloading, it is one aspect that affects bearing capacity. And on the basis of the laboratory test results and the shear strength which has been indicated, the Applicant has calculated and the Staff has agreed that an adequate margin of safety against bearing capacity failure is available based on the shear strengths from the laboratory test.

The contention is correct in indicating that

there is not the requirement not to meet the original PSAR specification, and that is, it is not intended now to demonstrate that the soils after preloading are 95 percent maximum modified density. And the reason for this is that that requirement on density in engineering practices assures us that if that goal is attained, we will have soils of such characteristics that we know it will not be highly compressible, we know it will have great shear strength. We will know that by having tested it in advance.

In this particular case, we are not now requiring that 95 percent modified be met but what we are doing is the equivalence of what that is intended to do, and that is by laboratory testing, actually go back and establish the shear strength and the soil compressibility which is what that standard was intended to cover.

So by laboratory testing, we have eliminated the need to meet PSAR specifications.

Q Does that complete your direct testimony?

A Yes.

MR. PATON: That is all I have, Mr. Chairman.

CROSS-EXAMINATION

BY CHAIRMAN BECHHOEFER:

Q Just as addition, do you have any idea, if it doesn't meet 95 percent, do you know what it does meet?

A In my estimation, based on the densities that are now indicated after preloading, the density of the cohesive soils, in my estimation would be either equal or exceed the 95 percent. I think the preloading in the soils is a condition which we would have hoped would have reached PSAR specifications.

JUDGE HARBOUR: Cohesiveness, what about the noncohesive soil?

THE WITNESS: As indicated by Dr. Hendron, preloading is not effective in improving density of

cohesionless soils; and therefore, we have the problem of seismic shakedown and that problem has been addressed by the installation of the permanent dewater system; seismic shakedown and liquification.

CHAIRMAN BECHHOEFER: Ms. Stamiris.

CROSS-EXAMINATION

BY MS. STAMIRIS:

Q Mr. Kane, when you said that the Applicant has performed calculations and the Staff has agreed on the adequate margin of safety for bearing capacity, to what extent -- I mean, that tells me that you were reviewing the Staff's or the Applicant's calculations. Do you do any of your own original calculations?

A The calculations that I have, and I think our consultant, which will be the Corps of Engineers, has checked their calculations which has been submitted in response to questions, so a check --

CHAIRMAN BECHHOEFER: Is that a check for anything more than mathmatical accuracy?

THE WITNESS: Well the check begins with an agreement that the right shear density, and that is the major, is put into the calculation. We are in agreement with that.

And then, we look at the methods that they are using to estimate the factor of safety, and we are in

agreement with that method. And then, we are in agreement with the mathematics.

CHAIRMAN BECHHOEFER: All right.

BY MS. STAMIRIS:

Q Yesterday, you were here, I believe, when Dr. Hendron testified that when he was conducting his analysis on bearing capacity, that his analysis was in fact dependent on the accuracy of that data provided to him by Bechtel in their boring samples. To what extent is the NRC's analysis then indirectly dependent upon Bechtel's original submission of data?

A Both Dr. Hendron and the Staff are dependent on the input that we received with respect to the results of the laboratory test. We are also dependent on the input that we received from the structural engineering people with respect to the magnitude of loading. A geotechnical engineer has not developed that information. He obtains that information and uses that information in his estimate of safety factors.

BY MS. STAMIRIS:

Q Well, how can the NRC be assured of the final safety as a result of that analysis, if in fact they have not checked or verified the accuracy of the original data input?

A We have checked the laboratory test results. We find them to be reasonable.

Q But you do not do them yourself?

A I know of no plant where the NRC goes out in the field and does the actual borings and laboratory testing. We are dependent on that being performed by the Applicant, and we evaluate it based on our experience as to what is reasonable.

MS. STAMIRIS: All right.

CHAIRMAN BECHHOEFER: Did the Staff observe any of the borings?

THE WITNESS: Yes. I should say the Staff's consultant, the Corps of Engineers, observed the taking of the borings that have been designated COE with respect to the ones at the Diesel Generator Building or observed the procedures in taking those borings and recovering the sample.

BY MS. STAMIRIS:

Q On all of the borings, and I just want to include this in a general sense, in all of the borings that were

got upon in any way for bearing capacity, could you estimate the percentages which were observed by the Corps of Engineers?

A Six borings were observed by the Corps of Engineers at the Diesel Generator Building. The percentage would be over the total number of borings, which I do not know.

Q When you said that although it is not now required that the 95 percent density be demonstrated by the Applicants, that you have come up with the equivalent by other means.

I would like to ask you, isn't there a significant difference as far as the impact and the overall safety and structural integrity of the Diesel Generator Building towards having achieved 95 percent density before that building is built on that foundation as was originally required in the PSAR and the Applicant's design as opposed to assuring yourself that as a fact, with the building there and all of the dynamic forces that come into play, that 95 percent density is achieved?

A In response to your question, with respect to bearing capacity, I don't feel the fact that we are now getting closer to density, that we are required -- is a major impact on bearing capacity -- we do not feel we have any bearing capacity failure of the Diesel Generator

Building. We recognize that we have had a settlement problem and what results from the differential settlements from that standpoint, you are correct, that it would have been better to have reached 95 percent modified in the beginning and had avoided the settlements, yes.

Q I would like to ask you, Mr. Kane, I hope you can answer this, if you are sympathetic to the concern I raised yesterday about putting each different element of the NRC analysis or Consumers analysis into a neat little bot and looking at bearing capacity in the isolated sense as opposed to drawing the whole picture together as to the overall affect --

MR. PATON: Mr. Chairman, I object to whether or not he is sympathetic to a rather complicated area. First of all, I am not sure he knows precisely what the question is; and then if he knows it, whether or not he is sympathetic. I don't think that would help this record.

JUDGE HARBOUR: Try to reword it.

BY MS. STAMIRIS:

Q I will try to rephrase it.

Mr. Kane, do you think that the analysis of bearing capacity in and of itself is of significantly less value than looking at bearing capacity in the whole picture for the Diesel Generator Building?

MR. STEPTOE: Objection. Your Honor, it is

not clear what Ms. Stamiris means by the whole picture. The whole picture to me is the whole context of these hearings, and the Board is going to draw the whole picture when it makes its decision.

It is just not clear and it cannot possibly be clear what Ms. Stamiris' is trying to do except to find an ally in the witness to reorganizing the procedures which were followed in these hearings which are procedures that is really up to the Board and the parties to determine. It is n't a technical question.

(Discussion had off the record.)

CHAIRMAN BECHHOEFER: Let me try this. This may just be for public information so they can understand how the Commission evaluates plants, but is the separation of geotechnical evaluations into distinct elements a rational and normal procedure in engineering practice in order to determine compliance with standards, with applicable standards?

THE WITNESS: Yes, and I understand from your question it to mean do we in a matter of policy address distinctly aspects of bearing capacity and liquification, and my answer would be yes.

CHAIRMAN BECHHOEFER: Now, how are these separate evaluations put together?

THE WITNESS: They come together in our SSER. And they are in SSER No. 2. We do evaluate bearing capacity in a separate section, and we do evaluate settlement in another area. We do evaluate liquifaction in another section.

CHAIRMAN BECHHOEFER: When you have done this and then put them together, do you think you have an adequate evaluation of the plants or the conformance of the plant to applicable standards or criteria?

A Yes. That is what our standard review plans and regulatory guides are helping us -- to address these aspects and see that their required level of safety is

being met, and then the SS -- or the SER gives us an opportunity to report how we have been satisfied.

CHAIRMAN BECHHOEFER: All right.

BY MS. STAMIRIS:

Q Mr. Kane, as a follow up to that, when you answer that the separate evaluations are brought together in the SER or SSER, what I'd like to ask you is can you tell me, in terms of individuals, who makes the integrated decision on safety in the end?

A Each of the engineering specialties -- and geotechnical engineering would be one -- we'll normally have one reviewer who is responsible for a given project to accumulate all the assessments and come to the conclusion on safety.

Q Then, is there a person or persons who then takes the assessment of each reviewer in his specialty and draws them together as a whole?

A Generally, one plant will have one geotechnical engineering reviewer, generally. With Midland, because of the problems that we've had and the difficulties, and the difficult fits such as underpinning, we have had use of more consultants than normally. And my responsibility is to coordinate their efforts and summarize their efforts and my efforts in the SER.

Q Okay, thank you. Then, if that is your

responsibility, going back to my original question about why the 95 percent density, if, in fact, it is achieved after the fact, is not the same, in a broad sense, if 95 percent density achieved as a proper foundation before the building is built, what is your assessment of the difference between the plannings of those achievements of density as far as the overall impact of safety on the diesel generator building is concerned?

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concern

MR. STEPTOE: Objection. That goes beyond the scope of 4-A-1, the testimony that this witness was offered to address, which is the bearing capacity issue.

MR. MARSHALL: Exception. I think it's within his realm or scope of expertise.

(Discussion had off the record.)

CHAIRMAN BECHHOEFER: I think we'll overrule the objection.

You can answer this, but remember it has to be in the context of Contention 4-A-1.

BY THE WITNESS:

A The Staff's opinion as to recognizing that preloading has been necessary to produce the condition in the soils which would have been obtained if they had been originally compacted to 95 percent modified, the Staff's opinion of that occurring is in the SSER. We have addressed it.

BY MS. STAMIRIS:

Q Okay. I'll try and be more specific by asking it in this way. When I asked you originally what was the difference between a 95 percent density achieved before the building was built and achieved after the building was built, with regard to bearing capacity, you said it didn't have a significant impact in your mind.

I would like to know, with respect to other safety evaluations at the Diesel Generator Building, in your estimation, does this 95 percent density achieved after the fact have a significant difference?

MR. STEPTOE: Same objection.

MS. STAMIRIS: I'm asking it beyond bearing capacity.

CHAIRMAN BECHHOEFER: I think we'll overrule that.

You may answer.

BY THE WITNESS:

A The problem with settlements and what has occurred because 95 percent modified was not achieved is a very real problem which we have been directing ourselves to to make sure we know the settlements that have occurred and get a good hold on the future settlements.

So, those concerns are coming about because we did not get the original good compaction.

And the Staff has addressed in the SSER our concerns. It is my understanding that the session that is going to be scheduled on the Diesel Generator Building will be bringing out those concerns with respect to settlement. So it's something that we're not covering now but it is anticipated it will be covered.

BY MS. STAMIRIS:

Q Then, is it your understanding that at some other time that we will cover in this hearing the effect on the structural integrity of a 95 percent density achieved after the fact at the Diesel Generator Building?

A I would not phrase it exactly like that. We will address the problems which have resulted because that was not obtained. We will not go back and attempt to demonstrate that 95 percent has been attained. What we will attempt to do is that -- we know the properties with respect to the Compressor Building -- and demonstrate that these have been addressed in the analysis of the Diesel Generator Building.

Q Can you tell me what witness will address the impact on the structural integrity of the Diesel Generator Building?

A Your key words, structural integrity, would lead me to indicate that would be the structural reviewer, which would be Frank Rinaldi.

Q Mr. Kane, are you aware of the existence of voids that were discovered in the soils at the Administration Building that's reported in the NRC inspection report?

MR. PATON: I object.

MR. MARSHALL: Take exception.

MR. PATON: It seems like we're off on -- I don't

see any relationship between that question and Contention 4-A-1.

I think some of her previous questions were objectionable, but I just think that I'm at the point where I think we should go back to discussing Contention 4-A-1.

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MS. STAMIRIS: This is a background question. I don't intend to go into any detail about the Administration Building, and my next question will relate to the Diesel Generator Building.

MR. MARSHALL: It's a sort of a question that's in the scope of his expertise.

(Discussion was had off the record.)

CHAIRMAN BECHHOEFER: We'll let him answer, but it just has to be a preliminary question --

MS. STAMIRIS: Yes, clearly.

CHAIRMAN BECHHOEFER: -- because we don't want to go back and hear about the Administration Building --

MS. STAMIRIS: Yes.

CHAIRMAN BECHHOEFER: -- in detail.

BY THE WITNESS:

A I am aware of the problem of settlement at the Administration Building because you, in the past, have brought that to my attention in the hearing and referred me to the I.D. documents that recorded that information.

BY MS. STAMIRIS:

Q Well, do you have a recollection, then, of the existence of voids in relation to that settlement problem at the Administration Building?

A I would call a description of when an excavation

was made into the fill in that area there were the presence of voids, yes.

JUDGE HARBOUR: I didn't hear you.

THE WITNESS: There were the presence of voids in the fill.

JUDGE HARBOUR: I didn't get that last word.

THE WITNESS: Fill, f-i-l-l.

BY MS. STAMIRIS:

Q Mr. Kane, since it is in the record that the specifications for testing and placement of the soils were the same at the Administration Building and at the Diesel Generator Building, I'd like to ask you, if there were voids under the Diesel Generator Building which the borings did not tap into, how would this affect your bearing capacity in ounces?

A I would have to address whether I think there are voids there first.

Q Well, okay, if you address what I asked you next.

A I will.

Q Okay.

A We have many borings under the Diesel Generator Building, including the six that were observed by the Corps of Engineers. The only voids that I know have been reported in the Diesel Generator Building were those that

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were under the mud mat at the time the Diesel Generator Building was hung up on the duct bank. I feel confident based on all the explorations that we have --

JUDGE HARBOUR: All the what?

THE WITNESS: All the explorations that we have.

BY THE WITNESS:

A (Continuing) -- that we do not have voids under the Diesel Generator Building.

I feel we have required significant explorations and laboratory testing to demonstrate the properties of the foundation materials there, so I do not feel that there are voids on the supposition that there were voids.

MR. STEPTOE: Objection, your Honor.

MR. MARSHALL: Exception to the objection.

MR. STEPTOE: The objection, having stated that he does not believe there are voids and there is -- and based on yesterday's testimony by Dr. Hendron, there's no evidentiary foundation for what is obviously going to be speculation at this point.

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MS. STAMIRIS: I have no choice --

MR. MARSHALL: We'll get to that later, I'm sure.

CHAIRMAN BECHHOEFER: Well, I think I asked Dr. Hendron a question, if there were voids, would they have a significant effect.

MR. STEPTOE: And I thought Dr. Hendron consistently stated --

CHAIRMAN BECHHOEFER: Well, he did, but I don't object to the Staff answering the same question. Overruled.

BY THE WITNESS:

A Assuming there were voids, to come to the conclusion whether they affect bearing capacity would be very much dependent on the extent of those voids. If they're small, the capability of the wall footing to bridge those voids would be one consideration. If they're large voids, then, in my estimation, that would significantly affect the ability of the structure to safely carry it.

BY MS. STAMIRIS:

Q I asked Dr. Hendron yesterday to give me a very rough estimate of what percentage of the overall surface area -- and I believe I said let's say extending it 10 feet outside of the Diesel Generator Building -- what

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percentage of that area is actually covered by borings as far as talking about surface area, and he declined, he didn't want to make such an estimate.

Could you make a very rough estimate of what percentage of the surface area your borings actually covered?

A No, I -- I would have to -- if you wanted an estimate, I think I should look at the number of borings and look at the area we're involved with and give it a figure. But I think you're directing your attention to something that's a problem with geotechnical engineering, and that is we are continually faced with the decision of saying when are the explorations enough, when do we know the conditions enough to have confidence that we know what's there. And, in my estimation, the number of borings that we have in the Diesel Generator Building are more than we normally have.

Q Well, they may be more than you normally have, but don't you in abnormal situations or excessive, you know, unusual circumstances, need an unusual -- all right, let me -- I'm sorry. Let me ask it this way. Can you conceive of a situation where -- I know that's not going to work. I'd might as well start over from here.

CHAIRMAN BECHHOEFER: Well, let's try this. Given the package that you knew about under the Diesel

Generator Building, were a sufficient number of borings taken to give you a valid -- maybe I shouldn't say statistical sample, but valid basis for making a judgment?

THE WITNESS: Our professional judgment now is that there are enough borings, and that is the basis on which we were able to make our conclusions with respect to bearing capacity.

We felt it necessary to ask for additional borings in the Diesel Generator Building to demonstrate the effectiveness of the preloading. But we now feel there are enough explorations and enough laboratory testing to permit us to come to the conclusion.

CHAIRMAN BECHHOEFER: I don't know if that helped you any, but --

MS. STAMIRIS: Well, somewhat, but I am trying to get an estimate.

BY MS. STAMIRIS:

Q Would you say that less than -- could you say that less than 10 percent of the surface area has been covered by borings?

MR. STEPTOE: Objection. Really, the question has been asked and answered.

MS. STAMIRIS: No, he said he couldn't answer it. That's why I'm asking if he could answer it this way.

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MR. STEPTOE: It's essentially the same question.

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MR. PATON: I also object, Mr. Chairman. He said he doesn't know. I don't see any sense in speculating on 10 or 20 or 30 percent when he just said he didn't know.

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CHAIRMAN BECHHOEFER: I'll sustain that objection.

BY MS. STAMIRIS:

Q Mr. Kane, are you aware of the void that was encountered in drilling on May 19, 1982 adjacent to the Diesel Generator Building?

A I'm not familiar with the date, but I have had discussions with Ross Landsman from Region III, who indicated while drilling between the Turbine Building and the Diesel Generator Building -- it's my understanding to install a permanent dewatering well -- that a void was created during that drilling process.

Q Can you be 100 percent certain that that void was caused by the drilling as opposed to something that was already present before the drilling took place?

A As certain as my human limitations allow me. In recognition of what happened while that boring was being made -- and that is an obstruction was encountered, and to clear that obstruction it took several on time to clear that obstruction , and it was felt that the drilling that was done during that time was creating that void --it would be my feeling, based on what I have been told, that it was due to the drilling.

JUDGE HARBOUR: Due to?

THE WITNESS: The drilling.

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BY MS. STAMIRIS:

Q Do you think that Mr. Landsman was present and performed some analysis or professional judgment on the situation as it was taking place in May of 1982?

MR. PATON: I object, Mr. Chairman. Mr. Landsman will be here --

MR. MARSHALL: Exception.

MR. PATON: -- and I don't think the questioning here relates to the preloading of the Diesel Generator Building, which is what Contention 4-A-1 is about.

MR. MARSHALL: Mr. Chairman, she's only asking if the man was present on this occasion.

MS. STAMIRIS: Well, I should ask Mr. Kane.

MR. MARSHALL: And this man knows.

MS. STAMIRIS: I'll wait and ask Mr. Landsman about it when he's here.

CHAIRMAN BECHHOEFER: Dr. Landsman would be the one to answer that, and he will be here at some point.

MS. STAMIRIS: Okay.

BY MS. STAMIRIS:

Q Mr. Kane, to try and draw this line of questioning together, I'd like to ask you, do you consider in your expertise as a geotechnical engineer, in conducting your analysis of bearing capacity, that it is very important that the NRC is assured that, indeed,

that void was not encountered, as I believe it's worded in the original reports of that event, as opposed to something that was caused by the drilling? Do you believe that that's important to your assessment of bearing capacity at the Diesel Generator Building?

A It is important, and it's my understanding the Region III personnel who is knowledgeable about that, it is his opinion, and that is what we are relying on, that it was caused by the drilling.

Q Now, Mr. Kane, when I asked questions yesterday about how snow and ice loads were taken into account, Dr. Hendron said that those would not have been a part of his analysis but would be in the original data from Bechtel. I'd like to ask if you have any knowledge or understanding of how unusual snow or ice loads on the Diesel Generator Building have been taken into account in computing the bearing capacity?

capacity.

MR. PATON: I object, Mr. Chairman. Contention 4-A-1 concerns preloading of the Diesel Generator Building, and I think your question is just absolutely not relevant.

MR. STEPTOE: I have a different objection really, or comment that I think what Dr. Hendron said was that the snow and ice loads were given to him by Bechtel. I don't believe he said they were not part of his analysis in the sense that they were added.

I believe Dr. Hendron's statement was that they were considered in his calculation as part of the loads that came to him from Bechtel.

MS. STAMIRIS: I believe he said he assumed that they were in there, and if, in fact, they were, his analysis would be accurate.

CHAIRMAN BECHHOEFER: He said it was part of the live load.

(Discussion had off the record.)

CHAIRMAN BECHHOEFER: I think with respect to Contention 4-A-1 we'll sustain it, but you might answer, if you know, whether the data you used to compute bearing capacity included snow and ice loading as part of the live load.

THE WITNESS: My answer would be the same as Dr. Hendron's in that it is my understanding that it is

included in the loads that are established by the structural engineer.

The magnitude of the loads are the responsibility of the structural engineer. It is our job to take those loads and apply them to the foundation to see how they behave for bearing and for settlement.

MS. STAMIRIS: I would like to explain that the reason I'm asking these questions on bearing capacity is I understand that Mr. Kane addressed bearing capacity yesterday afternoon when I wasn't here, and I thought I was to address that with him now, as well as Contention 4-A-1. So I don't have a great deal of questions on bearing capacity, but I'd like to follow up on that.

MR. PATON: With that understanding, Mr. Chairman, I'll -- It was clear to me we were addressing Contention 4-A-1, but Ms. Stamiris just indicated to me she wanted some cross examination on bearing capacity, and I don't object to that. I just would like to know what issue we're addressing. As a matter of fact, if she would just tell us whether she's discussing bearing capacity generally or 4-A-1, then I will respond to that.

MS. STAMIRIS: I'm discussing bearing capacity generally at this point.

BY MS. STAMIRIS:

Q Okay now, Mr. Kane, you said that the

magnitude of the live loads and the data input was the responsibility of -- and would you repeat --

A Structural engineering.

Q Structural engineering; and would that be Consumer Power Company's structural engineers?

A That would be -- knowing how they are organized, it would be by the designers, which would be Bechtel.

Q Yes. Since NRC, in their environmental statement, makes predictions about unusual fogging and icing conditions due to the high degree of moisture that will be in the air at the cooling pond, do you have any knowledge whether unusual loading conditions of snow and ice weight have been taken into account regarding the effects of the cooling plant?

A I do not know.

Q Thank you. This relates to bearing capacity, but it goes back to trying to get an integrated analysis of the overall effect of bearing capacity with other things. Do you believe that the existence of cracks all the way through the concrete wall at the Diesel Generator Building affects your analysis of bearing capacity?

A No.

Q Why?

A Because of the way a bearing capacity analysis is performed. The crack would not cause -- unless it

were excessive -- would not cause a major rate distribution of load, which is what you need in your bearing capacity analysis.

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If the Diesel Generator Building cracks were so significant as to accurately meet the description of Dr. Charles Anderson, who came in for Mrs. Sinclair before, when he talked about it being rubble neatly piled together like puzzle pieces -- I mean, if you had an extreme situation like that, would not that affect your analysis of bearing capacity of that structure?

A It would not affect my analysis of bearing capacity. It would affect my consideration of what is occurring with respect to settlement and what is settlement doing to the structure and what is settlement going to do to the structure in the future.

JUDGE HARBOUR: I would like to say something. I don't quite understand where you're going. If the building were in a state of rubble, whether the soil failed underneath it or not due to the bearing capacity failure would have nothing to do with the safety of that building if it had already been reduced to rubble.

MS. STAMIRIS: I didn't mean to imply --

JUDGE HARBOUR: Or if it had even cracked that badly.

MS. STAMIRIS: No, I used that type of a hypothetical to help me understand to what extent the structural aspects of the building came into bearing capacity analysis at all, and that's the only reason I

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used that example.

BY MS. STAMIRIS:

Q Would I be correct in understanding that the structural integrity of the building does not affect bearing capacity at all?

A Bearing capacity does affect structural integrity.

Q What about the converse?

A Well, I could foresee the structural integrity being a concern but not being unrelated to bearing capacity, whereas, if I knew I had a bearing capacity failure I'd be very concerned that I have significantly damaged the structure.

Q I did not quite understand -- I'm sorry -- whether or not structural integrity of the building can affect bearing capacity. I know in your professional judgment it does not in this case, but I wonder if it has a place in bearing capacity at all.

A It would have a place if whatever has changed in the structure has caused a redistribution of loads to where that redistribution of loads will now result in a bearing capacity failure.

Q And you took those kinds of things into account in your overall judgment?

A Of bearing capacity, yes.

MS. STAMIRIS: Thank you. I don't have any more

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questions now, and I don't have any other questions on 4-A-1 now.

CHAIRMAN BECHHOEFER: Mr. Marshall?

MR. MARSHALL: Yeah, I have two or three questions that I'd like to clear up in my mind.

CROSS-EXAMINATION

BY MR. MARSHALL:

Q When asked a couple of questions by Ms. Stamiris, you emphasized heavily on method as to approach, the proper approach to solving the problem in regard to the diesel engine room, and you said that, as I understood it, that you didn't just go over all of your computations. Is that correct? You didn't go through all of that? As you recognized the approach as being proper and if that was the proper method to solving the problem, that you didn't go further beyond that?

That's how I understood you. Is that correct?

MR. PATON: I object, Mr. Chairman. I think it's conceivable that Mr. Kane may understand the question, but I doubt if anybody who read the record would understand the question. It's very vague about solving problems --

MR. MARSHALL: Well, we'll qualify it later on.

MR. PATON: I just don't think the question --

MR. MARSHALL: Give me a chance to finish the question.

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MR. PATON: Oh, I'm sorry; I thought you were finished.

finished.

MR. MARSHALL: Well, hardly. I'm not an expert. I'm just a farm boy. I've told you that redundantly.

BY MR. MARSHALL:

Q The question that I understood you to make was -- that's how I understood -- was that you had recognized these accepted approaches to solving a problem which you used as methods. Those passed your judgment as being proper, so proper that you did not follow through to do any computations on your own. That's how I understood it, that you just accepted them approaches.

Now, what we have here is group dynamics that's bothering me.

A May I respond to that?

Q Yes, go ahead.

A I think I have indicated that we not only checked the input, which is the main important item, and that is the shear strength, in the bearing capacity calculation, that we also checked the method, and, with respect to the Diesel Generator Building, we checked the mathematics.

Q All right. Now, what I'm wanting to get at -- and I don't want you to think I'm being facetious or anything like that -- but I know and I think, I'm sure, I'm confident that this has to be within your scope, that a chain is no better than its weakest link. And I say the same thing about computers. Right or wrong?

MR. PATON: Was that computers, Mr. Chairman?

MR. MARSHALL: Yes. What I'm saying --

MS. STAMIRIS: He means computations.

MR. MARSHALL: What I'm saying -- yes --

MR. PATON: Oh, computations.

MR. MARSHALL: I'm saying that Bechtel may have a man on the computer that wouldn't agree with him at all if he went through it. That's what I am saying.

MR. PATON: If he understands the question, I don't object.

BY THE WITNESS: There are many calculations, very difficult calculations that require trial and error solutions to arrive at the final solution which are handled by the computer.

I think every engineer has to approach those with caution and make sure that there are reasonable checks that the input is correct and the output is correct. But with respect to bearing capacity of the Diesel Generator Building, it is not a difficult computation that requires computer use.

Q I have another question that you just raised. Could you please define for us, for all of us your understanding of the word "reasonable".

MR. PATON: Well, Mr. Chairman, I object unless it's placed in some concept with some --

MR. MARSHALL: You don't want him to educate you, is that correct?

MR. PATON: No, hear me out. Hear my objection. I think the question should be based in some setting. Reasonable what? Tell him how you use the word.

MR. MARSHALL: He's already used the word, just a few minutes ago, and he's been redundantly using it all morning. I want to know what he means by reasonable. What is reasonable to me might not be reasonable to him.

MR. PATON: Mr. Chairman, I would not object if the question were put in some context.

MR. MARSHALL: I'll have something to follow up that you can bet that you understand in just a few minutes.

CHAIRMAN BECHHOEFER: Well, he may not be using reasonable in the same way every time he uses it.

MR. MARSHALL: I've got a few more questions. I don't want to be limited here just to --

MR. PATON: Put it in context. Reasonable what?

CHAIRMAN BECHHOEFER: Yes, reasonable what?

MR. MARSHALL: Well, for illustration, I'll elaborate a little further. Mrs. Stamiris asked about some voids over there. To me, that means emptiness.

He said to me, or everybody present, that that was a result of a flowing well. I got it. Or a well that hits something down there internally. He don't know how many wells he drilled, but on one of these drills, these drillings , they hit this tning and they got a void.

Now, what I want to know, which is reasonable, how come we're putting six or seven million dollars in there if there is only the one void, putting a thing under there to stabilize that structure of that diesel engine room.

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Why are we putting all this effort that's going into delaying everybody? Now why, if there's only one stinking little void, and is that reasonable to go ahead and do all this fancy underpinning work and all if you just got one void there?

MR. PATON: I object, Mr. Chairman, and I would ask that if Mr. Kane is prepared to answer the question that he first state the question he thinks he's answering.

MR. MARSHALL: I'm asking him what's reasonable.

MR. PATON: If he'll do that, I'll withdraw the objection.

MR. MARSHALL: I want to know what's reasonable, and I want this Board to understand from this expert witness, in his opinion, what's reasonable, what does he mean when he says reasonable in conjunction with the diesel engine room down there.

CHAIRMAN BECHHOEFER: I think it's a little bit broad, because the Court does not understand that all this underpinning is being done to fill the void. That's not our understanding.

MR. MARSHALL: Well, that's the implication, there must be more voids down there.

CHAIRMAN BECHHOEFER: No. I don't think the underpinning is done with respect to voids at all.

MR. MARSHALL: It's the point of stabilizing the

building, keep it from sinking.

CHAIRMAN BECHHOEFER: It's a little bit different.

MR. MARSHALL: What I would like to know, what is reasonable in the context in which you're using it.

(Discussion was had off the record.)

CHAIRMAN BECHHOEFER: I think we'd better sustain the objection to that. He can't really answer that question.

MR. MARSHALL: Well, it's just a one word question.

JUDGE HARBOUR: Mr. Marshall, just a second now, please.

Is it your understanding that the presence or absence of the void which has been referred to has anything to do at all with the requirement for the underpinning of those structures?

THE WITNESS: Mr. Marshall is incorrect. The Diesel Generator Building is not being underpinned. The Diesel Generator Building is not being underpinned, nor is the problem with the drilling and the creation of the void considered to be an impact on the Diesel Generator Building.

BY MR. MARSHALL:

Q All right, then, I'll withdraw that question,

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but the point I'm making is that we have a question raised there as to voids, and voids to me means emptiness. It means hollowed out point. In fact, there's a lot of hollowed out spots under that thing around the way we've been getting this, and I know how they got that. I'm a pretty old man; I know how they got it. The thing is I'm not here to testify as to how it got there. That's your department.

The point is, when you used the reasonable in regards to the topography and to the earth there, that's in your realm of understanding. And I want to know what's reasonable and what's not reasonable. Where the heck is plan demarcation here on this thing?

Now, Ms. Stamiris feels that that's a catacombs down underneath there. I know that. She isn't saying it, but I know it. And she wonders how extensive this is.

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All I know is just one hole. That was from drilling. How many wells is it? I don't know how many wells. But this one we know had a void.

Well, she has a reason. She had no water to drink for a long time down at --

MR. PATON: Mr. Chairman, I object, and I think that we should either have a question or --

MR. MARSHALL: We do have one. We want to know what actually he means when he uses the word consistently in his testimony as to the word reasonable. What is reasonable in his sense, and what is unreasonable.

CHAIRMAN BECHHOEFER: We sustained that objection, however. We don't think that one can just define the word apart from the context in which it's used.

MR. MARSHALL: Well, what context was he using it in?

CHAIRMAN BECHHOEFER: Well, I think he used it in a number of contexts throughout his testimony.

MR. MARSHALL: Well, I'm trying to pin it down to some one singular context that we can understand him as laymen.

CHAIRMAN BECHHOEFER: Dr. Kane, do you ever remember using the word reasonable?

THE WITNESS: Yes. I think I used it when I talked about the extent of explorations that were done

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for the Diesel Generator Building, and I said in my estimation a reasonable number of borings have been completed.

If you want to tie me to reasonable there, to that context, I can answer that.

BY MR. MARSHALL:

Q Yes. And he asked you how many wells.

CHAIRMAN BECHHOEFER: Why don't you try --

BY MR. MARSHALL:

Q What was your answer?

CHAIRMAN BECHHOEFER: Wait a minute. One question at a time. Answer the first one first.

THE WITNESS: The reasonableness of the number of borings is very much dependent on what you find with the borings. If you find with the first several borings that you take that conditions are uniform, that there's not much change in foundation sewers, and you can understand the geology as such that you would not anticipate significant changes, then the reasonable number of borings would produce a number that is significantly less than if you go in and your earlier set of borings show you that conditions are very heterogeneous, that we have different soils with different engineering properties, than a reasonable number of borings would result in a number which is significantly larger than the first one.

So reasonable is using your judgment, your engineering judgment based on what you're encountering.

MR. MARSHALL: That's what I wanted to find out. That's exactly what I wanted to find out. What's wrong with that? That's exactly what I wanted to find out.

BY MR. MARSHALL:

Q Now, another thing that I'm not quite clear on yet, and I'd like you to explain it in this same manner. Just be patient with me. As I said, I'm a farm boy, I'm not up on this sharp stuff.

The thing that I want to know now, did I misunderstand you when I heard you testify, or I thought I heard you testify to the fact that approaches that were used were methods that were well recognized and that you accepted those methods without actually going over the actual work yourself?

A With respect to the --

Q To different group dynamics approaches by different people. Who they are, I don't know. We didn't get into that, what you said. We just say one, but there were more than one different people that were approaching with the proper method, as you said. But the fact that they were using those methods led you to conclude that everything was okay?

CHAIRMAN BECHHOEFER: Can you understand what Mr. Marshall's driving at there?

THE WITNESS: I would attempt to clarify what I'm going to respond to --

CHAIRMAN BECHHOEFER: Okay.

BY MR. MARSHALL:

Q Can you do it?

A With respect to establishing the factor of safety against bearing capacity type failure for the Diesel Generator Building, the method that was used for static condition is widely accepted in the engineering profession and is widely used for all nuclear power plants. And so it's not a method that's new or has to be challenged. It has been demonstrated to be acceptable.

The method that was used by Dr. Hendron with respect to evaluating the safety factor during earthquakes is not as widely accepted. He is addressing a problem which we are coming to know more about, but his method is not as widely accepted.

We have reviewed Dr. Hendron's calculations. We have received Bechtel's computation with respect to diesel generating ability and have satisfied ourselves that an accurate margin against bearing capacity type failure is available.

Q Then I misunderstood you in that you did go

over their work, then. You did go over their -- for instance, what I'm still saying is a chain is no better than its weakest link. If I was running those computers you'd find out the method didn't mean very much.

JUDGE HARBOUR: Excuse me, Mr. Marshall. I think you had it correct when you said that you did misunderstand what he had said earlier.

MR. MARSHALL: I beg your pardon?

JUDGE HARBOUR: You were just now correct when you stated that you had not understood what --

MR. MARSHALL: Yes, yes. That's what I said.

CHAIRMAN BECHHOEFER: Do you have further questions?

BY MR. MARSHALL:

Q Well, only that the problem that we have there on that well business, was that the only well that produced a void?

A As far as I can recall, it's the only well. I understand that there was a boring, I think in the service water pump structure earlier, that had difficulty in clearing obstruction and may have loosened the material in that area.

Both of these, to my knowledge, are being addressed by the region to demonstrate the extent that it was disturbed by that drilling.

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Q Someone else is addressing this particular subject, is that correct? Am I understanding you now?

A That is correct.

MR. MARSHALL: Okay, that's all.

CHAIRMAN BECHHOEFER: Mr. Steptoe?

MR. STEPTOE: Just one brief line of questioning, Mr. Kane.

CROSS-EXAMINATION

BY MR. STEPTOE:

Q Ms. Stamiris asked you about which borings were supervised or observed by the Corps of Engineers. Do you recall that question?

A Yes.

Q And you said that the borings that were prefaced by COE were observed by the Corps of Engineers. Her next question was how many was this, and you said -- did you say six?

A Six in the Diesel Generator Building area.

Q She then asked you what percentage of the total number of borings in the Diesel Generator Building area this represented. My question to you is isn't it true that Dr. Hendron performed a set of calculations for bearing capacity, which the Staff reviewed, based on these six COE borings?

A That is correct.

correct.

Q So for the purposes of that set of Dr. Hendron's calculations, that the Corps of Engineers, in effect, observed 100 percent of the borings?

A With respect to Dr. Hendron's analysis, and when he takes only the results from the Corps of Engineers' borings, the answer would be yes.

MR. STEPTOE: I have no further questions.

JUDGE HARBOUR: I'm not quite satisfied with the wording and the arithmetic here. There are more than six borings in the vicinity and within the confines of the boundaries of the Diesel Generator Building, are there not?

THE WITNESS: That's correct.

JUDGE HARBOUR: And six of those -- they're immediately adjacent to the Diesel Generator Building -- the Corps of Engineers borings, is that correct?

THE WITNESS: That is correct.

JUDGE HARBOUR: So all of the borings used by Dr. Hendron were the Corps of Engineers borings in one set of his calculations, but I don't remember which. Do you remember which set of calculations that was?

THE WITNESS: Dr. Hendron's calculations used both the Corps of Engineers boring results and the other borings. I think Goldberg Zoino Dunnicliff. I think, to answer your question, Dr. Hendron used more than

the information from the Corps of Engineers borings, but I understand Attorney Steptoe's question to be that he did make an analysis using information just from the Corps of Engineers borings and -- and the Corps observed those borings, and my answer to him was yes.

(Discussion had off the record.)

CHAIRMAN BECHHOEFER: The Board has no further questions.

Mr. Paton?

MR. PATON: No redirect, Mr. Chairman.

CHAIRMAN BECHHOEFER: Ms. Stamiris, do you have further questions based on --

MS. STAMIRIS: No.

CHAIRMAN BECHHOEFER: I guess, Mr. Kane, for the time being, at least, you're excused. We'll see you again later, I guess.

(Witness excused.)

CHAIRMAN BECHHOEFER: I think this would be a good time to break for lunch. We'll be back about 1:15.

(Whereupon, a luncheon recess was taken in the above-entitled cause, to resume at 1:15 p.m. of the same day:)

AFTERNOON SESSION

(1:15 p.m.)

CHAIRMAN BECHHOEFER: All right, back on the record. I guess we are in a position to discuss a schedule a little more definitive of views. We can't be sure that Dr. Harbour will be available the week of the 13th, so we do not think that, at least the QA hearings, should be scheduled for that week. It remains to see when they can be scheduled for.

It is not impossible, but Dr. Harbour would not know definitely until after Thanksgiving so that is when we will decide the time. We would plan to at least start hearings on the Diesel Generator Building on Monday, the 6th, and we would intend to run through Saturday, if necessary -- hopefully, that would wind up both hearings on that subject, at least.

If Dr. Harbour turned out to be available the next week and we had to carry over, it is possible that we would stay. We don't really want to plan on that, so we are hoping that six days will be enough to complete that testimony. I haven't read it yet so I don't know whether it would be or not. That is most of the testimony that we received yesterday, so we will plan to start on the 6th; and unless the parties decide they can go the week before for QA -- my guess is from

the time required to respond to the QA -- is that that can't happen.

I invite Mr. Paton or Mr. Miller to --

MR. PATON: Judge, I have a response with respect to the Diesel Generator Building. Could we inquire of the Applicants which affects schedules, could we inquire of the Applicant now whether they have made a decision on the stipulations that were submitted this morning, because that will affect the schedule.

MR. MILLER: Well, with respect to the surface water pump structure, I think that the Applicant can enter into a stipulation as drafted by the NRC Staff. With respect to the proposed Diesel Generator Building, I am not yet in a position to have to consider it, at least overnight, and perhaps we will suggest an alternative, draft a stipulation to the Staff. But I am not prepared to respond.

MR. PATON: The reason I ask, Mr. Chairman, is this. We have had with the Applicant, many, many discussions about the stipulations, and we are now apparently down to the Diesel Generator Building. It is open to question.

The reason it affects the schedule is this. If the Applicant does not agree to stipulate on the Diesel Generator Building, then the Staff is going to be forced

to put on its own case, and that is the case that supports the issuance of the order of December 6th, 1979. We have up until this time, with respect to all of the structures involved, that has not been necessary. But if we have to do that with the Diesel Generator Building, then we are going to have to go back to December 6th, 1979 and put on testimony before this Board which would authorize the issuance of the order, and that is going to take up some time. That is going to, in our opinion, change the order of the proceeding.

Now I don't want to dwell on it or take too much time with it because there is a possibility that we can work this out with the Applicant. We have faced this dilemma with every single structure that we have addressed, and I have said to the Applicant in each case, if you don't feel you can stipulate, then we are going to have to take time and go back and prove the December 6th, 1979 order which I think most people agree, is not very productive for us to take a lot of time to do that.

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to that

So I don't think I will say any more about it and see if we can work it out. But if we are not able to work it out, there's going to be a problem with respect to that.

MR. MILLER: Perhaps Mr. Chairman, we can get some further illumination of Mr. Paton's position as to whether or not he is suggesting that if we are unable to stipulate, he won't be prepared to go forward on December 6th with the Diesel Generator Building.

MR. PATON: I will be prepared to go forward on December 6th with the Staff's portion of the Diesel Generator Building which will be justification of the issuance of the order. But that will mean that we will -- it will probably affect our preparation of the portion of the case if the Applicant really wants to talk about it, and that is the adequacy of the preload program as we view it now. It puts us in a position where it will necessarily, substantially affect our presentation of the case. We have been in this position with respect to every structure, and we have had these lengthy, lengthy discussions with the Applicant and we debated it back and forth. If we are not able to stipulate, we are going to have to spend our time preparing that part of the case.

There's nothing new about this. It is just that we are in the same position that we were in before,

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and if we can't work out a stipulation, I think it will affect the schedule.

MR. MILLER: One of the reasons I am a little bit uncertain about this is that I didn't have the December 6th, 1979 order in front of me. But --

CHAIRMAN BECHHOEFER: I have the order if you want to borrow it.

MR. MILLER: One of the questions that I need to resolve before I can discuss this meaningfully with the Staff is whether or not the insufficient information with respect to the Diesel Generator Building was a basis for issuance of the order.

As the parties will recall, at the time of the December 6th, 1979 order was issued, preload had been applied and removed and the information that was then available to the Staff was in a very different status from information regarding the other structures that are the subject of this hearing.

I just don't have the order well enough in my mind. I don't want to absolutely rule out any agreement with the Staff on this, but I think that the verbal formula that we used for all the other stipulations may not be appropriate from the Applicant's point of view with respect to the Diesel Generator Building.

CHAIRMAN BECHHOEFER: Let me tell you right off

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here, there are some statements about lack of acceptance criteria, but I haven't seen how they relate, so I can't give you a --

JUDGE HARBOUR: Wait until the testimony.

CHAIRMAN BECHHOEFER: We can perhaps wait until tomorrow.

(Discussion was had off the record.)

CHAIRMAN BECHHOEFER: Well maybe we could hold off on the schedule for a week until we hear from Mr. Paton, whether you are going to have a stipulation or not.

The one thing we do have -- ought to decide is your motion for an extension of time to file your testimony on QA, and I would like to see if we could come to some agreement as to when we will hear the QA. My inclination is that we don't have time before January to hear the QA.

MR. MILLER: There is a week in December before the holidays, and that is the week of December 16th.

CHAIRMAN BECHHOEFER: Well that is the week we have the problem.

MR. MILLER: I beg your pardon, Mr. Chairman.

CHAIRMAN BECHHOEFER: That's the problem.

Could we tentatively schedule hearings through

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January 4th through the 14th, on QA matters? Would any party have any objection to that?

MS. STAMIRIS: I don't have any objection to that.

CHAIRMAN BECHHOEFER: The 4th is a Tuesday, I am told. The 14th should be Friday week.

MR. MARSHALL: Of 1983?

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CHAIRMAN BECHHOEFER: Yes.

We could set aside those two weeks, and presumably, including Saturday.

MR. MILLER: That is satisfactory to the Applicant.

MR. PATON: Mr. Chairman, --

CHAIRMAN BECHHOEFER: Do you know anything about Mr. Keppler's --

MR. PATON: I do not know his schedule on those dates, but we will check with his office within the next day and if there is a problem, we will advise the Board immediately.

CHAIRMAN BECHHOEFER: Well not only Keppler but the other people as well.

MR. PATON: Yes.

CHAIRMAN BECHHOEFER: Then for the other one, we would at least like to aim for December 6th through the 11th for the Diesel Generator Building if we could do that. We will discuss that tomorrow.

MR. PATON: Mr. Chairman, on the Diesel Generator Building, we are in the similar position of the Applicant. When the Applicant got our testimony on QA, they determined that they needed more time to prepare the response. We are in a similar position with respect to their testimony on the Diesel Generator Building, and

we are talking to our people back at Bethesda about whether or not we would seek a delay. But I hope to have an answer for you tomorrow when I discuss it further.

CHAIRMAN BECHHOEFER: All right. Well you are not filing a response; you are filing your own testimony.

MR. PATON: No, our response to the testimony is what they filed yesterday.

CHAIRMAN BECHHOEFER: Which would be your testimony, essentially.

MR. PATON: Our testimony is in the SER, but the response to their testimony that they filed yesterday, that is what we are concerned about.

CHAIRMAN BECHHOEFER: Well what I am saying is that I don't think you have to file anything on that.

MR. PATON: I understand that it is not a matter of preparation in response to it.--

CHAIRMAN BECHHOEFER: Right, right.

Now you had asked for a filing date of what, December 1st?

MR. PATON: We would ask for December 1st, depending on -- I must say we picked that date because it gave us three days in the office to finalize testimony on a week when there would be no hearing scheduled. If we are going to be moving, the hearing dates for quality assurance to the dates that have been discussed, that is,

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January 4th through the 14th, I think we would be asking for some additional time. Nothing of significance, but so that we can get our testimony prepared in a somewhat more reasonable fashion. We are not contemplating --

CHAIRMAN BECHHOEFER: Well how much time would the Staff want, prior to the hearing, to review the -- I was initially thinking, you ought to have about two weeks.

MR. PATON: Judge, I would say ordinarily, I would say two weeks except of course, that the two-week period is right during the Christmas holidays. I would think if the Applicant filed his testimony in December 3rd, that would give the Applicant five weeks in which they had our testimony and would leave the Staff four weeks which includes the two weeks, includes the holiday season, that would be my suggestion.

MS. STAMIRIS: Would ongoing hearings also have an impact? I mean, it also would include the Diesel Generator Building.

MR. PATON: Thank you, that's right. That takes another week out of our schedule, leaving the last three weeks of December for the Staff to prepare, so I think I would object to the Applicant filing any later than Friday, December 3rd. I would object to the scheduled hearing.

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hearing.

MR. MILLER: You can have until Monday the 6th, which is really the same thing since everybody is going on the 3rd. I think we can do that.

(Discussion had off the record.)

CHAIRMAN BECHHOEFER: Well, I would think that the 6th would probably be all right. What we might decide, if the Staff has some new problems responding, we may have to drop the January hearings back another week for a couple of days, perhaps, maybe.

MR. PATON: Mr. Chairman, may I inquire, does the Applicant intend to mail the testimony on the 6th?

MR. MILLER: No, Mr. Paton. We will give it to you and we will serve the Board and the parties, the first day of the hearings when we are all here in Midland again.

MR. PATON: In other words, Mr. Chairman, I would request that the Applicants, if they would hand us two copies on Monday, the 6th, here in Midland, and if they would mail two copies or any way they want to, to get the copies to our Chicago office, on Monday, the 6th, that would be acceptible to Staff.

MR MILLER: We can do that.

CHAIRMAN BECHHOEFER: Well, that would be reasonable, so we will fix the 6th for yours. Hopefully, we will be able to start before the QA. If it proves

impossible, we are always here for motions.

Well, your motion is not resolved in that manner.

MR. MILLER: Thank you.

CHAIRMAN BECHHOEFER: I don't intend to issue a written rule on that.

Are there any other preliminary matters before we start with Mr. Lewis's testimony?

MR. PATON: Yes, Mr. Chairman. I want to inform the Board that when we were to address the service water pump structure, the Board asked that we have QA witnesses available for questioning by the Board. Dr. Landsman will be here from Region III. Mr. Gilray indicated to me that he is going to be at another hearing. We would plan to have Mr. Gilray arrive here on Monday. He does not expect to be able to be here during the testimony on the service water pump structure.

JUDGE HARBOUR: What date are you referring to now?

MR. PATON: Whenever we start the service water pump structure, which I think is scheduled tomorrow, and I think at that time, there was a --

THE CHAIRMAN: Well, tomorrow or Thursday, perhaps.

MR. PATON: All right. I think originally, the Board said we should have QA witnesses here available

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to answer questions, and I think later, all parties agreed that we would respond to what has become known as Judge Harbour's questions and so on. Mr. Gilray won't be able to be here during that session but we will be here Monday.

CHAIRMAN BECHHOEFER: If there are any questions that Dr. Landsman can't answer, we will perhaps -- maybe Mr. Gilray could answer them the following week.

MR. PATON: When we finish, I hope I remember to ask you, if there is no need for Mr Gilray, I would just save him the trip. But if the Board needs him, he will --

JUDGE HARBOUR: At the conclusion of Dr. Landsman's testimony, we should be able to know whether there are residual questions that would require Mr. Gilray.

MR. PATON: Thank you.

CHAIRMAN BECHHOEFER: Anything further?

MR. PATON: No.

CHAIRMAN BECHHOEFER: Is the Applicant prepared to proceed?

MR. STEPTOE: Yes, Mr. Chairman. I would like to have Miss Lauer conduct this examination.

MS. LAUER: Judge, the Applicant would call Mr. Donald Lewis to the stand.

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stand

Mr. Donald Lewis has already been sworn.

Whereupon,

DONALD LEWIS,

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

DIRECT EXAMINATION

BY MS. LAUER:

Q Would you please state your name for the record.

A My name is Donald F. Lewis.

Q By whom are you employed and what is your position?

A I am employed by Bechtel Associates Professional Corporation. I am the acting assistant project engineer and engineering group supervisor for licensing and safety on the Midland nuclear project.

Q Are you familiar with the pretrial testimony entitled "Testimony of Donald Lewis on Behalf of the Applicant Regarding Underground Piping at the Midland Plant" which also includes attachments of two references, five tables and four figures?

A Yes I am.

Q Are you primarily responsible for this testimony?

A Yes I am.

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Q And do you have any editions to correct at this time?

A Yes I do.

Q Would you please do so.

A Going to Page 5, the next to the last line on that page, where it reads, Table A, change that to read Table 1.

On Page 6, the paragraph towards the bottom of the page numbered 1, put an asterisk at the end of that Paragraph 1 and at the bottom of the page, put the footnote with the asterisk, add the following words, "Monitoring will commence after the monitors are installed and operational."

On Page 14, the first paragraph, the fourth from the last line, at the end of the line it reads: (Reading.)

"NC 3652.3, change that to read ND 3652.3."

On Page 16 on the last paragraph at the end of the second sentence, insert a new sentence --

JUDGE HARBOUR: Excuse me, is this after the word Auxillary Building?

THE WITNESS: No, this is Page 16, last paragraph, the sentence that ends: (Reading.)

"Were 18-1 and 2HCB-1 and -2.", insert

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the new sentence as follows: (Reading.)

"In addition, Line 1 inch OCCC-1, control room pressurization tank fill line, is a stainless steel line installed in 1981."

On that same page and in the same paragraph, next to the last line on the page where it reads: (Reading.)

"Inspect these lines", change that to read "to inspect the BWST lines."

JUDGE HARBOUR: Is that steel lines?

THE WITNESS: Yes sir.

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yes

On Page 17, the last paragraph on the page, the first line, delete the word "only." Second line, following the word "lines", insert the words "for the BWST."

MR. WILCOVE: That is the second line of the last paragraph?

THE WITNESS: Yes it is. So that sentence now reads: (Reading.)

"Examination of the buried safety related stainless steel lines for the BWST" -- and then it goes on.

Add a sentence at the end of that paragraph as follows: (Reading.)

"The one inch control room pressurization line will be evaluated to confirm that corrosion, due to stray welding currents, is not of concern."

On Table 4, the first sheet of the table in the footnotes at the bottom of the table and four places, it references paragraphs of the ASME Codes, Section NC. In each of those four places, change NC to ND. That's in Footnotes 2-A, 2-B and 2-C.

In Footnote 2-C, change Code Case 1606 to read 1606-1.

On Table 5, Item No. 10 reading: (Reading.)

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"48-inch diameter service water line to cooling tower," delete the asterisk.

On Item 12 which reads: (Reading.)

"Service water metering pit", add an asterisk.

The asterisk footnote remains as written. Insert an additional note at the bottom of the table as follows: (Reading.)

"The piping reinstallation is subject to the NRC work authorization program and the excavation permit system. The soils aspect of the work are 'Q', including the excavation and backfill."

I have no further questions.

Q Mr. Lewis, with these additions and corrections, is this testimony true and correct to the best of your knowledge and belief?

A Yes it is.

MR. LAUER: Judge Bechhoefer, at this time, Applicant moves that Donald Lewis' testimony be admitted and bound into the record as if read.

CHAIRMAN BECHHOEFER: Any objections?

MR. WILCOVE: Staff has no objections.

MS. STAMIRIS: No objections.

MR. MARSHALL: No objections.

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CHAIRMAN BECHHOEFER: Before we rule on the admissibility, Dr. Harbour has a couple of questions.

EXAMINATION

BY THE BOARD:

Q Mr. Lewis, when you submitted testimony previously to this Board, did you include a statement of your qualifications with that testimony?

A Yes I did.

Q Was it the same as the statement of the qualifications that you have submitted for --

A With one exception, sir. At that time, I was vice chairman of the Michigan section of the American Nuclear Society, and I am no longer in that position, so I will correct my affidavit for that fact.

Q So the present one though is essentially the same and it is also correct as far as your present qualifications are concerned?

A Yes it is.

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EXAMINATION BY THE BOARD

BY JUDGE HARBOUR:

Q You say that you have a Bachelor of Science degree in Physics. Do you have any education or training in the field of engineering?

A My education and training in the field of engineering was both in the part of my undergraduate program in physics and also the training within the navy nuclear power program.

Q What kinds of engineering courses did you take in connection with your undergraduate training and physics?

A Mathematics, calculus.

Q Now what was the nature of your training experience in the navy program that would relate to your qualifications as an engineer?

A The navy program consisted of two-six month courses conducted at what I believe to be the postgraduate - the first course, I believe was conducted at the post-graduate level, it consisted of training in theromdynamics, design of system, fluid systems, basic electrical theory and other courses such as would be required to operate and train people in the operation of the navy nuclear propulsion plant.

The second six months consisted of some intense classroom training of the same basic type followed by

approximately four months of actual operating experience in an operating-navy nuclear propulsion plant prototype.

Q Would you give me the actual title of your current position? I see on the second page -- the last paragraph of your qualifications, you have a statement of what your current positions are. Would you explain what your -- the actual work that you do.

A Yes, sir. The title as it appears in the first paragraph of the affidavit, I think, assistant project engineer, is one title. The second title is engineering group supervisor. The group for which I am a supervisor is the licensing and safety group to the Midland Project --

Q The licensing and safety group?

A Yes, sir.

Q All right.

A And my function as an assistant project engineer was with respect to licensing and safety of the Midland Nuclear Project.

Q Will you explain to me very briefly what the licensing and safety group does.

A The licensing and safety group is a multi-purpose group that is conducting walkdowns in the plants at this time for seismic proximity and other seismic interactions.

The group is performing the environmental

qualifications reviews for equipment, safety related equipment in the plant. The group is responsible for maintaining a final safety analysis report. As an employee of Bechtel, I am referring to the Bechtel responsibility as they apply to the final safety analysis report maintenance. The group stays current on the licensing issues that are taking place outside the project. And if necessary, applies them to the project and makes recommendations to that effect, and also we respond to -- we go back and respond to specific licensing questions that the project may have in giving guidance in the conduct of the design from a licensing perspective.

Q Have you had any previous engineering experience in geotechnical engineering?

A No, I have not.

Q Did you prepare this testimony entirely yourself?

A No, sir, I did not. I am primarily responsible for the testimony, but I have gathered input on it from other documents that we had submitted to the NRC at other times and from people within the organization that do have the geotechnical expertise.

expertise.

Q In Section 3 of your testimony, how much of this did you prepare and how much was prepared by someone else?

A Section 3 of the monitoring program for underground piping?

Q Yes.

A This section was primarily input by a member of the Consumer Power Company. I believe I referred to that as I do in my affidavit, that this was significant input from the Consumer Power Company. I reviewed it and I agree with it.

Q Was the input from the -- from whom did the greatest amount of this information in this Section 3, beginning on page 3 and continuing to page 8, how much of this information was actually prepared by you?

A None of this was actually prepared by me.

Q But you are sponsoring this testimony; is that correct?

A Yes, I am. I have been party to most of the discussions that have led to these agreements on this monitoring program, so I have personal knowledge of it. I am not the most knowledgeable person.

JUDGE HARBOUR: I have no further questions at this time.

MS. LAUER: Judge Harbour, if you have specific

questions on Section 3, we have the person here who did most of the drafting of that section. We would like to put him on the stand for questioning.

JUDGE HARBOUR: We have Mr. Lewis' testimony here. First we will see how this goes.

MR. WILCOVE: Mr. Chairman, if I could ask who that person is.

MS. LAUER: Mr. Clutier.

CHAIRMAN BECHHOEFER: We will accept the testimony into evidence, but we will leave open the possibility that if the questions under Section 3 can't be answered, then that part might have to be stricken. We will leave open the possibility, but Judge Harbour has some questions, substantive questions on Section 3. We will accept it into evidence now and it will be bound into the record as it was read.

(The document referred to, the testimony of Mr. Donald Lewis, follows:)

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

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

TESTIMONY

OF

DONALD F. LEWIS

ON BEHALF OF THE APPLICANT

REGARDING UNDERGROUND PIPING
AT THE MIDLAND PLANT

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

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

AFFIDAVIT OF DONALD F. LEWIS

My name is Donald F. Lewis. I am employed by Bechtel Associates Professional Corporation as the acting assistant project engineer and the engineering group supervisor for the Midland Nuclear Project. In this position, I am responsible for licensing activities, including evaluation of specific design issues with respect to licensing and technical requirements.

I have a total of 15 years of experience in the nuclear power industry. Nine of these years have been in the design and construction of commercial nuclear power plants. The balance of my experience has been in the United States Navy as an officer in the Naval Nuclear Propulsion Program. I have a Bachelor of Science degree in Physics from Rensselaer Polytechnic Institute. In addition, during my service as a naval officer, I attended the United States Navy Nuclear Power School in Bainbridge, Maryland and the United States Navy Nuclear Power Training Prototype Unit in West Milton, New York.

In 1973, after leaving the Navy, I went to work for Bechtel Power Corporation as the nuclear steam supply system coordinator on Portland General Electric Company's Pebble Springs Nuclear Project and held the same position on Iowa Power Company's Central Iowa Nuclear Project. In these positions, I was responsible for incorporation of the reactor and reactor auxiliary systems into the plant design, schedule and licensing effort.

Beginning in 1976, I served as the nuclear discipline specialist in Bechtel's Ann Arbor area office. In this position, I was responsible for providing technical assistance to projects on nuclear, environmental, and licensing matters. I have also held the position of mechanical nuclear design group supervisor for the American Electric Power Nuclear Plant studies. I am also the former Vice Chairman of the Michigan Section of the American Nuclear Society, and was a past member of the ANS 51 Standard Committee to develop PWR design criteria.

In connection with my current positions as assistant project engineer and engineering supervisor for the Midland nuclear project, I am responsible for licensing activities with respect to the underground safety related piping at the Midland Nuclear Plant, as well as evaluation of specific design issues with respect to licensing and technical requirements.

I am primarily responsible for this testimony on the underground piping, with significant input provided by Consumers Power Company in Section 3.0 through 3.6. I affirm that the statements in this affidavit and in the underground piping testimony are true and correct, to the best of my knowledge and belief.

Donald F. Lewis

Sworn and subscribed to before me this 7 day of October, 1982.

Notary Public, Washtenaw County

TABLE OF CONTENTS

REFERENCES

1. CPCo letter Serial 16881, 5/3/82 (attached)
2. CPCo letter Serial 16269, 3/16/82 (attached)
3. ASME Subsection ND, 1971 Edition w/ Addenda through Summer, 1973
4. ASME Subsection ND, 1977 Edition

TABLES

FIGURES

UNDERGROUND PIPING

1.0 BACKGROUND

1.1 SCOPE OF TESTIMONY

This testimony provides updated information regarding underground piping at the Midland Plant. It addresses open items identified during hearings held in February, 1982 on the subject of underground piping and tanks. The open items for which the applicant was responsible are the following:

- Provide to the NRC staff soil profiles along the service water system piping and information establishing 3 inches of overall future predicted settlement.
- Resolve with the NRC staff the curve to be used to define the relationship of piping strain to piping ovality.
- Submit to the NRC staff the replacement program for the 36-inch diameter service water system piping.
- Submit to the NRC staff the program for monitoring settlement and strain in the service water system and other seismic Category I piping.

One open item to be resolved by the NRC staff was to address corrosion of piping at the Midland plant. This testimony addresses the results of actions taken to address concerns for the corrosion of underground stainless steel safety related piping.

1.2 GENERAL

At the time of the submittal of the previous testimony on underground piping and tanks, concerns for the adequacy of the

underground piping and tanks had been identified and addressed. Commitments had been made to undertake specific remedial fixes and institute monitoring programs. Since that time, the design for the remedial fixes and the program for monitoring of the underground piping have been substantially defined. In addition, open items with the NRC staff have been resolved. In the process of fulfilling previous commitments and finalizing the design, some modifications to the design have been made. These modifications have been reviewed and approved by the NRC staff. The following sections of this testimony will identify modifications to the design and monitoring program.

2.0 SOIL PROFILES ALONG SERVICE WATER SYSTEM PIPING & SETTLEMENT INFORMATION

Prior to the previous hearings on underground piping in February, 1982, the applicant had provided to the NRC staff sketches that showed the results of soils borings and related the locations of these borings to two of the underground service water system pipes. These sketches have been referred to as soil profiles. During the previous hearings on underground piping in February, 1982, the NRC staff requested that similar sketches be provided for the remaining underground service water system pipes. These sketches were provided to the NRC staff in March, 1982. Our understanding from the NRC staff is that these profiles provided the information required.

Information establishing the basis for the applicant's estimate of 3 inches of overall settlement for the next 40 years for buried piping located on fill material which is not replaced was provided to the NRC staff by the applicant's letter, Serial 16881, dated May 3, 1982(1). Our understanding from the NRC staff is that no open or unresolved items exist with respect to this estimate of future settlement at this time.

3.0 MONITORING PROGRAM FOR UNDERGROUND PIPING

At the time of the previous hearings on underground piping, the NRC staff and the applicant had reached agreement on the concept of relating piping ovality to piping strain and to utilize this relationship in a monitoring program for the piping during plant operation. A specific strain to ovality relationship had been developed by the applicant and submitted to the NRC staff(2). Resolution of this relationship was identified as an open item in the previous hearings. This item has now been resolved and the agreed upon relationship is presented in Figure 1 to this testimony.

The general concept of long term monitoring for the underground safety grade piping subjected to soil settlement has not changed since the previous hearing testimony presented in February 1982. Various details have been modified as a result of comments received from the NRC staff. In addition, we have agreed to monitor the building penetration clearance (rattlespace) of certain pipes and to limit the laydown loads over buried safety grade utilities. This section summarizes the results of the monitoring program changes from the previous testimony presented by the applicant.

3.1 STRAIN GAGE MONITORING

Because of the differences the staff and applicant had in methodology for determining the strain versus ovality relationship, the curve for the 26 inch diameter piping was redefined based on experimental data. The curve shown in Figure 1 is the result of a conservative plot through the experimental data available on strain versus ovality. This curve is used to determine the equivalent strains for the allowable ovality and the measured ovality data taken on the Midland service water piping.

The ovality allowable is 4% (equivalent to 0.0048 inch/inch strain), which includes the appropriate safety factor agreed upon previously. Using the curve of Figure 1, the ovalization data measured in the 26 inch diameter pipe can be transformed to an equivalent strain. This equivalent strain value is subtracted from the allowable (.0048 inch/inch) to determine the future allowable for the strain monitoring stations selected on the piping. Table 1 shows the measured ovality, corresponding meridional strain, and future allowable strain for all strain monitoring stations on the buried Midland safety grade piping. The method used to calculate the future allowable strain allows the pipe strain resulting from soil settlement before the 1981 data to be accounted for at each station. Table 1 also specifies the number of strain gages for each monitoring station. The number of gages were determined by reviewing the pipe elevation profiles for abrupt inflection points and critical buckling zones. The strain gages are to be mounted one pipe diameter apart along the top line of the pipe and centered at the given monitoring station.

3.2 VERTICAL SETTLEMENT MARKERS

Vertical settlement markers were added at various monitoring stations to supplement the pipe strain gage measurements. Their locations have been chosen in accordance with the following guidelines:

1. Locations where loosely compacted soil may exist, based on borings taken throughout the plant site fill material.
2. Locations where high future differential settlement could potentially occur due to underlying utilities.

Figure 2 is a monitoring station location diagram for both strain gage monitors and settlement markers. Stations which have settlement markers are indicated by a star notation as referenced by the sketch legend. Figure 3 is a drawing of a typical pipe settlement marker which will be attached directly to the pipe.

The vertical settlement measurements shall be based upon the initial installation survey of the markers. This survey shall establish an elevation datum. The subsequent surveys shall be compared against the datum to calculate the pipe movements. The differential vertical displacement from the initial datum to the current survey measurement shall be used for comparison to the acceptance criteria. The acceptance criteria is tied to the conservative upper limit of predicted maximum future settlement (3 inches).

3.3 TECHNICAL SPECIFICATION ACCEPTANCE CRITERIA AND ACTIONS

If either the future allowable strain specified in Table 1 or 75% of the vertical settlement criteria 3 inches is reached, a reportable

occurrence will be enforced. Increased monitoring frequency will be required. NRC notification and an engineering evaluation of the situation shall be initiated. Supplemental reports to the NRC will follow the initial notification to describe the final resolution and actions. Such actions may include excavation of piping in the affected zone for visual examination and possible replacement or sleeving. Strain gages which are determined to be providing faulty data will be recalibrated or replaced within ninety days during the first five years of monitoring.

3.4 MONITORING FREQUENCY

The monitoring frequency has changed slightly since the applicant's previously submitted testimony. The measuring frequency for the monitoring stations is the same for both strain gages and vertical settlement markers. The monitoring schedule submitted in the FSAR technical specification is as follows:

1. At least once per 30 days during the first 6 months of unit operation and until the observed settlement has stabilized at less than or equal to 0.10 inches from the previous reading.*

2. At least once per 90 days during the first 5 years of plant operation for all stations. After the fifth year, a report to the NRC on the need to continue monitoring the field stations based on the evaluation of time history plots of the collected data.

* Monitoring will commence after the monitors are installed and operational.

3. After the fifth year of plant operation, anchor stations shall be monitored on a yearly basis for plant operating life.

4. In case of an unusual event (seismic, system upset conditions) monitor all stations immediately.

5. Upon a reportable occurrence, increase monitoring frequency on a basis as determined necessary by the licensee and the NRC.

3.5 RATTLESPACE MONITORING

The penetration clearances (rattlespace) of certain pipes will also be monitored for adequate clearance. The piping penetrations into buildings where the safety grade pipes have not been reanalyzed and rebedded will be monitored. Penetrations to be monitored at the auxiliary building are associated with the following piping: 18-1HCB-1, 18-1HCB-2, 18-2HCB-1, 18-2HCB-2, 26-OHBC-15, 26-OHBC-16, 26-OHBC-19, 26-OHBC-20. At the diesel generator building, the following penetrations will be monitored: 8-1HBC-311, 8-1HBC-310, 8-2HBC-81, 8-2HBC-82.

The soil settlement, seismic, and thermal displacements will be combined and compared to the available annular space to ensure at least a 0.5 inch safety margin. The monitoring frequency will be yearly for the first five years of plant operation.

3.6 LAYDOWN LOADS AND SAFETY GRADE UTILITIES

Load limits have been specified to prevent a surcharging effect from laydown loads for long term storage over buried safety grade piping

and conduits. Exclusion zones will be used to designate the affected safety grade utility and the maximum allowable loads and time limits. Table 2 is the proposed technical specification limits to be submitted in the FSAR. The basis for the specified limits is an allowable surcharge settlement of 0.5 inches at a depth 7 feet below the ground surface, which is the average utility depth. The control procedure to administer this program will be handled in conjunction with the plant operating procedures for controlling heavy loads inside the plant

4.0 REINSTALLATION PROGRAM FOR 36" AND 26" SERVICE WATER SYSTEM PIPING

During the previous evidentiary hearing on underground piping, the applicant committed to replace the 36-inch diameter service water system piping as a result of the inability to reach resolution with the NRC staff as to the adequacy of the existing piping. Following those hearings in April, 1982, it was determined that it was also necessary to rebed a portion of the buried 26-inch diameter servce water piping as part of a fill replacement program to resolve potential liquefaction concerns. The following subsections of this testimony will discuss the basis for and extent of the rebedding of the 26-inch diameter piping and the program for the replacement of the 36-inch diameter buried service water pipes. The reinstallation program was first submitted to the NRC in March, 1982 by applicant's Serial 16269 dated March 16, 1982(2). The NRC staff reviewed the design associated with the reinstallation program in detail in the course of an audit held in August, 1982. It is our understanding that at this time, no open items exist between the NRC staff and the applicant regarding this reinstallation program.

4.1 DEFINITIONS

The following definitions are for terms as they are used in this testimony:

Replace - The removal of existing buried pipe and the installation of new pipe.

Rebed - The exposure of the existing buried pipe, removal of underlying soil, placement of new underlying fly ash concrete fill, and realigment of existing pipe,repair coating, and backfill around and over pipe.

Reinstall - Encompasses both the replacing and rebedding of piping discussed in this testimony.

4.2 BASIS FOR REINSTALLATION PROGRAM

The ability of the safety related buried pipe at the Midland nuclear plant to perform its intended safety functions over the life of the plant has been discussed extensively with the NRC staff. Agreement has been reached between Consumers Power Company and the NRC staff on the acceptability of a portion of the safety related piping. However, because no agreement has been reached on appropriate acceptance criteria for the 36-inch buried service water system piping, the applicant will replace it.

Some 26-inch diameter buried service water system piping, the ability of which to perform its intended safety function over the life of the plant was deemed acceptable, will nevertheless be rebedded as part of the fill replacement program to resolve liquefaction concerns(2). The necessity of rebedding this pipe was brought into focus in early 1982.

The results of the dewatering recharge tests confirmed that the ground water level in the area adjacent to the intake structures (SWPS and CWIS) would rise above el. 610' (the technical specification action limit) within a restrictively short time after loss of dewatering capability. Therefore, action was initiated to obtain NRC concurrence to rebed the affected pipe using a fill material that was not subject to liquefaction.

4.3 SCOPE OF REINSTALLATION PROGRAM

The reinstallation program discussed herein includes the replacement of the buried 36-inch diameter service water system piping in the vicinity of the service water pump structure and the rebedding of the two buried 26-inch diameter service water lines immediately adjacent to the circulating water intake structure. Figure 4 of this testimony identifies the boundary of the reinstallation program.

The lines to be replaced are identified as:

36"-OHBC-15

36"-OHBC-16

36"-OHBC-19

36"-OHBC-20

These are the service water supply and return lines at the point of entry to and from the service water pump structure. The replacement will be made from a point inside the service water pump structure near the penetration up to, but not including, the T-fitting.

The pipes to be rebedded are portions of lines 26"-OHBC-53 and 26"-OHBC-54. These are service water supply and return lines to and from the diesel generator and turbine buildings. The lines to be rebedded extend from the 36" lines to a point even with the southwest edge of the circulating water intake structure.

4.4 SOILS AND FILL CONDITIONS

Logs of exploratory borings along the sections of 26-inch and 36-inch diameter pipe to be reinstalled indicate that the subsurface soil consists of heterogeneous compacted fill from the ground surface (el. 634') to approximately el. 600'. The fill material rests on very dense, natural sands or hard, silty clays. Blowcounts observed in exploration borings adjacent to the service water pump structure and the circulating water intake structure indicate that sands are loose to medium dense above el. 610' and have the potential of liquifying if not dewatered and a safe shutdown earthquake occurs at the site.

Fill material within the limits indicated on Figure 4 will be excavated down to el. 610' and replaced with a suitable material to minimize settlement and prevent liquifaction. Predicted future settlement, considering replacement of loose or soft fill material, is not expected to exceed 1 1/2 inches. Loads from these settlements are included in the pipe design.

The replacement fill material will be a type of low-strength fly ash concrete similar to the material known by the brand name K-KRETE. The properties of the new fill material will be similar to those provided in Table 3 to this testimony. These properties will be verified by testing.

4.5 MATERIALS

The existing 36-inch diameter buried pipe will be replaced with pipe of 36-inch diameter, 0.625" nominal wall thickness, welded ASME SA-672, Grade B-70, Class 20, hydrostatically tested in accordance with ASTM A-530, Sec. 5.

The pipe is locally isolated from the differential settlement caused by the transition from the old fill to the new fill by encasing it in a compressible material. The compressibility of this material is such that the pipe is effectively suspended from where it is actually in contact with the old fill to where it is actually in contact with the new fill (see Figure 4).

The material to be used to replace the excavated fill is described in Section 4.4.

4.6 ANALYSES

The reinstalled buried pipe has been analyzed for appropriate ASME load combinations and settlement stresses. The ASME Code Equations 8, 9, and 10[3] and Code Case 1606-1 include stresses due to:

a) Design and peak pressure

b) Weight and sustained loads (including overburden)

c) Seismic inertial loads (both OBE and SSE)

d) Thermal expansion

e) Seismic anchor movements

Table 4 shows a summary of computed stresses compared to allowable stresses for the ASME code equations and Code Case 1606-1. The allowable stresses are taken from the ASME Code[3], Appendix I, for the materials and operating temperature relevant to the piping under discussion. Pipe support and component loads are combined in accordance with FSAR Table 3.9-3A.

The new 36-inch diameter service water piping is analyzed utilizing Bechtel computer program ME101, which is described in FSAR Section 3.9.1.2. Response spectrum analysis is performed using the SWPS

response spectra. Piping is modeled from equipment anchors in the SWPS to fictitious two-way restraints located 30 feet from the new fill/old fill interface. Soil stiffnesses for both the old and the new fill are considered in this analysis. The seismic stresses within the piping system are evaluated for both the upset and faulted conditions per ASME Section III, Division I, Paragraph ND 3652.2 and Code Case 1606-1. Seismic effects of buried piping are considered for design of supports and restraints located inside the SWPS.

Thermal analysis utilizes Bechtel computer program ME101. A mathematical model is prepared for all of the buried piping, piping inside the SWPS and some portions of piping inside the auxiliary building. Soil effects are considered in the analysis by modeling soil springs and the frictional effect is accounted for by modifying the thermal expansion. Thermal stresses are evaluated per ASME Section III, Division I, Paragraph ND-3652.3, Equation 10 or Equation 11.

The mathematical model for the seismic anchor movement (SAM) analysis considers all piping inside the SWPS and includes buried piping to locations 30 feet from SWPS wall. The model considers all pipe supports, equipment nozzle connections, and expansion joints. Seismic anchor movements are applied to all restraints and anchors inside the SWPS. Buried piping is considered in the analysis to be out of phase with piping inside the SWPS. SAM stresses are combined with thermal stresses and evaluated per ASME Section III, Division I, Paragraph ND 3652.3, Equation 10 or Equation 11.

The settlement analysis considers the effect of future soil settlement. The settlement is considered for both the new fill and also the existing fill. The piping mathematical model encompasses all piping in the SWPS and terminates 30 feet beyond the new fill/old fill interface. The worst combinations of settlement are considered. The first case considers that the old soil will settle 3 inches while the new fill does not settle. The second case assumes that future settlement of the new fill will be 1 1/2 inches and no settlement will occur in the old soil and the SWPS. The settlement stresses for both cases are evaluated individually per ASME Section III, Division I, Paragraph ND 3652.3, Equation 10a(4). Settlement effects of buried piping are considered for the design of expansion joints, supports, and restraints located inside the SWPS.

4.7 REINSTALLATION PROCEDURE

The reinstallation of these lines will be coordinated with the SWPS underpinning. The excavation required to expose these lines and replace unsuitable fill and the excavation for underpinning of the SWPS will be contiguous.

The underground utilities that will be exposed during the excavation work will be supported and protected as necessary to preclude damage. A list of structures, facilities, and utilities that may be encountered or affected by this excavation is included in Table 5. Precautions to preclude damage may include measures such as:

a) Shoring and bracing supporting fill

b) Complete temporary support

c) Staking utility locations prior to excavation

d) Hand excavation near utilities

Because of the need for the 36-inch pipe to meet the startup testing schedule, the 36-inch pipe will be replaced, and then temporarily backfilled for frost protection, by early February, 1983. Subsequently, during the 1983 construction season, the temporary backfill will be removed and the soil replacement and 26-inch pipe rebedding program will be completed.

The existing 36-inch pipe to be replaced will be cut at the tee fitting and at a point inside the SWPS near the penetration

During the soil replacement and pipe rebedding stage of the reinstallation program, the lines will be left in place and temporarily supported. The 26-inch pipe to be rebedded will be exposed to at least the tee where it connects to the 36-inch line and to a point approximately even with the southwest edge of the CWIS. The 36-inch pipe which was replaced will again be exposed. The soil beneath the pipes, within the limits shown in Figure 4, will be removed and replaced with fly ash concrete (as discussed in Section 4.4). Before being rebedded, the pipe will be inspected to verify the integrity of the pipe and the external corrosion coating and then encased in compressible material where applicable.

The pipe will be fabricated and installed, and the material used to replace unsuitable fill and to backfill the excavation will be placed, in accordance with existing design drawings and specifications. Relevant documents include:

a) Drawing 7220-M-169(Q), Yard Piping Plan Area E

b) Specification 7220-M-204(Q), Field Fabrication and Installation of Piping for Nuclear Service

c) Specification 7220-M-214(Q), Piping System Erection Fit-Up Control

d) Specification 7220-G-8, Protective Coating for Buried Carbon Steel Pipe

e) Drawing 7220-C-2031(Q), Excavation Area Plan and Section

f) Specification 7220-C-211(Q), Backfill

g) Specification 7220-C-230(Q), Operating Onsite and Offsite Batch Plant and Furnish Concrete

5.0 CORROSION OF UNDERGROUND STAINLESS STEEL PIPING

Excavation under the Unit 1 condensate storage tank in June of 1979 revealed pitting corrosion on the buried 6-inch stainless steel fill line, 6"-1HCD-513. In October of 1980, two further instances of corroded buried stainless steel pipe were noted, on line 1 1/2"-OECD-62, and on abandoned line 4"-2HCB-18. All three of these instances were ultimately attributed to stray welding current corrosion. None of these instances was in a safety related line.

Because of the observed corrosion of buried stainless steel, some concern existed that corrosion of buried safety related stainless steel lines might lead to failure of those lines. A survey showed that the only buried safety related lines were 18"-1&2HCB-1 and -2. These are the borated water storage tank (BWST) discharge lines leading south from the BWSTs into the auxiliary building. It was decided to excavate and inspect these BWST lines in the vicinity of a plant grounding grid cable, which passes near the pipes at the point where the pipes pass under the

In addition line 1" OCCC-1, control room pressurization tank fill line, is a stainless steel line installed in 1981

tank farm retaining wall. The plant grounding grid is a network of buried bare copper cables attached to normally noncurrent-carrying metal equipment, structures, and components to electrically ground them. Near the grounding grid is the likeliest location for stray welding current corrosion to occur. The excavation has been completed, and the inspection of the pipes revealed no corrosion or pitting.

Examination of the ~~only~~ buried safety related stainless steel lines for the BWST in the location most likely to experience stray welding current corrosion has shown no evidence of such corrosion. Therefore, it is concluded that the pipe would not fail in service, and the subject concern poses no risk to the safe operation of the Midland plant. The 1" control room pressurization line will be evaluated to confirm that corrosion due to stray welding currents is not a problem.

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Reference 1
in OFLewis' Oct. '82
Testimony

Consumers Power Company

James W Cook
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May 3, 1982

Harold R Denton, Director
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MIDLAND PROJECT
MIDLAND DOCKET NO 50-329, 50-330
UNDERGROUND PIPING INFORMATION REQUESTED DURING APRIL 16, 1982 MEETING
FILE: 0485.16 SERIAL: 16881
REFERENCES: (1) J W COOK LETTER TO H R DENTON,
SERIAL 16266, DATED MARCH 16, 1982
(2) J W COOK LETTER TO H R DENTON,
SERIAL 16638, DATED APRIL 15, 1982
ENCLOSURES: (1) TABLE 1.0 MONITORING STATION OVALITY
AND CORRESPONDING STATION
(2) BURIED CATEGORY 1 LINES AND TANKS
(3) ADDITIONAL GEOTECHNICAL INFORMATION

The purpose of this letter is to provide confirmatory information regarding several issues discussed during a meeting between the NRC Staff and Consumers Power Company. The meeting was held in Bethesda on April 16, 1982.

Enclosure 1 is an expansion of the table previously submitted by our letter, Serial 16638, dated April 15, 1982. Additional information is provided specifying the future allowable strain based on an acceptance criteria and technical specification limit of 0.48% strain. The number of strain gages has also been specified in the table. The number of gages were determined by reviewing the pipe elevation profiles for abrupt inflection points and critical buckling zones. The strain gages are to be mounted one pipe diameter apart at a given monitoring station.

At the April 16 meeting a concern arose about the accuracy of the vibrating wire strain gages. In a telephone conference with the Irad Gage Company, they indicated the instrument is accurate to 10 (μinch/inch) as a worst case condition for any type of vibrating wire gage. This includes accounting for inaccuracies in installation and calibrations. This accuracy is an order of magnitude greater than the accuracy required for the strain measurements to be taken (.0001 in/in vs .00001 in/in).

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A clarification on the technical specification limits and requirements proposed in the pipe monitoring program submitted March 16, 1982 is necessary. Our intention is to use the 4% ovality (equivalent .0048 inch/inch strain) which includes appropriate safety factors as the technical specification unless we can justify a higher value at a later date. If the specified limit is reached we would immediately notify the NRC Staff and increase the monitoring frequency to one month intervals. In parallel with the Staff notification an engineering evaluation of the situation would be performed. This evaluation would consider the remedial action necessary to restore the safety function and reliability of the service water system to overall plant operations. The actions necessary may very well include excavation of the piping in the affected zone for visual examination and possible replacement or sleeving.

The NRC Staff asked Consumers Power Company to verify that no other buried Category 1 pipes remain unidentified. Enclosure 2 is a current table of all the buried seismic Category 1 lines and tanks. The pressurization lines and tanks have been added to the list of buried Category 1 piping. The control room pressurization lines and tanks were installed during the summer 1981, and therefore not subjected to the soils settlement problems. The penetration pressurization lines and tanks have not been installed; however appropriate procedures for soil settlement will be followed. The list does not include the 48-inch diameter (48-OHBC-2) discussed in Enclosure 3 of our letter, Serial 16638, dated April 15, 1982.

The NRC Staff expressed a concern regarding the margins for future settlement at the wall penetration of pipeline 26-OHBC-15. Our investigations indicate that there is a 90° elbow fitting in this line immediately upon exiting the building. Any bending moment developed due to soils settlement will be transformed to an equal torque value. This load transformation causes the vertical deflection due to settlement to change to an angle of twist on the pipe at the penetration. This angle of twist has no effect on the annulus clearance of the wall penetration and therefore the only real clearance we need to assure is the seismic rattlespace (0.3693 inch). The margin we presently have is 0.6307 inches which is a factor of 1.7 times the conservative estimate of seismic rattlespace.

The NRC Geotechinical Branch requested information concerning soils and its relation to buried utilities. Enclosure 3 addresses the concerns expressed about the prediction of maximum future settlement for plant life (3.0 inches) and the isolated sand pocket near the diesel fuel tanks. A concern was also expressed about the soil properties used in estimating the soil forces required to deform condensate line (20-1HCD-169) into its present configuration. We have responded by seperately providing the Structural Mechanics Assoiciates calculations estimating the soil capacity at Midland.

We believe the information supplied satisfies the concerns the NRC Staff expressed during the recent April meeting.

J A Mooney
Executive Manager
Midland Project Office

For J W Cook

JWC/WJC/mkh

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CBechhoefer, ASLB, w/o
PChen, ETEC, w/a
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MMCherry, Esq, w/o
FPCowan, ASLB, w/o
RJCook, Midland Resident Inspector, w/o
RSDecker, ASLB, w/o
SGadler, w/o
JHarbour, ASLB, w/o
DSHood, NRC, w/a (2)
JDKane, NRC, w/a
FJKelley, Esq, w/o
RBLandsman, NRC Region III, w/a
WHMarshall, w/o
WDPaton, Esq, w/o
BStamiris, w/o

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BCC RCBauman, P-14-312B, w/o
JEBrunner, M-1079, w/a
WGCorley, PCA, w/a
PJGriffin, P-24-513, w/a
RWHuston, Washington, w/a
DFLewis, Bechtel, w/a
JAMooney, P-14-115A, w/a
DBMiller, Midland, w/a
MIMiller, IL&B, w/a
JARutgers, Bechtel, w/a
JRSchaub, P-13-309A, w/a
PPSteptoe, IL&B, w/a
TRThiruvengadam, P-14-400, w/a
JTsacoyeanes, Teledyne Engineering, w/a
FCWilliams, IL&B, w/a
NRC Correspondence File

Reference 2
in O.F. Lewis' Oct. '82
Testimony

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March 16, 1982
WJC 7-82

Harold R Denton, Director
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MIDLAND PROJECT
MIDLAND DOCKET NO 50-329, 50-330
ADDITIONAL INFORMATION CONCERNING SAFETY GRADE BURIED PIPING
FILE: 0485.16 SERIAL: 16269
REFERENCE: J W COOK LETTER TO H R DENTON,
SERIAL 15093, DATED DECEMBER 15, 1981
ENCLOSURES: (1) FUTURE MONITORING PROGRAM OF BURIED SERVICE WATER PIPING FOR MIDLAND PLANT UNITS 1 AND 2
(2) REINSTALLATION PROGRAM FOR 26-INCH AND 36-INCH DIAMETER BURIED SERVICE WATER PIPES AT THE MIDLAND NUCLEAR PLANT

By means of the subject enclosures we are providing additional documentation of the remedial measures to assure the performance of buried service water piping. The enclosures describe the agreement in principle with the NRC Staff on the remedial action necessary to resolve the Staff concerns. The agreements were reached during the recent soils hearings on underground piping held on February 18 and 19, 1982.

The enclosure on the future monitoring program for the existing 26-inch service water piping covers 2 types of monitoring; vertical settlement monitoring and pipe strain monitoring. It describes the monitoring station locations and the details of selection criteria, monitoring frequency, acceptance criteria and instrumentation for both types of monitoring.

The enclosure on reinstallation of service water piping describes the engineering and construction aspects necessary to accomplish the remedial actions. It describes the replacement of the 36-inch diameter piping agreed upon during the soils hearing and rebedding of a portion of Pipelines 26-OHBC-53 and 26-OHBC-54 in front to the circulating water intake structure.

The rebedding of 26-inch diameter piping is an additional commitment since the soils hearings, based on the recently evaluated results of the dewatering recharge test. The results indicate that the soils north of the service water pump structure and the circulating water intake structure would have only a three-day limit to prevent the potential for soil liquefaction during a seismic event and a dewatering pump failure. As a consequence, the fill in

the affected area will be replaced. The area covers a zone where the 36-inch diameter piping is being replaced and also a zone where Pipelines 26-OHBC-53 and 26-OHBC-54 are buried. The fill replacement with suitably compacted fill will eliminate the need to rely on the dewatering system in this area to prevent liquefaction.

We believe the enclosures adequately describe the remedial measures to be taken to assure the performance of the service water piping throughout the lifetime of the plant.

James W. Cook

JWC/WJC/dsb

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CBechhoefer, ASLB, w/o
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BCC RCBauman, P-14-312B, w/o
AJBoos, Bechtel, w/a
JEBrunner, M-1079, w/a
WGCorley, w/a
RWHuston, Washington, w/a
JAMooney, P-14-115A
DBMiller, Midland, w/a
MIMiller, IL&B, w/a
JARutgers, Bechtel, w/a
JRSchaub, P-13-309A
PPSteptoe, IL&B, w/a
TRThiruvengadam, P-14-400, w/a
JTsacoyeanes, Teledyne Engineering, w/a
FCWilliams, IL&B, w/a
Licensing Clerk
NRC Correspondence File

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TABLE 1

Monitoring Station Ovality and Corresponding Strain

Station	Measured Ovality (%)	Meridional Strain (%)	Future Allowable Strain (%)	No of Strain Gages
Line: 26-OHBC 15				
			Allowable Strain = .48%	
1	1.25	0.25	0.23	2
2	2.34	0.35	0.13	2
3	1.87	0.31	0.17	2
4	1.88	0.32	0.16	2
5	2.34	0.35	0.13	2
6	1.56	0.28	0.20	2
7	2.34	0.35	0.13	2
8	1.24	0.25	0.23	2
Line: 26-OHBC 16				
1	2.18	0.34	0.14	3
2	2.18	0.34	0.14	2
3	2.34	0.35	0.13	2
4	2.18	0.34	0.14	2
5	1.40	0.27	0.21	2
6	1.72	0.29	0.19	2
7	1.12	0.23	0.25	2
Line: 26-OHBC 53				
A1	NA	NA	0.48	2
1	1.40	0.27	0.21	2
2	2.96	0.40	0.08	2
3	2.18	0.34	0.14	2
4	2.18	0.34	0.14	2
5	1.40	0.27	0.21	2
6	1.56	0.28	0.20	2
Line: 26-OHBC 54				
A1	NA	NA	0.48	2
1	2.50	0.36	0.12	2
2	2.50	0.36	0.12	2
3	2.18	0.34	0.14	2
4	2.03	0.32	0.16	2
5	2.50	0.36	0.12	2
6	2.03	0.32	0.16	2

Station	Measured Ovality (%)	Meridional Strain (%)	Future Allowable Strain (%)	No of Strain Gages
Line: 26-OHBC 55				
A1	NA	NA	0.48	2
1	2.03	0.32	0.16	2
2	1.47	0.27	0.21	2
3	1.56	0.28	0.20	2
4	1.56	0.28	0.20	2
Line: 26-OHBC 56				
A1	NA	NA	0.48	2
1	1.09	0.22	0.26	2
2	1.87	0.31	0.17	2
3	0.90	0.21	0.27	2
4	2.49	0.36	0.12	2
Line: 26-OHBC 19				
A1	0.78	0.19	0.29	2
1	1.87	0.31	0.17	2
2	1.87	0.31	0.17	3
3	1.87	0.31	0.17	2
4	0.90	0.22	0.26	2
5	0.89	0.21	0.27	2
Line: 26-OHBC 20				
A1	1.09	0.24	0.24	2
1	1.87	0.31	0.17	2
2	1.09	0.24	0.24	2
3	1.87	0.31	0.17	2
4	1.87	0.31	0.17	3
5	1.79	0.30	0.18	2
Miscellaneous lines				
18-1HCB-1				
A1(Vlv pit)	NA	NA	0.48	2
A2	NA	0.04	0.44	2
18-1HCB-2				
A1 (Vlv pit)	NA	NA	0.48	2
A2	NA	0.04	0.44	2

Station	Measured Ovality (%)	Meridional Strain (%)	Future Allowable Strain (%)	No of Strain Gages
Miscellaneous Lines - Reference: SK-C-745				
18-2HCB-1				
A1 (Vlv pit)	NA	NA	0.48	2
A2	NA	0.015	0.47	2
18-2HCB-2				
A1 (Vlv pit)	NA	NA	0.48	2
A2	NA	0.015	0.47	2
8-1HBC-311				
A1	NA	NA	0.48	2
8-1HBC-310				
A1	NA	NA	0.48	2
8-2HBC-82				
A1	NA	NA	0.48	2
8-2HBC-81				
A1	NA	NA	0.48	2
8-2HBC-311				
A1	NA	NA	0.48	2
8-2HBC-310				
A1	NA	NA	0.48	2
8-1HBC-81				
A1	NA	NA	0.48	2
8-1HBC-82				
A1	NA	NA	0.48	2

TABLE 2

LAYDOWN LOAD ALLOWABLES

Loaded Area	Allowable Load (psf) (< 2 months)	Allowable Load (psf) (> 2 months)
10' x 10'	1,500	500[1]
20' x 20'	750	500[1]
40' x 40'	500	225
100' x 100'	325	150

[1] Any long-term load in excess of 500 psf will be evaluated on a case-by-case basis.

TABLE 3

SUMMARY OF SOIL CONSTANTS FOR FLY ASH CONCRETE

	OBE 0.06g	SSE 0.18g[2]	References
Compression wave velocity	10,000 fps	10,000 fps	1,2
Shear wave velocity	5,000 fps	5,000 fps	1,2
Surface wave velocity	4,675 fps	4,675 fps	1,3
Maximum particle velocity (all wave types)	2.88 in/sec	8.64 in/sec	4
Maximum particle acceleration (all wave types)	23.16 in/sec^2	69.48 in/sec^2	3,5
Soil unit weight	130 pcf	130 pcf	
Poisson's ratio	0.25	0.25	
Angle of internal friction	25°	25°	
Coefficient of lateral pressure	0.33	0.33	
Coefficient of friction	0.466	0.466	
Shear wave velocity[3]			
E max	3,322 fps	3,322 fps	
E min	1,500 fps	1,500 fps	
Ultimate compressive strength	250 psi	250 psi	
Maximum soil strain in/in	(6.17) 10^{-5} in/in	(1.85) 10^{-4}	1

(1) (deleted)

(2) SSE acceleration has been increased by 50% to provide a margin for the site-specific response spectra.

(3) The shear modulus and Young's modulus are assumed to remain constant with shear strain.

SUMMARY OF SOIL CONSTANTS FOR FLY ASH CONCRETE (Continued)

REFERENCES:

1) TPO Design Guide C-2.44, Seismic Analyses of Structures and Equipment for Nuclear Power Plants, Rev 0

2) Subsurface Investigation and Foundation Soil Report, Vol 2 of 2, Dec 1975, Appendix 2C

3) Iqbal, M.A., and Goodling, E.C. Jr., Seismic Design of Buried Piping, 2nd ASCE Specialty Conference on Structural Design of Nuclear Power Plant Facilities, New Orleans, Louisiana, Dec 1975

4) Newmark, N.M., Blume, J.A., and Kapur, K.K., Seismic Design Spectra for Nuclear Power Plants, ASCE, Journal of the Power Division, Nov 1973

5) Midland Civil Design Criteria, Standard C-501, Rev 11

ENCLOSURE 1

ASME CODE CHECK - STRESS SUMMARY FOR

BURIED SERVICE WATER PIPING[1]

(Stresses in psi)

TABLE 4

Line Number	Description	Normal Eq 8[2]		Upset Eq 9[2]		Faulted Code Case 1606-1[2]		Thermal Eq 10[2]	
		Actual Stress	Allowable Stress	Actual Stress	Allowable Stress	Actual Stress	Allowable Stress	Actual Stress	Allowable Stress
36/26"-OHBC-15	SW Supply	6,642	17,500	8,094	21,000	10,876	42,000	14,092	26,250
36/26"-OHBC-16	SW Return	6,642	17,500	8,084	21,000	9,525	42,000	19,895	26,250
36/26"-OHBC-19	SW Supply	6,642	17,500	8,153	21,000	10,866	42,000	4,580	26,250
36/26"-OHBC-20	SW Return	6,642	17,500	7,848	21,000	9,053	42,000	9,409	26,250
26"-OHBC-53	SW Supply	5,842	17,500	17,972	21,000	30,101	42,000	10,128	26,250
26"-OHBC-54	SW Return	5,842	17,500	10,847	21,000	15,852	42,000	13,742	26,250
26"-OHBC-55	SW Supply	5,842	17,500	11,488	21,000	17,134	42,000	10,875	26,250
26"-OHBC-56	SW Supply	5,842	17,500	10,301	21,000	14,760	42,000	21,764	26,250

NOTES:

1. This table shows maximum stresses in the above lines. The extent of the pipe summarized here matches that included in Enclosure 2.

2. Piping stress summaries:

   a. Equation 8

      Stresses included = design pressure, weight and sustained loads (includes overburden)
      Allowable stress = $1.0S_h$ - in accordance with ASME NC-3652.1 and Section III, Division 1, Appendix I

   b. Equation 9

      Stresses included = peak pressure, weight and sustained loads (includes overburden), occasional load (OBE)
      Allowable stress = $1.2S_h$ - in accordance with ASME NC-3652.2 and Section III, Division 1, Appendix I

   c. Code Case 1606

      Stresses included = peak pressure, weight and sustained loads (includes overburden), occasional load (SSE)
      Allowable stress = $2.4S_h$ - in accordance with Code Case 1606-1 and Section III, Division 1, Appendix I

   d. Equation 10

      Stresses included = thermal expansion, anchor movement (OBE)
      Allowable stress = S_A - in accordance with ASME NC-3652.3 and Section III, Division 1, Appendix I

MIDLAND PLANT UNITS 1 AND 2

REINSTALLED BURIED PIPE STRESS SUMMARY

LINE 36"-0HBC-15

(Stresses in psi)

Data Point	Pressure	Weight	Overburden	Thermal	Settlement[1]	Seismic[2] (SSE)	Seismic Anchor Movement (OBE)	Total
86 (Tee in Line 36"-0HBC-15)	2,442	2,958	0	9,110	10	1,219	1,286	17,025
215 (90° Elbow)	2,442	648	0	4,673	12	926	9,419	18,120
350	2,442	46	0	25	2	116	4	2,635
351 (Outside Face of SWPS)	1,434	0	4,200	16	1	102	3	5,756
35A	1,434	0	4,200	16	1	70	3	5,724
352	1,434	0	4,200	16	1	70	3	5,724
353	1,434	0	4,200	16	5	74	3	5,732
354	1,434	0	4,200	39	28	107	3	5,811
355	2,442	0	4,200	351	91	350	20	7,454
356 (Tee for Line 26"-0HBC-53)	2,442	0	4,200	2,752	534	2,063	135	12,126
358 (36" x 26" Reducer)	2,442	0	4,100	654	1,468	553	30	9,247
360	1,742	0	4,100	-	6,079	1,172	0	13,093
361 (Start of Compressible Material)	1,742	3,569	0	5	23,747	5,565	0	34,628
361A	1,742	1,080	0	3	6,990	2,214	0	12,026
361B	1,742	2,091	0	1	9,766	4,566	0	18,166
382 (End of Compressible Material)	1,742	537	0	1	26,522	940	0	29,742

TABLE 4

Enclosure 2
Sheet 1
8/25/82

Data Point	Pressure	Weight	Overburden	Thermal	Settlement[1]	Seismic[2] (SSE)	Seismic Anchor Movement (OBE)	Total
38A	1,742	0	4,100	1	-	2,198	0	8,041
38B	1,742	0	4,100	1	-	2,041	0	7,884
38C	1,742	0	4,100	0	-	1,413	0	7,255
38D	1,742	0	4,100	0	-	787	0	6,629
38E	1,742	0	4,100	0	-	306	0	6,148
38F	1,742	0	4,100	0	-	0	0	5,842

NOTES:

[1]Settlement stresses shown are the maximum values determined by either a 3-inch differential settlement between new fill and the old fill, or a 1-1/2-inch differential settlement between the new fill and the SWPS.

[2]Values shown are based on dynamic seismic analysis. A check by an analysis based on BC-TOP-4 techniques for the buried portion of the lines will be completed to consider the new fill condition. If the check reveals higher stresses due to the BC-TOP-4 analysis, the tabulated values will be revised.

TABLE 4

MIDLAND PLANT UNITS 1 AND 2

REINSTALLED BURIED PIPE STRESS SUMMARY

LINE 36"-OHBC-16

(Stresses in psi)

Data Point	Pressure	Weight	Overburden	Thermal	Settlement[1]	Seismic[2] (SSE)	Seismic Anchor Movement (OBE)	Total
847 (36" x 30" Reducer to Line 30"-OHBC-34)	2,442	189	0	1,196	4,218	649	2,735	11,429
845	2,442	515	0	1,380	6,713	865	3,188	15,103
830 (Tee for Line 36"-OHBC-1)	2,442	2,588	0	5,874	20,835	2,797	14,021	48,557
835A	2,442	404	0	1,255	5,540	382	860	10,883
835	2,442	380	0	-	9,631	-	-	12,453
834	1,434	150	0	1,305	11,373	117	2,524	16,903
836 (Outside Face of SWPS)	1,434	0	4,200	853	8,754	168	2,579	17,988
90A	1,434	0	4,200	786	1,926	72	571	8,989
90B	1,434	0	4,200	784	798	93	157	7,466
90R	1,434	0	4,200	1,262	1,152	523	150	8,721
290 (Tee for Line 26"-OHBC-54)	2,442	0	4,200	6,179	4,869	2,883	846	21,419
90Q (36" x 26" Reducer to Line 26"-OHBC-16)	2,442	0	4,200	267	695	748	164	8,516
90P	1,742	0	4,100	403	5,477	165	36	11,923
90N (Start of Compressible Material)	1,742	-	0	121	23,726	0	0	25,589
90LC	1,742	-	0	121	11,166	-	-	13,029
90LB	1,742	-	0	121	1,394	-	-	3,257
90LA	1,742	-	0	121	13,953	-	-	15,816
90L (End of Compressible Material)	1,742	-	0	121	26,513	-	-	28,376

TABLE 4

NOTES:

[1]See Note 1 for Line 36"-OHBC-15.
[2]See Note 2 for Line 36"-OHBC-15.

MIDLAND PLANT UNITS 1 AND 2

REINSTALLED BURIED PIPE STRESS SUMMARY

LINE 36"-OHBC-19

(Stresses in psi)

Data Point	Pressure	Weight	Overburden	Thermal	Settlement[1]	Seismic[2] (SSE)	Seismic Anchor Movement (OBE)	Total
32 (Tee in Line 36"-OHBC-19)	2,442	1,731	0	2,761	16	2,445	1,277	10,672
200 (90° Elbow)	2,442	1,717	0	3,243	32	2,139	1,337	10,910
204	2,442	456	0	437	14	666	122	4,137
20A	2,442	1,306	0	2,141	80	2,352	396	8,717
20B (90° Elbow)	2,442	1,114	0	2,010	86	1,877	196	7,719
208	2,442	109	0	349	14	176	4	3,094
209	2,442	109	0	349	14	176	4	3,094
210	2,442	110	0	349	14	176	4	3,095
700	2,442	113	0	349	14	176	4	3,098
701 (Outside Face of SWPS)	1,434	0	4,200	212	9	107	3	5,965
702	1,434	0	4,200	212	9	107	3	5,965
703	1,434	0	4,200	212	9	107	3	5,965
704	1,434	0	4,200	212	9	107	3	5,965
705	1,434	0	4,200	212	9	107	3	5,965
706	1,434	0	4,200	212	9	107	3	5,965
707	1,434	0	4,200	212	9	107	3	5,965
735	1,434	0	4,200	212	9	107	3	5,965
740	1,434	0	4,200	212	9	107	3	5,965
742	1,434	0	4,200	215	11	108	3	5,971
743	1,434	0	4,200	290	46	112	3	6,085
745	2,442	0	4,200	402	87	642	4	7,777
750 (Tee for Line 26"-OHBC-55)	2,442	0	4,200	3,379	544	3,023	18	13,606
755	2,442	0	4,200	704	1,489	750	0	9,585
762	1,742	0	4,100	217	6,039	1,189	0	13,287
765 (Start of Compressible Material)	1,742	3,568	0	40	23,746	5,556	0	34,652

TABLE 4

Line 36"-OBHC-19 (Continued)

Data Point	Pressure	Weight	Overburden	Thermal	Settlement[1]	Seismic[2] (SSE)	Seismic Anchor Movement (OBE)	Total
765A	1,742	1,080	0	24	6,990	2,215	0	12,051
765B	1,742	2,091	0	8	9,766	4,558	0	18,165
780 (End of Compressible Material)	1,742	537	0	8	26,522	944	0	29,753
78A	1,742	0	4,100	10	-	2,195	0	8,047
78B	1,742	0	4,100	7	-	2,038	0	7,887
78C	1,742	0	4,100	4	-	1,410	0	7,256
78D	1,742	0	4,100	2	-	785	0	6,629
78E	1,742	0	4,100	1	-	305	0	6,148
78F	1,742	0	4,100	0	-	0	0	5,842

NOTES:

[1]See Note 1 for Line 36"-OHBC-15.
[2]See Note 2 for Line 36"-OHBC-15.

TABLE 4

MIDLAND PLANT UNITS 1 AND 2

REINSTALLED BURIED PIPE STRESS SUMMARY

LINE 36"-0HBC-20

(Stresses in psi)

Data Point	Pressure	Weight	Overburden	Thermal	Settlement[1]	Seismic[2] (SSE)	Seismic Anchor Movement (OBE)	Total
886 (Tee at Line 36"-0HBC-1 Inside SWPS)	2,442	391	0	3,251	5,301	741	1,550	13,676
887 (90° Elbow)	2,442	1,741	0	1,686	15,307	1,464	1,882	24,522
890	2,442	464	0	580	3,450	332	282	7,550
892 (90° Elbow)	2,442	795	0	4,239	15,125	2,046	2,570	27,217
894 (90° Elbow)	2,442	916	0	2,642	13,112	1,678	2,280	23,070
896	2,442	462	0	496	2,342	234	394	6,370
897 (90° Elbow)	2,442	915	0	4,231	15,877	1,484	2,937	27,886
898	2,442	490	0	597	2,707	1,751	1,156	9,143
899 (Outside Face of SWPS)	1,434	0	4,200	486	2,170	1,965	1,013	11,268
A99	1,434	0	4,200	357	1,538	373	233	8,135
B99	1,434	0	4,200	351	1,508	38	148	7,679
C99	1,434	0	4,200	351	1,508	40	148	7,681
D99	1,434	0	4,200	351	1,508	38	148	7,679
E99	1,434	0	4,200	351	1,508	38	148	7,679
F99	1,434	0	4,200	351	1,508	38	148	7,679
G99	1,434	0	4,200	351	1,508	38	148	7,679
H99	1,434	0	4,200	351	1,508	38	148	7,679
J99	1,434	0	4,200	351	1,508	38	148	7,679
K99	1,434	0	4,200	368	1,508	40	148	7,698
L99	1,434	0	4,200	368	1,508	-	148	7,658
M99	1,434	0	4,200	546	1,508	38	148	7,874
N99	2,442	0	4,200	805	2,479	485	246	10,657
700 (Tee for Line 26"-0HBC-56)	2,442	0	4,200	8,309	4,611	2,411	1,100	23,073
P99	2,442	0	4,200	336	635	423	43	8,079
O99 (36" x 26" Reducer)	1,712	0	4,100	1,185	6,534	189	22	13,772

TABLE 4

Line 36"-0BHC-20 (Continued)

Data Point	Pressure	Weight	Overburden	Thermal	Settlement[1]	Seismic[2] (SSE)	Seismic Anchor Movement (OBE)	Total
R99 (Start of Compressible Material)	1,742	-	0	310	23,749	0	0	25,801
S99 (End of Compressible Material)	1,742	-	0	300	26,525	-	-	32,667

NOTES:

[1]See Note 1 for Line 36"-0HBC-15.
[2]See Note 2 for Line 36"-0HBC-15.

TABLE 4

MIDLAND PLANT UNITS 1 AND 2

REINSTALLED BURIED PIPE ST[illegible] SUMMARY

LINE 26"-OHBC-53

(Stresses in psi)

Data Point	Pressure	Weight	Overburden	Thermal	Settlement[1]	Seismic[2] (SSE)	Seismic Anchor Movement (OBE)	Total
356 (Tee at 36"-OHBC-15)	1,742	0	4,100	9,633	58	6,623	495	22,651
365	1,742	0	4,100	9,633	59	1,239	495	17,268
366	1,742	0	4,100	336	12	4,624	11	10,825
367 (90° Elbow)	1,742	0	4,100	4,931	53	12,826	48	23.700
368	1,742	0	4,100	2,293	5	4,048	4	12,192
380	1,742	0	4,100	326	4	1,275	1	7,448
384	1,742	0	4,100	654	5	8,491	3	14,995
385 (90° Elbow)	1,742	0	4,100	3,168	22	24,259	12	33,303
390 (45° Elbow)	1,742	0	4,100	4,138	9	11,680	15	21,684
391	1,742	0	4,100	2,316	1	2,294	7	10,460
392	1,742	0	4,100	39	0	65	0	5,946
393	1,742	0	4,100	22	0	22	0	5,946
394	1,742	0	4,100	1	0	18	0	5,861
395	1,742	0	4,100	0	0	18	0	5,860
396	1,742	0	4,100	0	0	18	0	5,860
398	1,742	0	4,100	0	0	18	0	5,860
399	1,742	0	4,100	0	0	18	0	5,860
500	1,742	0	4,100	0	0	18	0	5,860
501	1,742	0	4,100	0	0	18	0	5,860
502	1,742	0	4,100	0	0	18	0	5,860
503	1,742	0	4,100	0	0	18	0	5,860
504	1,742	0	4,100	0	0	18	0	5,860
505	1,742	0	4,100	0	0	18	0	5,860
506	1,742	0	4,100	0	0	18	0	5,860
507	1,742	0	4,100	0	0	18	0	5,860
508	1,742	0	4,100	0	0	18	0	5,860
509	1,742	0	4,100	0	0	18	0	5,860
510	1,742	0	4,100	0	0	18	0	5,860
511	1,742	0	4,100	0	0	18	0	5,860
512	1,742	0	4,100	0	0	18	0	5,860
513	1,742	0	4,100	0	0	18	0	5,860
514	1,742	0	4,100	0	0	18	0	5,860
515	1,742	0	4,100	0	0	18	0	5,860
516	1,742	0	4,100	0	0	18	0	5,860

TABLE 4

Line 26"-OBHC-53 (Continued)

Data Point	Pressure	Weight	Overburden	Thermal	Settlement[1]	Seismic[2] (SSE)	Seismic Anchor Movement (OBE)	Total
517	1,742	0	4,100	0	0	18	0	5,860
518	1,742	0	4,100	0	0	18	0	5,860
519	1,742	0	4,100	0	1	18	0	5,861
520	1,742	0	4,100	0	20	19	0	5,881
521	1,742	0	4,100	0	139	30	0	6,011
522	1,742	0	4,100	0	1,887	388	0	8,117
523 (Start of Compressible Material)	1,742	3,526	0	0	23,310	5,003	0	33,581
523A	1,742	1,106	0	0	6,765	2,072	0	11,685
523B	1,742	2,100	0	0	9,780	4,174	0	17,796
550 (End of Compressible Material)	1,742	545	0	0	26,325	876	0	29,488
50A	1,742	0	4,100	0	0	2,020	0	7,862
50B	1,742	0	4,100	0	0	1,872	0	7,714
50C	1,742	0	4,100	0	0	1,294	0	7,136
50D	1,742	0	4,100	0	0	720	0	6,562
50E	1,742	0	4,100	0	0	279	0	6,121
50F	1,742	0	4,100	0	0	0	0	5,842

TABLE 4

NOTES:

[1]See Note 1 for Line 36"-OHBC-15.
[2]See Note 2 for Line 36"-OHBC-15.

MIDLAND PLANT UNITS 1 AND 2

REINSTALLED BURIED PIPE STRESS SUMMARY

LINE 26"-OHBC-55

(Stresses in psi)

Data Point	Pressure	Weight	Overburden	Thermal	Settlement[1]	Seismic[2] (SSE)	Seismic Anchor Movement (OBE)	Total
750 (Tee at 36"-OHBC-19)	1,742	0	4,100	4,180	285	11,292	36	21,635
782	1,742	0	4,100	4,180	1,098	527	36	11,683
785 (45° Elbow)	1,742	0	4,100	10,862	8,227	1,376	13	26,320
786	1,742	0	4,100	6,909	3,202	708	3	16,664
787 (Start of Compressible Material)	1,742	3,520	0	655	23,444	5,075	0	34,436
787A	1,742	1,109	0	388	6,845	2,106	0	12,190
787B	1,742	2,099	0	120	9,753	4,223	0	17,937
800 (End of Compressible Material)	1,742	550	0	147	26,352	894	0	29,685
80A	1,742	0	4,100	165	-	2,049	0	8,056
80B	1,742	0	4,100	99	-	1,898	0	7,839
80C	1,742	0	4,100	52	-	1,312	0	7,206
80D	1,742	0	4,100	21	-	731	0	6,594
80E	1,742	0	4,100	4	-	284	0	6,130
80F	1,742	0	4,100	0	-	0	0	5,842

TABLE 4

NOTE:

[1]See Note 1 for Line 36"-OHBC-15.
[2]See Note 2 for Line 36"-OHBC-15.

MIDLAND PLANT UNITS 1 AND 2

REINSTALLED BURIED PIPE STRESS SUMMARY

LINE 26"-0HBC-56

(Stresses in psi)

Data Point	Pressure	Weight	Overburden	Thermal	Settlement[1]	Seismic[2] (SSE)	Seismic Anchor Movement (OBE)	Total
700 (Tee at 36"-0HBC-20)	1,742	0	4,100	8,572	19,211	8,918	2,251	44,794
701	1,742	0	4,100	-	-	270	48	6,160
A65 (45° Elbow)	1,742	-	4,100	21,588	7,127	728	176	35,461
B65	1,742	-	4,100	12,755	2,270	164	37	21,068
C65 (Start of Compressible Material)	1,742	-	0	808	23,452	0	0	26,002
D65 (End of Compressible Material)	1,742	-	0	197	26,354	-	0	28,293

NOTES:

[1]See Note 1 for Line 36"-0HBC-15.
[2]See Note 2 for Line 36"-0HBC-15.

TABLE 4

TABLE 5

STRUCTURES, FACILITIES, AND UTILITIES
ENCOUNTERED OR AFFECTED BY EXCAVATION

1. Service water pump structure*
2. Circulating water intake structure
3. Railroad spur to diesel generator building and transformer area (Line D)
4. Permanent dewatering wells*
5. Oily waste lines
6. Fire water lines
7. Circulating water lines
8. Security duct bank
9. Electrical duct banks*
10. 48-inch diameter service water line to cooling tower*
11. 66-inch diameter pond blowdown line
12. Service water metering pit*

*Safety-related, or otherwise required to be covered by the quality assurance program.

The piping reinstallation is subject to the NRC work authorization program and the excavation permit system. The soils aspects of the work are "Q", including the excavation and backfill.

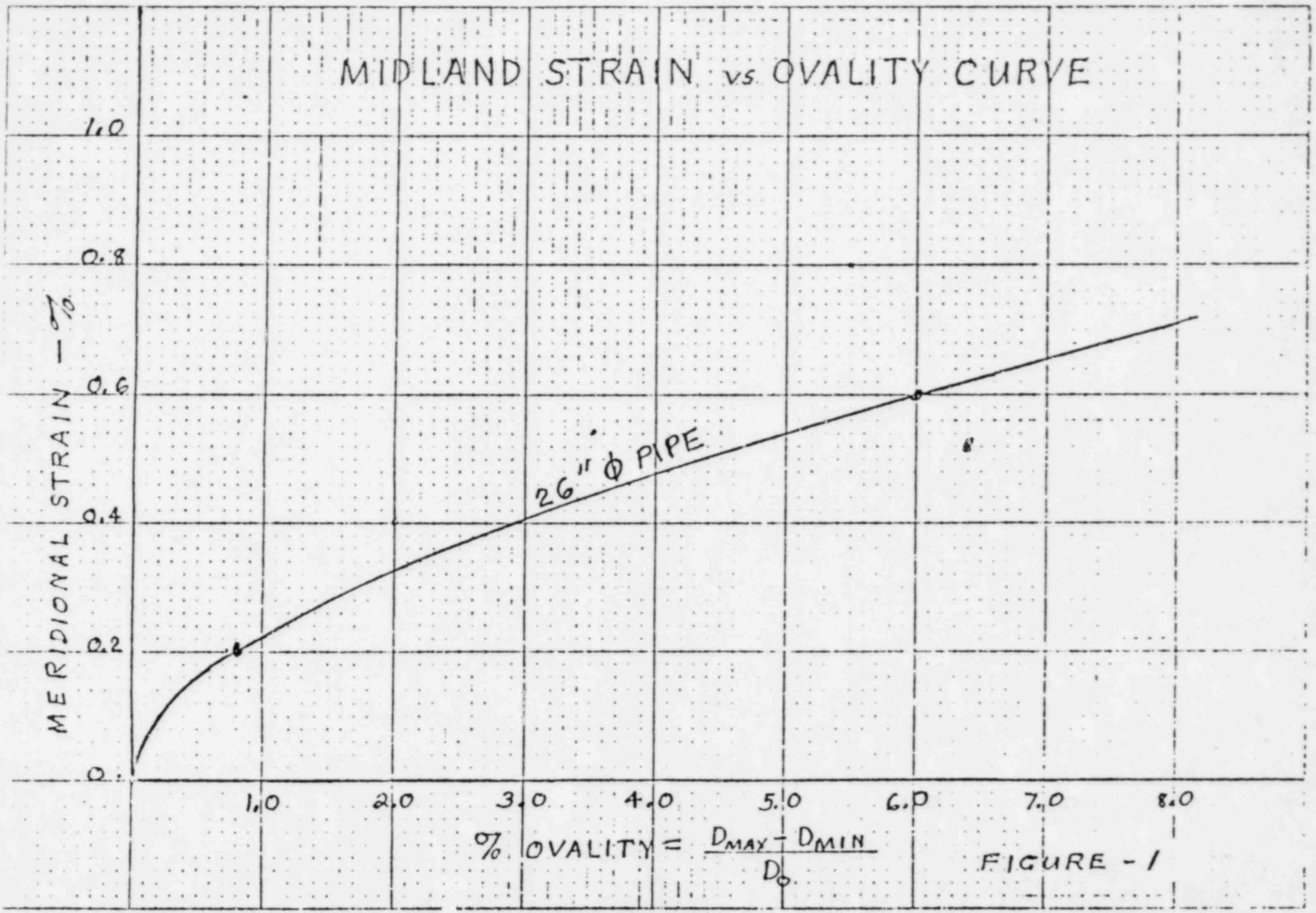

MIDLAND STRAIN vs OVALITY CURVE
MERIDIONAL STRAIN — %
1.0
0.8
0.6
0.4
0.2
0
26" ϕ PIPE
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
% OVALITY = $\frac{D_{MAX} - D_{MIN}}{D_o}$

FIGURE - 1

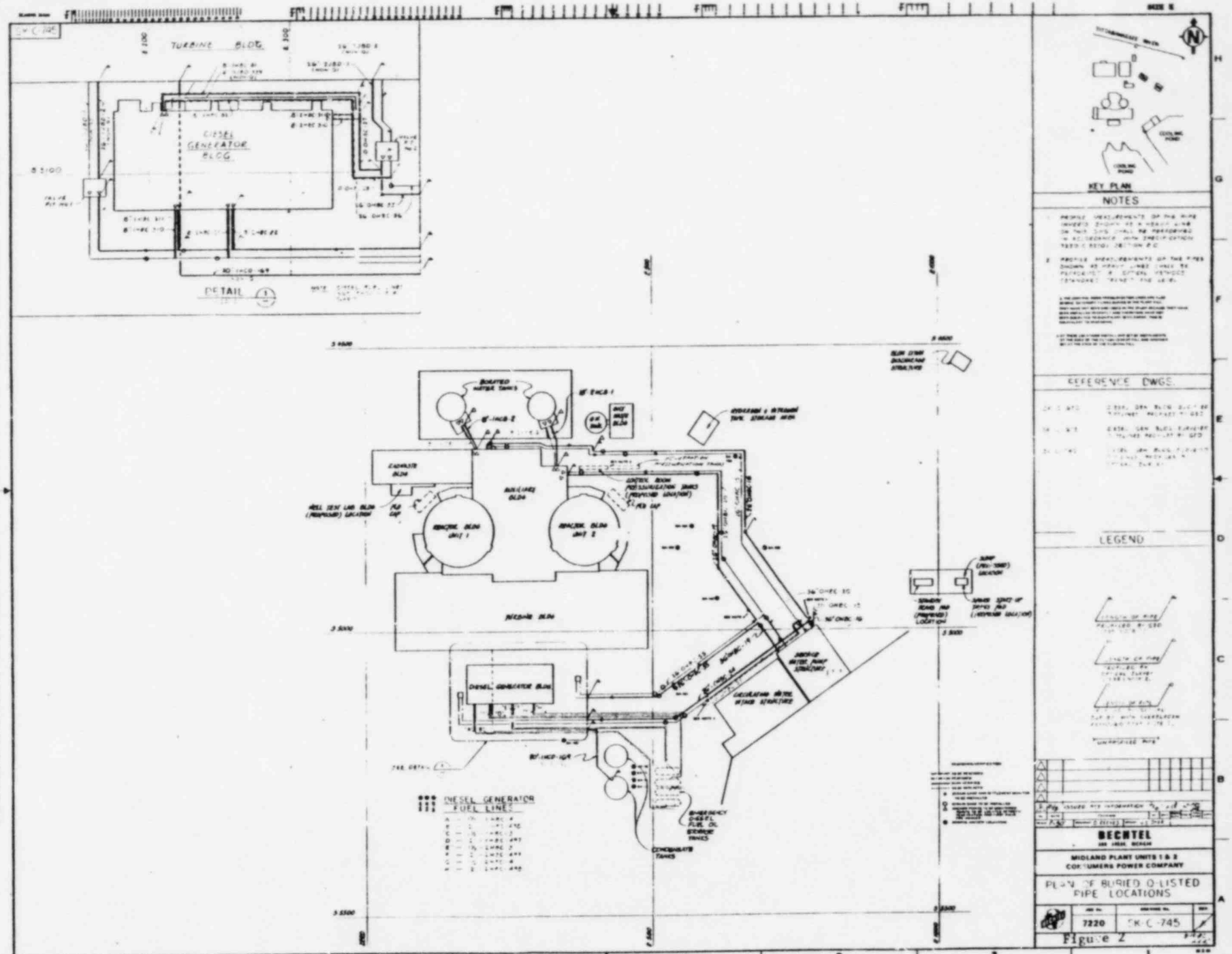
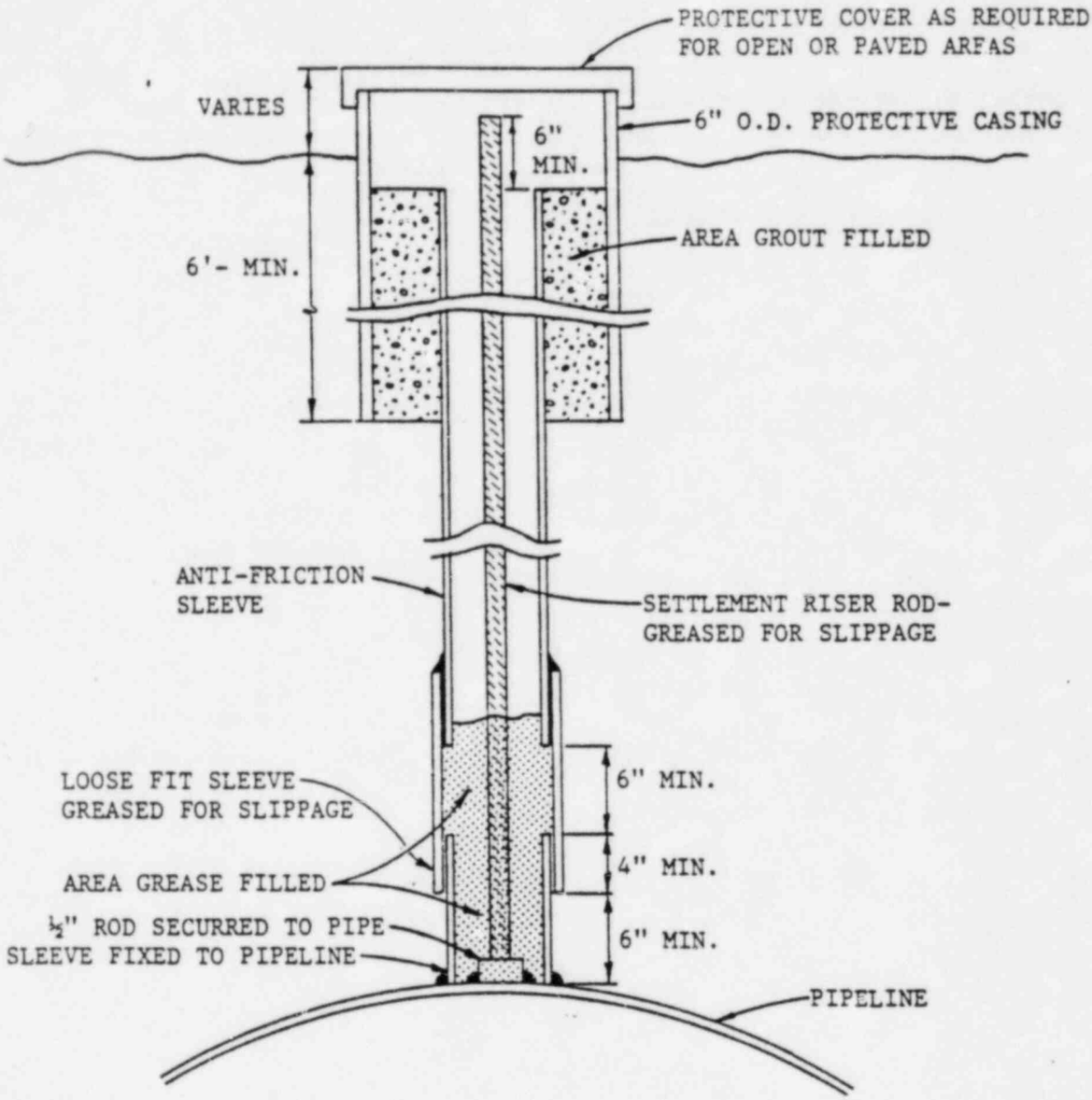

TURBINE BLDG.
DIESEL GENERATOR BLDG.
DETAIL
KEY PLAN
NOTES
REFERENCE DWGS.
LEGEND
DIESEL GENERATOR FUEL LINES
BECHTEL
MIDLAND PLANT UNITS 1 & 2
CONSUMERS POWER COMPANY
PLAN OF BURIED Q-LISTED PIPE LOCATIONS
7220
CK-C-745

Figure 2



NOT TO SCALE

PIPE SETTLEMENT MARKER
FIGURE 3

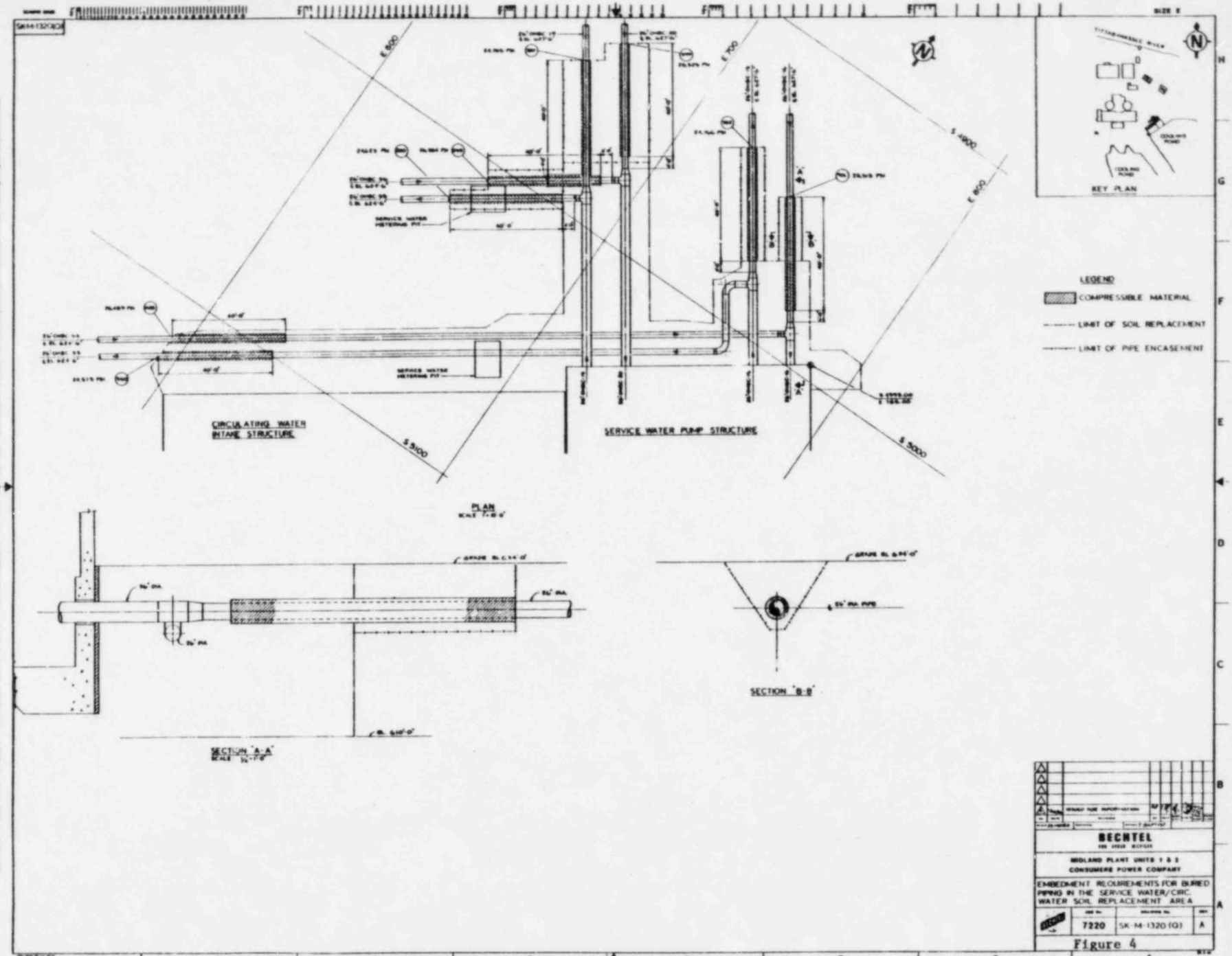

KEY PLAN
LEGEND
COMPRESSIBLE MATERIAL
LIMIT OF SOIL REPLACEMENT
LIMIT OF PIPE ENCASEMENT
CIRCULATING WATER INTAKE STRUCTURE
SERVICE WATER PUMP STRUCTURE
PLAN
SECTION 'A-A'
SECTION 'B-B'
BECHTEL
MIDLAND PLANT UNITS 1 & 2
CONSUMERS POWER COMPANY
EMBEDMENT REQUIREMENTS FOR BURIED PIPING IN THE SERVICE WATER/CIRC. WATER SOIL REPLACEMENT AREA
7220
SK-M-1320 (Q)
A

Figure 4

MIDLAND PLANT UNITS 1 AND 2

REINSTALLED BURIED PIPE STRESS SUMMARY

LINE 26"-OHBC-54

(Stresses in psi)

Data Point	Pressure	Weight	Overburden	Thermal	Settlement[1]	Seismic[2] (SSE)	Seismic Anchor Movement (OBE)	Total
290 (Tee at 36"-OHBC-16)	1,742	0	4,100	11,158	8,279	10,010	2,584	37,873
291	1,742	0	4,100	-	-	281	38	6,161
A40 (45° Elbow)	1,742	0	4,100	8,897	3,705	703	148	19,295
B40	1,742	0	4,100	7,615	1,201	196	39	14,893
C40	1,742	0	4,100	578	24	20	1	6,465
D40	1,742	0	4,100	5	11	20	0	5,878
E40	1,742	0	4,100	3	1	18	0	5,864
F40	1,742	0	4,100	1	1	18	0	5,862
G40	1,742	0	4,100	1	1	0	0	5,844
H40	1,742	0	4,100	1	1	-	0	5,844
J40	1,742	0	4,100	1	1	-	0	5,844
K40	1,742	0	4,100	1	1	-	0	5,844
L40	1,742	0	4,100	1	1	-	0	5,844
M40	1,742	0	4,100	1	1	-	0	5,844
N40	1,742	0	4,100	1	1	-	0	5,844
P40	1,742	0	4,100	1	1	-	0	5,844
Q40	1,742	0	4,100	1	1	-	0	5,844
R40	1,742	0	4,100	1	1	-	0	5,844
S40	1,742	0	4,100	1	1	-	0	5,844
T40	1,742	0	4,100	1	1	-	0	5,844
U40	1,742	0	4,100	1	1	-	0	5,844
V40	1,742	0	4,100	1	1	-	0	5,844
W40	1,742	0	4,100	1	1	-	0	5,844
X40	1,742	0	4,100	1	1	-	0	5,844
Y40	1,742	0	4,100	1	1	-	0	5,844
Z40	1,742	0	4,100	1	1	-	0	5,844
A45	1,742	0	4,100	1	1	-	0	5,844
B45	1,742	0	4,100	1	1	-	0	5,844
C45	1,742	0	4,100	1	1	-	0	5,844
D45	1,742	0	4,100	1	1	-	0	5,844
E45	1,742	0	4,100	1	1	-	0	5,844
F45	1,742	0	4,100	2	1	-	0	5,845
G45	1,742	0	4,100	4	3	-	0	5,849
H45	1,742	0	4,100	3	2	-	0	5,847

TABLE 4

Line 26"-0BHC-54 (Continued)

Data Point	Pressure	Weight	Overburden	Thermal	Settlement[1]	Seismic[2] (SSE)	Seismic Anchor Movement (OBE)	Total
J45	1,742	0	4,100	3	261	-	0	6,106
K45	1,742	0	4,100	3	535	-	0	6,380
L45 (Start of Compressible Material)	1,742	-	0	3	23,664	-	0	25,409
M45 (End of Compressible Material)	1,742	-	0	15	26,489	-	0	28,246

NOTES:

[1]See Note 1 for Line 36"-0HBC-15.
[2]See Note 2 for Line 36"-0HBC-15.

TABLE 4

MS. LAUER: We now tender the witness for cross examination then.

CHAIRMAN BECHHOEFER: You have no further direct?

MS. LAUER: No.

CHAIRMAN BECHHOEFER: I think Judge Harbour will lead off with his questions.

CROSS EXAMINATION BY THE BOARD

BY JUDGE HARBOUR:

Q On page 5 of your testimony, Section 3.2, entitled "Vertical Sediment Markers", the first paragraph states that there are two guidelines and it lists those guidelines and numbers them 1 and 2. I don't want to act as if I'm quibbling about your English usage here, but there is something in here, the difference between the singular and the plural -- criterion and criteria.

When you use the word criteria in the testimony here, are you referring to a single criterion or criteria-- as the use might be -- or to more than one?

A Which specific context are you looking at, sir?

Q I am looking at the third paragraph, starting with the vertical sediment measurements.

A In this case, the acceptance criteria is a number that will appear in the operator technical

pj4

specifications for allowable amounts -- amounts of allowable settlements.

Q But you are talking about one number here; is that correct?

A Yes.

Q And is that number three inches?

A Yes, it is, three-quarters of three inches, 75 percent of three inches.

Q Now that addresses guideline No. 1 in the first paragraph. Can you tell me what criterion is applied, that's singular, to address the second guideline in the first paragraph which is the locations of high future differential settlements which potentially occur due to underlying utilities.

A The same allowable amount of settlement is applied at every settlement marker regardless of whether that marker was chosen in accordance with paragraph one on that page or paragraph two on that page.

BY JUDGE HARBOUR:

Q Would you please define differential settlement as used in the second guideline identified by No. 2 here.

A The Guideline No. 2 locations were established such that if there was some unusual or unexpected affect due to an underlying utility of some type, that the monitor would establish that if the pipe settled adjacent to the utility, the pipes were to hang up on the utility such as a dropped bank or something of that nature, and had a curvature established as a result of higher settlements with a general fill that occurred over the utility, that would be shown by the settlement marker.

Q And over what horizontal or lateral distance would the three inches or 75 percent of three inches criterion apply?

A It applies at each individual marker.

Q And what is the spacing between -- how are you going to identify the differential settlements that might occur in pipe which is crossing an underlying utility of some sort?

A If one of the settlement markers were to go outside the allowable settlement distance, whether that is a differential settlement along the pipe or a point distance, it would still cause -- result in an investigation and evaluation to be performed under the

5/9/2

technical specifications. I do not know the precise difference between the settlement markers.

Q So you do not have any specific criterion for that?

A No sir I do not. The settlement locations had been established with the Staff and I have not seen them -- they have not been placed on any drawings yet.

Q Would the strain be different, resulting from differential settlement, if the three-quarters of three inches were reached over a horizontal distance of one foot or 30 feet?

A Yes it would be different.

Q If you had one inch and one foot, would that be a significant strain? That is, a one inch of differential settlement and one foot laterally, would that be a significant strain in the pipe?

A I would expect it would be but --

Q But there is no criterion here then to describe the differential settlement; is that correct, the allowable differential settlement over utilities?

A Other than the three inches at any given point on the pipe, that's correct. We are measuring strain locations, also.

JUDGE HARBOUR: That is all I have at this time.

CHAIRMAN BECHHOEFER: Ms. Stamiris.

CROSS-EXAMINATION

BY MS. STAMIRIS:

Q Do you expect at some point in the future to have more specific acceptance criteria for differential settlement?

A We have proposed in operating plan -- technical specifications concerning the settlement and it is part of Chapter 16 in the final safety analysis report.

If it is appropriate, it may become more specific than now. It may become more specific in the approval and acceptance of those operating specifications.

Q But the FS are a reference that you just gave me for that criterion is the one that you just described to Dr. Harbour.

A Yes.

Q On Page 6 of your testimony in the middle section, 3.4 on monitoring frequency, the first sentence says: (Reading.)

"The monitoring frequency has changed slightly since the Applicant's previously submitted testimony".

Would you describe the direction and extent of that change more precisely.

A If I recollect properly, I believe at that time, we were discussing every 90 days, monitoring initially, and

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we have now gone to more frequent monitoring initially until we demonstrate that stabilized conditions exist, and that was not in Paragraph 1.

5/10fol

BY MS. STAMIRIS:

Q And what is that monitoring frequency now?

A It is now at least once per 30 days during the first six months or until -- and until observed settlements had stabilized at less than or equal to .1 inches from the previous reading.

Q Are you prepared to address the corrosion and the piping problem this afternoon?

A I believe the NRC has a witness that will address that. The intention of my testimony on the corrosion is to indicate the results, the fact that an inspection was conducted on the going water storage tank supply line and that inspection did not reveal any corrosion problems in those lines.

Q But you did address some conclusions or general assumptions beyond that specific study. Let me find one I am thinking of.

The last sentence where you conclude: (Reading)

"Therefore, it is concluded that the pipe --"

That is not the one. I am sorry.

Well the combination of the last two sentences where you state that because you did not find the corrison problems in the pipes that you monitored at

the BWST, you concluded therefore that -- I'm sorry, I will try to ask it as a question.

Did you conclude that other pipes were not likely to be affected by corrison?

A In the correction of my testimony or the additional of my testimony, I added the reference to the one-inch control room pressurization field line which is the only buried, safety related stainless steel line presently installed in the plant other than the boring water storage tank supply line that were inspected.

In the modification testimony, I indicated that the evaluation of that one-inch line is not complete and will be completed.

Q Is there any stainless steel non-catory I piping in your plant?

A Yes, there is.

Q What would happen if that were severely corroded?

A The type of corrosion that was found was localized pitting corrosion; that if undetected, and if it did occur in other pipes, could result in leakage out of those pipes.

Q What did those other pipes contain?

A The pipes that I am aware of are condensate

pipes which contain water. Those are the only pipes which I am aware of.

Q Can you give me a rough percentage -- is the other piping at the plant, is there carbon steel piping at the plant?

A Yes, there is.

Q Is that subject to corrosion concerns?

A I believe the NRC witness will be able to give you more detailed and more specific information than I can on the corrosion of carbon steel piping.

I will say that the carbon steel piping is protected against corrosion by a coating and also by a corrosion -- carthotic protection system.

Q Well, let me ask you, to your knowledge, the type of stray welding current that you believe caused the corrosion in the piping near the BWST, do you believe that those stray welding currents would represent a misapplication of quality assurance in regard to welding procedures?

MS. LAUER: Objection; it is outside the scope of his testimony.

MR. WILCOVE: I agree with Miss Lauer. This testimony is to address the technical adequacy of the pipe, and I think it is best to save the quality assurance issues for those hearings when they come up.

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dw
come
up

MS. STAMIRIS: I would like to state that my overall concern is that -- I mean, there is no point in assuring ourselves that one example or two examples of piping is not pitted and corroded if indeed the possibility exists that much more of the site wide piping is pitted or corroded, and so I think quality assurance is going to have to come in connection with this corrosion problem at some point.

CHAIRMAN BECHHOEFER: Maybe you can explain, maybe you can put it this way.

You mentioned that it can be stray welding current corrosion. Could you explain how such stray welding current corrosion could exist and then could you explain why it occurs and why it effects some pipes and not others?

THE WITNESS: Based on the report of this that I read, the welding machine is grounded and the current has to return through that ground back to the component being welded to the welding area, and it can be grounded directly to the components being welded or it may be grounded at some other location.

It appears that in some cases, it was observed that the welding machine was grounded to the grid of copper wires that form the plant's grounding system and that the current returned -- the machine was grounded

in that grid and in that grid was grounded back up to the component being welded. The ground from the grid -- the connection from the grid to the component being welded, again, the report that I observed, it may not have been a solid ground connection; and therefore, it formed a high resistance ground such that the current seeking the path of lowest resistance to return, instead of going through that connection, went through a point on this piping. And where the current went to the ground to the piping, pitting occurred.

The reason that it is of particular concern to the stainless steel piping and not to the carbon steel piping lies primarily in the coating system, protective coating system on the carbon steel piping which forms a high resistance barrier between that piping and the ground.

The stainless steel piping does not have that coating on it, such that the piping then, the cases that were observed, formed the path of lower resistance but leading to the pitting.

CHAIRMAN BECHHOEFER: So there are procedures that could be undertaken which would prevent this stray, preventing current from -- which could prevent the stray welding currents from affecting the stainless steel pipes?

THE WITNESS: Yes there are. After identification

of the problems in 1979, the field was advised to exercise greater care in assuring a firm grounding path existed when welding is taking place.

CHAIRMAN BECHHOEFER: Are those constructions still outstanding?

THE WITNESS: To my knowledge, yes they are.

CHAIRMAN BECHHOEFER: To your knowledge, are you being followed?

THE WITNESS: I can't testify to that.

CHAIRMAN BECHHOEFER: Ms. Stamiris, you may continue.

BY MS. STAMIRIS:

Q If I understand your response to the Board's questions correctly, I think I could say briefly that the welding machine was improperly grounded and I would like to ask you whether you believe that the key question is not whether or not instructions and corrections had been made since that time but the key question is, what assurance and what degree of assurance do you have that in fact, these welding machines were not improperly grounded in other locations. You know, throughout the site.

A As I explained, the inspection that we conducted encompassed all of the various stainless steel piping with the exception of the one line, and that one line

5/11/4

will be further evaluated to assure there is no problem there. Those lines cover all of the various safety grades of stainless steel piping on the site.

5/12fol

site.

BY MS. STAMIRIS:

Q All right.

A That was the basis for our conference.

Q Can you give me a rough idea if there is other stainless steel piping that is not of safety grade on the plant?

A I cannot qualify it for you in linear footage. Percentage-wise, the more common buried piping is the carbon steel piping.

Q Since we are concerned not with the design conditions or the design requirements for the underground piping, but with the conditions, what have you done to assure yourselves that indeed this resistant coating which you are relying on to protect your carbon steel piping, has indeed properly -- is indeed properly in place and performing its intended function?

A For piping that is excavated for one reason or another for rebedding replacements or for work in other areas, that coating is inspected.

Q Is the piping underneath inspected then or can you tell by looking at the coating whether it has been affected by corrosion?

A A visual inspection of the coating, of the surface of the coating, gives you -- tells you the condition of the coating itself.

JUDGE HARBOUR: It tells you the condition of the coating itself, but does it tell you the condition of the piping?

A Obviously, not directly. The pitting corrosion, if it were to occur on carbon steel piping, it will occur at points of low resistance, and that is at points where that protected coating was damaged or broken off such that it would not provide resistence.

JUDGE HARBOUR: What is before you, you went through rather quickly, the physical principle which protects the carbon steel piping from the chemical attacks. Now you did it in about three words and you did it fast. Could you do that a little bit more slowly and explain the protective system of the carbon steel piping?

THE WITNESS: The coating is a coal-tar base coating covering the entire outer surface of the pipe. It acts in this context similar to the installation on a wire, on an electrical wire such that it forms a high resistance path to the flow of electrical current.

The stainless steel coating does not have that benefit, obviously. If a current is seeking a path of return, it will follow the path of least resistance. And due to the high resistance, coating on the carbon steel piping is highly unlikely to take

that route.

JUDGE HARBOUR: From the pipe to ground?

THE WITNESS: That's right.

BY MS. STAMIRIS:

Q Is that carbon steel piping that is Category I?

A Yes.

Q Can you give me a rough percentage or qualify it in any way?

A The piping that is the subject of this testimony is carbon steel -- stipulated as Category I piping.

Q And then this testimony does address all of the Category I carbon steel piping, doesn't it?

A This testimony and the testimony in February did address the total, yes. This testimony is specifically addressed to the surface water piping; the February testimony referred to other piping as well, incuding diesel fuel oil piping, for example.

Q So other than the checks you have made on piping as it has come up to be rebedded or excavated for other purposes, you have not conducted a study of the carbon steel piping to see how it has been affected by corrosion other than --

A We have not performed a physical inspection outside of that; that's correct.

BY MS. STAMIRIS:

Q Now on Page 13 of your testimony -- and I have to admit that I don't have a very deep understanding of all of these things that I tried to read about -- but when you are talking about thermal analysis and thermal stresses on the piping in the middle paragraph, is this to keep within the pipe, the contents when the plant is operating?

A That is correct.

Q Are there any other sources of thermal that affect the piping?

A This analysis considered the temperature of the fluid going through the piping and changes in that temperature, resulting stresses were acceptable.

Q Do you believe that in evaluating the overall safety and integrity of the underground safety piping systems at the plant, that you need to look in an integrated fashion at the interaction between all of the elements which might include corrosion, chemical influences and thermal influences?

MS. LAUER: Objection. We don't -- Judge, there is no foundation to the question as far as chemical goes.

JUDGE HARBOUR: Has the chemical activity, the original cause of the corrosion is mentioned in his testimony as are the other two topics, I believe.

CHAIRMAN BECHHOEFER: Objection overruled.

/13/2

JUDGE HARBOUR: Well let's ask him. Let's ask the witness if that is true.

Was chemical corrosion originally thought of as a possible cause of the corrosion of the stainless steel piping and then, later, a hypothesis was later abandoned?

THE WITNESS: That is exactly correct.

JUDGE HARBOUR: And does that appear in your testimony?

THE WITNESS: I do not believe it does. I believe my testimony refers to the conclusion of the evaluation which was that the corrosion was due to stray welding currents.

JUDGE HARBOUR: Can you explain to me how I knew that?

THE WITNESS: I believe you were cutlining a basic investigative technique where you look at the possible causes of the problem.

BY MS. STAMIRIS:

Q Well I will explain in my following question the basis or the foundation for that, but can you agree in principal, based on your expertise, that you need to look at an integrated affects of the kind of things that I mentioned?

A I would agree that the total design of the piping system must consider within our design rules and

standards, the different conditions that that system will experience over the plant's life.

Q More precisely, do you believe that you need to examine the interaction between the separate elements, and I named, chemicals, heat and --

CHAIRMAN BECHHOEFER: How about corrosion?

BY MS. STAMIRIS:

Q Well upon corrosion, do you believe that it is necessary to analyze the final impact on piping of these elements in an integrated fashion as opposed to separately or a possible synergistic effect?

MS. LAUER: We would object again. We see no foundation for the chemical affect.

MS. STAMIRIS: I would just wait and leave that question until after my other questions then, so that you can see why I am going with this.

BY MS. STAMIRIS:

Q Before I leave the subject of what I will call the QA welding grounding problems, since I was the one that brought that up in this hearing, and I think it is a very significant concern, particularly with the combined effects of the settlements on piping -- what if I hadn't brought it up; I mean, is this something that Consumers considers to be significant, and if so, why didn't Consumers raise the subject of corrosion in piping?

A If the February hearing on piping was the time that you brought that up, that was the time that we discussed that subject last.

That problem was under investigation at that time.

5/14fol

time.

BY MS. STAMIRIS:

Q But you had no reference to it or there is no -- we had no knowledge that it was under investigation at that time; is that not correct?

MS. LAUER: Objection. How can the witness respond to the knowledge of the question?

BY MS. STAMIRIS:

Q Well, I should say, you did not inform us that any such investigation was underway; is that correct?

A At that time, and I believe I stated it, that I was aware there were some corrosion problems and I had looked into them sufficiently to satisfy myself that they were not of concern to the piping that we were talking about at that time.

Q But that was --

A You were right, I was not aware of the specifics of that investigation.

Q This was the response to my having raised it, and so I just want to ask one of the parties to have ever been informed on your own initiative of any study going on with corrosion and piping?

A Two parts to respond to your question.

First, my awareness of the problem, general awareness of the problem, precede my testimony; and therefore --

JUDGE HARBOUR: Preceded, excuse me. Which testimony?

THE WITNESS: My February testimony to this Board.

Secondly, I am aware of Consumers Power documentation identifying this problem in documenting the conclusion of it. That has been forwarded to the Board. I am not quite sure on a standard distribution.

Q You mean since your February testimony?

A That may have -- I do not know the date of that document.

Q Can you identify the number of that document, or in any way, could you get that information for me at a later time?

A The document I am referring to is the Safety Concern Reportability Evaluation, No. 12.

Q And you don't have any rough idea of the date of that?

A No, I do not.

Q All right. Now to try and --

JUDGE HARBOUR: Just a second, please. This is SERE, No. 12, you say?

THE WITNESS: Yes, sir, it is.

JUDGE HARBOUR: It is part of your testimony. It is attached to the top of it.

Now I mentioned yesterday that I had a very large pile of testimony on my desk, and it was immediately beneath your testimony and it deals with the corrosion of the famous steel piping, so I simply assumed that it had been provided by you as part of that testimony.

MR. STEPTOE: Judge Harbour, I do know that in the latest packet of information from Mr. Briar, which was sent to you, I think, on November 9th or 10th, that was included there as a final non-performance report. I do not know whether that non-performance report, in an incomplete form, had been sent to the Board.

JUDGE HARBOUR: This also explains the source of my knowledge about chemical corrosion, it being thought of as being the cause.

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MR. MILLER: Could we have for the record the date of that document?

JUDGE HARBOUR: For the record, the date of that document is -- it says date received 3/17/81, March 17th, 1981.

CHAIRMAN BECHHOEFER: Mrs. Stamiris, let me --

JUDGE HARBOUR: Excuse me. At the bottom of the page there's an evaluator's signature, dated October 21st, 1982.

MR. STEPTOE: That is what I was suggesting to you, Dr. Harbour, is that these documents originally may have been sent out in one form as an open item, and then, when they get closed out in October of this year, for example, it went in to Mr. Brenner, and Mr. Brenner forwarded it to you in his November 9th or 10th letter. But I wouldn't be surprised if in an earlier incarnation that document was also provided to the parties in an incomplete form.

JUDGE HARBOUR: Do we need to identify this document any further now that we've been discussing it?

MR. MILLER: Well, the implication and the questioning has been that it was Mrs. Stamiris who somehow raised this concern and that the company and Bechtel somehow had ignored it until it became the subject of the hearings in February. And I believe that

that document -- one of the dates you read on there precedes the February hearing by 11 months.

JUDGE HARBOUR: But this does not mean that this document was known outside of Bechtel and Consumers Power.

MR. MILLER: Oh, I don't mean to suggest that it was As I understood it, in Ms. Stamiris' question --

MS. STAMIRIS: You misunderstood.

MR. MILLER: -- was whether or not the company and Bechtel were taking any steps prior to the testimony in February to address the corrosion issue.

MS. STAMIRIS: That was not my question. My question was precisely whether or not you had made any effort to notify the Board or the parties of this hearing. And am I correct in assuming -- if this was not stapled and attached to Mr. Lewis' testimony, I would request that if I can find it at home tonight, which I think I can, that I would have another chance to ask questions about this tomorrow. Or maybe after a break I could look at some of this.

MR. WILCOVE: I was going to request that perhaps the Staff could be provided with that document, provided that the Board would have an extra copy, or perhaps someone could send it out.

JUDGE HARBOUR: We do not have an extra copy

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with us, but we'll be taking a break very shortly, and perhaps somebody wants to look at it, identify it, or --

CHAIRMAN BECHHOEFER: Run a Xerox.

JUDGE HARBOUR: Run a Xerox.

Now, your description of where or how I probably received this I believe is correct, because when these different notices come across my desk I go through them and look for interesting titles. I pulled those out of the file, and I probably put them with this testimony, which is the way they got together.

MS. LAUER: Mr. Chairman, we can only point out that Mr. Lewis is not responsible for the production of this document. As far as questioning him on it, I don't know how helpful that would be at this time.

CHAIRMAN BECHHOEFER: Ms. Stamiris, I had one question. When you raised the question back in February, did you not rely in part on the Staff inspection report?

MS. STAMIRIS: It was not a Staff inspection report, but it was a Staff -- it was a letter, I believe. It was some kind of NRC Staff document, and I believe I had that introduced as one of my exhibits, and I can't remember what exhibit number that was.

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CHAIRMAN BECHHOEFER: I remember it, too, but I don't have it with me.

MS. STAMIRIS: But it was not an inspection report.

CHAIRMAN BECHHOEFER: Now, do you have --

MS. STAMIRIS: I have further questions, but, before we leave this subject on the --

CHAIRMAN BECHHOEFER: We were wondering if it would be a good place to take a break.

MS. STAMIRIS: Well, I want to ask one more question about the documents, and was this safety concern evaluation report that we've just been talking about the only document that was sent at some later time that relates to this testimony?

MR. WILCOVE: Mr. Chairman, I would ask --

MS. LAUER: We would ask, first, is the question being directed to attorneys for Applicant or to the witness?

MS. STAMIRIS: I direct it to the witness.

CHAIRMAN BECHHOEFER: If he knows.

THE WITNESS: I do not know.

MR. MARSHALL: That's easy.

MS. STAMIRIS: Okay. Well, I'll assume that no one else here has knowledge of some other document that went with that, or they would inform the parties at this

time.

I think it might be a good time to take a break, if you wanted to, before I continue with my questions that go back to chemical interaction.

JUDGE HARBOUR: Before we take the break, I would like to say that this SCRE has the RE, which is the reportability evaluation, also attached to it, but it is also dated March 17th, 1981, as the front page is dated March 17th.

CHAIRMAN BECHHOEFER: Why don't we take a 15-minute break and Staff can copy this document.

(Brief recess.)

CHAIRMAN BECHHOEFER: Back on the record. Ms. Stamiris?

MS. STAMIRIS: First of all, I'd like to say I did not have a chance to finish reading the last page of this SCRE that we were talking about, so if I have further questions I'll ask them as soon as possible.

BY MS. STAMIRIS:

Q But, Mr. Lewis, how would you identify, or what number would you give to this SCRE?

A It would be titled Safety Concern and Reportability Evaluation No. 12, referred to as SCRE-12.

Q Is this SCRE No. 12 an attachment to your testimony?

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A No, it is not.

Q Is it an attachment to someone else's testimony that you're aware of?

A Not that I am aware of.

Q Well, since I believe it relates to your testimony on corrosion that we've been talking about today, I'd like to ask you some questions about this report.

Is this SCRE-12 an evaluation of reportability of a 55-E report?

A The evaluation is initiated when a concern is identified, and then the form is used to document the fact that an evaluation is ongoing, and then the completion of the evaluation.

At the time of initiation of the report, I believe -- I guess it's in Block 6 -- an initial evaluation or an initial judgment is made as to whether the concern is reportable under 55-E or not.

In this case, it was determined not to be.

Q Okay. And when was that determination made?

A It's made twice during the processing of this form: once, initially, when the form was filled out, which appears to be approximately March of 1981, and a second time when the evaluation was completed, which appears, in this case, to be October of '82.

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Q During the time that this further evaluation was going on, between March of '81 and October of 1982, other than in response to my questions on the subject of corrosion, did Consumers Power Company make any attempt to notify the Board or parties in this hearing of this corrosion concern?

A I do not know.

Q Can you briefly describe for me the criteria for reportability on which this determination marked C in the boxes of Block 6 was arrived at?

MS. LAUER: Objection. That's clear from the report itself that t is determination was not made by Mr. Lewis, and I believe we're getting beyond the scope of his testimony and expertise on the quality assurance issues.

(Discussion was had off the record.)

CHAIRMAN BECHHOEFER: I think we'll have to sustain that one. I don't think Mr. Lewis can answer that question.

MS. STAMIRIS: Okay, then I'll wait to ask some quality assurance people about this.

BY MS. STAMIRIS:

Q Mr. Lewis, on the second page of this report, in block -- it's a continuation of the Block 5 description

of your concern -- the sentence in Point A which explains why these facts do not represent a reportable condition is somewhat unintelligible to me. Can you put that in any other words? I'm having trouble with that sentence.

MS. LAUER: Objection; same basis.

MR. MARSHALL: Exception.

JUDGE HARBOUR: Well, where is the reference to it?

MS. STAMIRIS: That's on the second page, in the middle box, under 5-A, Sentence A. I don't understand it.

(Discussion was had off the record.)

CHAIRMAN BECHHOEFER: Mr. Lewis, are you aware of that statement in Block 5?

THE WITNESS: I have it in front of me now, yes.

CHAIRMAN BECHHOEFER: Do you feel you're competent to address the question?

THE WITNESS: I do not have knowledge of the authorship of the sentence or what it meant at the time it was written. I could state what it means to me now.

CHAIRMAN BECHHOEFER: I think we'll allow you to do that.

THE WITNESS: Block 5 on the second page, Paragraph 8, as I read it, states that the problems, the

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actual corrosion problem that had been noted at that time and is the subject of this report as shown in Block 4 on the first page dealt with nonsafety piping. So, at that time, there was no evidence in hand of pitting or corrosion in safety grade piping.

There was a concern that we wanted to assure that there was not any, and that's why it was being documented. But there was no evidence of any corrosion of this type in safety grade piping.

I believe that is what is being referred to in Sentence A.

BY MS. STAMIRIS:

Q Would I be correct to say that, based on your understanding that you just described, that the concern referenced in the first page of this sentence is a concern that safety piping could also have experienced similar conditions to the non-Q pipe corrosion?

A As I read it, the fact that pitting corrosion had been found in nonsafety piping raises the concern that there might possibly be that same condition in the safety grade stainless steel piping and that that concern should be investigated.

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Q Okay. Do you believe that -- that's quite different. I mean, your understanding of this is based on something other than words that are printed here. I mean, do you believe that the definition or understanding you just described to us of this sentence is not apparent from the wording on this page in 5-A?

MS. LAUER: Objection.

CHAIRMAN BECHHOEFER: I think that's a little confusing, because I get that meaning from the top sentence, not on A and B, but the top sentence in the carry-over block.

MS. STAMIRIS: Okay.

MS. LAUER: Chairman Bechhoefer, he has given his interpretation of this section. I don't see how he can testify beyond that point as to what the author of this document meant.

MS. STAMIRIS: Certainly I would be happy to wait till the author of this document is able to answer questions about it, but I don't see the word safety piping in that top part or in that part. And unless it's just an unwritten understanding that that's where this concern was going, I think that --

JUDGE HARBOUR: Well, excuse me, but it seems to me that I can see where that reference -- in the lead-in sentence of Paragraph A, where the term the packing in A

refers back to safety grade piping.

MS. STAMIRIS: Okay. Perhaps the problem is because of my very cursory examination of this document, so I'll wait until a later time.

JUDGE HARBOUR: Excuse me. I would like to just ask a question about Paragraph B, because as long as we're reading A and B, we should, I think, also address B.

Does Section B of Part 5 indicate that at this time the author did not believe this to be a reportable incident as far as 5055-E reporting requirements are concerned?

THE WITNESS: If you're asking me if that is my understanding of those words, yes, it is.

JUDGE HARBOUR: Okay, thank you.

BY MS. STAMIRIS:

Q On the fourth page of this document, I'd like to ask you about your understanding of this issue as opposed to your specific knowledge of the wording in this document. But in the second paragraph or box there is --

A Excuse me, ma'am. Could you show me or identify what page you're looking at?

Q It's the next to the last page of this stapled -- no, I'm sorry; third from the last.

MS. LAUER: Could you read a portion of it?

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BY MS. STAMIRIS:

Q At the top there appears to be a No. 024779?

A Yes.

Q In the second box and paragraph is a statement that this problem may exist in carbon steel pipe if the coating and racking has a defect. And I'd like to ask you whether you believe that a defect in the tar coating that you described to me earlier could be caused by excessive bending from settlement?

A The coating does -- the coating is not rigid and does have substantial flexibility to undergo the degree of bending that is anticipated in the pipe.

Q So your answer is that you do not believe that the tar coating or whatever the protective coating is against corrosion could be affected by pipe bending?

A I could not say that it will not be affected. I will state that it would not be affected such that it would cease to perform its function of coating the pipe.

Q On what do you base the conservatism of that assessment?

A The coating that we are using is not unique in industrial applications. I also find that same judgment made in the Staff's Safety Evaluation Report No. 2.

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Q Am I correct in assuming, then, that the Applicant did not perform any studies to determine whether in fact the tar coating had been affected by bending at points of stress?

A To my knowledge, that is correct.

Q When Bechtel changed their analysis of the original corrosion and pitting problem cause from chemically induced to having been induced by stray welding currents, do you know why or on what basis they ruled out the chemical cause?

A First, I do not believe that the cause was changed or a conclusion was changed from one to the other. Rather, in investigating the concern for the pitting, various mechanisms that potentially could cause that pitting were investigated.

Part of that investigation, the chemical properties of the soil, were evaluated and found to be benign and not capable of causing the type or extent of local corrosion that was found.

Q Could you identify to me the name of that study or where that study could be found which evaluated the chemical properties of the soil with regard to corrosion?

A I believe that you'll find it on the last page of the SCRE as reference a MMQS report, stainless steel pipe corrosion study.

MS. STAMIRIS: Okay, this is the one that I haven't had a chance to finish reading completely yet, so I'd like to be able to ask - out that at some later time, rather than review it quickly now.

MS. LAUER: Objection. This is the time that was scheduled for our examination on piping.

MS. STAMIRIS: Well, I simply can say that it was an inadvertent error on my part that when I gathered up and read the testimony on piping I thought I had all of the relevant testimony when I had Mr. Lewis', and I now believe that this other document which I received at some other time is also relevant to this testimony.

(Discussion was had off the record.)

CHAIRMAN BECHHOEFER: Do you have the material with you now, or what?

MS. STAMIRIS: Yes. I would think that, you know, I would probably be able to raise any possible questions on it later this afternoon or, you know, by the end of the day.

CHAIRMAN BECHHOEFER: While other people are asking their questions, perhaps you can --

MS. STAMIRIS: Well, yes, if we don't have a break, I'll attempt to. I don't know what else I can do. That's all I can say at this point is where I am.

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I do have other questions of Mr. Lewis, though, at this time.

CHAIRMAN BECHHOEFER: All right. While we're still on that chemical contamination question, you stated, I think, that Bechtel was merely looking into that question to see whether it had been caused by chemical corrosion? Is that what you said, or --

THE WITNESS: In effect, I believe it was. We were faced, initially, with an observed corrosion condition without knowledge of the cause of it. So we attempted to investigate the probable causes and to determine which one, in fact, was the cause.

CHAIRMAN BECHHOEFER: Did Bechtel ever attribute it to chemical corrosion?

THE WITNESS: I am not directly knowledgeable on initial discussions in this area.

To my knowledge, Bechtel did not. Nothing I read indicates that Bechtel did contribute to that.

CHAIRMAN BECHHOEFER: I was wondering what that sentence meant on the top of this third to the last page of the SCRE-12, also identified by No. 024779. It's the second sentence on the page, the top block. I was wondering whether you might be familiar with what happened there.

THE WITNESS: I am not. I have to restate

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that I was not directly involved at that time, and it is possible that there was an evaluation made that I'm not aware of that said that.

CHAIRMAN BECHHOEFER: Okay.

okay.

BY MS. STAMIRIS:

Q There is a statement here that since the failure mechanism -- I'm sorry, this is on the same page, 024779, in the second box, I think the next to the last sentence in the middle of that paragraph:

"Since the failure mechanism is due to stray current, areas which would be susceptible to corrosion can be identified."

And it's my understanding from your previous testimony that you did, indeed, go back and look at these specific areas that you thought would be the most susceptible to the spray current problem. And I'd like to ask, if you have knowledge, on what criteria this decision was made or on what the judgment was based as to which areas -- well, no. Do you believe that already explained that in your testimony? I think you did.

A I stated that we inspected the areas of buried safety grade or Q, if you will, stainless steel pipe, because that is what we believed to be the material that would be susceptible to this type of corrosion.

Q And did you not, when you were explaining something about the copper -- I mean, when you made your previous explanation about that study you did explain how you chose the areas that you chose to examine, didn't you?

JUDGE HARBOUR: I believe it was possibly -- was it related to the areas of location of the site grounding grid? Was that your testimony? I'm not certain.

THE WITNESS: No, I don't believe that was my testimony.

We identified all of the stainless steel safety related buried pipe in the site, and that was the subject of our investigation.

BY MS. STAMIRIS:

Q Well, you mean you looked at the full length of all the safety grade stainless steel piping and examined it for corrosion?

A At that time, the identified stainless steel buried piping lines were the four borated water storage tank supply lies. Portions of those lines were available for -- had been excavated and were inspected. I do not believe 100 percent of the length of those lines were inspected.

Q Okay. So, then, the portions which were inspected were the portions which happened to be excavated?

JUDGE COWAN: That is exactly what he said before. That's my recollection.

MS. STAMIRIS: That's what I asked him in

the first place, is ask the discussion that he had with regard to the grid, as Dr. Harbour brought up, did indeed relate to the criteria that they applied to where to look at these pipes, and I wasn't going to go into it if he did.

BY THE WITNESS:

A Yes. I refer you to the last page of the three, the last sheet on it, the safety evaluation, where it states: (Reading)

"It was decided to excavate and inspect these lines --"

That is, the borated water storage tank lines --

" -- in the vicinity of a plant grounding grid table which passes near the pipe."

And the section that was done did cover that area.

BY MS. STAMIRIS:

Q Now, if the problem has been determined to be chemically caused, would it have been more difficult to pinpoint the likely areas of weakness due to corrosion?

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A I cannot testify to that.

that.

Q Well, just from your expertise and background with the piping and engineering, doesn't it seem like the possibility of chemical contamination would be a widespread or a more generalized source of concern -- I mean, as far as its physical location -- than if it were caused by stray welding current?

A The chemical considerations that were investigated were the chemical properties of the soil on the site, and, in that sense, yes, you are correct.

Q Okay. Now, going back to the other questions I wanted to ask regarding your testimony and the synergistic interaction of the different elements that we're looking at here, and I had mentioned corrosion, chemical, and the third one that I forgot at one point was distortions due to settlement. I want to go back and ask you, as a preliminary question, whether it is your understanding that the cooling pond serves as the ultimate sink for chemical contaminants in the water?

A I am not expert in the area of soils or water migration or chemical migrations through the soils.

Q Well, do you know if there are chemicals in the cooling pond water?

MS. LAUER: Objection. This is completely outside the scope of this witness's testimony.

MS. STAMIRIS: I said it was a preliminary

question so I could relate why I was raising about the synergistic effects of corrosion and chemicals and settlement when he makes an integrated evaluation as to the safety of the piping.

CHAIRMAN BECHHOEFER: It's a foundation question. You can answer it, if you know.

THE WITNESS: Certainly the water has chemicals in it. I am not familiar with what that chemical composition is other than to say that I know that it meets federal standards for discharges to those pipes of waters. But I do not know the specific consistency of it.

BY MS. STAMIRIS:

Q Does your testimony draw a conclusion as to the overall safety or reasonable assurance of safety of the underground piping except for that one that you mentioned that has yet to be studied with regard to corrosion?

A My testimony in the area of corrosion is intended to draw a conclusion with respect to the borated water storage tank lines, because that is what I specifically address in that section.

Q Then you are making no statement as to an assurance as to the integrity and safety of the overall piping at the plant in this testimony?

A I do not make that specific statement in my

submitted testimony.

Q Well, what about the last paragraph?

A Again, this is accepting the addition that you made that, based on the examination of the BWST piping -- okay, now, that is very specific. I'm sorry.

Do you know whether any further testimony from the Applicant is intended to address the overall safety of piping at the plant?

JUDGE HARBOUR: Are you talking about as far as corrosion is concerned?

MS. STAMIRIS: As far as corrosion is concerned, yes.

BY THE WITNESS:

A I do not believe the Applicant proposes to have further testimony regarding corrosion of buried piping at the plant.

Q Then I will address my questions about the overall safety of piping with regard to corrosion to you, even though you have said that you are specifically addressing only the borated water storage tank lines.

MS. LAUER: Chairman Bechhoefer, could I remind, at this point, that the Board directed that the Staff present a witness on the corrosion of underground piping, who should be testifying, according to the schedule, on Wednesday.

MR. WILCOVE: Mr. Weeks will be here tomorrow to testify.

MS. STAMIRIS: Well, I want to know the Applicant's position on corrosion of underground piping. Certainly, they must have a position of their own.

MS. LAUER: Chairman Bechhoefer, this is not an issue beyond what we have submitted here today. The safety concerns that have been raised are addressed in our testimony.

MS. STAMIRIS: Then, by that, we would have to assume that your only safety concern with piping at the plant and corrosion is the borated water storage tank, as opposed to piping overall.

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overall.

MS. LAUER: Quite to the contrary. That is merely the scope of our testimony, Chairman Bechhoefer. Safety concerns have been taken into account throughout the installation of the piping throughout the plant. These were particular problems that were raised. They've been addressed. We presented testimony here on these. We know of no contention dealing with it. Other piping in the plant, safety concerns have been resolved there. There were no safety concerns, to begin with, on most of the piping in the plant.

(Discussion had off the record.)

CHAIRMAN BECHHOEFER: I think we can't allow questions if it's beyond the scope of his testimony. You'll have to ask the Staff. The case will have to rise or fall on what the Staff has to say. And if corrosion of other piping proves to be a problem as a result of the Staff testimony, well, the Applicant will have to, maybe, put on some rebuttal. But, if it doesn't prove to be a problem, well, we can rely on the Staff. But --

MR. MILLER: Judge Bechhoefer, unless it be that there's an indication somehow that the Applicant is not bearing the burden of proof here, and I think that the Board's order was really quite specific as to what issues were to be addressed by the parties and what

issues were to be addressed specifically by the Staff, and it's my distinct recollection that the issue of corrosion of stainless steel piping was an issue that was directed specifically to the Staff.

Mr. Lewis' testimony was designed to give the Board some additional facts as to what the Applicant had, in fact, done, but we did not believe that we had even been requested to address the overall issue of corrosion of underground piping, which we regard as an issue that is well beyond the scope of the remedial soils hearing.

MS. STAMIRIS: Well, I think Judge Decker, when he was a member of this Board, raised some very profound questions about the safety implications of corrosion in the piping and brought them into this hearing and requested specific answers to them, and it doesn't seem to me that Consumers, just because the Staff is going to offer a witness on corrosion and piping, that Consumers should not be expected to provide some assurance to the Board and the parties that the piping overall is safety against corrosion concerns. And I do believe that --

CHAIRMAN BECHHOEFER: Well, I can't remember -- I remember Judge Decker raised the question, and I had assumed, as Mr. Miller did, that he was asking the Staff

to come in and testify.

I think the issue had arisen through a Staff document initially. But the Applicant, of course, will be bound by the testimony the Staff puts in, and if the Applicant is unhappy with it, it really will be -- it may then offer rebuttal testimony on that.

MS. STAMIRIS: Okay.

CHAIRMAN BECHHOEFER: All right.

MS. STAMIRIS: When the Staff completes their testimony on this, if there are significant questions that remain unanswered about how thoroughly and deeply and effectively the Applicant looked into the corrosion problem, since my understanding of the way Staff always operates is that they do a review of what the Applicant does, they don't go in and initial studies and do their own work or research in the first place -- if significant questions still remain as to how thoroughly and how much beyond the specific examples of failure they looked to determine the overall assurance of the underground piping at the plant with respect to corrosion, then I would hope that I would be able to come back and ask some others -- Consumers or Applicant's -- witness at some other time about these deficiencies.

MS. LAUER: Chairman Bechhoefer, the Applicant would just like to say that there is no contention on this matter and that --

CHAIRMAN BECHHOEFER: Well there is a contention on the safety of underground piping, certain underground piping and I am not sure that it said that it had to be against only one type of physical force. But when corrosion turned up at the hearing last year -- I can't remember when -- Judge Decker asked for the Staff to address the question.

We wanted the subject addressed. We didn't ask for the Applicant to address it, but the testimony of the Staff -- if the Staff witness came after a significant question, then they -- we may have to decide whether the record has to be filled out. It may well be that the Staff witness will have looked over this and determined that the Applicants have done a thorough study of corrosion. And if that is the case, we may not have a need for Applicant testimony.

(Discussion was had off the record.)

CHAIRMAN BECHHOEFER: I think we will just have to proceed to the extent that the Staff witness has knowledge. We don't really care whether the issue is dealt with by the Applicant or the Staff. We need a

record of it; and if the record is adequate, that is okay. And if the record isn't adequate, we may not determine -- we may offer them the opportunity of filling out the record.

MS. STAMIRIS: I would agree to that.

Now what I would like to do then is --

CHAIRMAN BECHHOEFER: He will be in tomorrow. The Staff witness will be in tomorrow.

MR. WILCOVE: He will be in tomorrow.

MS. STAMIRIS: I would like to then put aside my contention for the -- for the generic implications of the corrosion problems and ask Mr. Lewis if these questions directed specifically to the studies that were done on corrosion at the borated water storage tank lines which you specifically referred to in your testimony. And in the studies that have been done to arrive at the conclusion of overall safety for those lines with respect to corrosion, did you take into affect or into your analysis, the combined effects of chemicals in this soil from that soil study that you mentioned with welding problems and with possible bending problems because of settlement?

Did you look at the combined effects of those three things at the borated water storage tank lines?

A The conclusions on the first two items, the chemical attack, the potential chemical attack and the

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corrosion due to stray welding currents were that there was no affect.

The settlement has been addressed separately because of three concerns that you mentioned. Two had no affect whatsoever. I've got to say yes, they were all -- the conclusions of the three aspects are mutually supportive.

Q But what you are saying is that settlement and welding corrosion problems and chemical causes were analyzed separately, not in an interacting fashion?

A I believe the cause of the corrosion was one, review, and that addressed the chemical and the electrical.

Q In a combined way?

A I am not sure what you mean by combined way. There was one evaluation done by one group to determine the cause of the corrosion.

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BY MS. STAMIRIS:

Q Since the -- I believe it is in the record, and you stated some awareness of chemicals being in the water of the cooling pond. And since I think it is clearly in the record in the Final Environmental Statement, that there are probably other places that the cooling ponds will serve as the collecting point or sink for chemical contaminants in waste water.

Is it not also true that the cooling pond waters are going to be continuously recirculated through the plant area soils because of the dewatering system?

A I cannot testify to the plant's water system or the behavior of liquid contaminants or liquid constituents throughout the pond or the soils.

Q Well I am asking you one thing now, about your understanding of how the dewatering system operates.

Do you not believe that the permanent dewatering system will be pumping and recirculating water from and back to the cooling pond?

MS. LAUER: Objection. I believe all this goes to an operating license contention which will be addressed later on discovery.

MR. MARSHALL: Take exception. It is pertinent to this question right here from this witness.

(Discussion was had off the record.)

JUDGE HARBOUR: I am going to ask a related question here which I hope will resolve some of your questions and get this thing going.

Are the stainless steel pipes in the area that is subject to being dewatered, that is dry, kept -- was the water table kept below the position of the pipe?

THE WITNESS: Under normal operation, yes. The dewater levels will be below the elevation of the borated water water source tank line.

JUDGE HARBOUR: So that if there are chemicals in the water, if the water does not contact the pipes, is there any way that those hypothetical chemicals might affect the pipes?

THE WITNESS: To my knowledge, no.

MS. STAMIRIS: I don't have any further questions at this time.

CROSS-EXAMINATION

BY MS. SINCLAIR:

Q I wonder if you would explain the importance of corrosion in general piping and what adverse affects can be expected from corrosion on this pipe.

A Would you repeat the second part of your question?

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Q What affects can you expect from corrosion in piping and why is it something to guard against?

A Corrosion does involve a removal of material from the pipe wall. The various type of corrosion and the manner in which material is removed is different for the different types of corrosion, but in all types, what you end up with is the net affect, over a period of time, removal from the wall to the pipe.

Q And what results can you expect from that outside of leakage? Is there any other?

A Under normal conditions and what would be expected to happen at this plant, you would not expect to leakage.

Q You would consider that serious if you had leaking pipes?

A Without getting into specific case, I would have to say, no, not necessarily.

Q If they are safety related pipes, do they deal with materials that you must contain if you don't want them to leak?

A No ma'am, not necessarily. The surface water piping, for example, recirculating cooling pond water and those pipes, leak a nominal amount. It would have no affect on the plant or its operation.

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operation.

BY MS. SINCLAIR:

Q Would you say that non-safety related piping can impact on safety related piping systems?

A We have considered that in the design of the plant and concluded that no, non-safety related piping, it would not unacceptibly impact on safety related piping.

Q Do you feel that you have identified all of the possible sources of corrosion in your testimony in piping?

A No, ma'am, I haven't even started. I have not attempted to cover that in my testimony.

Q At what point would we get that kind of information about what the other sources of corrosion would be in piping?

MR. WILCOVE: Mr. Chairman, I believe that Dr. Weeks will be offering more extensive testimony on corrosion tomorrow. Perhaps Ms. Sinclair can ask those questions of Dr. Weeks.

MS. SINCLAIR: Well, there is certain information that I have received which I would like to start to initiate with the testimony, with this witness because it may involve getting certain kinds of documents here, and tomorrow won't be the right time to do it so I would like to pursue this a little bit.

BY MS. SINCLAIR:

Q How important are the welds as far as piping is concerned?

MS. LAUER: We just have one question, are we referring here to underground piping?

MS. SINCLAIR: Yes.

CHAIRMAN BECHHOEFER: Are we referring to corrosion as well? How important to corrosion --

MS. SINCLAIR: Yes.

CHAIRMAN BECHHOEFER: All right.

THE WITNESS: In terms of corrosion, the corrosion could take place in the base metal alloy pipe or in the weld holding used to join the sections of pipe together.

Q Well, as a weld is completed, what is the next step in finishing the weld? What does that consist of?

A I am not certain. I have a couple of problems. One is, I am not a welding expert. I am not certain what you mean by completed. Once the weld is completed, then the next step is to have the weld inspected for acceptance.

BY MS. STAMIRIS:

Q Isn't there a procedure of losing grinding wheels to smooth out the weld?

A On some piping, I believe there is.

MS. LAUER: I was going to object that this is getting way outside the expertise of this witness.

CHAIRMAN BECHHOEFER: This witness is not an expert on welding.

MS. SINCLAIR: Well,he is supposed to be an expert in piping, right?

MS LAUER: If I may clarify, the witness is here to present the re-installation program. That is the best of his prepared testimony. And his capacity and the position he holds at Bechtel, oversees that.

MS.SINCLAIR: At what point will we get somebody in here that can tell us the affects or how welds are handled after they are completed in piping, what the finishing process is and what is involved in that I do have information that deals with that, and it affects an awful lot of the welds in the piping.

I would like to have such a witness here.

JUDGE HARBOUR: Ms. Sinclair, is this related to some affect on the corrosion and the piping that is due to the welding?

MS. SINCLAIR: Yes.

MS. STAMIRIS: I would suggest that you should probably write to your main concerns that relates to corrosion. You are leading up to it in a logical way

but you could go right to the heart of the matter.

MS. SINCLAIR: The procedures that I understand that are followed after a weld is in place is that they are finished off with grinding stone or grounding wheels. Would you know whether these grinding wheels have NRC safety code --

MS. LAUER: Same objection, your Honor.

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CHAIRMAN BECHHOEFER: I think we will have to sustain it. That is really not his expertise, either.

MS. SINCLAIR: Well will Dr. Weeks have this kind of expertise?

MR. WILCOVE: I am not sure exactly what his knowledge of the piping welds are but he is an expert and he will be testifying on corrosion. I am not quite sure how these questions lead to corrosion.

(Discussion was had off the record.)

MS. SINCLAIR: Well perhaps I should just explain the basis of my questions here and then you can decide whether he is competent to testify further on this or if we have to get someone else in here.

But in the past, I have received information over the phone from an anonymous person who has a long history of understanding how the welds in the piping and so on are done at the plant.

He told me that the grinding wheels that are used in polishing the welds were not of the safety grades that are required by the NRC Code. He gave me the code numbers. He said that the code numbers that should be used for the welds, after they are completed and for finishing, should be A36 -- no, they should have used 37C-36TBNA. But in fact, they used a much cheaper grade

which they got from surplus stock, which he thought was from the Detroit area, with the number A36-TBNA.

Now he said that these grinding wheels that are of the lower grade, contain ferric oxide; and therefore, they will corrode.

MS. LAUER: May I interrupt, Judge, at this point. I believe Ms. Sinclair is simply testifying into the record. This is not --

CHAIRMAN BECHHOEFER: We have asked her to explain where she is going.

MS. SINCLAIR: I have tried to develop this line of questions --

JUDGE HARBOUR: Please proceed.

MS. SINCLAIR: And so, he explained to me that these cheaper grade of grinding wheels contain ferric oxide which will corrode the welds and that this may not be apparent immediately, but this is the reason why there is an NRC safety code for the types of grinding wheels that should be used.

He said the grinding wheels that should be used were silca carbide and they are more expensive, a little more difficult to obtain, but the Bechtel Purchasing Department chose not to use this silca carbide and substituted this other type instead.

I would like to have the Board into this or provide

the witness who can explain these things. My source also mentioned that the way in which you can check what wheels were used is in the purchase orders. If you secure the purchase orders, the shipping or packing lists and the invoices, you will be able to tell what the code number on the grinding wheels that were actually used has been.

I only received this this past week. This person would not provide an affidavit to the Government Accountability Project but was willing to discuss it with me but he remained anonymous.

MR. PATON: Mr. Chairman, we would propose to show Ms. Sinclair's statement to Dr. Landsman who will be arriving tomorrow and ask him his reaction to that. So that if he believes whether further investigation is warranted -- or, we would get some reaction from Dr. Landsman and report back to the Board.

CHAIRMAN BECHHOEFER: I think this matter is well beyond this person's expertise, and I don't think he can --

MS. SINCLAIR: I just did not know where else it would fit in.

CHAIRMAN BECHHOEFER: The only thing you may be able to ask of Dr. Weeks is a question or two about --

MS. SINCLAIR: I read his testimony, and in no place, does he even discuss anything relating to this, but I certainly will try --

CHAIRMAN BECHHOEFER: I know, but in terms of his general expertise, whether the corrosive affects could occur, possibly, you could ask that tomorrow. Certainly, with respect to whether these conditions exist, the Staff witness is not going to know that, and you may have to ask --

MS SINCLAIR: Would it be possible --

CHAIRMAN BECHHOEFER: If you present it to Dr. Landsman --

MS. SINCLAIR: Would it be possible for the Board to subpoena the purchase orders, shipping lists and invoices of the grinding wheels that were used at the plant so we can identify what qualify of grinding wheels were used --

MR. MILLER: I have a better idea. Why don't we subpoena this person, whoever he or she is, to come forward and to swear before this Board, the fact that we --

MS. SINCLAIR: This was an anonymouus piece of --

CHAIRMAN BECHHOEFER: We don't take anonymous pieces of information.

MS. SINCLAIR: But he has provided me with all the information that you need and this hearing --

CHAIRMAN BECHHOEFER: The Staff can approach this person in confidence but --

MS SINCLAIR: This man knows how many people who have -- because of intense concern with this plant-- have come forward within the system that Consumers provided and have lost their jobs because they have given that information. They also know that people who have tried, anonymously, are threatened with --

CHAIRMAN BECHHOEFER: But for us to resolve questions of litigation --

MS. SINCLAIR: But you have all the information you need.

CHAIRMAN BECHHOEFER: No we don't. We don't know if the guy is lying.

MS. SINCLAIR: Well you can find out by going to the purchase orders and --

CHAIRMAN BECHHOEFER: No, we are not going to. You can bring this to the attention -- we are not investigators. You can bring the matter to the Staff's attention, and the Staff will investigate it and then they can present testimony if it is called for. But

we don't go out and conduct investigations.

MR. PATON: Could I react to that? Two things. I wanted to show this information to Dr. Landsman. He may say to me, "Look, we have heard this before. We have looked into it and there is nothing to it." I don't know what he is going to say.

I would not like to commit right now that the Staff would make a full investigation of this.

CHAIRMAN BECHHOEFER: Right, I am well aware of that.

MR. PATON: We are talking about an anonymous phone caller.

Could I ask Ms. Sinclair if this is the piping that we are talking about in Category I?

MS. SINCLAIR: Yes, that is one of the reasons why I was concerned.

MR. PATON: All right, thank you.

MS. SINCLAIR: This substitution of this cheaper grade grinding wheel had been going on for at least four hears to his knowledge.

MR. PATON: We will discuss this with Dr. Landsman and report to the Board when we have some reaction.

(Discussion had off the record.)

CHAIRMAN BECHHOEFER: Do you have any further

questions?

BY MS. SINCLAIR:

Q I also want to know if your testimony is, by limiting it to the piping of the borated water storage tank, if at some point we are going to get an overview of other underground piping besides this?

CHAIRMAN BECHHOEFER: I think that question was answered. The fact witness will come in tomorrow on that subject.

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MS. SINCLAIR: And he will not be confined to this borated water storage.

CHAIRMAN BECHHOEFER: No. The Board had originally asked the Staff to address this issue since there was a document that we were not aware of. Maybe we should have asked the Applicant to address this but we didn't.

Mr. Lewis came in with some additional information which the Applicant had, but the basic portion of the testimony will be presented by the Staff tomorrow. And as we mentioned, if the Staff testimony -- if the Applicant is not satisfied with this, they will then have the opportunity to bring in further testimony of their own.

MS. SINCLAIR: I thought Dr. Weeks' testimony, in following the NRC rules, would be quite limited.

(Discussion was had off the record.)

CHAIRMAN BECHHOEFER: Do you have any further questions of this witness?

MS. SINCLAIR: No I don't.

CROSS-EXAMINATION

BY MR. MARSHALL:

Q I have a few questions which I am sure will be objectionable, as usual.

He raised certain questions beyond his

expertise on direct examination, and I am going to ask him some questions over that.

First off, I would like to ask you if you are, just for my benefit, an employee of the Bechtel Corporation?

A Bechtel Associates -- yes.

Q Now, the men that done this work that you talked about and all this welding and installation of these pipes, were they also Bechtel employees?

A I believe so.

Q Don't believe.

A To my knowledge they were.

Q The answer is yes, right? That's all.

Now this is the question, and I have a lady back here who has one of the most beautiful cameramen you have ever seen. This is the situation.

Confucius say, one picture is worth many many words. You said that in a pond of yours over there -- not yours -- or whose ever, that there is some kind of contaminant, some kind of -- different kinds of elements of some sort of things in that water, chemicals maybe, something of that nature.

I am on my way home for dinner today, across from your pond, the one we are speaking of just across the railroad tracks where a cameraman can see it, is 3,000, I

estimate seagulls, none of which will set down on your pond but they sit in the gravel pits on the opposite side of the river, and none of them will sit down on the river.

That's not all. This time of the year, things get cold. A similar number of geese that set down in the same spot are going south. I want to know why none of them sat down in your pond or in the river.

MS. LAUER: I object.

MR. MARSHALL: Why? Are you objecting to the Audobon Society?

Go out there now and take a look yourself, and find out why none of them will sit down on your pond or in the river between.

JUDGE HARBOUR: He has heard the question, but please let him answer.

THE WITNESS: I think the question calls more for a hunter than for a engineer.

BY MR. MARSHALL:

Q A hunter, I never hunt.

A I am not aware of any contaminants or chemicals in the pond even now or even expected to be there during the plant's operation, that would cause wildlife to avoid the pond. Beyond that, I have no expertise or information on that.

Q We had some ducks in there about three weeks ago

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and they avoided that pond like the plague. I watched them, and I am not an Audobon person.

JUDGE HARBOUR: Mr. Marshall, have you ever seen a water bird lie on that pond?

MR. MARSHALL: I have never seen a water bird land on that pond at any time. This is just on the other side of the river. That gravel pit is just full of seagulls. They won't sit down in that river in between, river. There has to be a reason for that. They are smarter than I am.

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CHAIRMAN BECHHOEFER: Do you have any further questions?

MR. MARSHALL: That's all. I just want to know the answer to that one.

JUDGE HARBOUR: I have a possible answer but I would not give it for the record. So after the hearing, I will give you my private version of why I think --

MR. MARSHALL: Well that is the situation, go out there and look at the birds and watch them for a while.

CROSS-EXAMINATION

BY MR. WILCOVE:

Q Mr. Lewis, am I correct in saying that there are certain Category 1 26-inch pipe lines that penetrate the valve pit at the Diesel Generator Building?

A That is correct.

Q Do you intend to monitor the rattlespace at those penetrations?

A No, it is not our intention at this point to monitor the penetration of the piping into the valve pits. I might add that this again is the subject of the proposed operating technical specification and that this question could be addressed there as well as to whether it was -- would be required as part of the specification as approved to do that monitoring.

Q I take it you mean that you have not yet

determined whether such monitoring will be a part of that proposed technical specification.

A That's correct.

Q Mr. Lewis, would you please turn to Table 1 of your testimony. With respect to the number of strain gauges listed on the far right column, how did Consumers determine which monitoring stations needed three strain gauges and which ones needed two strain gauges?

A I believe that determination considered the underground utilities and possibly other areas where it was considered more potential for having bending of the pipe and the desire to have more information concerning the strained conditions in the pipe at specific locations.

Q Mr. Lewis, will you please turn to Page 17 of your testimony with respect to the inspection of the borated water line, how slight of a defect or pitting would that inspection have revealed?

A The inspection was a visual inspection directly on the pipe, so any defect visible to the naked eye would have been identified.

Q What percentage of the pipe surface did you look at?

A I do not have that information. I know that the inspection was conducted in areas in proximity or vicinity of the grounding grid.

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Q Mr. Lewis, would you now turn to Enclosure 2 to Table 4 of your testimony with respect to the third column on the far right, the one titled Seismic SSE.

Am I correct in saying that column consists of the calculations of the stress caused the pipe -- the seismic shakedown earthquake?

A That's correct.

Q Those calculations were based on a dynamic type of analysis; were they not?

A Yes, they were.

Q Did the analysis use the response spectrum method?

A Yes it did.

Q Am I correct in saying that in that dynamic strain analysis, the input for the material properties of the case were based on .18 G?

A Yes you are. That is as stated in the footnote to the table on my testimony that shows those properties.

Q Am I correct in saying that that corresponds with 1.5 times the FSAR earthquake?

A Yes, you are.

Q Under special loading, however, the analysis used was .12 G; am I coreect?

A Yes you are.

Q Do you intend to rerun the analysis to resolve

this inconsistency?

A I refer you to Footnote 2 on Enclosure 2 of Table 2 which indicates, or states, that in the check analysis using the technique in our approved BC-TOP-4, will be run. That analysis for seismic stresses will utilize seismic loads of one and a half times the design base safe shutdown earthquake.

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Q With respect to analyzing the adequacy of piping not listed in this enclosure, what response spectrum was utilized?

A That seismic analysis was utilized using the DC-COP-4 technique, utilizing a factor of seismic input of one and a half times the shutdown earthquake.

Q So in other words, all Category I piping was analyzed utilizing 1.5 times the FSAR earthquake, underground piping?

A The piping that is not being replaced or installed was utilized concerning that; and upon completion of the check analysis for the piping that will be re-installed, that will also be done to the one and a half SSE, yes.

Q But the analysis that has taken place, wasn't 1.5 simply FSAR earthquake utilized -- because you had it in your last answer which I missed.

A Analyses done of the existing pipe, yes, were done one and a half times the FSAR safe shutdown earthquake.

The only intention of my clarification to your answer, again, refers to the table, the values listed in this table that were performed to the one times the FSAR safe shutdown earthquake.

Q Mr. Lewis, have you made a determination as to

whether the site specific response factor is enveloped within 1.5 times the FSAR earthquake?

A Prior to my previous testimony in February of 1982, we reviewed that question and determined that for the seismic load used in the seismic input to the very piping analysis, the 1.5 times the FSAR safe shut-down earthquake does envelope the site specific response spectra.

MR. WILCOVE: I have no further questions.

(Discussion had off the record)

JUDGE HARBOUR: I have just one additional question which pertains to reference one. This one is stapled to your testimony so I am certain it is part of your testimony.

THE WITNESS: Yes, sir, it is.

JUDGE HARBOUR: On page two of that reference, No. 1, and the third paragraph, there is a discussion concerning a pipe which is designated 26-inch -- OHBC-15 that comes out of a building.

The statement is made in this reference that there's no concern about its rattlespace dimensions changed because of its 90 degree band, elbow, immediately outside the structure.

Can you tell me how far it is immediately outside the structure as far as the elbow is concerned,

as far as the elbow is located?

A It is within 5 to 10 feet. I would have to check a drawing to give you the precise value.

Q If there were settlements of the structure, where would the shear zone be between the settlement of the structure and the adjacent soil that contains this elbow? Would it be between the elbow and the structure or would it be beyond the elbow?

THE WITNESS: I believe I understand your question. The primary concern which we were addressing earlier, the general area of the field settlement carrying the pipe down, that would tend to carry the pipe down with respect to the structure.

If the structure settled with respect to the field, the shear zone to take place at the wall of the structure -- although whether it would be a discontinued shear zone or a more gradual zone, I am not certain. I believe it would probably be a gradual zone rather than a plain --

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JUDGE HARBOUR: But that would be essentially the interface between the soil and the structural foundation outside of the foundation wall?

THE WITNESS: Yes sir.

JUDGE HARBOUR: And the settlement of the structure relative to the soil containing the pipe would not cause a vertical change in -- or would not the settlement cause a vertical change in the rattlespace at that penetration?

THE WITNESS: Potentially, that settlement could. We will be monitoring that rattlespace under technical specification limits.

JUDGE HARBOUR: You will be monitoring the rattlespace at that particular pipe penetration?

THE WITNESS: Yes sir, we will.

CHAIRMAN BECHHOEFER: Is that all you have?

JUDGE HARBOUR: That's all.

CHAIRMAN BECHHOEFER: I have a couple of questions about the future settlement which I gather is three inches.

First, why is this considered to be conservative, I refer you to Page 5 -- but it is probably elsewhere -- why is three conservative?

THE WITNESS: I believe this has been the subject of some discussion, both at the Board and certainly

between the Applicant and the NRC Staff.

This prediction is based upon settlement monitoring that is taking place at the site and has been taking place at the site for a number of years, that is, the basis for our calculation resulting in the three-inch extrapolations to the end of the plant life.

CHAIRMAN BECHHOEFER: Why is this conservative? You just told me that it is fractural but why is it conservative?

THE WITNESS: I believe your question to me is why a -- in extrapolation to a large number rather than a smaller number is a conservative number.

CHAIRMAN BECHHOEFER: Well my understanding, maybe I am wrong, initially, this plant was not supposed to seek more than two and a half inches for its 40-year life back at the construction stage. That is at least my understanding. It may be wrong, but I am just wondering why three inches is conservative.

THE WITNESS: Well again, the estimate is based on a great deal of experimental data that has been taken and is still being taken that was not available at the construction stage.

CHAIRMAN BECHHOEFER: Was this three inches, since I understand it applies to buried piping which is not replaced -- and I get that from Page 3 -- is this

three inches in addition to whatever else has settled already?

THE WITNESS: It is three inches from the -- about mid-1981 which is approximately the time the measurements were taken through to the end of the plant life.

CHAIRMAN BECHHOEFER: Now it is my recollection from February that some of that piping will have sunk 15 inches or more by the end of the plant life. I understood that it was around 11 or 12 already for some of the pipe.

(Discussion was had off the record.)

CHAIRMAN BECHHOEFER: Well anyway --

THE WITNESS: Will you repeat the question, please?

CHAIRMAN BECHHOEFER: Well my question is, does this not mean that if you predict three more inches, does that mean that some of the pipes will exceed 15 inches?

THE WITNESS: As a potential upper bound, that is correct. The settlements that occurred prior to -- the position of the pipe at the time of the precise profile measurement was as much as approximately 12 inches off of the design elevation, that is correct.

JUDGE COWAN: Does that necessarily mean it is off that much because of settlement?

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THE WITNESS: No sir. That does not necessarily mean that that differential is all due to settlement. As we discussed in February, there are -- the pipe was hidden from our view at that time and we could not define how much of the settlement was due to the welding process or the back boning process for settlement.

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process.

JUDGE COWAN: Now in your safety analysis of this piping, would you use three inches or would you use 15 inches?

THE WITNESS: The piping that is being replaced or re-installed is being re-installed to its design elevation within installation tolerances.

JUDGE COWAN: Well as I say, on page three, it says this is for the piped that's not being replaced. I am asking for it right now.

THE WITNESS: For the piping that's not being replaced, again, as we discussed in February, we are not doing detailed analysis for the settlement aspects of that pipe, rather, we are monitoring the pipe during operation, specifically for strain such that if the condition of the pipe is compromised beyond acceptible limits due to settlement or anything else during the plant's operation, that will be identified and the appropriate action can be taken.

JUDGE COWAN: So therefore, you will have alert levels, action levels for that type of thing?

THE WITNESS: Yes, that is correct.

JUDGE COWAN: What criteria are you using for pipe which is replaced? How many inches are you predicting that will sink? Is that fact of the original two and a half or --

THE WITNESS: For the pipe that is replaced, we consider the differential settlement values for analysis of the pipe. In the interface between the new field supply of cement and the old field, we consider for design purposes that a differential settlement of three inches could occur and we analyzed for that.

For the condition, the interface between the service water pump structure and the new field condition flyash cement, in consideration that we are excavating down 610 feet and coming, filling back up from that elevation with the flyash cement, we have estimated a value of one and a half inches settlement in that field.

So we have taken, at that interface between the surface water pump structure wall and flyash cement, we have taken a maximum differential settlement of one and a half inches.

JUDGE COWAN: On page six of your testimony, you stated that strain data which you determined to be providing faulty data, will be recalibrated or replaced within 90 days of the first five years of monitoring.

What then? Do you use faulty data or -- for the rest of the 35 years?

I should say first, there will be some -- I understand there will be a long term monitoring program. The frequency may vary; is that correct?

THE WITNESS: Our proposed technical specifications states that we will monitor for five years. At that point -- and a report to the NRC will be submitted on the need to continue monitoring fill stations. If that report is acceptable to the Staff, then monitoring would be reduced or stopped depending on the resolution or indeed, acceptability and discussion of that report.

JUDGE COWAN: I take it, to the extent that monitoring continued, however, would you have some programs for checking the accuracy of the guages, replacing them if necessary?

THE WITNESS: Yes, sir. Guages that were continuing to be used would be subject to the same maintenance and surveillance conditions as guages would be during the first five of operation.

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CHAIRMAN BECHHOEFER: There is a list of certain precautions to preclude damage, and the word in there is "may". My question is, could that be construed as to say that none of those will be used or one of those might be used?

THE WITNESS: It is our intention to utilize all of those in one phase or another of the reinstallation program as appropriate.

CHAIRMAN BECHHOEFER: So the "may" does not indicate an indecision whether to use some procedures of this sort?

THE WITNESS: That is correct. The "may" refers more to the lack of definition precisely where and when each of those will be needed.

CHAIRMAN BECHHOEFER: Would the utility locations referred to in Paragraph C on that same page be all utility locations or just certain ones? C and D are really the same questions.

THE WITNESS: We are stating all the utility locations prior to excavation. Again, in the event of excavation itself.

CHAIRMAN BECHHOEFER: Yes, of course.

JUDGE COWAN: I have one question. On Page 12 of this paragraph, the fifth paragraph, you described what is done to accommodate the differential settlements between

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two types of fields by means of a material that goes around the pipes.

What sort of -- how thick is this and how long are the portions of the pipe that is covered by this material?

THE WITNESS: Sir, in Figure 4 of my testimony, there is a sketch of the piping that will be replaced or rebedded, and it shows the bounds of the compressible material. In each of the cases that it is used, it will be 40 feet long along a 40 foot length of the pipe and six inches thickness.

JUDGE COWAN: So that when you say the compressed ability of this material is such that the pipe is effectively suspended, I guess what you are saying is that the differential settlement points, which are 40 feet apart, results in a distribution of the displacement so that the bending occurs -- I just did not quite understand what you said when you said it is effectively suspended.

THE WITNESS: Your interpretation is correct. The piping in that area becomes similar to a piping system installed in a building in the plant between two supports.

For the purpose of considering or developing stresses in the pipe, it is suspended at each of the two ends of that 40-foot length. It is accurate at each of those two ends and it is suspended, essentially, in the

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air, between those two -- along that 40-foot span.

JUDGE COWAN: So that the actual place between the two types of fill, I take it, that's a very rapid discontinuity in the amount of compression on the two sides.

THE WITNESS: Again, for purposes of design as a conservative approach, we assume a plane shear slip between the new fill and the old fill. For example, between the service pump structure and the new fill occurring along that plane.

If you were referring to changes in compression of the compressible material along that length, yes, you are right. The compressible material on one side would see that --

JUDGE COWAN: In one direction and the other one in the other direction.

THE WITNESS: That's right.

JUDGE HARBOUR: In other words, all of the motion would be taken up by the compressible materials surrounding the pipe, essentially all of it.

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JUDGE COWAN: And distributed --

THE WITNESS: Rather, it is spread along the full length of the 40-foot section of the pipe because at the ends, where the pipe leaves that compressible material it goes back to the fill, at those points, there does seem to be a three-inch differential.

JUDGE HARBOUR: I was talking about the shear motion that would occur after --

THE WITNESS: Yes, that is taken up by the compressible material.

CHAIRMAN BECHHOEFER: Any redirect?

MR. LAUER: Yes.

REDIRECT EXAMINATION

BY MS. LAUER:

Q Mr. Lewis, can you briefly explain the responsibilities involved in the reinstallation program?

A As an assistant project engineer on the Midland project, I was given a responsibility in September of 1981 for overseeing, managing, if you will, the resolution of the buried utility concerns with respect to plant settlement. In that context, for the last year since that time, I have been very actively involved both within my own project to direct that the various work be done and to gather information concerning the pipe and the concerns that had been raised. And, with Consumers Power

Company interfacing with them on this issue and with the NRC as well as this Board.

Q Referring to Page 5 of your testimony, are the vertical settlements used to measure differential settlements over a length of pipe?

A No. I refer you to the last paragraph in Section 3.2, the next to the last sentence where it states that the differential vertical displacement from the initial datum to the current survey measurement shall be used for comparisons to the acceptance criteria. That is referring to a given settlement monitor as an additional datum point established. And if that marker settles more than what is acceptable specifications, than an actual limit would be reached.

The differential settlements that could occur due to underlying utilities would be defined or identified primarily as a result of the strain gauge measurements that would show -- if the pipe was deflecting, it would show -- the strain gauge would show and the rise in strain at that location.

The vertical settlement, in addition, would provide additional information.

Q Why is there special interest in the locations where there could possibly be high future differential settlements?

A The concern is for increased stress or strain in the pipe leading that could conceivable be due to failure and also of functions of the pipe. Again, the strain measurement is a direct measurement to that concern.

Q If you are not using a vertical settlement marker to measure that strain, how do you measure, just briefly?

A Using the strain gauges that are monitored on the pipe at the same location at the level settlement markers and provide those strain gauges as we discussed before, to provide a direct measurement of strain in the pipe at a given location.

Q Mr. Lewis, with regard to the BWST stainless steel line, do you know if that line is thick enough to account for corrosion?

A The design for that line, as well as our other lines, includes an allowance for corrosion. I am not familiar with precisely what the dimension of that allowance is for that particular pipe that is a design practice.

JUDGE HARBOUR: You said a thickness allowance?

THE WITNESS: It is an allowance on the minimum wall thickness for the pipe.

BY MS. LAUER:

Q And when that line was excavated, did you see the report on the inspection of the line?

A Yes I did.

Q And from reading that report, what did you conclude?

A I concluded that inspectors looked at the BST -- the supply lines in July of 1982 and including areas immediately adjacent to the grounding grid, including at least one area of the grounding grid with the contact with the piping, and found no pitting corrosion at all.

MS. LAUER: We have no further questions at this time.

CHAIRMAN BECHHOEFER: Ms. Stamiris.

CROSS-EXAMINATION

BY MS. STAMIRIS:

Q In regard to the statement that you just made about the July 1982 report that you saw on pitting corrosion, am I correct in understanding from your previous testimony that that report is contained, if you will, on the last page of this SCR reportability group of documents?

A No, ma'am, that report is summarized in the last page entitled "Project Engineer," and it is in complete response to No. 12. The report is, I believe, Reference B. It is identified as Reference B on that page.

Q Don't you believe that the complete report should be provided to this Board?

MS. LAUER: Objection --

MS. STAMIRIS: How can we know that this summary does not leave out some important or significant details from the overall report?

MS. LAUER: Objection, that is not the proper witness to answer the question.

(Discussion was had off the record.)

CHAIRMAN BECHHOEFER: Does the Applicant know whether those two reports have been made available to the NRC?

MS. LAUER: Just a minute, your Honor.

(Discussion was had off the record.)

(Discussion was had off the record.)

MS. LAUER: Chairman Bechhoefer, we're really not sure. We can check into that. There's a possibility, at least, that they were provided to Mr. Weeks.

JUDGE HARBOUR: I'm sorry; I didn't hear your last.

MS. LAUER: There is a possibility that they were provided to Mr. Weeks of the NRC. We're uncertain. We'll check on that, if you'd like.

BY MS. STAMIRIS:

Q When you speak of -- and this is in follow up to the testimony that you just recently made to some of the Board's questions -- you said that on replaced pipe you allowed for a differential settlement of three inches which could occur, and then you described a calculation of how the amount of settlement is measured between what is taking place at this point in time and what had taken -- you know, at the point that the pipe was originally laid.

Now, does not -- I still am not clear and I hope you can explain briefly whether differential settlement has to, in fact, take into account two different spatial locations and the difference between those two spatial locations?

A For the analysis of the new piping, that was what

was done, yes. We considered the differential settlement -- that's a settlement of one location relative to another adjacent location -- and analyzed the effect of that on the piping system that travels from one location to another.

Q And so the two locations between which you measured the difference would vary according to the individual piping and what those two points were?

A Yes, that's correct.

Q Okay. Are you aware of references that have been made to a permanent pipe monitoring system when you were here in February?

A I would refer to the monitoring system described in my testimony as a permanent pipe monitoring system. That's specifically --

Q You would call five years a permanent pipe monitoring system? I mean, there is a possibility, according to this testimony, that we would only have monitoring for five years, isn't that correct?

A If that can be defended based on measured data and accepted by the NRC, that is correct.

Q And would you consider a five year monitoring to be a permanent monitoring system over the operation of the plant?

A As opposed to a temporary system or a construction

system, it has -- it is installed with capability, the design capability to operate for the life of the plant. It is a permanent system.

Q All right. The instruments that are actually being used in the monitoring, are they designed to last for 40 years?

A The design plan is 40 years. We discussed to some extent, I think, in February the amount of testing and experience -- there's extensive experience with the instruments. Specific test data, I believe, is limited to about 20 years, something of that nature.

Q Do you understand that the effect of the dewatering system will have an effect on settlement?

A There is an amount in the three inch number that is attributed to dewatering, yes.

Q Well, let me put it this way: If there were fluctuations in the water levels of the plant due to certain degrees of failure or different occurrences with the permanent plant dewatering system over the 40 year life of the plant, isn't it conceivable that that would have significant effect on the settlement and ovality monitoring and the other things that you're monitoring with your piping?

JUDGE HARBOUR: Excuse me. Are you suggesting that each time that there is flooding and dewatering that there is also vertical motion of the soil?

MS. STAMIRIS: Is there a potential for that, yes.

JUDGE HARBOUR: All right. Could you answer the question of whether you think there is a potential for reversals in direction as a result of watering and dewatering, if that is within your capability.

THE WITNESS: I would not expect to see any change in elevation of the piping even should there be failures in the dewatering system that would result in water levels coming up, rising.

Again, the installed gauges should be -- the installed gauges would indicate such changes, but I would not expect to see the pipe float with a rising water level should it rise, should the water level rise.

BY MS. STAMIRIS:

Q You would not expect any effects of potential failure of the dewatering system to affect the pipe levels? Or are you saying that you would not expect significant effects from possible dewatering failures?

JUDGE HARBOUR: Changes in elevation, do you mean?

MS. STAMIRIS: Yes.

BY THE WITNESS:

A Again, given that we are talking water pipes that would not tend to float, if you will. With water levels, it should rise. I would not expect to see any change.

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

Oh, yes, I do. I'm sorry. There was one question.

BY MS. STAMIRIS:

Q When Dr. Harbour or Judge Harbour asked the question about -- it was an OHB 26 inch pipe -- do you remember what page of your testimony that was on? I'm sorry, I just pulled this out by accident. Oh, I think it was on --

JUDGE HARBOUR: I believe it was in Reference 1, wasn't it?

THE WITNESS: Yes, that was --

MS. STAMIRIS: Yes. I think it was on Page 2 of Attachment 1.

JUDGE HARBOUR: Of Reference 1.

MS. STAMIRIS: Of Reference 1.

BY MS. STAMIRIS:

Q When you said that -- when you were talking about how the rattlespace was going to be monitored, or

the effects on piping due to the rattlespace, I wondered if the NRC has agreed to the acceptance criteria that you referenced when you referenced the certain technical specifications that you will be watching for on that rattlespace of that pipe.

A We have discussed the proposed technical specification with the NRC. It was submitted for their review as part of FSAR in September of 1982, and we have not -- I do not know the extent to which their formal review of the submitted specification has been completed.

At the time we submitted the technical specifications we felt we had good agreement with the NRC Staff.

Q But you have not as yet had a final word on the Staff's evaluation of that specification?

A That is correct.

MS. STAMIRIS: Thank you. I don't have any more questions.

CHAIRMAN BECHHOEFER: Mr. Marshall?

MR. MARSHALL: Just one question, as usual.

CHAIRMAN BECHHOEFER: Okay.

CROSS-EXAMINATION

BY MR. MARSHALL:

Q This piping, you say "we" -- I'm great on words because I'm ignorant as hell -- when you say "we," do you

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mean the expertise of the Bechtel Company?

A What statement are you referring to?

Q Talking about the installation of the piping in general. The piping.

A In general, that is what I am referring to.

MR. MARSHALL: That's all. That was the answer.

CHAIRMAN BECHHOEFER: Mr. Wilcove?

CROSS-EXAMINATION

BY MR. WILCOVE:

Q Mr. Lewis, with respect to the transition zones, am I correct in saying the settlement will be monitored at each end of the zone?

A Yes, you are.

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MR. WILCOVE: And, as a suggestion, this report has been referred to rather extensively, and I have a feeling it will be referred to rather extensively tomorrow. I would suggest that it be offerred into evidence.

(Discussion was had off the record.)

MS. LAUER: May we ask which report?

MR. WILCOVE: Oh, I'm sorry. Safety Concern and Reportability Evaluation.

MS. LAUER: No. 12?

MR. MARSHALL: No objection.

CHAIRMAN BECHHOEFER: Well, first, does anyone want to offer it?

MS. STAMIRIS: Can Mr. Lewis sponsor it as an exhibit?

CHAIRMAN BECHHOEFER: Well, he said he had knowledge of it. I suppose he could. You could sponsor it as a Stamiris exhibit or a Staff exhibit, either one.

MR. MARSHALL: Yes.

MR. WILCOVE: Staff is willing to stipulate as to its authenticity.

MS. STAMIRIS: I would agree that it would be beneficial to have it noted in this way for the record. But I would like the qualification that I would not be

precluded from asking further questions about this document at a later time from the offerer of the document or someone more closely related to the quality assurance.

MR. MARSHALL: You're not precluded.

MS. STAMIRIS: Okay.

CHAIRMAN BECHHOEFER: Well, that goes without saying. But I think it's probably easier if it's in the record, and --

MS. STAMIRIS: I think so too.

MS. LAUER: Applicant has no objection to admission.

CHAIRMAN BECHHOEFER: Who is going to offer it and mark it and offer three copies?

JUDGE HARBOUR: May I make a suggestion here, also. Do not use copies of the one that you got from me today, because it has my own personal notes written in red ink, which Xeroxes quite readily. A clean copy should be supplied. These notes of mine might be confused with some of the legitimate changes that had been made and initialed by the author of this, so I don't want any confusion between my notes and the legitimate changes. That's all.

MR. MILLER: We can certainly provide a clean copy.

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(Discussion was had off the record.)

CHAIRMAN BECHHOEFER: Why don't we mark it and admit it today, and then note it in the transcript and provide the copies tomorrow.

We'll let it go in as what, a Staff exhibit?

MR. WILCOVE: Staff has no objection to it going in as a Staff exhibit. That might be more appropriate. Staff has no objection to it going in as a Staff exhibit.

CHAIRMAN BECHHOEFER: Well, if the Staff gets a clean copy, will you make sure that we get enough for the reporter, then.

MR. WILCOVE: Should we offer it into evidence now?

CHAIRMAN BECHHOEFER: Why don't you do that, since it relates to this witness' testimony, and it would be better here, I think, than later. But the copies could be offerred to the reporter tomorrow.

MR. WILCOVE: Okay.

CHAIRMAN BECHHOEFER: What is this, Staff 15?

MR. WILCOVE: Has everybody stipulated to the authenticity of this document?

MS. STAMIRIS: Yes.

MR. WILCOVE: In which case, the Staff now offers it into evidence collectively as Exhibit 15.

CHAIRMAN BECHHOEFER: Without objection, the exhibit will be admitted into evidence.

(The document referred to, previously marked Staff Exhibit No. 15 for identification, was received in evidence.)

CHAIRMAN BECHHOEFER: Does the Staff have any further questions?

MR. WILCOVE: The Staff has no more questions of Mr. Lewis.

CHAIRMAN BECHHOEFER: How about the Applicant?

MS. LAUER: No, no more questions.

CHAIRMAN BECHHOEFER: How about anybody else?

MR. MARSHALL: No.

CHAIRMAN BECHHOEFER: I guess Mr. Lewis is excused, and I guess we're ready to adjourn for the day.

(Witness excused.)

CHAIRMAN BECHHOEFER: Anything before we adjourn?

MR. WILCOVE: The Staff's plan is to put Dr. Chen and Mr. Kane on the stand first, thereby giving Dr. Weeks an opportunity to read the transcript from today so that when Mr. Kane and Dr. Chen are finished then we'll be prepared to put on Dr. Weeks.

CHAIRMAN BECHHOEFER: Fine. Okay, we'll be adjourned until 9:00.

(Whereupon an adjournment was taken in the above-entitled cause to be resumed on Wednesday, November 17, 1982, at the hour of 9:00 a.m.)

NUCLEAR REGULATORY COMMISSION

This is to certify that the attached proceedings before the

NUCLEAR REGULATORY COMMISSION

in the matter of: CONSUMERS POWER COMPANY (Midland Plant Units 1 & 2)

Date of Proceeding: November 16, 1982

Docket Number: 50-329 & 330 OM; 50-329 & 330 OL

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)