NUCLEAR REGULATORY COMMISSION

ORIGINAL

In the Matter of:

CONSUMERS POWER COMPANY	)	DOCKET NOS 50-329 OM
	)	50-330 OM
(Midland Plant Units 1 & 2	)	50-329 OL
		50-330-OL

DEPOSITION OF WALTER R. FERRIS

DATE: December 10, 1980 PAGES: 1 thru 172

AT: Chicago, Illinois

ALDERSON REPORTING

400 Virginia Ave., S.W. Washington, D. C. 20024

Telephone: (202) 554-2345

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY LICENSING BOARD

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

Offices of Isham, Lincoln and Beale
One First National Plaza
Chicago, Illinois

December 10, 1980

Deposition of:

WALTER R. FERRIS

the deponent called for examination by the staff of the Nuclear Regulatory Commission pursuant to notice, at 9:30 a.m.

PRESENT ON BEHALF OF THE RESPECTIVE PARTIES:

For the Nuclear Regulatory Commission

Mr. William Paton
Counsel for NRC

Mr. Joseph Kane

Hari Singh

Jim Morrison

For the Consumers Power Company

Mr. Alan S. Farnell
and Mr. Ronald G. Zamarin
Isham, Lincoln & Beale, Counselors at Law
One First National Plaza
Chicago, Illinois 60603

(Witness sworn.)

WALTER R. FERRIS

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

EXAMINATION

BY

MR. PATON

This is the deposition of Walter Ferris of the Bechtel, San Fransisco office being conducted pursuant to notice sent by the staff November 25th, 1980.

Mr. Ferris, please state your full name and your employer for the record.

A My name is Walter Ronald Ferris, and I work with Bechtel, Incorporated in the Hydro & Community Facilities Division.

Q All right, the name of the corporation you work for is Bechtel; it's Incorporated; is that correct?

A Bechtel, Incorporated.

Q And is the organization that is located in Ann Arbor, Michigan also Bechtel, Incorporated?

A In Ann Arbor, there are Bechtel, Incorporated personnel in the geotechnical group.

Q Now, you say the geotechnical group, are you acquainting that to the hydro and community facilities division?

A Yes, they are members of the hydro and community facilities division.

Q Do you acquaint these -- is the geotechnical the same as the hydro and community facilities?

A No, it is not.

Q What is the difference?

A The geotechnical group is a sub-group within the hydro and community facilities division.

Q What is your position within the hydro and community division in San Fransisco?

A I'm the chief soil engineer.

Q Are you Dr. Afifi's boss?

A Technically I am his superior or supervisor.

Q I'm looking at a document that you gave me that apparently is your resume, and I'm going to mark it Staff Exhibit 1, December 10, 1980. And I'll mark it Ferris Deposition.

(At which time the document was marked.)

And I notice you have a degree from Harvard; is that June of 1955?

A That's correct.

Q Soil mechanics?

A That's correct.

Q Is that a Bachelor Degree?

A No, that is a Master's Degree. At that time Harvard

called it a "SM" but it is in fact a Master's Degree.

Q Okay. On your resume, it says December, 1941 to January, 1942, Royal Engineers, UK,(United Kingdom) am I correct, that that is two months?

A No, you are not correct, I was in the Royal Engineers from December, 1941 until January of 1948 -- a little over six years.

Q Okay, I'm sorry, but do you see your resume, it says from and to, does that not say January '42?

A It appears to be a typographical error.

Q So, you would make that a '48; is that correct?

A That's correct.

Q Would you tell me in your judgment what Dr. Afifi's responsibilities are?

A Dr. Afifi is the assistant chief soil engineer in the geotechnical group in the Ann Arbor office.

Q Assistant chief engineer in the what?

A In the Ann Arbor Office of Bechtel.

Q But you indicated the group, geotechnical group.

A He is with the geotechnical group.

Q Did you read his deposition?

A Yes, I have.

Q Can you tell me what his responsibilities were with respect to the soils problem at the Midland site?

MR. FARNELL: Currently, right?

BY MR. PATON:

Q What they have been and what they are now. Tell me what they are now.

A He is now providing to the Midland Project Engineering Group information in relation to the questions from the NRC, which relate to the technicians for the problems that occurred.

Q What kind of information is he providing?

A Just the soil information.

Q Tell me what you mean by that.

A Oh, soil perimeters that would be used by them for design.

Q I didn't hear the first word.

A Soil perimeters.

Q Okay; is that all?

A Yes, at the moment, yes.

Q You say he is providing soil perimeters to project engineering; is that the extent of his responsibility at the present time?

A No, you asked me on the Midland job. He is providing it on the Midland Project.

Q Yes, I do mean to limit it to the Midland Project.

A That is what his job is.

Q Does he have any responsibility to see that the information he provides to project engineering is properly

authorized.

MR. FARNELL: Would the court reporter read back that question.

(At which time the aforementioned question was read back.)

MR. FARNELL: I think we need some clarification of "properly authorized." I just don't understand. I think it is vague.

BY MR. PATON:

Q Let me ask the witness. Do you understand what I mean by that question?

A I'm not quite clear what you mean by it.

Q Okay. He provides soil perimeters to project engineering, right?

A Right.

Q What do they do with it?

A They use it for specific design purposes.

Q Does Dr. Afifi have any responsibility to see that the information he has provided to project engineering is appropriately used for specific design purposes?

A Only in the event that the project would ask him to review something that they had done in his area of expertise.

Q So, his responsibility is limited to providing information and it ends there -- providing information requested by the project to the best of his ability in his

area of expertise. Does he ever volunteer information prior to its being asked?

Q I really don't know how to answer that.

Q Well, you said he responds to questions.

A That's correct.

Q Does he ever give them information that they haven't asked him for?

A I don't know how he would know about it without being asked.

Q So, your answer is no?

MR. FARNELL: I think that's not what he said.

BY MR. PATON:

Q Do you know whether he ever volunteers information?

A I do not know.

Q In reading his deposition, do you recall the exchange between myself and Dr. Afifi concerning the proper compaction standards?

A I recall there was some discussion on that.

Q And do you believe that there was any confusion within Bechtel over a period of several years with respect to the proper compaction standard to be used at the site?

MR. FARNELL: Is this being tied to the transcript or is this kind of --

MR. PATON: He can base his answer on anything he wants. His reading of the transcript or his general knowledge.

MR. FARNELL: Would the court reporter read back the question.

(At which time the aforementioned question was read back.)

MR. FARNELL: What year? Are we talking about any year?

BY MR. PATON:

Q I asked him for several years.

MR. FARNELL: I want to make sure we are talking about the same thing. That's why --

WITNESS: Based on my reading of the transcript, there was confusion. I had been aware that there was some confusion prior to that time.

Q Do you understand Dr. Afifi's responsibilities to include clarifying that confusion?

A Yes, I do believe that if he is aware of the confusion.

Q But only if he is aware of the confusion; is that correct?

A How could he know otherwise?

Q In other words, you don't see any responsibility on his part to verify that the information he provided was being properly used?

A If he was not provided with information that permitted him to know that, I don't see how he could possibly

have responded to it.

Q Okay, you agree he did give them advice on the proper compaction standard to be used at one point?

A Yes, I have seen a memo.

Q And after he gave that advice, there was still confusion on the proper compaction standard?

A I'm not familiar with that area.

Q Okay, you read his deposition, but you don't recall having read the deposition as to whether the confusion came after he gave them advice; is that correct?

A I believe the confusion existed beyond that, I don't know anything about the detailings of it.

Q And you don't see Dr. Afifi's responsibilities as including the duty to go out and try to find out whether the advice that he gave us was being followed?

A No, I don't believe so unless he is specifically asked by the project to.

Q Okay, now you answered a question a short time ago as to what Dr. Afifi's present responsibilities are with respect to Midland.

A Yes.

Q What have his responsibilities been for the past three or four years? Do they differ in any way from what you just said his present responsibilities are?

A No, as far as I recollect, Dr. Afifi being in

Ann Arbor he has been essentially working as my assistant chief in the geotechnical group of hydro and community facilities division which is located in the Ann Arbor office.

Q Your answer is that his duties for the past three or four years have been the same as you have just indicated they are presently?

A Right.

Q How often over the last three or four years, approximately, how often do you talk to Dr. Afifi?

A I talk to him quite frequently. Probably two times a week, by telephone.

Q Mr. Ferris, I want to show you a document that is dated June 30, 1980, that has already been designated in these proceedings as deposition exhibit number 4 in the deposition of Mr. Lyman Heller. And I'll hand it to you and you can look at any part of it you want. But I'm directing your attention to Enclosure 1, the last paragraph of number 36 which is four lines long. You can look at any part of that document that you want. My question will be addressed to that paragraph.

Q Could you point out again the particular paragraph that you want me to address?

Q Yes. And in fact, I'll tell you the question, it may help you with your review of the document. But the paragraph I'm referring to is the four-line paragraph

that appears at the end of number 36 on the page that is parked "Enclosure 1."

Q Mr. Ferris, I want to tell you the question then you can read the document a little better.

This sentence I'm directing your attention to is really the second sentence of the four-line paragraph of the end of 36. And it reads, "Also provide the locations, boring logs and availability testing data of any exploration completed in 1979 and 1980 which has not yet been submitted."

And the question I'm going to ask you is did you at some time after that letter submit the information referenced in that second sentence that I just read?

A I personally did not.

Q Do you know if it was submitted?

A I do not know if that has been completely compiled with as yet.

MF. FARNELL: Also he doesn't know if there is any such information.

BY MR. PATON:

Q I'll ask the witness. Do you know if there is any such information?

A I'm aware at this time that there were boring logs that the NRC had not seen, but I do not know if those have been as yet sent to Anderson.

Q Who within Bechtel should know that?

A The project engineer.

Q And who is that?

A Currently, it is Curtis.

Q In July, 1980, who was the project engineer?

A I don't recall.

Q All right, now would Dr. Afifi know whether that information had been provided, is that within his responsibility?

A He would know what he had provided to the project so indirectly he might know what was available to go to the NRC.

Q Do you know anything about the information contained in boring logs and available test data of any exploration completed in 1979 and '80 that had not been submitted to the NRC in June of 1980? Do you know what that information was?

A I don't recall precisely, no.

Q Who within Bechtel would know that information?

A The project engineer would know it.

Q If the NRC asked for that information, whose responsibility is it to determine whether it will be provided to the NRC?

A I believe the applicant is responsible for that.

Q When you say "project engineer" do you mean Bechtel or Consumers?

A The Midland Bechtel project engineer would know

what Bechtel had available.

Q I'm trying to think of how to word this question and I'll do the best I can. The question is this way: it seems unusual to me -- and please respond or comment on my statement -- I'm not trying to argue with you, but it seems to me that the chief soil engineer for Bechtel does not know whether when the NRC makes a request for boring logs and availability test data of any exploration completed in 1980 that that information was not ever provided.

MR. FARNELL: That's not even a question.

BY MR. PATON:

Q Does that seem unusual to you?

MR. FARNELL: That is unreasonable.

BY MR. PATON:

Q Is that within the scope of your responsibilities --

A I have no direct contact with the NRC.

Q Do you have any responsibility with respect to a question from the NRC -- strike that.

With respect to the particular sentence that I asked you to direct your attention to, did you have any responsibility?

A Only in reviewing the data that would be sent.

Q Did you review the data that would be sent?

A I do not recall all of the data that I have reviewed specifically.

Q Do you recall whether you specifically reviewed this data?

A I recall having reviewed some borings that were not available to NRC on June 30th.

Q Did the data that you reviewed indicate poor foundation conditions in the areas of the electrical penetration rooms?

A Which data are you referring to?

Q The data you just indicated that you reviewed.

Q I do not recall that.

Q Have you reviewed Volume 8 of the responses to the NRC 50.54(f) questions?

A. I have reviewed the responses that Afifi has prepared for the project and therefore, those portions that are contained in Volume 8, I would have reviewed, just the soil portions.

Q Do you know if the information requested in this sentence that I have referred you to in Heller Deposition Number 4 is contained in Volume 8 of the 50.54(f) responses?

A I do not.

Q Do you have in your office Volumes 1 through 8 of the 50.54 (f)?

A Yes, I do.

Q Now, with respect to the information that's indicated in the sentence in the Heller Deposition to which I have

referred you. do you have any recollection as to whether there was any indication or information indicating poor condition foundations anywhere on the site.

A I do not know specifically what is in the borings referred to there, so I cannot answer your question.

Q All right.

A I don't recall what is in them.

Q Let me ask you this, do you remember whether or not you ever reviewed this information at any time?

A I think I just answered that.

MR. FARNELL: It has been asked and answered.

BY MR. PATON:

Q I know you said you don't remember, but did you ever look at it?

A I think I told you I recall seeing some of that information, but what I don't know is whether I see all that's referred to in that general sentence.

Q You said you saw some of --

A I believe I have.

Q So, you are fairly clear that you saw some of it, but not all of it?

A Right.

Q As to the "some of it" do you recall anything about it?

A I do not recall stuff relating to electrical

penetration area, it may have been there, but I don't recall.

Q Do you remember anything about -- did it indicate anything about foundation conditions at the feed-water isolation valve pits?

MR. FARNELL: That has been asked and answered.

BY MR. PATON:

Q No, I asked about the electrical penetration.

A Well, I don't recall that either.

Q Mr. Ferris, with respect to the information that is referred in this sentence in the Heller Deposition that you indicated you had at one point seen some of, do you know any reason why that information was not submitted to the NRC prior to the NRC asking for it?

A No, I do not.

Q Okay. Are you aware of any information -- and my question relates to the Midland case and the soil problem -- are you aware of any information Bechtel has provided to Consumers for the purpose of forwarding to the NRC that has not been sent by Consumers to the NRC?

A No, I do not.

Q Do you have any reason to believe that there is any bias or lack of objectivity in the staff's review of the safety issues in the Midland project -- I'm limiting this to the soils issue.

MR. FARNELL: Would the court reporter read back

last question.

(At which time the aforementioned question was read back.)

MR. FARNELL: I think that's -- are you talking about any one individual or are you talking about everybody that's reviewed it? Are you talking about attorneys? It is too broad of a question.

MR. PATON: I'm asking if he has any reason to believe -- I think the question is clear.

MR. FARNELL: I object to the form.

MR. PATON: Either he does or he doesn't. Maybe he does, maybe he doesn't know.

MR. FARNELL: You are talking on balance, are you talking one individual? I mean the staff is composed of a lot of different people that's what my objection is.

BY MR. PATON:

Q Do you believe that within the staff there is any individual that is involved in the review of the Midland Facility and that person is biased or has a lack of objectivity?

A I have no reason to believe that.

MR. FARNELL: Would the court reporter read back the last question.

(At which time the aforementioned question was read back.)

BY MR. PATON:

Q In view of your knowledge of the settlement projects at Midland, do you think the staff should require a closer than normal scrutiny of the geotechnical engineering aspects of the Midland design?

A I don't know why.

Q Is there a soils problem at the service water structure?

A Yes, there is.

Q What is the problem?

A There is some bore filling beneath the inboard end of the service water structure and there is a plan to underpin that end of the building.

Q I don't remember a word you used -- you said bore fill under the something.

A Under the inboard end of the service water structure.

Q Tell me what you mean by "bore filling."

A The expirations indicate low blow counts in the standard penetration test.

Q Is that the extent of the investigation that was conducted? You made standard penetration tests and determined that there were low blow counts; is there anything else? Strike that question.

Did you conduct any other investigation besides standard penetrations?

MR. FARNELL: Of the fill beneath the service water structure?

MR. PATON: Yes.

WITNESS: My recollection is standard penetration tests.

BY MR. PATON:

Q And you indicate the problem is low blow counts, do you recall any of the specifics?

A I don't recall the numbers.

Q And describe the proposed remedy.

A It's planned to underpin the end of the building with piles.

Q Now, you said underpin. The piles would be attached to the side of the building; is that correct?

A That is correct.

Q Okay. Tell me what needs to be known before that underpinning is designed?

MR. FARNELL: I'm not sure that we have got any foundation that this is something that he has knowledge.
It also needs to be known by who. It is just too open-ended of a question.

BY MR. PATYON:

Q You indicated that generally speaking the remedy is to underpin the end of the building.

A That's correct.

Q Do you know what kind of information -- strike that.

Describe the discipline of the person who would make that design -- design the remedy.

A There is not one person.

Q All right, tell me what disciplines would be involved.

A Well, the pile part of it, the recommendation for that will be made by soil engineer and then the overall analysis of the building would have to be carried out by a structural engineer.

Q Okay, is there a discipline called "foundation engineering"?

A Yes. A soil engineer carries out foundation engineering.

Q And you are a soil engineer?

A I'm a soil engineer, yes.

Q Now, can you tell me what information you would need about that fill to provide your input into the design of the underpinning?

A You would need to know the soil conditions at the structure.

Q Okay, tell me what you mean by that.

A You would need to know what type of soil is there. What its consistency is.

Q Anything else?

A You would need to have some assurance that there is a stratum to which you can carry the building load safely.

Q That would frequently be the till?

A In this particular instance, it is the till.

Q Anything else?

A No, I think those are basically it.

Q Okay, by type, do you mean sand or clay?

A Yes, the soil stratification.

Q What kind of a determining would you make other than the fact that it is either sand or clay?

MR. FARNELL: Are you talking about type of information?

MR. PATON: You said type of soil --

WITNESS: I meant soil clarification.

BY MR. PATON:

Q All right, can I change that.

A You can change that to soil clarification.

Q Now, within soil clarification what are the possible clarifications?

A Gravel, sand silt and clay.

Q You would determine that in your soil clarification. You would determine that the soil was made up of gravel, sand or silt or clay or what it was. Now, would you determine how much of each of those if there was more than one of those involved, would you determine how much of each one of

those was there?

A My intention would be to get the soil stratification, which is what I mentioned initially to you.

Q Is soil stratification part of the soil clarification?

A I would clarify each stratum.

Q Clarify each, okay. And would you do that down to the point where you got to the till or whatever you felt was the foundation?

A It would go into good foundation, the soil.

Q What do you mean by consistency?

A Soft or stiff.

Q How is that measured, what perimeter?

A In its very crudest method by standard penetration test.

Q Now, stratum, I'm not sure I understand stratum. That part of this clarifying -- each stratum -- is that what you meant when you used that term?

A It is the soil layering, each layer is a stratum, so the subject surface consists of strata of different materials.

Q How would you go about determining those things, where would you get your information?

A From borings.

Q What kind of borings?

A Normally, soil borings.

Q Well, what I mean is standard penetration tests would be one.

A That's one method of doing it.

Q Now, that would give you disturbed samples, right?

A Yes. They would be disturbed.

Q And then you would also take undisturbed samples?

A You could if you so desired.

Q Do you have any idea whether that would be done under the service water structure?

A I do not recall if it was done.

Q Do you have any opinion as to whether or not it should have been done?

MR. FARNELL: For what purposes?

MR. PATON: For the purpose we are talking about.

WITNESS: Well, I believe it need not have been done.

BY MR. PATON:

Q I want to make sure, Mr. Ferris, when you say it need not have been done, were you referring to undisturbed samples?

A Yes, right.

Q Why do you say that? That maybe it need not be done.

A It depends on what your underpinning procedure is.

Q Doesn't the information that you are going to get

about the soil condition determine what your underpinning procedure is going to be?

A Yes, you would make a decision at that point.

Q Okay, but then you just said your underpinning procedure would determine whether or not you are going to take undisturbed samples. It seems like a vicious circle to me.

A You can get information on the underpinning procedure by other procedures.

Q For example?

A A load test on the pile.

Q And do you know whether the plan is to rely on load tests for piles in this case?

A I do not recall that it is specifically to rely on that.

Q Do you know if it was ever planned to do that? Was it ever planned to do that?

A What do you mean when you say -- what is your actual question?

Q Was there ever a plan to rely on load tests for piles in place of taking undisturbed samples?

MR. FARNELL: I don't think those things are mutually -- he testified that those things are mutually exclusively.

Q Well, if they are not that's fine, he can tell me that.

A I do not recall.

MR. FARNELL: That was inherent to your question. I don't think there is a foundation for it.

MR. PATON: Okay.

BY MR. PATON:

Q Now, I was asking how you get the information to help you determine things such as soil clarification, clarifying soils and the gravel, sand and clay and silt and you were telling me that you would take borings. Would you take standard penetration tests which would give you disturbed samples, you might take undisturbed samples, what other means would you use to determine soil conditions?

A In this particular instance, you would make a load test on a pile, that would give you information.

Q Would you determine the area and depth of the problem of the bad soil conditions?

A You would determine the depth of the pore soil conditions.

Q Would you not also determine the area?

A Not necessarily.

Q Is that because you would assume that bad soil conditions extended under all areas of the structure was affected?

A You could make that assumption, I don't know.

Q All right. Now, I'm talking about what you would

need to know to design the underpinning and my question to you is --

MR. FARNELL: We are just talking about the surface water building now?

MR. PATON: I'm still talking about the surface water structure and my specific question is I'm addressing what you need to know to design your underpinning and my question is would you need to know the maximum static and dynamic loads to be imposed?

WITNESS: The soil engeineer would not necessarily need to know that.

BY MR. PATON:

Q Would the structural engineer need to know the --

A The structural engineer must know that.

Q Would the structural engineer or the foundation engineer have to know the load bearing capacity of the piles?

A Could you repeat that question, please?

Q For whoever is designing the underpinning, is it necessary to know the load-bearing capacity of the piles?

A Yes, it is.

Q Is it necessary to make a settlement prediction for the piles?

A Yes. You would need to know.

Q Now, with respect to the information that you have

said you would need to know, how much of that information did Bechtel know on December 6th, 1979 -- and I'll volunteer to you that that is the date of the order modifying construction permits that was issued by the NRC.

MR. FARNELL: Just for convenience, why don't we do them one at a time because there are a lot of factors here.

WITNESS: I would like to have your question again, please, because it sounded long to me.

BY MR. PATON:

Q Okay, that's fair. Let me first just state a little background, I'm going to ask you with respect to a lot of information and I'll take the information one at a time.

A For the surface water structure?

Q For the surface water structure for Midland for the soils problem. How much of this information was in the possession of Bechtel on December 6th, 1979, and the reason I'm asking you that question, is that's the date of the order modifying construction permits. What I want to try to find out from you is when that order was issued. What did Bechtel know about the design of these remedies? That is the purpose of my questio..

A And are you going to ask me specifically the items that you want to know about?

Q I think your attorney wants me to do that, and I'll

do that.

A Okay, fine.

Q Starting with maximum static and dymanic loads to be imposed, I believe you indicated to me that you must know that in the design of the underpinning and my question to you is what was the status of the review -- strike that.

What did Bechtel know about the maximum static and dymanic loads to be imposed for the underpinning at the surface water structure on December 6, 1979.

A I don't know. That's a structural matter. I don't know the answer.

Q All right. For the structural people to know that, wouldn't they have to have some information from you as a soils engineer?

A Yes, they would.

Q What kind of information would they have to have from you?

A The information you asked earlier about the soil conditions.

Q All right, now on December 6, 1979, had you provided the structural engineers with information that you described under the heavy soil conditions?

A To the best of my recollection we had boring data at that structure at that time.

Q Okay, you had boring data. But for example, had

you clarified the soils in the surface water structure into gravel, sand, clay or silt?

A I believe so.

Q Had you on December 6, 1979, determined the consistency of the soil in that area?

A I believe we were aware that there were low blow counts there.

Q Had you come to any conclusions with respect to stratification?

A I can't recall that precisely, but I believe we knew where the till was and we knew where the fill was, so at least to that extent, we knew the stratification.

Q When you talked about stratification, didn't you mean that you would determine the layering in the till?

A If there was any.

Q Do you know whether there was any?

A I do not recall that.

MR. FARNELL: Let's go off the record.

(At which time a brief discussion was held off the record.)

BY MR. PATON:

Q Mr. Ferris, I'm returning to the question that we left off on, concerning what you would have to know to design the underpinning at the surface water structure and am I correct that one of those you would have to know,

the engineer that was designing it, would have to know would be load-bearing capacity?

A Right.

Q To know load-bearing capacity, am I correct that you would have to know the sheer strength of the soil?

A Not necessarily.

Q You would not?

A For the par.

Q And is that because you would do load tests later?

A That's correct.

Q Is it good engineering practice to make load tests for piles after they are installed as opposed to determining their load bearing capacity prior to installing them?

A I did not say that the load test would be done after they were installed.

Q When do you do the load test?

A You have to install a pile to load test it.

Q When do you load test it then?

A After you have installed it, but it does not have to be one of the piles that was in the structure.

Q You say in some instances, you could determine load-bearing capacity by knowing the sheer strength prior to the installation of the pile; is that correct?

MR. FARNELL: I don't think that's what he testified.

WITNESS: I didn't.

BY MR. PATON:

Q You didn't say that?

A I guess maybe you can read back what I answered to that question.

MR. FARNELL: My notes say that he didn't necessarily need to know it.

BY MR. PATON:

Q Do you understand the NRC's position with respect to the installation of piles at the surface water structure to be that it is appropriate to first analyze by methods that will estimate bearing capacity prior to installing the piles?

MR. FARNELL: Would the court reporter read back the last question.

(At which time the aforementioned question was read back.)

WITNESS: I don't understand that comment completely, could you either show me or elaborate on that?

BY MR. PATON:

Q Let me ask you a question, do you have any knowledge of what the NRC's position is with respect to the files and what kind of information you should have before installing the piles?

A Yes, I believe I do.

Q Please state what that is.

A I believe they had requested to evaluate the capacity of the pile using sheer strength perimeters.

Q And do you believe that is appropriate in this case?

A No, I do not.

Q Why not?

A I do not believe it is the best way to determine the capacity of the pile. It's not the most reliable.

Q You are indicating that a load test for the pile is more reliable.

A Yes, I am.

Q Now, you said something awhile ago that I didn't understand. When do you make the load test for the pile, when do you plan to make the load test for the pile in this case?

A I do not recall precisely when it was to be made.

Q Do you know how many piles you are going to install in the underpinning of the surface water structure?

A I believe it is 16.

Q And how many of those are you going to load test?

A I did not say we were going to load test those piles.

Q That's the confusion. You are going to conduct a load test, but you are not going to load test t[illegible] piles?

A We will load those piles, but not in the same manner that the load test is carried out.

Q You are going to conduct your load test in some area other than the precise place in which the piles are going to be installed; is that correct?

A It will be in the area of the surface water intake structure but will not be one of these piles.

Q And your statement is that those load tests about their being more reliable results than following the procedures suggested by the staff?

A Yes.

Q Considering the fact that we are -- strike that. Is the surface water structure a categoric I structure?

A Yes, I believe it is.

Q What does that mean?

A That means it is essential for the safe shut down of the plant.

Q Considering that the surface water structure is a categoric I structure, do you agree that it would be prudent even assuming that the load tests give more reliable results to learn sheer strength prior to the installation of piles to determine its load bearing capacity.

MR. FARNELL: Would the court reporter read back the last question.

(At which time the question was read back.)

BY MR. PATON:

Q Can you tell me why?

A I have already answered that.

Q Okay. I understand that your testimony is that load tests would give a more reliable result. Is it your opinion that you wouldn't learn anything by attempting to learn the sheer strength of the pile prior to the installation of the piles?

A You would learn something, obviously because you have obtained some information.

Q But your judgment is that it is not worthwhile getting that information?

A That's correct.

Q Is it based on some kind of cost benefit, I mean for example, if obtaining that information cost a dollar; would you go ahead and get that information?

A No, it's based on good engineering practice, current good engineering practice.

Q You say, "current." Has it changed?

A Yes, it has changed.

Q Was there a time when it would have been good engineering practice to get sheer strength first?

A There is a time when some engineers would have believed that was the way to do it.

Q Give me some idea about time. Are we talking about

five years, ten years ago?

A Probably ten years ago or more.

Q Could you tell me anything about why engineers within the last ten years have undergone a change of anything in this regard?

A Much more reliable procedures for installation and checking the loads and piles have been developed.

Q So, that within the last 10 years load testing to your knowledge has become much more reliable.

A Load testing has always been reliable, but there are additions to that work that are done that make it even more reliable.

Q Can you just tell me briefly what you are referring to when you said "additions to that work"?

A Well, things that you do in addition to the actual loading of the pile.

Q Can you give me an example?

A Yes, use of the waive equation which was developed about 10 years ago.

Q Could you give me one more example?

A That is the basic.

Q And in your opinion of the waive equation and other I think you described as additions, make the load tests so reliable now that in your engineering judgment whatever you would learn from obtaining sheer strength is

just not worthwhile going after.

A That is correct. The combination of the load test and waive equation analysis when properly done by somebody who understand it is far superior.

A Okay, now, you do the load test obviously before you install the piles?

A That's what I said.

Q Before?

A Before you install the piles for the structure.

Q Can you design the piles before you do the load tests or do you have to wait until after the load tests?

MR. FARNELL: Are you talking about the piles -- I think there is problem.

MR. PATON: Can you design the piles that are going to be installed prior to doing the load tests?

WITNESS: What aspect of the design do you refer to?

BY MR. PATON:

Q Load-bearing capacity.

A I believe it is possible to state that a pile of capacity can be driven up the side.

Q Let me get away from what is possible. Do you know what your plan is in this case?

A Yes, I do. My understanding is that it is to drive 110 capacity piles that utilize but use only 75 tons of them.

Q I heard you say "drive 110 ton capacity piles" and I didn't hear the rest.

A Well, the actual required capacity should be 75 tons, that is my understanding, but for conservatism, the piles will be driven as 110 piles.

Q I don't know what you mean by they are driven as 110 piles.

A They are driven to a sufficient depth to allow a 110 allowable capacity.

Q But you have determined that the load bearing capacity is 75 tons.

A Presumably a structural engineer has provided that information. That's what I understand.

Q How did he do that prior to conducting the load test?

A He did that from his structural analysis.

Q What kind of information did he use?

A Presumably the weight of the structure and whatever design perimeters go into the structure.

Q Doesn't he know sheer strength of the soil to know that?

A No, he does not.

Q Mr. Ferris, the 75 tons, is what the structure will impose; is that correct?

A That is my understanding. I have not made that

calculation but that's what I have been told.

Q Did you say you plan 16 piles?

A That is my understanding.

Q So, the total load would be somewhere in the vicinity of 16 tons?

A Yes, I don't have a calculator.

Q Well, whatever that is?

A That's my recollection, yes.

Q I'm not pressing you on those numbers. That is the load to be imposed now what I want to ask you about is the ability of the soil to support a pile that is carrying 75 to 110 tons. And my question is don't you need to know the sheer strength of the soil to know whether the soil can support 16 piles, each of which is carrying between 75 and 110 tons?

MR. FARNELL: I think it was 75 without 110.

MR. PATON: All right, 75.

WITNESS: I believe I have already answered that. You do not need to know the sheer strength of the soil.

BY MR. PATON:

Q Do you need to know the sheer strength of the soil to know how many piles are required?

A Not in my opinion.

Q Mr. Ferris, in your experience within the last five years, have you first estimated bearing capacity by

analytic methods? In other words, have you followed the procedure that's suggested by the staff as opposed to using load tests?

A I personally have not.

Q Do you know of any instance where it has been done?

A It may have been done, I can't recall.

Q To your knowledge. do you recall now?

A I do not recall right now.

Q In the last five years, approximately how many instances do you recall in which load tests were used instead of first analyzing bearing capacity by analytical methods?

A I can recall three right now.

Q Okay. Could you describe those three briefly?

A Yes. I can tell you the project, Bellrich project, which is being done out of the Ann Arbor office and two specific contracts on the Hope Creek, Nuclear Plant Fernon Categoric I structures.

Q Does waive equations involve an analytical approach?

A Yes, it does.

Q Is it used in connection only with load tests?

A No, it doesn't have to be used, you need to know the load tests to use it, but there are aspects beyond that where eve.y time you use a waive equation you don't have to have a load test.

Q Does waive equation use sheer strength?

A No, it does not.

Q Is the waive equation approach reliable in heterogenerous soil deposits?

A Yes, I believe it is.

Q Does the pile load test permit you to determine long-term settlement?

A No, the pile load does not permit you to do that.

Q Do you make any determining of settlement of the piles?

A I believe the piles were being installed conservatively so that not a problem.

Q Does that mean that they are driven down to the till?

A The piles must be driven into the till.

Q And once they are driven into the till, does that mean you can forget about settlement?

A No, I did not say that.

Q Okay, tell me what concerns you have, if any when the piles are driven into the till with respect to settlement.

A If they are driven sufficiently deep into the till, I don't have a concern for settlement at the loads we are discussing.

Q Approximately how deep do you mean?

A We will have to determine that.

Q How do you determine that?

A You do it as a result for your valuation of the load test and the waive equation.

Q Then I thought I started out asking you does a pile load test permit you to determine long-term settlement?

A I'm talking about capacity, the pile load test determines capacity.

Q Does a pile load test tell you how much of the pile is going to settle?

A It does under the immediate load, it does not tell you the long-term settlement.

Q That's what I'm concerned about. The long-term settlement. Do you have any concerns about long-term settlement?

A No, I do not in this particular instance.

Q Why not?

A Because I believe I told you that the piles are going to be installed for a higher capacity than is required and that provides your margin of safety.

Q You mean you have determined that 75 tons each pile supports approximately 75 tons?

A Right.

Q But they will be conservatively placed so that they will support 110 tons and therefore you are not concerned about settlement?

A That's correct.

Q Will the load tests allow you to determine a down drag or negative skin friction and I'm equating those two.

A The load test will not, the load test that I have been discussing with you will not.

Q How will you determine that?

A I do not know precisely how that's being done.

Q Do you know whether it has been done?

A I do not know that either.

Q Do you know -- you stated there was a determination that each pile would support approximately 75 tons, do you know when that determining was made? The precise date.

A Who is going to design the piles?

A We are authorizing a consultant to assist us with design.

Q What is the name of that consultant?

A That's Dr. M. T. Davisson.

Q Do you know when he was retained?

A Sometime in 1979, prior to the end of June, 1979, I can't recall the precise date.

Q And is it Dr. Davisson that determined that you were going to need 16 piles that would support 75 tons each?

A No, I believe we went through all that. The

structural engineer provided the loads that the piles have to carry.

Q Do you know who the structural engineer was?

A I do not know who that was at that time.

Q So, the structural engineer provides that information to Dr. Davisson, right?

A He provides it to Sherif Afifi.

Q And does Dr. Afifi add any information to that when he passes it on to Dr. Davisson?

A I don't know any reason why he should.

Q Dr. Afifi doesn't he add any information to it?

A. With regard to the load-bearing capacity?

Q No. That's not what I mean. I mean within Dr. Afifi's area of expertise and responsibility, what does he add to the information he got from the structural engineer before he passes it on?

A He would provide the soil data at the structure, the boring logs, whatever information he had, water table level.

Q Would he provide all the information we talked about before under the heading of soil conditions, for example, clarifying the soil into gravel, sand, clay and silt.

Q A Well, he would provide the boring logs and any evaluation of those logs that he made.

Q From which someone else could determine the soil clarification into gravel, sand, clay and silt.

A I believe, Dr. Afifi will have a clarification for the soils on the boring logs.

Q You say he will have --

A Or he has.

Q Do you know whether he has or whether --

A He has on all the boring logs that he has seen. I don't know why it should be different here.

Q Do you know when he obtained that information here?

A At the time of the drilling.

Q Which was when?

A I don't recall the precise date when those borings were made.

Q Do you know whether it was before December 6, 1979?

A I believe so.

Q Do you know whether Dr. Davisson is now designing the pile foundation?

A I don't know.

Q Will Dr. Davisson address long-term settlement of the piles; is that his responsibility?

A I believe he will comment on that.

Q Do you have any idea whether he has made any

conclusions in that respect yet?

A I don't recall that either.

Q Did you ever talk to Dr. Davisson?

A Yes, I do.

Q How frequently?

A Well, I talked to him last Thursday.

Q Well, that doesn't help me too much. Approximately how many times a week do you talk to him?

A Probably once a week, but not necessarily on Midland.

Q Okay, with respect to Bechtel and Dr. Davisson, who is the principal contact for Dr. Davisson?

A Afifi in Ann Arbor.

Q With respect to this problem, with respect to the Midland Project?

A With respect to the Midland project.

Q Mr. Ferris, I may have asked you this question before, and I just don't recall your answer. I want to ask you on December 6, 1979, what did Bechtel know about the maximum static and dinet flows to be imposed on the piles to underpin the surface water structure?

A You would have to ask a structural engineer that.

Q And you are not -- do you know who the structural engineer is?

A The project structural engineer, whoever that

is, the Midland Project Structural Engineer.

Q The Bechtel --

A Bechtel.

Q Not Consumers?

A No, Bechtel.

Q Mr. Ferris, did you bring any files with you today?

A No, I didn't.

Q Can you tell me why you didn't?

A Because I don't have any personal files on the Midland Project.

Q No notes?

A No, any notes that I had, I sent to the project. To Sherif Afifi.

Q When did you do that?

A After meetings.

Q You mean right after any meeting you would send him the notes?

A I would send him the notes to be incorporated into the notes of the meeting.

Q So you have no personal notes?

A No, I have no personal notes. I do a lot of projects. I don't keep personal individual files.

Q Can you describe what kind of records are kept at Bechtel in San Fransisco with respect to the Midland soils problem?

A I can only -- just those that are in our geotechnical group there.

Q Yes.

A And I receive copies of correspondents, the reports that you mentioned earlier, things like that, and those are filed in the geotechnical files in San Fransisco.

Q How many people work in the geotechnical?

A We have about a dozen soil engineers.

Q And are you --

A I'm in San Fransisco.

Q Right, and do you supervise that group?

A Yes, I do. That's one of my responsibilites.

Q These files are kept in a file for a group that you supervise?

A No, I supervise their individual work, I work for a manager of soil engineering who is overall in charge of the soil treatment.

Q Who do you work for?

A Harris Burk.

Q You don't consider those files to be under your control?

A No, I don't, I consider them to be under Mr. Burk's control. I have access to them.

Q What kind of information is in those files other than correspondents that you received?

A There would be correspondents that we have received or sent, that's essentially all.

Q Okay, are the files that concern themselves, are the papers that concern themselves with the soils problem in Midland kept in a discrete file or are they mixed in with other papers?

A They are -- the file we have is for the Midland Project and the reports, volumes of reports that you referred to are kept in a separate place from that particular filing cabinet.

Q Okay, by that you mean the 50.54(f) responses?

A Yes, the hard-bound three-ring binders.

Q Right. Ignoring for a minute, the volumes that contain the 50.54(f) responses, what is the quantity of material that you have in the Bechtel office that concerns the soils problem, the Midland for example, could it all be placed in one drawer of a file cabinet?

A It's about a drawer and a half to the best of my recollection. I'm not absolutely sure, I don't do the filing.

Q And can you give me any kind of idea how far back that file goes in time to some year, '75, '74? If you know.

A I don't know how far back, most of it I'm sure goes back to 1978.

A Do you mean at least to 1978?

A I said the bulk of the correspondence in that is from August of '78 up to the present.

Q How long have you been assigned to the San Fransisco office?

A 21 years, a little over 21 years.

Q I want to ask you about contracts between Bechtel and other organizations with respect to the piles in the surface water structure and I want you to ignore the contract that you made or have with Dr. Davisson, do you have knowledge of any other contracts between Bechtel and anyone with respect to those piles?

A I don't believe I have any contract documents.

Q Okay. I didn't ask you if you have any documents, I'm asking you do you have any knowledge as to any contracts between Bechtel and anyone with respect to it?

A I don't recall that at all, I don't recall seeing it.

Q In the normal course of your business, would you expect that there was a contract for the purchase of these bills by this time?

A I would expect there was if they had been contracted for it.

Q I'm afraid your answer to me sort of --

A I don't know. I haven't seen the contract to the

best of my recollection.

Q In the ordinary course of your experience, you have been with Bechtel for 21 years in the San Francisco Office, and you are now in the Midland site and the soil problems there. What would be your estimate of when Bechtel ordinarily would have contracted for the purchase of those piles?

MR. FARNELL: Are you talking about as the design or the pile or are you talking about some point in time or some --

MR. PATON: No, I'm talking about his knowledge of this case and to estimate approximately when --

WITNESS: I don't know anything about the contract for the piles.

BY MR. PATON:

Q I understand that, and I'm clear on that. I'm asking you in your 21 years of experience with Bechtel.

A On a general basis?

Q On a general basis, when would they ordinarily contract for piles, bearing in mind your knowledge of this case, approximately when?

A Ordinarily on a job you would contract shortly before you drive the piles.

Q Do you mean maybe six months before?

A Could be on that order.

Q Then you would not be surprised to learn that Bechtel

has not yet contracted for these piles?

A They are not doing work so it wouldn't surprise me.

Q If you had to guess, would you say they probably have not --

A I don't know.

Q Mr. Ferris, is there a problem with the fill material in the electrical penetration area?

A Yes.

Q Would you please describe that problem?

A Again, borings in that area indicate low blow count.

Q Do you remember precisely what the blow counts were?

A No, I don't.

Q Is there any other indication of pore fill in that area?

A There is principally low blow counts.

Q What conclusions have you reached as a result of obtaining low blow counts in that area?

A As proposed to underpin the penetration areas?

Q What I mean by my question is what conclusions have you reached as to the conditions of the soil?

A Well, there is loose material there.

Q Have you reached any other conclusion other than

there is loose material there?

A I don't know what you mean.

MR. FARNELL: By a "problem" what do you mean?

MR. PATON: I mean do you agree that there is pore fill in that area?

WITNESS: There appears to be based on the blow count.

BY MR. PATON:

Q And I'm asking you what you know about the fill and you have indicated to me that there are low blow counts and that indicates -- did you say -- loose fill --

A Loose or less dense than we had anticipated.

Q And I'm asking you, are there any other indications of the inadequacies of that filled material?

A I'm not aware of any.

Q Please describe the remedy that's proposed and I'm now talking about the electrical penetration area.

A It is proposed to underpin the ends of the electrical -- I guess they are called the wings of the auxilary building. Is that the same place that you are talking about?

Q Can you describe in a little more detail what the proposed remedy is to this soils problem in the electrical penetration area?

A Well, they are going to carry the load at the end of each wing of the auxilary building down into the glacial till by means of caissons, so they are going to

transfer the load at that end to the till so that the fill is not supporting it. In the process of doing that, they also have to supoport one of the column walls of the Tushen building which is an adjacent building, or locally they have to column lines.

Q What is going to support the other end of the wing that is going to be supported?

A The control building.

Q Is this proposed remedy going to impose additional loads on the control building?

A I believe it will.

Q Was that taken into account in the design of the control building?

A I do not know that.

Q Is that not within your area of expertise?

A No, it is not.

Q What was in the original design? What was to support this wing that is now going to be supported by the caissons?

A Fill.

Q Okay. Do you consider the change from the support from the fill as in the original design to caissons resting on till; is that in your opinion a significant design change?

A It would change the design to the extent that a structural engineer should look at the design.

Well, he should look at the design, he should evaluate the design.

Q Doesn't it require a fairly substantial amount of redesign?

A I'm not a structural engineer

Q Within your area of expertise, do you consider this a significant change in the design?

MR. FARNELL: I think he answered.

WITNESS: I believe it is a change.

BY MR. PATON:

Q Well, my question was whether it is a significant change.

A I don't know what significant means.

Q Then describe to me the design change, it has more significance than painting a building a different color, I assume; is that correct?

A Yes, there is no connection with that at all.

Q I'm trying to get your expert opinion on whether this is a minor change of design or a major change of design.

A It has changed the support condition for the wing walls.

MR. FARNELL: Could the court reporter read back the last question and answer.

(At which time the aforementioned question and answer were read back.)

BY MR. PATON:

Q Do you have any idea of the dollar cost of the proposed remedial action for the electrical penetration area?

A No, I don't.

Q Do you have any idea of the proposed cost of the remedies that are proposed to resolve the soils problem at the Midland site?

A No, I don't.

Q Is there anyone in Bechtel that would address that subject?

A I'm sure there must be, but I don't know who that would be.

Q Do you have any idea who that would be, for example, the comptroller or there must be someone who addresses problems like that.

A Well, the project engineer probably knows, but I don't know for sure.

Q Do you mean the project engineer --

A Of the Midland Project.

Q The Bechtel Project Engineer?

A The Bechtel Project Engineer.

Q And is this the gentleman that's on the site?

A No, he is the man in the office in Ann Arbor.

Q And is this Mr. Curtis? Did you ever hear anyone

in Bechtel discuss the cost of any of the remedial actions that are proposed at the Midland site?

A I do recall hearing a cost discussion once.

Q What did that consist of?

A It was a discussion of some analysis of different procedures for correcting the diesel generator building.

Q Do you remember any dollar figures that were mentioned?

A No, I do not remember precisely any figures.

Q Who was at that meeting?

A The person that I recall discussing it was Carl Wiedner. It was a personal communication.

Q You have been with Bechtel for 21 years. Can you tell me generally how Bechtel resolves matters similar to this where an obvious error has been made and there is some substantial cost to remedy that error, how is that generally resolved as between Bechtel and the Applicant?

MR. FARNELL: Would the court reporter read back the last question.

(At which time the aforementioned question was read back.)

WITNESS: I don't know.

BY MR. PATON:

Q In 21 years, have you seen any other situations like this where an obvious error has been made and remedies

of substantial portions and remedies have to be proposed and made?

A Yes, I have recalled other occasions.

Q Can you tell me briefly what was the most recent one like this that you can recall?

MR. FARNELL: I'm going to put an objection on the record, I think this is just totally, completely outside the scope of any permissible discovery in this case. I'm going to let him answer it, but I think it is a waste of his time and our time. And also, I'm going to ask him to not disclose any discussions he has had with attorneys within Bechtel with regards to these matters.

MR. PATON: Since you have stated on the record that you think this is a waste of time, I think it is appropriate that I make some response. I have been --

MR. FARNELL: That may be more of a waste of time, but go ahead if you want.

MR. PATON: I don't know why we are getting into the same acrimonious --

MR. FARNELL: I'm smiling.

MR. PATON: Okay, good, you are smiling. I have been attempting to find out from some Bechtel personnel, it seems extremely obvious that an error of major proportions has been made here, and I would have to assume that there is some arrangement between Bechtel and Consumers as to who is

going to pay for this. And I'm merely trying to discover anything I can about that, because I think it would clearly lead to discoverable evidence. With respect to how this problem came about, and the proposed remedies and etc. -- that's the purpose of my inquiry.

BY MR. PATON:

Q I believe you can answer my question as to the most recent instance that you recall similar to this where a major error has been made, remedial action is required.

A Could you say what you mean by "similar"? Do you mean that something happened that should not have happened?

Q Yes.

A The most recent that I can recall right away was at a mining project in Utah.

Q And was this work done by Bechtel?

A Yes, it was.

Q And something happened that shouldn't have happened? Briefly describe that.

A Okay, it was a settlement, more settlement than was anticipated by the people at the building structure.

Q And was the problem remedied?

A Yes, it was.

Q Is it clear to you the cause of the problem?

A Yes, I believe it is.

Q What caused the problem?

A I believe the sequence of construction was not the sequence that we -- that my group's personnel had recommended and that resulted in additional settlement.

Q And was that construction done by Bechtel?

A It was managed by Bechtel.

Q Do you have any idea in that instance the cost of the remedial actions?

A No, I don't.

Q And you have no idea as between Bechtel and the people they were contracting with to do that work, who paid for that remedial action?

A No, I do not.

Q And your statement is that in 21 years -- strike that. In 21 years, can you estimate approximately how many instances you have seen similar to that where work was done on a contract with Bechtel and a major error was made requiring remedial action?

A Okay, I can only recall two other occasions.

Q And in your 21 years with Bechtel, you don't can't give us any information on how these matters are resolved as with regard to whc pays for those remedial actions?

MR. FARNELL: You have asked him that at least twice, he has answered it at least twice, which is in my opinion totally outside. I think you are really pushing limits here.

BY MR. PATON:

Q Okay, well, I gather your answer is no, you don't have any idea.

A I don't now.

Q Now, with respect to the electrical penetration area, you have described the proposed remedies underpinning the wing, wnich are the electrical penetration areas with caissons; is that accurate?

A It is underpinning the outer ends of the wings.

Q What is the difference between a caisson and a pile?

A Size, I guess is the most, and the method of installation.

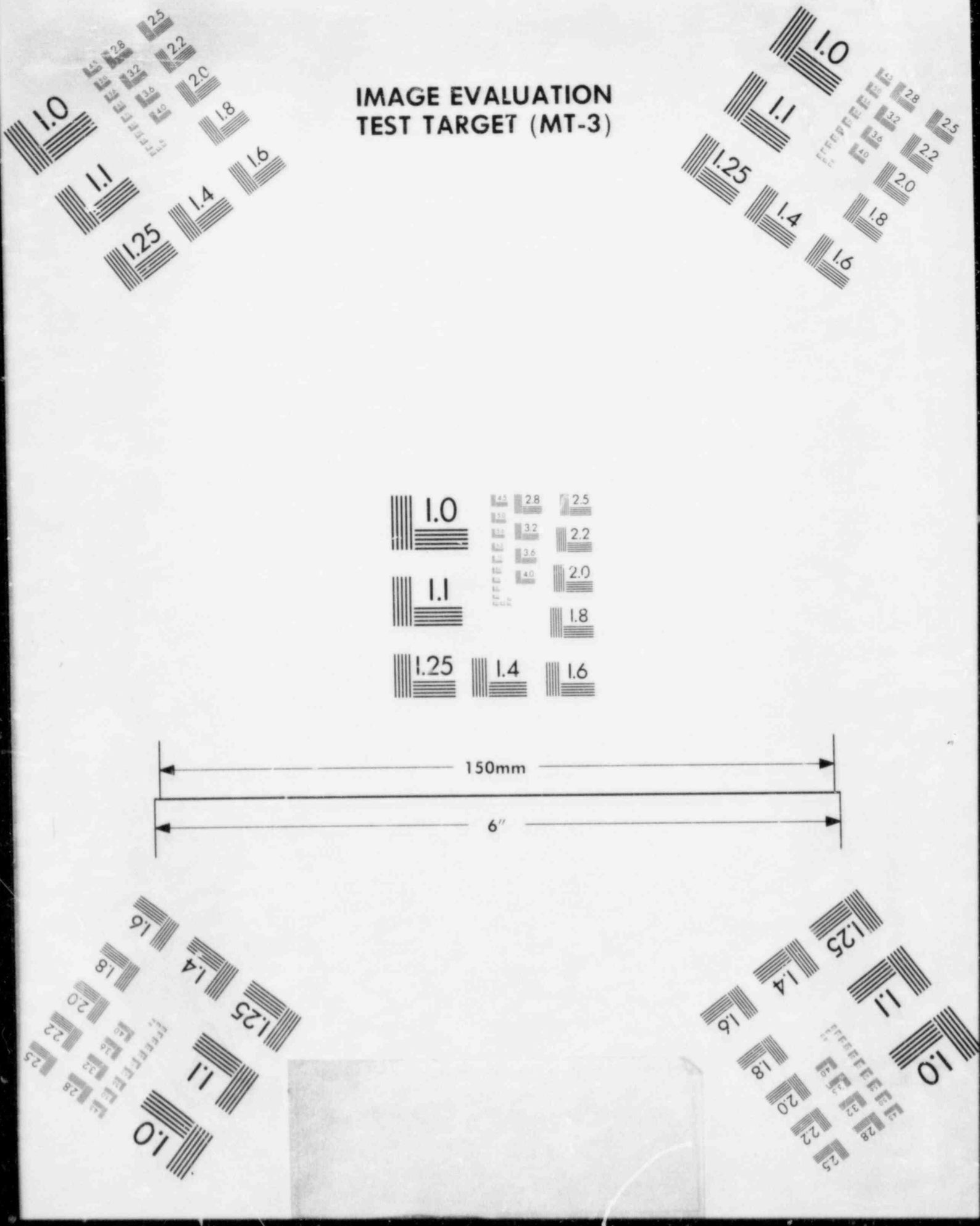
Q Just tell me, which is bigger, etc.

A Well, generally speaking, a caisson is bigger, and depending on how it is installed, it could be installed by hand, or it could be installed by drilling process.

Q Why are you using caissons here and piles in the case of the surface water structure?

A In the case of the electrical penetration it is because of the access to the work, you could not drive piles there, and also, in that particular instance, we do wish to investigate the stratum to which we go and make sure that the caisson is seated in the glacial till.

Q In the case of the surface water structure, you are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TEST TARGET (MT-3)
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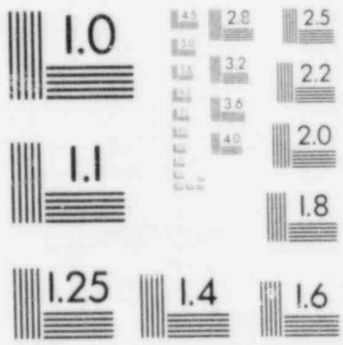
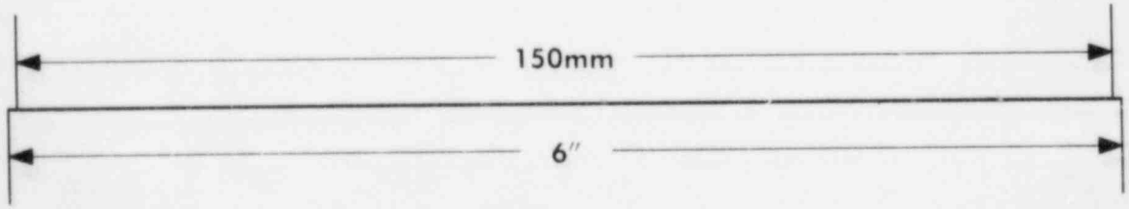
IMAGE EVALUATION TEST TARGET (MT-3)





not going to investigate the stratum to be sure that it is installed?

A I did not say that.

Q Okay, we are doing it by another procedure, which I discussed earlier, now, when I asked you a similar question to what I asked you with respect to the surface water structure, and that is: what do you need to know about the soil before you design the caissons that will underpin the electrical penetration areas.

A Okay, the stratum that we are going to -- we already have a lot of information on. The glacials till in which the major structure is under, the main concern is that the caissons being sent into that till, so we need to inspect the bottom of the caissons to make sure we are in that till.

Q My question was what do you need to know about the soil before you design the caissons?

A You need similar information to that, that I mentioned at the surface water, we need to know the soil stratification, what is fill and where is the till.

Q Do you need to know for example, the soil conditions, is your answer the same as before that you need to know soil conditions and that would include soil classification which is gravel, sand, clay and silt; is that correct?

A That's correct.

Q What is the source of the information that you have with respect to the till?

A The Dames and Moore Reports?

Q What is the approximate date of that Dames and Moore Report?

A My recollection is that there are two and I believe they were in the late '60s, 1969 or 1970.

Q You indicate there are two Dames and Moore Reports.

A I believe there are two, I was not working on the project at that time.

Q Do you know if those reports have been provided to the NRC?

A I would assume so, but I don't know for my own personal knowledge. I believe there were appendices to the PSCR in which case the NRC would have them.

Q Do you know whether there are any cracks on the penetration area structure?

A No, I don't know that. I don't recall it anyway.

Q How often do you visit the site?

A Very seldom.

Q In the last two years, how many times have you been to the site?

A Well, that's '79 and '80?

Q Yes.

A Probably three or maybe four times.

Q And in those three or four times, when you go to the site, approximately how long did you stay there?

A Usually for a day or two days.

Q And when you go there, do you go just to meetings or do you go around and inspect and make a physical inspection of the site?

A The purpose of my visit has been to attend meetings, I take the opportunity of looking at those areas that I can see just for personal interest point of view.

Q In the last two years, how much time have you spent other than at meetings out looking at the site itself?

A Could you repeat that question please?

Q Yes. You indicated that in the last two years, you have been to the site either three or four times.

A Yes.

Q And I want you to tell me how much time you have spent outside meetings, in other words, I'm not asking you about meetings, I'm asking you about how much time have you spent on the site looking at or inspecting areas of a site and the structures on the site.

A I don't know precisely, but I would say maybe half a day each time I have been there.

Q When is the last time you looked at the electrical penetration area?

A I believe I have only been once in the electrical penetration area and that would have been some time in 1979, I believe.

Q Around -- '79?

A '79 or late '78.

Q And do you not recall any cracks at that time?

A I do not recall having seen any cracks.

Q Okay, now my question is do you have a distinct recollection that there was not any cracks?

A I would not say that.

Q Do you have any knowledge of any contract with Bechtel concerning the underpinning of the electrical penetration area?

A I'm not aware of any current contract for underpinning there.

Q Are you aware of any negotiations or conversations concerning a proposed contract?

A It's my understanding that there were negotiations with the potential low bidder -- or I'm not sure if it was a low bidder, but a selected sub-contractor, sometime about the time that the stop-work order came through.

Q By the "stop-work order " --

A I mean the December 6th letter or whatever it is.

Q All right, December 6, 1979?

A '79.

Q What was the status of that contract at that time, I mean was it just being discussed or negotiated or did it exist or what?

A I really don't know that. It's not something that I wouldn't normally be aware of.

Q Okay, who did you hear talking about it?

A I believe the first person who told me was Dr. Davisson whom I mentioned earlier.

Q Do you recall anything more about what he told you other than what you have just said?

A Not really.

Q Do you recall who the other party to the contract was?

A Yes, I believe it was with a firm and I'm not sure of the complete title of the firm, but it had Mergantile in it.

Q Do you know whether that contract included the design of the caissons?

A I really don't recall that.

Q Who in Bechtel would know about this contract?

A The project would know -- the project engineer. Mr. Curtis.

Q Mr. Curtis spent his time in the office in Ann Arbor?

A Yes, Mr. Curtis is part of the Ann Arbor Division of Bechtel Power Corporation.

Q Briefly tell me the difference between Bechtel Power Corporation and Bechtel Incorporated. Just generally, what does each one do. Why are they different?

A Bechtel Power Corporation consists of several divisions, and I'll have to read them off to you, San Francisco Power Division, Ann Arbor Power Division, Gaithersburg Power Division, and Los Angeles Power Division.

Bechtel Incorporated consists of a number of divisions also of which Hydro and Community Facilities Division is one, Mining and Metals Division is another -- and I don't recall the others right now.

Q All right. And is Bechtel Incorporated headquartered in San Fransisco?

A Hydro and Community Facilities is in San Fransisco. There may be facilities of Bechtel Engeineering that are not. I don't now that precisely.

Q All right. Thank you. Do you know whether Dr. Afifi has any knowledge or input into that contract that we have just been discussing?

A Do you mean the contractual discussions?

Q Yes.

A I do not know.

Q Now, referencing the contract that you indicated was

with an organization that had the name Mergantine in the the title and --

MR. FARNELL: I don't think there has been established that there was a formal contract.

MR. PATON: I think you are correct.

BY MR. PATON:

Q It was at least some discussions of a contract; is that correct?

A I think what I said was that I had heard that there had been negotiations but I don't know what the status was.

Q And to your knowledge, that contract concerned the electrical penetration area?

A That is correct, the underpinning of the electrical penetration.

Q Do you know whether Dr. Afifi provided any input such as plans and specifications or any other input with respect to that proposed contract?

A I do not know the extent to which he might have submitted information.

Q Now, I'm returning to the question of what you need to know to design the caissons in the area of the electrical penetration area, and your first response was you would have to know the conditions of the soils, the soil conditions.

A Soil stratification.

Q Okay. You would have to know soil classification?

A Stratification, yes, which would include the classification of each stratum.

Q Okay, stratification and within each stratum the classification of the soil?

A Right.

Q And you would also want to know the consistency of the soil?

A Right.

Q Generally whether it is soft or stiff?

A Right. But primarily you would want to know where the surface of the till is because that is the stratum to which you are carrying a load.

Q But you do need to know the soil conditions in the fill?

A You need to know the fill.

Q But don't you need to know -- you said the depth of fill, didn't you just tell me that you need to know the soil stratification?

A Stratification and classification. In my reference to the fill, I was considering that to be one stratum.

Q Do you mean that the fill is one stratum?

A I was considering it to be one stratum.

Q That is in fact not the case, is it?

A It is a rather heterogeneous stratum in some areas.

Q It is one stratum made up of a lot of different --

A Lenses.

Q -- a lot of different types of soil?

A Several different types of soil.

Q And you consider that one stratum?

A I was considering it in the way I was using it in the way I was when I responded to your question.

Q Do you have to know what the make-up of that stratum is? In other words, do you have to know what percentage of gravel, what percentage of sand, what percentage of clay, etc?

A Not necessarily in this case.

Q All right, then I think you are telling me that all you need to know really is the depth of that what you consider one stratum?

A The most important thing is the depth to the till stratum and in this area you need to know the depth to the water table because that is also something that must be taken care of in construction.

Q Did Bechtel know those things on December 6, 1979?

A Yes, I believe they did.

Q Do you know whether they had conveyed that information

to the NRC?

A I do not know that.

Q Would you have to know the maximum static and dynamic loads to be imposed on the caissons?

A I wouldn't have to, but somebody who is designing the caissons would have to.

Q Whoever designs the caissons would have to know that?

A Yes.

Q Did Bechtel have that information on December 6, 1979?

A I believe so.

Q Do you know whether the NRC has provided the applicant and Bechtel with any recent seismic requirements that may be different from those of the construction when the construction permit was issued?

A I have been told that there is classification in given to changing the SSC.

Q If that in fact happens, would that affect the analysis of the maximum static and dynamic load to be imposed?

A It would not change the static loads, but it would change the dynamic loads.

Q Right, do you know to what extent Bechtel has addressed any change in dynamic load caused by different seismic requirements?

MR. FARNELL: Are we talking about one building or all buildings?

MR. PATON: I'm still talking about the electrical penetration.

WITNESS: No, I'm not aware of what has been done.

BY MR. PATON:

Q To design the caissons, you have to determine the load-bearing capacity of these caissons, don't you?

A Would you please reword that question?

Q Yes, I think I better. In order to design the caissons, do you have to know the sheer strength of the soil on which the caissons will rest?

A In order to determine the factor safety against the sheer failure, yes.

Q And how do you --

MR. FARNELL: Would the court reporter read back the last question and answer.

(At which time the aforementioned question and answer was read back.)

BY MR. PATON:

Q On December 6, 1979, did Bechtel know the sheer strength of the soil on which the caisson was to rest?

A Yes, I believe I answered previously that we had all of the data that Dames and Moore produced.

Q This is the data that Dames and Moore produced

in 1969 and 1970?

A or the till.

Q And that related to the till?

A Yes, which is the bearing strata for the caissons.

Q Is it correct that the sheer strength of the soil in the fill -- is it correct that the sheer strength of the soil in the fill is not in consideration here?

A Well, there could be -- again there could be a small down drag load on the caissons.

Q Other than the down drag load; is that the only significance?

A That would be the only significance.

Q Okay. For the record, let me finish. That would be the only significance of the sheer strength of the soil in the fill is the down drag, right?

Does the fill material provide any lateral support for the caissons?

A I could not believe that that is taken into account in the design, but I'm not absolutely sure.

Q Mr. Ferris, I believe you indicated that prior to December, 1979, you knew the sheer strength of the soil in the till.

A Right.

Q And you obtained that information from Dames and Moore Reports dated approximately 1969 and 1970?

A I think what I said was that that information was in the Dames and Moore report.

Q Okay. Prior to December 6, 1979, did Bechtel ever put that information about the sheer strength of the soil in the till into an analysis to estimate the load bearing capacity of the caissons in the electrical penetration area?

A I don't recall for that specific date. I would assume if it was done , if there was negotiations for contract, but I don't now that for sure.

Q Would that have to be done prior to the contract being let?

A I'm sure somebody would have looked at that.

Q The point is you would have to apply that information to determine what kind of caissons you were going to buy; is that correct?

A Not kind, what size.

Q What design? Do you participate in any discussion as to any alternative remedy for the problem at the electrical penetration area?

A I don't recall having discussed an alternative there.

Q To your knowledge, did anybody in Bechtel ever consider any alternative to the use of caissons to underpin the electrical penetration area.

A I don't recall that.

Q Wouldn't it be normal engineering practice to consider some alternative to a proposed fix?

A My answer was that I don't recall. I did not say that it had not been done.

Q In the normal course of your responsibilities, do you think you would have participated in such discussions if they took place?

A Not necessarily.

Q Who would make a determination like that?

MR. FARNELL: Determination of what?

MR. PATON: As to possible alternative remedies to the --

MR. FARNELL: Determining --

MR. PATON: Possible alternative fixes or proposed remedies to solve the problem at the electrical penetration area.

WITNESS: The project structural engineer.

BY MR. PATON:

Q Okay, I believe you indicated you don't know that person's name?

A I'm not certain of his name and that's why I'm unwilling to mention it.

Q It's not Mr. Dahr, is it?

A It could be Mr. Dahr.

Q Whoever this person is as far as you know, his office is in Ann Arbor?

A That's correct.

Q Do you recall any discussions by anyone within Bechtel as to alternative remedies in the surface water structure for the surface water structure?

A Yes, I do recall discussions, I do not recall who they were with, but I do recall discussions.

Q Do you recall any possible alternative to the underpirning that was discussed?

A Yes, I do recall that there was discussion on alternatives.

Q But, you don't recall --

A I don't recall who it was with.

Q Was the question of cost included in those considerations?

A I do not believe cost entered into the discussions that I recall.

Q You don't have any clear recollection that cost was not considered.

Q I don't recall that either.

Q The usual practice would be to give some consideration to cost, would it not?

A Yes, of course, good engineering practice would require a consideration of cost.

Q And good business practice?

A Good engineering practice requires it.

Q Good business practice would also require it wouldn't it?

MR. FARNELL: It has been asked and answered.

MR. PATON: He didn't answer it -- that is specifically what he didn't answer.

MR. FARNELL: I object. There is no foundation that he is a business man.

MR. PATON: He is a chief soils engineer for Bechtel and has been with Bechtel for 21 years. If he doesn't have an opinion, that's fine with me.

MR. FARNELL: I'm still obejcting, no foundation.

BY MR. PATON:

Q Do you have an opinion?

A Well, I believe good business practice would also.

Q Would also consider that you would consider cost of good engineering?

A Good engineering practice means you are designed to meet the designs criteria at the lowest cost. So, from an engineering point of view, consideration is of great importance.

Q And you have answered as of engineers and I'm asking is that also as of good business practice?

A I just answered that, I believe it is also good

business practice.

MR. FARNELL: He already answered that.

Would this be a good time to break for lunch?

MR. PATON: Yes.

(At which time a one-hour lunch break was taken. And the deposition was resumed after lunch.)

BY MR. PATON:

Q Mr. Ferris, sometime ago, I believe you indicated to me in response to the surface water structure that it was your opinion that it was not good current engineering practice to estimate load bearing capacity of the soil prior to load test; is that what you said?

A I don't believe I said it in those words.

Q Would you say it in your own words?

A Yes. I think what I said was there are better ways of evaluating that.

Q Better ways of evaluating what?

A Load bearing capacity.

Q And is that better way by load testing?

A Load testing combined with the waive equation analysis.

Q And this is again, a better way to estimate load bearing capacity of piles; is that what you said?

A Yes, better way to estimate the load capacity of piles.

Q Did you indicate that at one time it was the practice to estimate the load bearing capacity of the soil first before you install?

A I would like to correct what I just said there, I'm talking about the load capacity of the soil, the load being transferred through the pile.

Q All right. Fine, would you say load bearing capacity?

A If you would like to call it that, that's fine. It doesn't bother me.

Q Again, you indicated that it has been determined now, currently, that it is not considered the best way to determine to estimate load bearing capacity of the soils. It is current practice to do that prior to load testing. There are better ways to estimate load bearing capacity.

A I don't remember my precise words, but I believe what I was indicating was my -- It's my belief that the procedure that I described using the waive equation and the load testing was a much more reliable way to evaluate the load bearing capacity of a pile in soil.

Q And did you inicate that there had been some change in engineering thinking in this area in the last ten years?

A I think I said it was more than 10 years, I beleive the waive equation was developed in the '50s.

Q Okay.

A And since that time these procedures have started to be used.

Q What is your source of information that indicates to you that change in thinking in the last ten or fifteen years? How do you know that?

A Major source?

Q Yes. I would like to know all of your sources.

A Basically, discussions with Dr. Davisson.

Q Discussions on work with Dr. Davisson, would you say primarily your discussions?

A Right.

Q Mr. Ferris, have you read the December 6, 1979 order?

A You just showed me that, I believe; is that the one you just showed me this morning?

Q No.

Q Then I probably nave, but I don't remember.

Q Do you rememebr the term "acceptance criteria" in that order?

A I don't remember in what context it was used.

Q Does the term "acceptance criteria" mean anything to you?

A It does to me. I think you need to tell me in what respect you were using it.

Q With respect to the proposed remedies, the remedies that are proposed by the applicant, say for example, on the surface water structure, does the word acceptance criteria have any meaning to you with respect to that proposed remedy?

A Yes, I believe there are proposals -- in fact, I know there are proposals to do things there to satisfy us, that we have appropriate capacity in piles.

Q You said there are proposals to do things there to satisfy us that we have --

A It's my recollection that in a meeting with the NRC at Midland in about Feburary last year, that there was a discussion of what was to be done at the surface water structure.

Q For the purpose of satisfying the NRC's review?

A Our primary purpose is to satisfy ourselves and the intention is, of course, to reach agreement with NRC.

Q Do you know what particular -- can you give me an example of an acceptance criteria as you understand it?

A Yes. It is my recollection that each of the piles at the surface water structure was going to be tested to one and a half times it's capacity, it's working capacity.

Q And when was that to be done?

A After the pile was installed, and before the pile load was -- before the load of the building was transferred

to the piles.

Q Now, bearing in mind the word "acceptance criteria" if the test -- did you say the piles were to be tested to one-and-a-half times the working load?

A That's my recollection.

Q And that would be to determine the acceptance of the pile?

A That's correct.

Q The acceptance of the pile at the working load?

A You are overloading the load to make sure that you have it satisfactory.

Q And what -- has that been done?

A As far as I know the piles have not been installed.

Q The proposed remedy, when was this proposed remedy sent to the NRC?

A I do not know that date. What I just said was that I recall it being discussed with the NRC and I believe Mr. Kane was present at that discussion. And I believe it was about February of last year.

Q February of this year?

A I beg your pardon, not last year. I think I might have said last year, but I mean 1980.

Q Okay, February?

A Of 1980.

Q That's when the proposed remedy for the surface

water was discussed in early 1980?

A In February of 1980 it was my recollection.

MR. FARNELL: Are you saying that was the first time it was proposed?

MR. PATON: I just asked him what was said --

WITNESS: To clarify the record, what I said was I did not recall when it was first discussed with the NRC, but I do recall it being discussed with the NRC at a meeting at which Mr. Kane was present in Midland in February of 1980.

BY MR. PATON:

Q Now, this proposed remedy is before the NRC, now you have sent it to the NRC?

A It was discussed with them. I do not have anything to do with sending stuff to the NRC.

Q But it has been proposed to the NRC to your knowledge?

A Yes, it may have been sent, but I don't know.

Q And this acceptance criteria that the piles would have the ability to bear one-and-a-half times the load that was expected, that test is going to be conducted sometime in the future; is that correct?

A Yes, when the piles are driven, after the piles are driven.

Q And the NRC will not know whether they meet that requirement until after the piles are driven -- you won't know

that either?

A That is correct. This is an acceptance criteria. It is an acceptance of each individual pile in the building.

Q Well, under that set of circumstances, since the NRC will not know until you perform this test, which is sometime in the future, that the piles meet that test, then is there any way that NRC could accept these piles at this time?

MR. FARNELL: I'm going to object to that, I don't know what the NRC can do. They can prove they can do a lot of things, but that one I'm not sure about.

MR. PATON: If this is within your understanding of acceptanc criteria, it would be acceptance for what purpose?

WITNESS: Construction.

BY MR. PATON:

Q And are you using that in the context of saying that the NRC would after receiving this information approve your proposal for construction?

A No, I have said other things to you about this, that isn't the only thing I said to you about it.

Q All right, but let's talk about this one.

A As far as the installed piles in the building, individually being accepted, that is my understanding of the acceptance criteria.

Q Okay, do you propose that the NRC accept this

proposal prior to determining whether or not it meets this acceptance criteria of one and a half times the expected weight.

MR. FARNELL: Would the court reporter read back the last question.

(At which time the last question was read back.)

BY M.R PATON:

Q The proposed remedy for the surface water structure --

MR. FARNELL: I don't think that question makes sense.

WITNESS: It doesn't to me on the basis of what I have discussed with you.

BY MR. PATON:

Q All right. We have been talking about the word acceptance criteria.

A That's correct.

Q Focus on the word acceptance.

A Yes.

Q What does tht mean in the context --

A In the context that I have been discussing it with you? I have been discussing the acceptance of the individual piles which are going to be used for proposed -- to be used for underpinning the surface water structure.

Q Have you been using it in the context of acceptance by NRC?

A Acceptance by anybody, Bechtel, our client and NRC.

Q Well, then you would not expect the NRC to accept it until after this test has been accomplished.

A Accept what?

Q Well, does the NRC when you send them information, do you send them a proposal for the surface water structure; is that correct?

A Right.

Q What do you expect them to do with that proposal?

A Expect them to evaluate. This is one item in that proposal.

Q Isn't the objective of your submitting that proposal that they evaulate and accept it?

A My feeling is that they should not accept it on one item out of that structure.

Q I think we can go through the same exercise with all the proposals I want to see how this particular one works. Would you expect NRC to accept it on whether or not it met the criteria?

MR. FARNELL: What do you mean? I'm confused.

MR. PATON: He has just told me precisely what he means by acceptance.

WITNESS: If you don't mind, I would like to answer it as I understand it. I believe we have told you the

acceptance criteria that are proposed to be used and I believe that's one of the items that the NRC should review in their review of that structure. Now, the acceptance of individual piles will be based on that acceptance criteria that the NRC has reviewed and hopefully accept it.

BY MR. PATON:

Q Okay, that is an acceptance criteria, can you think of another example of an acceptance criteria with respect to the remedy for the surface water structure?

A Well, that is the principle acceptance criteria. I'm having problems with what you are asking.

Q I think a lot of people have trouble with that subject.

MR. FARNELL: The questions you are asking?

MR. PATON: Yes.

BY MR. PATON:

Q Our maximum dynamic loads to be imposed are they acceptance criteria?

A Not in the pile driving portion, the insulation of the piles, the maximum dynamic loads have to be taken care of in the design of the structure, which may lead to the capacity of the pilings being a specific number of tonnage or whatever.

Q Well, for anybody to evaluate the piles that are proposed to be used at the surface water structure, don't

they have to know what the dynamic loads are to be imposed on that pile?

A Somebody would have to satisfy themselves that we have enough piles in the structure to take care of the loads that are coming on the structure.

Q Well, then are dynamic loads to be imposed an acceptance criteria?

A Not for the installation of the piles as such. As I understand your question.

Q Do you agree that you have to make that determination at some time?

MR. FARNELL: Which determination?

MR. PATON: The dynamic load to be imposed on the pilings.

WITNESS: That must be included on the design.

BY MR. PATON:

Q Before installation?

A Certainly, before you come up with a design for the foundation you must know what it is you are designing for and the loads is one of the most important things. Those are one of the most importhant things.

Q Did Bechtel know on December 6, 1979 what the dynamic loads were to be proposed on the piles for the proposed surface water structure?

A I do not know. That is not in my area of expertise.

Q Does the 75 ton pile load capacity corporate seismic loading?

A I don't know the answer to that, what I gave you is my recollection of what I heard in the meeting in February of this year.

Q Have you heard any discussions among any people at Bechtel as to the meaning of acceptance criteria?

A The word is used very often. I don't recall being party to a specific discussion in it.

Q In your professional experience, excluding for a minute NRC's use of that term, is that a term that you understand other than its use in connection with the NRC?

A Well, I would understand that use of terminology, but it would have to be in some context.

Q Okay. Do you consider demonstration of an adequate margin of safety against bearing capacity failure to be necessary to accept your proposed remedial measures?

MR. FARNELL: Could the court reporter read back the last question.

(At which time the aforementioned question was read back.)

MR. FARNELL: Are you talking all remedial measures?

MR. PATON: Surface water structure.

MR. FARNELL: I guess I have a vagueness objection. I don't know what adequate margin of safety is.

MR. PATON: That's in his opinion, I mean if he doesn't have an opinion, that's up to him.

WITNESS: There may be other criteria that I'm not aware of, but that is certainly one of the important criteria.

BY MR. PATON:

Q Okay, so that in your opinion, demonstration of that margin you consider that necessary?

A Yes, I believe I have already stated that several times today.

Q Would you say the same thing for demonstration of an adequate margin of safety against liquifacture failure?

A Yes. It's our normal practice to have a factor of safety against potential for liquifacture.

Q Would you say the same thing with respect to unacceptable elements of settlement?

A I would not be able to discuss that with you as such, because it combines structural analysis as well. It depends on the function of the structure.

Q Can you tell me what process Bechtel followed in selecting its consultants?

MR. FARNELL: For the Midland project?

MR. PATON: For this Midland soils project.

WITNESS: I can tell you with respect to some of the

consultants, I'm not sure that I can tell you with respect to all of them. On the first trip that I made to Midland, following the problem that we have been discussing here today, the settlement problem of the diesel generator building, I was asked by Phil Martinez to nominate consultants in the area of soils.

And I had a discussion with him at which we discussed the possibility of Dr. Peck being the consultant. I pointed out to Mr. Martinez that Dr. Peck is very busy, much sought after consultant, and I thought there was a very good chance that he could not spend as much time on his job as was possibly required.

And so I made a suggestion to him, to Martinez, that we ask both Dr. Peck and Dr. Hendron to be consultants in the area of soils for the evaluation of the diesel generator building on the understanding that Dr. Hendron would be the more available of the two and he and Dr. Peck when they could would review their work amongst themselves and then provide us with their evaulation of those areas that we requested.

I believe Sherif Afifi was present with me when I had the discussion with Martinez and I believe it was in the Ramada Inn in Midland is where we had the discussion.

BY MR. PATON:

Q You have indicated, however, that it was your idea.

A It was Mr. Martinez's idea that they required a consultant and he asked me to recommend one to him. I did and he accepted the recommendation that I made.

Q Did the name Dr. Peck come to mind because of your knowledge of his reputation in the area?

A Of course, Dr. Peck is one of the best known soil engineering consultants in the world.

Q Do you know how many hours your consultants such as Dr. Peck and Dr. Hendron had spent on the Midland Soils Problem? I mean do you keep records like that?

A I don't keep records like that.

MR. FARNELL: All consultants?

MR. PATON: Let me stick with Dr. Peck.

WITNESS: I personally do not keep those records.

BY MR. PATON:

Q Does anybody keep records like that?

A I believe that there may be records like that.

Q I gather from the answer you don't really know for sure.

A Well, Dr. Peck bills us for his work and I believe you could from looking at his bills over the past two years determine the number of days of work that he has done on the Midland Project. But I don't keep those bills myself.

Q Do you know who does?

A Yes, our accounting office would, but I don't know how long they keep them.

Q I assume you don't have any way to estimate how many days Dr. Peck for example --

A Not right now, I don't.

Q And would your answer hold generally true for other consultants like Dr. Hendron and Dr. Davisson, you don't know? You can't estimate for example, the number of days they have spent on the project?

A That is right. I could not tell you today how many days he spent on that specific project.

Q You stated before you have read Dr. Afifi's deposition.

A Yes, I did.

Q Have you read any other depositions in this case?

A The only other deposition I read was Mr. Kane's deposition -- or a portion of it.

Q We finished one portion of Mr. Kane's deposition that took place on three separate days --

A That's probably the time.

Q As far as you know it was three different transcripts?

A I can't recall that, but it was more than one volume, and probably it was over two or three days.

Q Now with respect to Dr. Afifi's deposition --

A Yes.

Q Does anything come to mind right now that you disagreed with in his deposition?

MR. FARNELL: I'm going to object to that.

MR. PATON: That exact question was asked by other counsel on your side of the case.

MR. FARNELL: I'm still going to put my objection in.

MR. PATON: Fine.

MR. FARNELL: I object to the form, compound. You can answer it if you recall.

WITNESS: t recall anything that I objected to.

BY MR. PATON:

Q How long ago did you read Dr. Afifi's deposition?

A Probably a couple weeks ago.

Q With respect to Mr. Kane's deposition, the same question.

MR. FARNELL: The same objection.

MR. PATON: Do you recall anything in Mr. Kane's deposition that you disagreed with?

WITNESS: I would have to say yes, there were some things.

BY MR. PATON:

Q Please do your best to tell us what you can recall right now that you disagreed with.

A I can't remember in detail but I believe that his

evaluation of some of our proposed analysis is not in agreement with my evaluation.

Q All right. I would like very much to get whatever detail I can, for example, tell us what evaluations.

A Okay, I guess we should go through them one-by-one then.

Q Yes, sir.

A Why don't you call it out and I'll tell you what I recall.

Q I don't know what it is that you disagreed with.

A I believe to start with the service order, intake structure, he wanted to evaluate pile capacity using soil perimeters as we discussed earlier. I believe our evaluations for pile capacity is a better way to do it.

On the diesel generator building, his evaluation of the effect of the preload is not consistent with my evaluation, it affected the preload on the compacted fill.

Q I would hope you would go on and tell us in what ways.

A I believe he has some concern about whether or not the preload was kept on long enough and I believe the data showed that it was. And I don't recall anything on the other facilities that were to be corrected. I did not agree that there was a signed technical basis for requiring the additional borings that are requested by the court engineers and of course, Mr. Kane has defended in his deposition.

I think those are probably the most significant ones that I can recall at the moment.

Q I want to ask you a few questions about the items that you have just discussed starting with the diesel generator building.

A Sure.

Q You indicated that you believe the surcharge was left on long enough.

A Yes, I do.

Q What is your basis for that?

A My basis would be the results of the piezometer and settlement analysis, settlement ratings, I mean.

Q What was it about the piezometer readings?

A The excess pore pressure had discipated which ordinarily is the manner in which you determine the primary consolidation has been completed.

Q And you also said the settlement data?

A Yes. When the settlement data are plotted on a semi-log plot of settlement versus time, they do reach straight line portion and that straight line portion extended for a sufficient length of time to indicate to me that secondary consolidation was taking place.

Q Was that about a year?

A No, it was not a year, it was less than that. The complete load was on in early April of 1979 and the load

was taken off about the middle of August of 1979, so it was about four months.

Q Do you understand from the deposition what Mr. Kane's position is with respect to the need for additional borings?

A Yes, I do.

Q What is his position?

A As I understand it, he wants to take undisturbed samples and evaluate the preconsolidation pressure of the material in the fill beneath the diesel generator building. And he also wants I believe to predict what settlement might occur. But as I understood his deposition, he was primarily interested in the preconsolidation pressure to compare that with the preload fill.

Q Is it your understanding from reading Mr. Kane's deposition that he thought the information from the borings was more significant than the information to be obtained from the surcharge program?

A It is my impression that he needed that information before he would have believed the other.

Q And is it your thought that the information obtained from the surcharge program -- strike that. In your opinion, is it possible that some valuable information would be obtained from the additional borings?

MR. FARNELL: What is your definition?

MR. PATON: I'm going to ask "possible" and then I'll ask the next step. I assume it is possible.

MR. FARNELL: Anything is possible, I'm talking about value.

MR. PATON: He is the expert.

MR. FARNELL: That's too vague. I'm going to object to it. Could the court reporter --

MR. PATON: I'll strike the question.

In your opinion, is it possible that there could be some information obtained from the borings that would assist in interpreting the information obtained from the behavior of the surcharge program?

MR. FARNELL: Would the court reporter read back the last question.

(At which time the aforementioned question was read back.)

WITNESS: My answer to that would have to be no.

BY MR. PATON:

Q Okay, that's very interesting. You are saying that that's not even possible; is that correct?

A As I understand your question, you asked me, would the boring give some data that would aid in evaluating the preload.

Q Well, actually what I asked you was is it possible that you could obtain some information that would be useful

in that regard.

A I don't believe that's possible.

Q And can you tell me why? Is it due to the heterogeneous nature of the fill?

A I can try to explain why. First of all, the preload fill is a full scale loading of the soil, so it is independent of whether or not the fill is heterogeneous.

Q I apologize for interrupting you, could you start again?

MR. FARNELL: Would the court reporter read back the last question.

(At which time the last question was read back after a brief interruption.)

BY MR. PATON:

Q Does that complete your answer?

A No, it doesn't. That was the first item. The second item, we have checked that the preload fill has done what we intended it to do, that is take out the primary consolidation that's been done in two ways, one by the piezometers and that is -- the piezometers show that the excess pull pressures have dissipated and secondly, the settlement carved on the semi-log plot has reached secondary consolidation.

The next item is that in my experience in dealing with preconsolidation as determined in the laboratory on soil samples that that is very much affected by sample disturbance, and it may also be affected by the soil itself. Whatever manner it has, whatever factors it has undergone to reach the state at which you sampled it.

And I would be very concerned that Mr. Kane would take samples and find out from those samples that he had a preconsolidation pressure that is being equal to the overburden pressure at the sample depth, prior to any preload being there at all.

Q You indicated some problems or proficiencies with the laboratory testing that would be done.

A Sample disturbances and laboratory testing and the valuation of the laboratory test.

Q Is there something about the particular instance that the diesel generator building that makes you more apprehensive about using laboratory tests than other situations, I mean laboratory tests are very commonly used and have been used on this site for other determinations, right?

MR. FARNELL: Could the court reporter read back the last question.

(At which time the aforementioned question was read back.)

MR. FARNELL: I'm going to object to the form of that.

You can answer it.

WITNESS: The objections I have to the sampling disturbances and the laboratory testing would apply to any of the sampling and testing that's been done at the site. However, the previous sampling and testing that was done prior to construction of the plant was the only information that we had available to us.

We didn't have any preload fill, any full scale load tests, we didn't have the benefit of those other factors. What I'm telling you is that in my opinion, the preload fill is a better way to evaluate the settlement.

BY MR. PATON:

Q It is a better way, but apparently, you feel that it is so much better that I believe you testified that it wouldn't even be possible that by taking samples and performing laboratory tests, you could gain any information that would help you interpret what has happened to the surcharge program.

MR. FARNELL: The record will speak for itself.

WITNESS: The concern that I have is that when the samplings are taken and tested that you will end up with a range of values of preload and not know really where you are. Mr. Kane would be just as much in the dark after that as he apparently is today.

BY MR. PATON:

Q In reading Mr. Kane's deposition, did you get the impression that he would take the information that he would obtain from borings, the borings that he has requested that have not been supplied, with respect to the diesel generator building, and make some kind of a worse case analysis?

In other words, that if he received a range of information that he would use the worse information to make his evaluation? Did you get that impression?

A I do not recall that I got that impression. I would like to recall that I don't recall one way or the other.

Q It could be then. Are there any weaknesses or deficiencies at all that you are aware of with the preloading method of the surcharging method?

A What do you mean by weakness?

A That's what I'm asking you, and is it a perfect method to accomplish what you are trying to accomplish.

MR. FARNELL: Are we talking in general? Are we talking about Midland diesel generator?

MR. PATON: I'm talking about Midland soils surcharge program, diesel generator building.

MR. FARNELL: That wasn't the way the question was formed.

MR. PATON: Strike it all. I'll ask it again.

BY MR. PATON:

Q With respect to the surcharge program, applied to the diesel generator building at Midland, are you aware of any weaknesses or deficiencies in that program?

A Deficiencies in what respect?

Q In accomplishing what it is you are trying to accomplish.

A Yes, the preload will not compact the sand portion to the same extent that it will compact a clay portion.

Q Are there sand portions below the diesel generator building?

A Yes.

Q Can you describe the extent to which there are sand portions below the diesel generator building?

A It is my recollection that on the north side of the building there is a fair amount of sand and particularly in the northwest corner.

Q Okay.

A There is also evidence of sand backfill along some pipelines that are under there.

Q Did you take any steps to accommodate that problem that the preloading program may not have compacted the sands?

A Yes.

Q What steps did you take?

A The corrective action proposed, our main concern is that the preload may not have compacted that sand sufficiently to preclude liquifacture in the case of loose sand, and our recommended corrective action for that is to lower the water table in the plant area so as to preclude the possibility of liquifacture and any sand left.

Q That's to your knowledge, that will be taken care of by permanent de-watering?

A That is what is proposed.

Q To your knowledge, is that permanent de-watering proposed solely in connection with sand at the diesel generator building or is it also proposed with sand in other areas?

A It was made as a general de-watering program to take care of any sand that might be located in the plant that were loose.

Q Has Bechtel had any meetings with Dr. Peck in the last three months?

A Do you mean meetings that I attended?

Q That you are aware of.

A The last time that I met with Dr. Peck on the Midland project was at the end of August in Midland. I don't know if that's three months.

Q Okay. That's probably more than three months, pretty close. Have you had any meetings with Dr. Hendron in the last three months since August -- After August?

A I have not met with Dr. Hendron.

Q Have you met with Dr. Davisson after August?

A I think I told you earlier today I met with him last Thursday and talked to him.

Q You said you talked to him.

A But not on the Midland project. You are right, I did say that I talked to him. I actually met him and talked to him.

Q Are there pipes and conduits beneath the diesel generator building now that are not connected to the diesel generator building?

A I don't recall that, that are not connected to the diesel generator building?

Q Let me ask you, are there any under the diesel generator building that are connected to the diesel generator building?

A I don't really recall where the pipes and conduits go to.

Q So, you don't know whether there are any that are connected or any that are not connected?

A I just do not remember that.

Q How is the effectiveness of the surcharge program affected by the fact that they are below the generator building that there are less compressible soils and more compressible soils?

MR. FARNELL: Would the court reporter read back the last question.

(At which time the aforementioned question was read back.)

WITNESS: Are you talking about the clay soils below the generator diesel building?

BY MR. PATON:

Q Clay and sand.

A Then I'll address both. In the clay, if there was prior to preloading a difference in compressibility in the clay, then the preload would tend to make the condition more uniform, it would stiffen the less compressible soil so that overall, you would have more uniform, you would tend towards more uniform compressibility of the clay soils.

In the case of the sand soils, the preload would stiffen the sand soils to the extent that they would be able to support the static loads, but it does not densify the loose soils sufficiently to preclude the possibility of liquifacture in some of the loose sand that we know are located there.

Q Do you plan to verify the effectiveness of your surcharge program at the diesel generator building?

A We are doing that right now by instrumentation.

Q And are you doing it partially by watching settlement

curves?

A That is part of the instrumenation. The records from the settlement points are plotted on curves. I'm not plotting them personally if that is what your question is.

Q No, no. And you are also doing that by watching the behavior of the piezometers?

A Yes. That is correct.

Q Do you recall a settlement curve testing designated DG-3?

A Not right now I don't.

Q Okay. Are you aware, Mr. Ferris, that there is of the request for addition of borings, that the staff has made that has not been responded to or that the applicant has not responded to date the question of our June 30th letter?

MR. FARNELL: I think the applicant has responded to it.

MR. PATON: Okay, fine, the applicant has responded to it with no boring information.

WITNESS: You showed me the letter today, earlier.

BY MR. PATON:

Q And what is your position with regard to that information , I mean is it that the staff doesn't need it or was it your position?

MR. FARNELL: Your position with regard to the request?

Is that what you mean?

MR. PATON: Yes.

WITNESS: I think there is no technical basis that indicates that those borings are required.

BY MR. PATON:

Q Then that's for the staff's evaluation.

A That's who is asking for them.

Q Okay, now, what I'm getting at is you made a judgment as to the staff's need for that information.

A Okay, I'm telling you from my point of view, I see no technical basis that would require those borings to evaluate what we have done.

Q No need on a technical basis is obviously, you don't think the staff needs that information; is that correct?

A I think we have provided the staff with a signed basis for revaluating the preload fill and what it has done.

Q Did piezometer elevations reach anticipated values under the surcharge program?

MR. FARNELL: Anticipated by whom?

MR. PATON: All right, I'll back up and ask you a previous question.

BY MR. PATON:

Q Did you prior to imposing the surcharge program, did you make any estimate as to what piezometer elevations would

be after you put the surcharge program on ?

MR. FARNELL: By "you" are you referring to Mr. Ferris?

BY MR. PATON:

Q Did Bechtel do that?

A I did not do that. I'm not aware that such an estimate was made and I would like to recall that there was one other portion of Mr. Kane's testimony that I disagree with. And that was the 30-feet rise -- 30-plus feet rise in the piezometers. I don't agree with that.

Q Okay. Do you have any idea how he made that estimation? Did he explain that?

A I think I know how he made it and I don't think those conditions exist underneath the building.

Q It had to do with the height of the surcharge and the weight of the cubic feet of water.

A It is my impression that he assumed that the soil below the diesel generator building was completely confined like in a consolidation test and then the preload fill was placed on it. Under those circumstances, the pore-water pressure would initially reach a height equivalent to the weight of load added.

Q And would that be under those circumstances approximatel 35 feet?

A I haven't calculated, but it is very roughly that.

Q You would start with the height of the surcharge, which was --

A Well, it is 20 feet times the weight of soil divided by the unit weight of water, which is 62.4, so I don't have a calculator here, but I think that will come right around 35.

Q 62 pounds per cubic foot?

A 62.4.

Q And you indicated that the conditions that Mr. Kane might have assumed when he mentioned that rise in piezometer elevation of 35 feet did not exist; is that correct?

A That is correct.

Q And tell me, how actual conditions differed from what you think he might have assumed?

A Well, first of all there is nothing to confine the water and the soil beneath the building in the sense that I just mentioned like having a consolidation ring in the laboratory.

Secondly, there are sand lenses and layers there that act as drainage paths which would permit the water pressures to dissipate quite rapidly. There are some other factors as well. You have learned enough salt mechanics today.

Q I appreciate your answer, but what are some of those

other factors?

A Well, the development of the pore-water pressure in the soil due to a load is rather complicated and it's merely just the load that's supplied as though the water can dissipate. There is deformation in the soil and that can affect pore-water pressures. It's quite a complicated deal.

Q I may not ask you all of the factors, but are there other factors that you haven't mentioned?

A Yes, I believe there are. There could have been openings in the fill, that may have been, I'm just hypothisizing. It could be that there were drainage paths even within the clay fill.

Q Okay, is it not good engineering practice or would it have been good engineering practice in that case for you to have made an estimate of the elevation in the piezometer -- in piezometer elevation prior to imposing the surcharge?

A With such a heterogeneous fill, I don't believe that such an estimate would have been very reliable. What we were looking for was to see when the excess pore-pressure dissipated completely and that is one way of telling that you have completed primary consolidaton.

The other way I mentioned earlier, is to look at the settelment card.

Q If the soil there had not been heterogeneous as it is, would you have made an estimate of the anticipated piezometer elevation prior to imposing the surcharge?

A Probably not. If it was me.

Q What if the soil was homogeneous, would you have done it in that case?

A Probably not.

Q If it had been homogeneous and if you had made an estimate, wouldn't you be interested in determining how close you came to your estimate to verify the performance of the surcharge program?

MR. FARNELL: That's got two assumptions in there. None of which is relevent to this case and I just don't see it. I don't even understand the question.

WITNESS: I think I can answer your question. I think the thing that you have to realize is what we were looking for was when the excess pore pressure dissipates, we were not interested in the maximum level to which the pore pressure reached.

BY MR. PATON:

Q Okay, try it just one more time. Your interest in knowing when the excess pore pressures had dissipated, related to your interest in knowing when you had reached secondary consolidation; is that a true statement?

A Well, when you finish primary consolidation,

then you get into secondary consolidation and I would be willing to accept that those two points would be about the same.

Q All right, you just don't see any way that your prior estimate, what would happen to piezometer level you don't see that that would have helped your determinations at all?

A It would not have helped our determination of when the primary settlement would be complete.

Q Does the level to which pore pressures -- pore-water pressures would rise have an impact on stability of the deposit being loaded?

A Yes.

Q But even in place of that, but that doesn't indicate to you that you should estimate prior to the surcharge what your piezometer elevations are going to be?

A The preload was put on in steps and those increments of loads were small enough that we were not concerned about failure of the fill.

Q Mr. Ferris, I'm going to hand you a document on the letterhead of Soil and Rock Instrumentation, dated October 19, 1979, a letter addressed to Dr. Sherif Afifi, signed by John Dunacliff and it has attached to it three pages and ask you -- and I have marked it as Staff Exhibit 2 and it does indicate that a carbon copy was sent to Walter

R. Ferris and ask you have you ever seen that before?

A I don't recall a clear recollection of having seen it before. It says a copy was sent to me, so I probably did see it, but I don't recall.

Q In your opinion does that letter reflect a problem with survey accuracy with the Borris Anchors?

A I can't tell that from the information that's here. I don't know what the purpose of the letter was originally. I know he is making a review. I can't recollect the subject and I don't recall having discussed it with anybody.

Q Well, this chart on the back here, review of settlement below.

A Yes, he makes some statements there, but without looking at additional data, I don't believe I would want to draw any conclusions from that.

Q In other words, your statement is there is not enough information in that letter for you to conclude whether or not it concludes a problem with survey accuracy in the Borris Anchors?

A Yes, I think you should talk to somebody else about that. I did not make any study as a result of that. I don't recall the letter.

Q Is your statement that you have read the letter sufficiently so that you can't tell whether it reflects a problem with survey accuracy or you haven't had enough time

time to read the letter?

MR. FARNELL: It's been asked and answered.

WITNESS: I have read through the thing and there appears to have been some questions with this survey, but it is not clear to me what those questions were and whether or not these are significant comments.

BY MR. PATON:

Q In line one of the letter, it says, "I have reviewed your plots of initial elevation versus settlement on the 14 Borris Anchor and settlement platt for the customers sent to me on September 20th" (Reading)

Do you know whether those plots have been supplied to the NRC?

MR. FARNELL: I'm going to object to --

WITNESS: No, I don't.

MR. FARNELL: -- the questions on the base of the document, he said he hasn't read it, he doesn't recall reading it, this is going to be purely speculation.

BY MR. PATON:

Q Well, I did show him the document and give him time to read it, the letter is addressed to Bechtel and it indicated a carbon copy was sent to him. And if he needed some more time to read the letter he can certainly take more time to read the letter.

MR. FARNELL: No --

WITNESS: I think I answered -- I told you the comment I have on it. I'm not familiar with the subject and I believe I would not want to discuss the items here without knowing more about this matter.

MR. FARNELL: That was the substance of my objection.

BY MR. PATON:

Q Do you have any other knowledge outside of this letter with respect to the accuracy of the survey, accuracy of the Borris Anchors at the Midland site?

Do you have any other knowledge that there is any other inaccuracies?

MR. FARNELL: I don't believe he said there were inaccuracies.

WITNESS: I don't recall that. I do recall that prior to or towards the end of the preload fill, there were additional instruments put in that were more accurate than the initial Borris point. Whether that related to some problem at the Borris point or not, I do not recall.

BY MR. PATON:

Q Do you know who would know that?

A Sherif Afifi.

Q Do you know whether there has been a problem with respect to building settlement markers, the accuracy of building settlement markers?

A Which building settlement markers?

Q On the diesel generator building.

A Ones that have been installed since August of 1979 or something prior to that time?

Q I'm not sure where you got that date, but that is fine.

A I really don't know. Something may have been discussed with me, but I don't recall. I do recall that we discussed getting more accurate instrumentation to evaluate the second settlement portion of the--

Q All right, who was that conversation with?

A I believe that was in the meeting that we had with at least one of the consultants in Midland.

Q Do you recall who?

A I would think it was Dr. Hendron, but I'm not absolutely sure of that.

Q Do you know whether Dr. Afifi would know about -- was he present at that conversation?

A I do not know that he was there, but he ought to have been, that's his office -- Ann Arbor.

Q To clarify the record, the meeting was at Ann Arbor?

A Ann Arbor but the meeting was a Midland meeting.

Q And you are not positive if Dr. Afifi was there, but you think hemight have been?

A I'm sure he was there for part of the meeting,

but I'm not sure when that specific topic was discussed that he was present. I would also think that John Dunacliff was present, but I don't know that for sure either.

Q And you reference some inaccuracies and instrument by that, would you refer to two things and that is one being the Borris Anchors and the other being building settlement markers --

MR. FARNELL: I don't think he testified that.

WITNESS: I think what I said was we discussed a more accurate way of measuring the settlement.

MR. PATON: What other type of instrumentation would you use to measure your settlement, other than Borris Anchors or building settlement markers?

MR. FARNELL: Is this just a general question?

BY MR. PATON:

Q At the diesel generator building.

A What we are using?

Q On the Midland site diesel generator building?

MR. FARNELL: Could have used -- did you use?

MR. PATON: Did you use.

WITNESS: That I'm sure has been discussed with the NRC, I don't recall the precise name of the equipment, but the points were put in and I'm sure that that has been discussed with the NRC in the meetings with NRC.

BY MR. PATON:

Q Do you know of any other instrumentation other than building settlement markers or Borris Anchors?

A I know that initially they were using scribe marks that had been put on when the form work for the diesel generator building was constricted and that's the basis for evaluating that this building had settled more than it should have.

Q What is a "scribe mark"?

A Just a pencil mark, just your every day mark.

Q Since August, 1978, -- let me interrupt and ask, you, I believe, got that date, August '78, does that mean something to you because that's when the problem was first discovered.

A It was early in August of 1978, I believe I may have mentioned it to you earlier today, that I was informed by Sherif Afifi that the settlement of the diesel generator building was approaching the predicted settlement differing at PSAR.

Q Since August, 1978, are you familiar with what type of instrumentation was used at the site at Midland for example, the diesel generator building to measure the settlement?

A Initially, Borris Anchors were put in the ground. I believe settlement plates were put on the ground as well, and then as I mentioned, sometime around about May or so of

'79, I'm not sure of the precise date, there was additional, more accurate settlement instrumentation installed in the building.

Q In the building?

A For measuring the settlement of the building, yes.

Q Is that building settlement markers or is that some other type?

A It was another type of instrumentation, I cannot recall the precise details but I'm sure that is in the response to questions to the NRC.

Q Is the accurate measurement of settlement anything you have discussed with Dr. Afifi in the last six months?

A I don't recall to be specifically -- if we specifically have or have not discussed that.

Q Is this a matter that you leave more to his responsibili or was this a matter that you would expect to discuss with him considering your relationship with Dr. Afifi?

A The day-to-day work of the geotechnical, the soils group and the geotechnical department in Ann Arbor is Dr. Afifi's responsibility. I expect him to keep me informed of the work that is going on, but I do not expect that I'm involved in every little detail or every calculation that they do.

Q Would you consider an inaccuracy in settlement

measurement to be something that he would discuss with you or is that a detail?

A I would think he might discuss that with me.

Q Do you know of any organization other than Soil and Rock Instrumentation that has made an evaluation of the quality of your settlement data?

A I'm not aware of another organization.

Could the court reporter read me back the last question?

Q Yes.

(At which time the aforementioned question was read back.)

MR. PATON: Al, we request that you provide us the plots that are referred to in the first paragraph of this letter.

MR. FARNELL: I'll talk to Bechtel and we'll endeavor to get those settlement plots to you if they are still in existence.

MR. PATON: I would appreciate it.

BY MR. PATON:

Q Are you aware that excavations have been made directly adjacent to the diesel generator building wall footings?

A Of my own personal observation?

Q No, I mean are you aware from any source of knowledge.

A Somebody told me that Joe Kane reported there was an excavation next to the building and I believe we had a discussion on that at the last meeting we had.

Q Do you know what the purpose of digging those excavations was?

A I don't know what the purpose was.

Q This is the diesel generator building we are talking about.

A Yes.

Q Do you know the length and depth of those excavations?

A No, I don't. I believe they were quite narrow excavations. I don't know how deep they were.

Q Were they inside the building?

A I don't know, I don't recall. All I recall was that they were close to the wall, whether they were inside or outside, I don't know.

Q Do you know how many there were or where they were?

A No, I don't.

Q Do you know when they were made?

A No, I don't.

Q Do you know if they had been backfilled?

A No, I don't.

Q Do you think that because of this excavation or these excavations, that that less than the final load is now

being applied to the diesel generator building wall footings?

MR. FARNELL: I don't think he can answer. I think he said he is not familiar with these excavations, therefore, I don't think he can answer this question because of lack of foundation.

Would the court reporter read the question back.

(At which time the aforementioned question was read back.)

MR. FARNELL: Also, I don't think there is any testimony that the excavations are currently there. This is in addition to my other objection.

Q Do you know if those excavations are there?

A No, I don't. I have been told that Mr. Kane made some reference to the excavation.

Q If there were excavations directly adjacent to the diesel generator wall footings, could you conclude whether that would remain at the final load being applied to the diesel generator building wall footings was less than the final load?

MR. FARNELL: Since we don't know the details of these or he doesn't know the details of these excavations, I don't think he can answer that question.

BY MR. PATON:

Q Would you have to know the details of the excavation

to make that conclusion?

A I could make a very general answer.

Q We will accept it as a very general answer if you want to give us that.

MR. FARNELL: As long as it is not speculation.

MR. PATON: General answer.

WITNESS: If you remove some soil from above the footing, I'll have change in pressure on the footing to some degree, but it will not be a very significant change.

What was your question again?

BY MR. PATON:

Q My question was directly adjacent to the diesel generator building wall footings.

A Adjacent to the wall?

Q Directly adjacent to the diesel generator wall footings. Does that change your answer?

A It would depend on what you mean by adjacent. I think removing a little soil may change the pressure a little bit, but I don't believe it is a significant change. I would need to know a lot more about it before I could give you a specific answer.

Q That's fine. I won't pursue that.

MR. PATON: Al, would you provide a plan or information that shows the limits or the extent of those excavations?

MR. FARNELL: Could you give me a little bit more

definition as to what type -- what you want?

MR. PATON: Let me do this, let me ask Mr. Kane -- he is not being deposed, but let me ask him to just address that matter.

MR. FARNELL: Let's go off the record.

(At which time a brief discussion was held off the record.)

MR. FARNELL: I'll endeavor to look into the excavations that Mr. Paton has referenced and to see if I can locate within Bechtel any information concerning when these excavations occurred, the extent of the excavation and whether they have been backfilled.

MR. PATON: Thank you, sir.

BY MR. PATON:

Q Mr. Ferris, do you agree that the diesel generator building is constructed heterogeneous soils with highly variable conditions of layering?

MR. FARNELL: That's a compound question. I'll object to it.

BY MR. PATON:

Q That seems so obvious, it is unbelievable, but we will break the question in half if you want me to.

Do you agree that the diesel generator building is conducted on heterogeneous soils?

A Beneath the diesel generator building is a

heterogeneous fill in my opinion.

Q And the reason you changed that answer is that the till below the fill may not also be heterogeneous, is that why you made that distinction?

A Until the load, the fill is a highly preconsolidated soil and it may vary from point to point. It is a very competent foundation stratum as you very well know.

Q Do you agree that the fill below the diesel generator building has highly variable conditions layering?

A I'm not sure that I would necessarily agree with layering, but lensing or layering, there is -- it is quite heterogeneous based on the boring data.

Q Other than Midland, do you have experience with other structures built on heterogeneous soils?

A Yes.

Q In these other projects, did you explore the condition of the soil with borings?

A In some of them.

Q Did you take soil samples?

A What sort of soil samples?

Q SPT's or undisturbed soil samples?

A This is borings to evaluate the foundation design criteria?

Q Yes, sir.

MR. FARNELL: Is this before the buildings were built also?

MR. PATON: Yes, sir.

WITNESS: I would say generally speaking, drilling and standard penetration testing or soil sampling is carried out as an initial process as you move on to a new side to determine soil conditions.

BY MR. PATON:

Q Prior to initiating the Surcharge Program for the diesel generator building at Midland, why didn't you take similar borings and soil samples that you have just described that you took in other instances before you began construction?

MR. FARNELL: First of all, he didn't say he did it in all instances.

MR. PATON: All right, in the instances in which you did it.

WITNESS: Could you read that question again because I'm not sure that I understood it.

(At which time the question was read back for the witness.)

BY MR. PATON:

Q I'm going to strike the question.

In the other projects that you mentioned, other than Midland, did you develop soil profiles and assign representative soil properties to these layers?

A Not in every case.

Q Did you do those in some cases?

A Do you mean some cases, probably most generally we did it.

Q In light of your answer that you most generally did it that way, why are you not complying with the borings requested by the staff in this case?

A For the same reasons that I didn't do it at some of the sites where we did it on.

Q Tell me generally what those reasons are.

A It's probably simplest to discuss one site, this is a mining plant in Nevada, in alluvial fan which is very heterogeneous deposit and you cannot get samples there that you can relate in the way that Terzagki and Peck have done in their book, you can't get standard penetration tests that are meaningful and you can't take undisturbed soil samples that are meaningful and so there we did a preload fills to evaluate the soil properties that we needed to determine settlement of structure foundation.

Q You said preload fills, do you mean surcharge?

A Surcharge fills.

MR. FARNELL: Would the court reporter read back the last few question and answers.

(At which time the previous two questions and answers were read back.)

WITNESS: I'm referring to the questions where I was

asked why we are not doing borings at the diesel generator building as requested by the staff, and the response that I have previously -- in light of the fact that we had done drilling and sampling elsewhere.

And the response that I gave was not relative to that particular question. I misunderstood the question.

The reason that we are not doing drill and sampling at the diesel generator building is because we believe we have provided the staff with ample information satisfactory information from the settlement and piezometer data to evaluate the adequacies of the preload fill.

BY MR. PATON:

Q You discussed a moment ago a project in Utah; is that correct?

A A moment ago I discussed a project in Nevada.

Q Was there a settlement problem at that project?

A No, there was not.

Q Is your reliance information from piezometers affected by the fact that the fill is heterogeneous?

MR. FARNELL: Would the court reporter read back the last question.

(At which time the aforementioned question was read back.)

MR. PATON: Strike that question and I'll try it again.

BY MR. PATON:

Q Is the accuracy of information provided by piezometer readings affected by the fact that the fill is heterogeneous?

A The accuracy of the piezometer is not affected by that.

Q Is the settlement information affected in any way by the fact that the fill is heterogeneous?

A What do you mean by the settlement information? Do you mean the settlement at a specific point or the overall picture?

Q No, the information you get from a settlement marker is the accuracy of that information affected by the fact that the fill is heterogeneous.

A I don't believe the accuracy of the settlement marker is affected by the heterogenity of the fill.

Q In the project where you took undisturbed samples can you tell me how you determined where to take undisturbed samples?

A Which project are you talking about now?

Q Well, I think you indicated there were projects in which you just spoke awhile ago where you did take undisturbed samples.

A We took them in the strata that we wanted to know the soil properties as best we could.

(At which time a brief break was taken.)

WITNESS: I think that there has been a confusion in the last few questions. I believe my understanding was what I normally do in the way of exploring sites and this is where there is nothing on the site before we go on there and we are getting foundation and material investigations

I believe what you are asking me about is borings made at the Midland site after a structure has been constructed. And that is not something that we normally do.

BY MR. PATON:

Q Based on your experience, do you believe running laboratory consolidation testing to be a reasonable approach for estimating the amount of settlement and the rate of consolidation?

MR. FARNELL: Would the court reporter read back the last question.

(At which time the aforementioned question was read back.)

MR. FARNELL: That's a compound question.

BY MR. PATON:

Q I'll break it down if you insist. Based on your experience, do you believe running laboratory consolidation to be a reasonable approach for estimating the amount of settlement?

A Yes.

Q Based on your experience do you believe running laboratory consolidation to be a reasonable consolidation for running consolidation?

A I would have to say that it is not a very reasonable one, not necessarily a very reliable one.

Before we get off that, I would like to point out that my response to that was a general response and could be influenced by a lot of other factors.

Q Was there ever any consideration given to making settlement prediction at diesel generator building prior to imposing the surcharge program?

A I'm not aware of any.

Q Do you recall any discussion of that in your reading of Dr. Afifi's deposition?

A I do not specifically recall it in Sherif Afifi's deposition. I do recall that there were discussions at the time prior to the time of preloading. There were some rough estimates of what the settlement might be.

Q Who made those?

A But there were no calculations.

Q Okay. Who made those rough estimates?

A Dr. Peck in a discussion that we had, I believe, in Champaign, Urbana, he made reference to a pessimistic upper limit of 6 to 18 inches as the settlement resulting from the preloading film.

Q Do you have any idea on what he based that rough estimate?

A No, I believe it was just that, a very rough pessimistic rough estimate. I do not believe he did any calculations. I do not believe he had any data to do any calculations at that time.

Q He must have known something about the site.

A No, I believe he was looking at a rough pessimistic upper limit of what the settlement might be. One of the factors that he was concerned about is that our instrumentation should be able to take care of whatever movements occurred.

Q I'm sorry, sir, I don't understand that -- our instrumentation should be able to take care of whatever occurred.

A Well, he wanted to make sure that when Bechtel arranged for instrumentation that they would be able to take care, operate, under the most pessimistic estimates of settlement that might occur.

Q In your recent statement about installation of instruments, did you mean that you wanted to make sure you had instruments that would measure any possible range of settlement so that the settlement wouldn't exceed what your measurements would measure?

A Yes, we didn't want to have an instrument that certainly the point would -- it would go off the scale or

something like that.

Q Sure. And are you connecting Dr. Peck's 6 to 18 inches pessimistic estimate with his -- in other words, that was in connection with him saying he wants to make sure we have instruments that would cover at least this much settlement. Is there a connection between those two?

A I believe it was made in the context of giving Bechtel some idea of what the upper limit of settlement might be, but it was not based on calculations because I do not believe that he had the data to do calculations, nor do I believe he did any calculations.

Q Okay.

A It was a spontaneous comment in a meeting.

Q Do you know whether Dr. Afifi gave any consideration to a prediction of settlement prior to the surcharge program being imposed?

A I'm not aware of any.

Q Let me read you from page 57 of Dr. Afifi's deposition, and he has not read this and corrected it, so let me just read this to you and see if it refreshes your recollection about anything.

I was asking him about whether he considered making a settlement prediction part of the surcharge program and I'll read this, but you can certainly look at it if you want to.

"My original thought may be, perhaps, if there be no confusion, that it would be one way to go. To predict the settlement on the basis of lab tests. The very initial thought because the material appeared to be heterogeneous enough and the surcharge program became an opportunity to provide answers, be provided in lab tests. That was not the favored way to go." (reading)

A I have trouble understanding that.

Q Obviously, there is typing or some type of errors in there, but my question to you is does that refresh your recollection at all about any consideration given to laboratory testing or anything?

A It doesn't change anything I have said.

Q You have no recollection?

A I don't recall discussing this with Dr. Afifi.

Q How many projects have you been involved in where there has been surcharging?

A I have been on several. Do you want me to tell you?

A Well, first of all, tell me approximately how many projects have you been involved.

A Right this moment I can think of five, but I'm not saying that I haven't been on more than that.

Q Okay. That's fine, sir.

Did any of those involve surcharging after the

structure had been partially or completely built?

A Yes, two of them.

Q Okay. Would you tell us about those two?

A Okay. One is a very conventional problem, quite commonly used in engineering in that it was oil tanks for a fossil fuel power plant in Louisiana, the tanks were built and then water load was applied in station to take out the settlement in the foundation. So in that way, the settlement of the tank was taken out prior to it carrying its oil load and also the bearing capacity was enhanced by the consolidation that took place.

Q Could I ask you a little bit about that one?

A Yes, sir.

Q Would that be the normal practice for foundation for oil tanks?

A I can't say that it is normal, it is one of the things that is done with oil tanks because frequently oil tanks run poor -- are frequently put on poor foundation.

Q You did it because it was some problem with the soil?

A The soil was soft.

Q Would it be good engineering practice to just go ahead and fill those tanks with oil?

A No, we could not have done that, we would have had a problem with the foundation.

Q Okay. What would be the most significant problem you would have?

A Bearing capacity failure in that particular instance, there was a potential for bearing capacity failure.

Q Now, in that instance, did you make a settlement prediction before applying the water load?

A I believe in that particular instance there was settlement as to it, but the primary control in that particular instance was in the piezometers, because we did not want to overload the foundation. We put in a partial water load and then watched the piezometer dissipate and at a specific point then added some more water until we reached the maximum load in the tank.

Q Was the amount of settlement in that case critical?

A No, it was not critical.

Q Now, I may have just asked you this, and you may have just addressed it, but why did you make a settlement prediction before imposing the water --

A Well, I didn't make it but somebody made it.

Q Why was it done?

A It was not necessary to be done, it was just something somebody did.

Q It was done but in your judgment it was not necessary to be done. So, then that case does not distinguish itself as far as you are concerned for the Midland case, in your

opinion in neither case was it necessary?

A Well, you asked me where I used surcharging and I'm responding to that request.

Q That is correct, but what I'm saying is you don't think it was necessary to make a settlement prediction in that case just like you don't consider it necessary to make a settlement prediction in the Midland case.

A I did not say that. In Midland, we did measure settlement and we did use --

Q I'm talking about settlement predictions.

A I didn't try to draw a parallel between the two.

Q But it is true that in neither case did you see the need for making a settlement prediction?

A That is correct.

Q And in the case of oil tanks you didn't need to make a settlement prediction because you imposed the load in stages and you watched your piezometers and you were able to control the situation that way.

A That's correct.

Q Would you tell us about the other instance in which --

A Instance or instances?

Q Well, I think you said there were two instances in which there was surcharging after the structure was partially or fully completed; is that correct, and one of

time was the --

A I do not recall saying that, but I do know another in which I can discuss with you. That is in Utah. I mentioned it briefly this morning. It is a mining project in an Anarconda Copper Company at a place called Carrfork.

In that particular instance, the plant site was in very narrow valley that was filled with material that had been washed down into the valley during flood stages from the hargrain.

We intended to do a conventional expiration at that site and found because of the type of material there that we could not get meaningful data to evaluate settlement for structure foundations.

We had in any case at that site intended to obtain sheer way velocity measurement because there were some crushers in the site, vibratory loads in the plant. We took the sheer way velocity measurements and then reduced the sheer moduluous values by a factor to come up with a moduluous on which we could evaluate settlement of foundation.

What we did not know at the time we did that, the location we selected for sheer way velocity happened to be the best part of the site and one structure we were aware that there would be quite significant settlement in the structures. And we had recommended at one of the major

structures on the site that they place the fill, the required fill area fill. And then put in the foundation of the structure.

For some reason that recommendation was not followed and the structure foundations replaced and then the fill was added and, of course, the structure started to settle quite a lot more than what we had predicted.

We had not in any case predicted the correct value of settlement on the basis of the data because the soils, the location of that structure were not as good as the location where we had measured the sheer way velocity. I was called to the site and recommended that we fill the building with sand and to some extent beyond this.

And I also contacted Dr. Hendron and asked him if he would come to look at the site. He came to look at the site and he increased the amount of preload that I put on the structure.

He, in addition -- we looked at each of the structures on the site and because we did not really know the quality of the material below them, we preloaded all of the significant structures like the tailing thickeners and other buildings on the site. And he in conjunction with us recommended a staged loading in the storage area.

In that particular case, we used only settlement measurements to evaluate when the preloading had been on long

enough because --

Q You mean as opposed to piezometers?

A We could not put piezometers on there, they would not have been meaningful, the water table was quite considerably below the foundation level, and drilling holes in that ground was just extremely difficult. The piezometers would not have been meaningful in the material either. It was quite relatively pervied.

So the entire valuation of the length of time that preload was kept on was based on the settlement measurement. It's my recollection that after about -- the text books tell you that sand settles immediately, of course, it doesn't -- granular material settles easily, they don't. They take some time to settle. And we find that usually the major part of the settlement had occurred within one month and we kept the load down for sometime after that until we were satisfied that we were in a secondary consolidation condition.

The preload was removed and strangely enough the building looks better than it did at the start. The cracks had closed, and as far as I know the plant is operating quite safisfactory.

The maximum settlement at the concentrated building was 16 inches.

Q At what building?

A At the concentrator building. The main building that I am talking about, the concentrator.

Q Does that complete your answer?

A That is in summary.

Q The 16 inches of settlement at the concentrator building, does that include the settlement that took place prior to the surcharge?

A It includes all of the settlement that took place including the settlement under the preload fill.

Q Roughly how long ago were you involved at this project?

A I would say it is about three years ago, it is quite recent.

Q All right.

A Yes, about three years.

Q And can you tell us, do you remember of the 16 inches how much took place before the preload and how much after?

A Oh, maybe a third of it took place before, I don't remember. That is the maximum settlement, not all points in the building settled that much.

Q Okay. Was there a differential settlement in this instance or was it all settling -- I guess you just mentioned there was a differential settling.

A There was differential settling. It was a different

foundation than the diesel generator building.

Q You indicated that the building looked better.

A You could not see cracks that you could see prior to that time.

Q Would you expect that from a surcharge program?

A I don't know whether you would or would not, it just happened to happen.

Q But if there are certain stresses on a structure causing cracks --

A Let me answer that question again. I would say if the surcharge program resulted in reduced differential settlements then you would expect that the cracks would close up.

Q Right, but if you have differential settlement before you start surcharge, and let's say the north end of the building is settling more rapidly than the south end of the building, if you put a surcharge over that whole building at a uniform rate, isn't -- why would that tend to reduce the differential settlement; isn't that going to either keep the differential settlement the same or aggrevate it?

A Well, the overall combination of the preload fill and the area fill may result in a more uniform settlement pattern in the building.

Q Okay. I'm sorry now, by preload fill, I think I know

what you mean --

A What I told you was that they had put in the building and then they put in the area fill which was required. When I went to the site I asked them to add preload fill in the building and adjacent to it and Dr. Hendron increased the amount of that preload for me, as to my recollection. Are you worried about the word preload?

Q No. Here is my concern, was the preload placed uniformly over the building?

A We try to put it uniformly to minimize differential settlement.

Q Okay, now that's the key, what did you do to minimize differential settlement?

A We tried to put in the fill in relatively uniform layers, you don't put all of it in at one end and nothing at the other.

Q Well, let me ask you this, do you have one end of the building settling more than the other if your preloading program puts more weight on the part of the building that is settling less, wouldn't that tend to reduce differential settlement?

A Would you say that again, please?

Q Yes, if you put more preload weight on the portion of the building that so far has settled less, wouldn't that tend to reduce your differential settlement?

A I believe that would, but I don't recall that we were that sophisticated in that particular instance.

Q That's my question then, if you didn't make any efforts, did you make any effort in your preload to reduce differential settlement?

A We do to the extent of putting in the fill in a uniform manner.

Q You indicated that the actual total settlement was approximately 16 inches --

A To my recollection -- it is my recollection that the maximum settlement in that specific building was about 16 inches.

Q And do you recall what your prediction settlement was?

A I would say it was probably around three inches, something like that.

Q Is there a report that you are aware of that describes the surcharging program that was conducted at Carrfork?

A Do you mean a summary report that we prepared later?

Q Yes.

A I don't recall that we did that. There are memoranda concerning the thing. I believe those would all be the property of Anaconda Copper Company.

Q You don't think that Bechtel would have any of those reports?

A I do not know that. At one time we would have, but I don't know what happened to the files at the end of the job.

Q Do you know if anybody in Bechtel would have them, who that person would be?

A I can't think of it right now.

Q Would they be in the San Fransisco Office?

A They would be in the San Fransisco Office in the Mining and Metal Division.

Q Do you know whether that summary report would show loading and settlement history?

A I do not believe I said there was a summary report.

Q Are you aware of any report?

A I do not recall that we did a final report on that, on the preloading. What I did say was there might be memos concerning it.

Q And would those memos be in your division files in San Fransisco?

A I believe they would be in mining and metals division files.

MR. PATON: Al, we are requesting that if such reports -- let's go off the record.

(At which time a discussion was held off the record.)

MR. PATON: Mr. Farnell, I'm requesting that you make an effort or you ask Bechtel to provide information concerning the experience just described by Mr. Ferris at Carrfork, including if possible loading and settlement history, cracking history, of the surcharge program that he has just described.

MR. FARNELL: Cracking history?

MR. PATON: Didn't he mention cracks?

WITNESS: I did mention cracks. I don't know what information is available.

MR. PATON: Those are the subjects, if any of that is available.

MR. FARNELL: We will make an attempt to locate such documents. Note for the record it is Christmas time and your stockings seem to be getting stuffed with many document requests but we will play Santa Clause and do our best for you.

MR. PATON: I appreciate that, Christmas or any time.

BY MR. PATON:

Q Can you tell me the thickness of the compressible layer at Carrfork?

A I can't answer that question. I can tell you that there was about 100 to 120 feet of soil above rock, but I don't know the relative compressibility.

Q Do you recall the height of the surcharge load?

A I don't precisely recall that. I really don't

recall the height.

Q Did you follow any general rule, such as the surcharge being 50 percent more than the final load?

A We -- my recollection is that we had it 50 percent over the dead plus normal alive load. That is what my recollection is and that is merely a recollection.

Q Do you have any recollection in that regard with respect to Midland as to what degree the surcharge exceeded the final expected load?

A Well, I believe at the last public meeting there was some information handed out showing what the preload stress was related to the building stress and I don't remember the exact numbers, but that piece of information was given to NRC.

Q Okay, fine.

Q Mr. Ferris, let me review, at Carrfork I think you indicated you did not take piezometer readings.

A No, there would have been no point in taking them.

Q That is correct, you did not?

A Yes.

Q Did you address piezometer readings with respect to the first example you gave?

A Yes, I did. That was the primary basis that we used for controlling the load.

Q Mr. Ferris, I want to ask you some questions about a piezometer elevation plot designated as piezometer number 40 which I'll show you. It is attached to a document entitled consumers exhibit number 12 of Mr. Kane's deposition.

A I didn't see these.

Q There are some pencil marks on that sheet, which are my own writing, and I ask you to ignore those, please.

A Okay. I can't read everything on this or at least I'm not sure that I understand it.

Q I think if you have any difficulty, I think we have a better copy of that. That one for example doesn't show the elevation.

A This is fine, I think I can understand it.

Q Let me ask you some questions and then if you want to review it some more.

A If I have a problem I'll let you know.

Q During the months of May, June and July, 1979, will you tell me whether that chart shows that the piezometer elevation shows a drop or an increase?

MR. FARNELL: I think the document will speak for itself.

WITNESS: It appears that -- I presume I don't see the scale on this drawing here, but I presume that upwards means increasing pore pressure.

Q We have a better picture of this which shows

this line to be 60 and that to be 65. I can show it to you if you want it.

A No, this is just fine.

Q Okay.

A It looks to me like there is a slight increase on the piezometer pressure.

Q Did you expect that?

A Well, I cannot tell that based solely on this document.

MR. FARNELL: What time are you talking about?

MR. PATON: He is looking at May, June and July and he said it increased and I asked, "Did you expect it to increase over that three month period."

WITNESS: But I think I would need to know something other than what you have just given me to be able to respond.

BY MR. PATON:

Q Well, let me ask you this, you know that the surcharge reached its full height on April 6th, 1979; is that correct?

A Yes, right. It was early and I didn't remember it was April 6th.

Q And it was starting to be taken off on August 15, 1979. It was fully off on August 30, 1979?

A Yes.

Q So that during the months of May, June and July, 1979,

the full load was imposed?

A Yes.

Q And what other information would you need to tell me whether that slight increase in piezometer elevation in that three month period is what you expected to have.

A The two things that come first to mind are I would like to see a plot of lake level during this period of time. And I would like to see information on the variation of the area ground water table in the vicinity of this, outside of the limits.

Q All right, are you indicating that that ground water level could have influenced the piezometer reading?

A Of course, it will increase the piezometer reading. I don't know if that is the cause of the rise because it could be that the lake was rising in that period. It could be that the area ground water is rising.

Q But didn't you indicate to me before that your knowledge of the piezometer elevation was part of what led you to conclude that you are now in secondary consolidation?

A Yes, that is correct.

Q Well, then if you are sure you are in secondary consolidation, then you must know what is going on with the ground water.

A What I'm saying is you need to change this to take out these other affects, effect of the lake and the ground

water and then look at that to see if there has been any.

Q Did you do that?

A I personally did not.

Q Did Bechtel do it?

A I believe something like that has been done.

Q All right. Who did that?

A It would have been done under Sherif Afifi's supervision.

Q Do you have knowledge, does he know that ground water table level during that period of time?

A I would assume he does. We had a lot of piezometers in the area.

Q Mr. Ferris, I want to show you Figure 1 attached to Consumers Exhibit No. 8 of the Kane deposition. And I suggest to you that there is a plot here showing pond elevation versus time. This second plot right here, and I think there is something that would show you the elevation of the pond during May, June and July.

I presume this must be August, this is about August here. There are some other platts that show it, let me point that out to you. I'm suggesting to you that this last chart shows April and here is August right there (pointing) and the days I think are the same. Right there on that bottom chart.

A And this piezometer is where the two pieces I wanted

to know were piezometers not affected by the surcharge, but in the vicinity of this structure so that I have some idea where the ground water table is and I also wanted to have a plot of the lake water because that lake elevation because that could have something to do with it.

Q What you are telling me in short is that you cannot simply --

A I cannot look at the plot and tell you right off.

Q All right, let me ask you this, if the piezometer number 40 was not influenced in any way by the ground water table, what would you have expected that curve to do in May, June and July?

MR. FARNELL: I think he also said it might be influenced by the lake.

MR. PATON: Well, I assume the lake is affecting the ground water, right, assuming it isn't affected by the lake or the ground water table, what would you expect that curve to do in May, June and July?

WITNESS: If it is not affected by the lake or the ground water, I would have expected it to be fairly level.

BY MR. PATON:

Q Well, as the surcharge squeezed out the excess pore pressures, wouldn't that line have declined?

A Yes, if it was still dur g that -- I did not

understand that question.

Q You are saying that it may have already squeezed out all of the excess pore pressures, that is a possibility. We are talking about a supposition, not about a real thing. You are saying that you can't really make accurate --

A I cannot look at that one curve without other data and tell you exactly what has happened.

Q And you did not do this?

A I did not make that evaluation.

Q But to your knowledge, you think Dr. Afifi did?

A I believe it would have been done in the soils group in Ann Arbor.

Q Did you ever hear Dr. Afifi say whether the piezometer behavior was -- what he had expected?

A The only comments on piezometers that I can recall is that people felt that the pore pressure dissipated quite quickly and, of course, we had no idea whether that was going to be the case beforehand or not. Do you know whether Dr. Afifi is also satisfied that you are now in secondary consolidation?

A I believe he is.

Q Is there anyone in Bechtel who has expressed to your knowledge any doubt about whether you are in secondary consolidation?

A I don't recall hearing anybody express that doubt.

Q Have any of your consultants expressed any question about whether you are in secondary consolidation?

A I have not heard them say that.

Q Okay. Who under Dr. Afifi do you know would do the actual work involved in taking out of that curve there the impact of the lake and the ground water table so that you would --

A I do not know that, on a day-to-day basis, that is entirely within Dr. Afifi's area of work and he could assign any of his people to do something like this.

Q Have you ever heard Dr. Peck discuss the piezometer behavior at the Midland site?

A Yes, I have.

Q What did you ever hear him say about it?

A I believe he is of the opinion that we have reached secondary consolidation.

Q Based on what I mean?

A Based on the data that he has been given.

Q Those are his conclusions?

A Yes.

Q Have you ever heard anything about his reasons or basis for his reasons?

A I'm sure I must have, but I can't recall specific statements.

Q Did you ever hear him say that the piezometer

behaved exactly as expected?

A I think he was a little surprised that the piezometer pressure didn't go a little higher than it did, but I don't know of anything else that was surpising and I guess he did not know how quickly the water pressure would dissipate either before we actually put the load on.

Q Let me ask you about there is a line on piezometer number 40 plot that says "begin surcharge removal."

A Yes.

Q And immediately after that line there is a fairly sharp drop in piezometer elevation.

A Yes.

Q What causes that to drop at that point?

A Well, one possibility would be just removal of the surcharge.

Q That relieves the pore water pressure, is that correct?

A Yes, in this particular instance it appears to have gone down and come back up again.

Q Okay, now coming back up again, is that called rebound?

A Well, it could be rebound.

Q What do you call it?

A I don't know that that's what it is called.

Q I don't understand what causes that. I can understand

why you take the surcharge off, there is a relief pore water pressure is relieved.

A And drops.

Q And drops the elevation drops. But do you understand why it goes back up again or rebounds?

A Well, I think it is going back to the controlling water level there. It may have gone below that when the load was taken out.

Q What force would cause it to drop way below that natural stage and bounce back up again?

A Well, if you had a negative pore pressure that would cause it.

Q Tell me what you mean by "negative pore pressures."

A Well, pore pressures that are less than the base that you are measuring the pore pressures from.

Q To me the answer is you have a negative pore pressure --

A Let me give you an example, and if you take a dense sand and squeeze it, you will see that what was -- maybe if it is saturated, what was wet on the outside becomes dry because when you sheer the sand it increases in volume and the pore water is sucked back into the pores. You get negative pore pressure.

Q All righ. Now, the curve shown on this piezometer number 40 plot after the removal of the surcharge shows lower

piezometer elevations, do you agree with that? Lower than it showed in May, June and --

MR. FARNELL: What point --

WITNESS: The thing I would like to know is where was the lake level during this period was there any pumping going on in this period. What other factors could have affected the ground beyond. I cannot just by looking at one curve tell you the answer to your question.

BY MR. PATON:

Q Absence to the knowledge of the ground or the water table level, you cannot draw any conclusions from the fact that the curve after surcharge removal is distinctly at a lower elevation than prior to the removal of the circulation. You can't draw any conclusions?

A Well, I would assume that part of that is because of the reduction of the water base water level for some reason, but I don't know what.

Q By base water, do you mean the ground water table?

A Yes, say the ground water level lowered beyond what happened. That's what I said with that one piece of information I could not --

Q In other projects, on which you have experienced with preloading, did the piezometer elevation decline after reaching full surcharge height?

MR. FARNELL: I don't understand. Would the court reporter

read back that question.

(At which time the aforementioned question was read back.)

MR. FARNELL: My objection is that are you assuming that the surcharge remained on or did you take off the surcharge, that's it. The question is indefinite.

BY MR. PATON:

Q After reaching the full surcharge height and the resuming is that it stayed on?

A I think I can answer your question. In the case of the oil tanks that I mentioned, when we applied an increment of water in the tank, the piezometers rose and then we maintained that water level in the tank and the piezometric level, level in the piezometer, declined and at some point we added another increment and the piezometer went up again.

Q And that is merely normal expected behavior; is that right?

A Yes.

Q And it declined because you were squeezing out the excess pore pressure?

A Right.

Q I assume that by looking at this chart, this plot of piezometer 40 you cannot tell absent some other information where you reached secondary consolidation?

A No, I would like to see other information before

I would make that decision. What I'm really trying to say, just giving me that chart doesn't tell me all the information I need to have. And I have not made an evaluation of it.

Q Have you seen the other information, do you recall having seen the other information that you said you might need? Such as the pond level.

A I probably have seen it. I do not recall it in relation to that curve. In fact, I don't recall that specific curve, although, I must have seen it because I presume it was at the public hearing.

Q Approximately how long -- and is it your testimony that you, yourself, did not make a computation to remove from this type of information any impact of the pond or the ground water level?

A I did not.

Q You didn't do that yourself?

A I didn't.

Q Did you ever review that work that was done by anybody else?

A I'm sure I must have reviewed some of that in the responses that have been made to NRC.

Q Roughly how long ago would that have been?

A Quite some time ago.

Q Do you know what kind of piezometers were used at the midland site at the diesel generator building?

A The piezometers that I saw at the Midland Plant site were casagrande type piezometers.

Q Is that an open-tube type of piezometer?

A As it was used at Midland it is.

Q Were all of the piezometers used in connection with the diesel generator building to your knowledge of that type?

A I believe they were.

Q Were there piezometers in use in other places on the site that were other than open-tube type?

A I don't recall.

Q Do the piezometers at the diesel generator building, which I think you said were open-tube type, have a problem with time lag?

A Well, there is a time lag affect for any type of piezometer. Casagrande type of piezometer was developed to reduce the time lag from what I would call a stand pipe piezometer, a stand pipe observeration. And so there would be a small time lag.

Q You mean the open-type has less of a time lag than another?

A The time lag relates to the time that it is required for the water to flow into the piezometer to reach equalibrium level. If you can do that with a very small volume of water, then the time lag will be small and there are piezometers

like that. And then with a casagrande type, there is a small, I think it is a 38th inch diameter intube so that the volume of water if piezometer changes by a foot of volume of water that flows in has to be whatever the volume of water is in a 38th inch tube of a foot.

Q Do you know who placed the plant fill at Midland as between Bechtel and Canonie?

MR. FARNELL: What part?

WITNESS: I was never at the Midland site at that time so I cannot tell you from my own knowledge. But it is my understanding that the lower part of the fill was placed by Canonie up to somewhere about elevation of 615 and above that the fill was placed by Bechtel, but I don't know how reliable that information is.

BY MR. PATON:

Q How about at the dike?

A Canonie was a contractor in the dike.

Q To your knowledge Canonie did the entire dike?

A It is my understanding he did the entire dike.

Q To your knowledge, did Dr. Afifi suggest some compromise with respect to the borings that are being requested by the staff?

A Suggest to me?

Q Suggest to Bechtel or to --

A I don't know if he did to Bechtel, but he and I

discussed possible.

Q Tell us those conversations, tell us what he said and what you said.

A Well, I would have to start off the thing by saying that I don't believe that the borings that were requested with the core are technically required. I believe that for each of the fixes that we have provided you information there is a check which is a sound check and well recognized in the industry.

Q I'm sorry, sir --

A A sound check. Therefore, our discussions were not related to the technical necessity of doing borings.

Q Okay.

A But rather discussing what might be done to get out of a stalemate situation. That's really the only basis that we discussed.

Q Did you read Dr. Afifi's deposition that addressed that subject?

A I'm sure I must have. I don't recall exactly.

Q Let me suggest to you that I asked him whether his suggestion was based on -- I'm going to suggest something to you and ask you if it refreshes your recollection. I'm going to suggest to you that I asked him whether his recommendation were based on the merits of the case, the real need for borings, or was it just an attempt on his part to settle,

get rid of a problem with the staff.

A Well, I don't know about his recommendation that you are talking about, I'm talking about discussions I had with Dr. Afifi.

Q And I'm asking you about your recollection of his deposition --

A I don't remember.

Q I suggest to you that he gave the matter some consideration and said it was very difficult to know which of those two provided the basis for his suggestion.

MR. FARNELL: I totally disagree with that. And also Mr. Afifi has not completed his deposition yet, so I can't agree with that at all.

BY MR. PATON:

Q Can I ask you to read pages 245 through page 250.

I think starting on line 20 he tells what he proposed.

My question is, did you ever have any conversation with Dr. Afifi that led you to believe that there was any question in his mind as to the basis for his settlement in this dispute?

A I don't understand the question.

Q All right, let me strike that.

What was your understanding of what his

suggestion was or his offer was to provide the staff with some information?

MR. FARNELL: There is a couple -- can you refer to a specific page in here or --

MR. PATON: You can base your answer on the deposition or conversations that you had with him. Do you understand that he made some kind of an offer or a suggestion?

WITNESS: I read that here. What I told you was that I had conversations with Afifi, but I don't know anything about conversations that he had.

BY MR. PATON:

Q What is your recollection of your conversations with Dr. Afifi as to any suggestion he had to bide the staff with some of the information they were requesting?

A The recollection that we had, we met with the NRC, I believe at the end of July at that meeting it was my recollection that it seemed it was a problem in the staff's understanding bearing capacity. And I believe our discussion was based around trying to satisfy that requirement to see if there was some way we could satisfy that because we felt perfectly satisfied, in fact, with bearing capacity and with settlement from a technical point of view with the information we presented.

But in an effort to get out of the stalemate, we discussed what might be done, but those were

discussions between Dr. Afifi and me and were not. And I don't know how those discussions were transmitted further on in the organization, I don't know if they were transmitted further in the organization.

Q Am I correct that the thrust of your statement is that at least in your opinion any suggestion to provide the staff with that information was based on your desire to settle the dispute and not based on your real thought that this information was really needed by the staff?

A That's correct.

Q Now, my question is this, did Dr. Afifi ever say anything to you that indicated he agreed with you in that regard, that he was doing it solely to satisfy the staff as opposed to thinking that there was any real need for this information?

A I believe that's the spirit in which we had the discussion.

Q To your knowledge, he agreed with your thinking on that matter?

A That would be my recollection of the conversation.

Q And you have just read his deposition from pages 245 to 250.

A Right.

Q Does your understanding of pages 245 to 250 indicate to you any conflict --

A I don't really see anything.

MR. FARNELL: You are talking about two different things. His conversation with Mr. Afifi and these are conversations with other people.

WITNESS: In reading that I don't see any conflict with the discussions.

What was your question that led up to all this response, do you recall what your question to me was?

BY MR. PATON:

Q Now, I'm going back to our discussion of a minute ago about piezometer number 40.

A Yes.

Q And I think you indicated that you couldn't just look at that plot and make conclusions.

A Yes, I don't believe so.

Q You might not have said this, but I construed it to mean you would have to take out of that plot the affects of the ground water.

A I would have to look at all those factors that might affect the piezometric level.

Q Can you tell me how you would go about that, how would you take information concerning the ground water table, how would you --

A Physically?

Q How would you take that information and interpret the

piezometer number 40 plot?

A I believe I would have to go through all the piezometri data they have to get that information that's necessary to modify that curve.

Q Did the graph that I showed you -- do you recall, I'll be glad to show it to you again.

A I recall the one you showed me.

Q Did it show that the level of the pond did not change during that period?

A The particular graph that you showed me for PC-40 did not have the pond elevation on it.

Q I thought it did.

A You showed me one for PC-30, that had pond elevation.

Q This graph for PC -- my point is the pond is the pond. Would you expect --

A I wouldn't disagree with that.

Q And would you disagree that during May, June and July, the level of the pond --

A The problem I have with this graph was knowing where May, June and July is on it. I can see April and I can See August. The pond elevation during that period rose slightly and then fell according to this. The scale on this drawing is quite different than the scale on the one you just showed me there.

Q Is the change in elevation of the pond

sufficient to have affected the piezometer elevation?

A It could have, I don't know without looking at data to be able to tell you, but the change in the pond elevation would have caused some change in the ground water level and the plant fill and the affect of that on the piezometer is what I would be interested in finding.

Q Even if the pond water level remained absolutely constant, it could be that it was causing the ground water table to -- the ground water table was changing as a result of the influence of the pond; is that possible?

A Well, that would be one factor that I would want to look at. I do not know because I don't have the data here, I do not know whether in fact that was happening, but that would be one thing I would like to look at.

Q Mr. Ferris, directing your attention to piezometer number 40 plot, and specifically the piezometer elevation after the surcharge has been removed, and bearing in mind the fact that the elevation of the pond on figure 1 shows the elevation of the pond remained constant --

MR. FARNELL:: I'm going to object, he didn't agree with that statement.

MR. PATON: All right, I'll start with that.

MR. FARNELL: You are talking about two different scales and they are hard to read so I think this whole line of questioning is going nowhere, slowly.

BY MR. PATON:

Q Directing your attention on Figure 1 of Kane Deposition Exhibit No. 8, the pond elevation, would you agree that it remained almost constant through the end of the year 1979?

MR. FARNELL: He said already he had problems with it --

MR. PATON: From the middle of '79 to the end of the year.

MR. FARNELL: He said already he had problems with the scale on that thing.

BY MR. PATON:

Q He may have problems. If he can't answer the question because of problems, that's fine.

MR. FARNELL: What do you mean by "almost" counsel?

MR. PATON: If he can't answer the question, he should say so.

MR. FARNELL: It's vague, I'm objecting. I'm telling you, you don't have to speculate, either.

WITNESS: I can see that this line is relatively level. There are little humps in there.

BY MR. PATON:

Q All right, bearing in mind that, what would be the possible explanations for the fact that the piezometer elevation after the surcharge removal appears on piezometer

number 40 plot to be lower than the piezometer elevation prior to the beginning of the surcharge.

A I think I would have to go back to what I said before. The pond level is one of the pieces of information but the ground water level in the vicinity of the diesel generator building is another and there could be things that were going on that I am not aware of that need to be factored into that before you can analyze it.

Q Can you tell me anything that would cause a sharp change in the ground water table?

A Yes, a sharp rise in the pond might locally cause a --

Q Or a sharp decline?

A Or a sharp decline.

Q Do you know of any others.

A Well, I'm sure I could think of some, I just don't know offhand.

Q What we are suggesting is there was no change in the pond and what other possible causes could there be?

A Well, if I was going to analyze that, one of the things I would look at first, is the whole pattern of the ground water in the plant fill, and that is controlled by the pond, but the pond level the level at some point within the fill doesn't have to be the same.

(At which point the deposition ended on December 10, 1980, at 6:00 p.m. to be resumed on December 11, 1980, at 8:00 o'clock a.m.)

AUTHENTICATION

This is to certify that the attached proceedings before the Nuclear Regulatory Commission in the matter of:

DOCKET NUMBER: 50-329-OM, 50-330-OM, 50-329-OL, 50-330-OL

PLACE OF PROCEEDING: Offices of Isham, Lincoln and Beale
One First National Plaza, Floor 42
Chicago, Illinois

DATE OF PROCEEDING: December 10, 1980

were held as herein appears, and that this is the original transcript thereof for the file of the Nuclear Regulatory Commission.

Terri Heraty

TERRI HERATY

AUTHENTICATION

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