

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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

APPLICANT'S RESPONSE TO INTERVENOR
STAMIRIS' PLEADING OF DECEMBER 24, 1984

I. Introduction

On December 24, 1984, Intervenor Barbara Stamiris filed a pleading entitled "Intervenor Stamiris' Request for Evidentiary Hearings on Matter Raised in the CPCO-Dow Trial, and Referral of Certain Matters to the Office of Investigations" ("the Request"). The Request, inter alia, sought to expand the Board's reopening of the record related to the litigation between Consumers Power Company ("Consumers" or "Applicant") and Dow Chemical Company ("Dow")^{1/} to consider (1) the circumstances surrounding the substitution of boring logs from elsewhere in Midland in place of the correct ones for the diesel fuel oil tank area and (2) two segments of testimony of Mr. Donald Horn. The Applicant believes that, in the present posture of this proceeding, a request for piecemeal review of

^{1/} Consumers Power Company (Midland Plant, Units 1 and 2), LBP-84-20, 19 N.R.C. 1285 (1984)

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information raised in the Dow litigation is premature, wasteful, and indeed contrary to the thrust of the relief sought in the Request itself. The Applicant therefore requests the Board to refrain from entertaining any further such requests until Consumers notifies the Board that it is contemplating the restart of construction on the Midland Project.

II. Advisability of Waiting Until Reactivation

As the Board is well aware, on July 16, 1984 Consumers shut down construction of the Midland plant. See Board Notification 84-148, Sept. 14, 1984. Mr. John D. Selby, in an affidavit furnished to the Board, indicated that Consumers had no plans to resume construction on the Plant. Consumers Letter to Board, Nov. 5, 1984. Moreover, as the Board noted in its Partial Initial Decision ("PID"), the Applicant has proposed that no further hearings be held at this time. Consumers Power Company (Midland Plant Units 1 and 2), LBP-85-2, slip opinion at 17 (Jan. 23, 1985).

Circumstances therefore greatly distinguish the current situation from that in which the Board found itself in LBP-84-20, supra, when it reopened the record to hear certain Dow issues. At that point, both construction of the project and the hearings were active; at present construction of the project is suspended and no hearings are scheduled. Indeed, the Board in LBP-85-2 characterized the quality assurance and management attitude issues in the case generally as being of

"uncertain materiality, even if work on the project were ever to be resumed." LBP-85-2, supra at 4. In such circumstances it would be a waste of the resources of the Board and the parties for the Board to entertain this, or any future, requests to reopen the record based on the Dow litigation, absent some indication by Consumers that it intends to revivify the project and pursue the licensing hearings.

It would in any event be unsound practice for the Board to indulge in item by item review of fragments of testimony from the Dow litigation before the entire record is available. Isolated excerpts of any record can be seriously misleading. To make decisions regarding the necessity for further hearings before this Board based on a partial record in the Dow litigation may lead at best to confusion and at worst to serious error. Intervenor Stamiris has acknowledged as much in the Request by asking the Board in effect to defer ruling on the Request until after the completion of the Dow trial. And, as the Board has noted, the issues in the Dow litigation of interest in this proceeding are limited. LBP-84-20, supra at 1302.

Moreover, in LBP-84-20, the pivotal issue was whether the record should be reopened to encompass Dow issues at all. Here that question is not posed. The Board has already decided in LBP-85-2, supra at 359, to retain jurisdiction to hear further matters arising out of the Dow litigation. Thus, no prejudice to anyone, and substantial benefit, would accrue from

deferring all motions to expand litigation of Dow issues in this proceeding at least until Consumers gives notification of reactivation of the project.

The instances cited by Ms. Stamiris in the Request amply demonstrate that reviewing seriatim the material uncovered in the Dow litigation would be unwise. With respect to the information discovered regarding the boring logs B-1 to B-4 at the Diesel Fuel Oil Tank location, the Applicant issued a 10 C.F.R. § 50.55(e) report on December 21, 1984. In that report, Consumers set forth the information presently available regarding the boring log substitution. Consumers also indicated that it would not pursue further investigation or reporting unless the Midland project is reactivated. Under these circumstances, there is essentially nothing to litigate. The Board implicitly recognized the futility of prompt hearings on this issue in its PID. LBP-85-2, supra at 15-16.

Ms. Stamiris also relies on a newspaper report^{2/} of one segment of testimony and a brief quotation of another from the Dow transcript as supporting a need for expanded litigation of Dow issues in this proceeding. The chosen segments, however, constitute highly selective use of testimony to support a preconceived inference that facts relating to soils

^{2/} Reliance on a newspaper account, without examination of the actual transcript, is, in itself, improper and unsound.

settlement issues have been withheld from this Board. As closer analysis shows, neither of these examples rises to a level of substantiality sufficient to warrant further inquiry in this licensing proceeding.

Ms. Stamiris' first example makes a reference to testimony of Donald Horn supported only by a terse and oblique reference in a newspaper article. The sketchy report is supposed to reflect nondisclosure of important information regarding soils problems to the NRC.

In the actual testimony in question Mr. Horn is testifying about the authenticity of a Quality Assurance Daily Log Sheet dated November 30, 1978 which he prepared and signed. (A copy of this Dow trial exhibit is attached hereto as Appendix A.) The document, inter alia, contains an agenda for a meeting with the NRC Staff regarding the Diesel Generator Building to be held on December 4, 1978. In pertinent part, that agenda reads: "Chuck would state that borings are complete in all areas. Testing is complete for Diesel Generator Building. Also, no settlement in other areas was to be mentioned." Appendix A at p. 2.

Ms. Stamiris' implication is that this agenda excerpt, taken out of context, proves that the Applicant intended to withhold information about settlement of Category I

buildings other than the Diesel Generator building from the NRC at the December 4, 1978 meeting. A look at the totality of the record both in the Dow litigation and before this Board shows just the contrary.

In fact, there should be no implication that documents of this genre were withheld from the NRC or the Board. Although this particular log dated November 30, 1978 is not an exhibit before this Board, Mr. Eugene Gallagher testified from another of Mr. Horn's QA logs dated December 21, 1978 after refreshing his recollection from a number of such logs shown him by Mr. Zamarin. Tr. 2337 (July 15, 1981).^{3/} There is no reason to believe that the November 30 log was not part of the discovery and disclosure process preceding the 1981 hearings.

Secondly, whatever the "no settlement . . . was to be mentioned" sentence seems to mean in the isolated context of the excerpted agenda, there is no evidence that the meeting participants, especially Mr. Horn, actually withheld any information from the NRC. On the contrary, the meeting notes of the December 4 meeting with the NRC Staff (Appendix B hereto) show that the participants in the December 4 meeting were there to discuss the settlement of other Category I

^{3/} Citations to transcript of this proceeding are given as Tr. ___. Citations to the Dow litigation transcript are given as Dow Trial Tr. ___.

structures, not just the Diesel Generator Building: "The purpose of the meeting was to inform the NRC of the status of the settlement problem of the diesel generator building and other structures at the Midland Plant." Appendix B at p. 2. This set of meeting notes was introduced as Stamiris Exhibit 7 in this proceeding.

One need not rely utterly on documentary evidence as to the meaning of Mr. Horn's testimony paraphrased in the November 14, 1984 newspaper article. On December 20, 1984, he testified in the trial about his November 30 log and about the December 4 meeting itself. He stated that the agenda item meant that the lack of settlement in other Category I structures was to be mentioned to the NRC as a positive item and that the meeting focused on Category I structures.^{4/}

^{4/} Mr. Horn testified specifically:

Q. He asked you or had you read the sentence concerning status report for Bechtel and a line that reads:

"Chuck would state that borings are complete in all areas. Testing is complete for diesel generator building. Also, no settlement in other areas was to be mentioned."

Can you explain what the discussion was at the November 30, 1978, meeting regarding this particular portion of your notes as reflected in your log?

A. The statement "Also, no settlement in
(Footnote Continued)

Mr. Horn also specifically testified (Dow Trial Tr. 3579) that the Bechtel meeting minutes of the December 4, 1978 meeting -- Stamiris Exhibit 7 -- shows that Category I structures were discussed at the December 4 meeting. Any inference from the Dow trial that the Applicant withheld information about settlement of other Category I structures from the NRC is not supportable.

The second testimony excerpt cited by Ms. Stamiris is a further example of selective use of a fragment of testimony to distort the meaning of the whole. Again, the totality of the record available supports just the reverse of what Ms. Stamiris asserts. The Request at p. 3 quotes but one question and answer from a lengthy interrogation of Mr. Horn by

(Footnote Continued)

other areas was to be mentioned," was to be a positive statement. It was to indicate to the NRC that we did not have excessive settlement in other areas and therefore that was to be mentioned, the fact that we did not have settlement in other areas.

Q. Now, at your meeting on December 4th with the NRC, was the focus of that meeting -- the discussion, I should say, of that meeting focused on Category 1 structures?

A. To the best of my recollection it was Category 1 structures.

Dow Trial Tr. 3573-74. (The entire transcript segment from which this quote is excerpted is attached hereto as Appendix C.)

Mr. Goold (Dow Trial Tr. 2472) for the proposition that "Applicant had a greater awareness of the extent of the soils settlement problems in 1977 following the Administration Building grade beam settlement, than was revealed in the OM/OL proceeding."^{5/} In other words, the Request implies that

^{5/} Ms. Stamiris cites Donald Horn's November 9, 1984 Dow trial testimony in such a manner as to suggest that Mr. Horn was stating his own personal knowledge. In fact, even the quoted question and answer themselves show that Mr. Horn is testifying as to what the document in question says, not to his personal knowledge of the subject matter of the document, namely the U.S. Testing compaction tests at the Administration Building.

Lest there be any doubt as to that conclusion, a few pages earlier in the transcript Mr. Goold had the following colloquy with Mr. Horn:

- Q. Nobody advised you at the time that tests had been rerun and the results of that reexamination showed that the "percent compaction was in all cases lower than that previously determined?"
- A. I don't recall that.
- Q. Nobody from -- you didn't discuss that with anyone from U.S. Testing?
- A. Not that I recall.
- Q. Did you discuss it with anyone from Consumers Power?
- A. Not that I recall.
- Q. Did you discuss this information with anyone from Bechtel?
- A. Not that I recall.

Dow Trial Tr. 2469.

Consumers withheld information on the details of the analysis of the Administration Building grade beam settlement problem from the parties and the Board. As the record shows, however, the parties and the Board had ample opportunity to inquire into the Administration Building problems in the 1981 hearings.

The subject matter of the interrogation of Mr. Horn quoted in the Request is known to the Board and to the parties to this proceeding. The document with respect to which Mr. Horn is testifying is the initial Bechtel Report on the Administration Grade Beam failure, issued in December, 1977. (A copy of this report is attached as Appendix D.) This Report, though apparently never introduced as an exhibit in this proceeding, was furnished to NRC inspectors during their investigation of soils settlement matters. See, e.g., prepared testimony of Hood, Kimball and Gallagher, July 10, 1981 following Tr. 1560; Gallagher, Tr. 2351, 2554. Ms. Stamiris herself, in the course of a lengthy examination of Consumers witness Howell in July of 1981, indicated that she had access to a draft of the document which was the subject of Mr. Horn's testimony. Tr. 2816.

More importantly, testimony was presented to this Board with respect to the facts underlying the evidence in the Dow trial to which Ms. Stamiris' Request refers. The flaws in the soil compaction test procedures used by U.S. Testing Company in its analysis of the Administration Building grade beam settlement were addressed by Consumers witness Keeley in

his prefiled direct testimony. Mr. Keeley explicitly discussed the recalculated results of the proctor tests.^{6/}

Moreover, Chairman Bechhoefer questioned NRC witness Gallagher about the inferences which should have been drawn from the information contained in the report. Gallagher, Tr. 2572-75. Clearly, the Board and the parties had opportunity to ventilate the subject of the Administration Building proctor tests. Again, the suggestion that Consumers withheld information from this Board is insupportable.

III. Conclusion

Neither of the examples from the Dow transcript gives rise to any new issues or suggests any new conclusions on any issues previously litigated before this Board. Given the flimsiness of the basis for the claim that these two excerpts

^{6/} Mr. Keeley's testimony reads:

In August, 1977, Consumers Power became aware of settlement of a grade beam for the Administrative Building, a non-safety related structure. Investigation indicated that in the affected area the fill had been compacted to a value lower than that required by the specification. It was determined that the testing contractor, U.S. Testing, had selected lower maximum laboratory dry density standards than were appropriate, which resulted in an indication that the soils underlying the grade beam had been compacted to greater than 95% of optimum. In actuality, such soils were compacted in a range of 83.1% to 90.5% of optimum.

Keely, prepared testimony at 5, following Tr. 1163.

from the Dow transcript contain new information or suggest that Consumers withheld information from this Board, the Board should indicate that it will not consider further motions to reopen the record unless and until additional hearings are scheduled in this proceeding.

Respectfully submitted,

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Dated: February 8, 1985

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

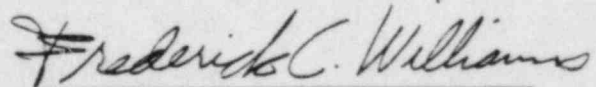
BEFORE THE ATOMIC SAFETY AND LICENSING APPEAL BOARD

'85 FEB 11 AM 11:05

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

CERTIFICATE OF SERVICE

I, Frederick C. Williams, one of the attorneys for Consumers Power Company, hereby certify that copies of the Applicant's Response to Intervenor Stamiris' Pleading of December 24, 1984 were served upon all persons shown in the attached service list by deposit in the United States mail, first class, postage prepaid, this 8th day of February, 1985.


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CONSUMERS POWER COMPANY
PROJECT QUALITY ASSURANCE SERVICES
DAILY LOG SHEET

DISCIPLINE: ONE Civil
DATE: November 2, 1978
PAGE 2 OF 3

ACTIVITY	ENTERED BY SIGNATURE & DATE	FINDING AND/OR EVALUATION	NCR WRITTEN YES/NO	CORRECTIVE ACTION, CLOSURE DATE, AND SIGNATURE OF PERSON CLOSING ITEM
	<p><i>Donald F. Howe</i> 11-30-78</p>	<p>Sherif Afifi stated that the reason for using Dutch comb penetrometer was:</p> <ol style="list-style-type: none"> 1. <i>haste</i> measurement of strength. 2. Actual comparison of variations of materials <p>IV. Consultants recommendation by Dr. R. D. Peck and C. J. Dunnichoff</p> <ol style="list-style-type: none"> a. Preload b. Instrumentation <p>V. Status report by Bechtel (Chuck McConnell)</p> <ol style="list-style-type: none"> a. Activities completed <p>Chuck would state that borings are complete in all areas. Testing is complete for Diesel Generator Building. Also, no settlement in other areas was to be mentioned.</p> <ol style="list-style-type: none"> b. Activities in progress <p>Soil monitoring instrumentation is approximately 80% complete. Utilities have been monitored. Concrete crack monitoring/recording is in progress. Filling of the pond is in progress. Concrete to be poured next week in the slab on the second floor.</p>	<p><i>YJ</i></p>	<p><i>N/A</i></p> <p style="text-align: right;">Copy sent to Section Head on <u>12-11-78</u></p>

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CONSUMERS POWER COMPANY
PROJECT QUALITY ASSURANCE SERVICES
DAILY LOG SHEET

DISCIPLINE: ONE Unit
DATE: November 30, 1978
PAGE 3 OF 5

ACTIVITY	ENTERED BY SIGNATURE & DATE	FINDING AND/OR EVALUATION	NCR WRITTEN YES/NO	CORRECTIVE ACTION, CLOSURE DATE, AND SIGNATURE OF PERSON CLOSING ITEM
	<p><i>Donald E. Horn</i> 11-30-78</p>	<p>c. Activities planned for Future</p> <p>Other structures, condensate tanks and transformer pads will be covered in the discussion.</p> <p>VI. Schedule by Bechtel</p> <p>The big holdup is the north section for Turbine Building modification</p> <p>a. Overall Project</p> <p>Construction 58% complete Engineering 86% complete Structural Concrete 93% complete Fuel Loading 11-1-80 First Diesel Generator needed for testing 1-1-80</p> <p>b. Impact on Project schedule</p> <p>c. Schedule for remedial measures</p> <p>VII. Responses to open items in NRC Inspector's report dated 11-17-78</p> <p>a. FSAR conflicts</p> <p>b. Project specifications conflicts</p> <p>c. NRC question 362.2 FSAR Section 2.5.4.5.1</p> <p>d. Structural aspects of the building settlement</p> <p>It was stated by Ben Margullo that the Bechtel responses were too general and that specific reference should be made to each comment. A meeting would be set up after lunch to discuss</p>	<p>1/5</p>	<p>N/A</p> <p>Copy sent to Section Head on <u>12-11-78</u></p>

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CONSUMERS POWER COMPANY
PROJECT QUALITY ASSURANCE SERVICES
DAILY LOG SHEET

DISCIPLINE: ONE Carl
DATE: November 30, 1978
PAGE 4 OF 7

ACTIVITY	ENTERED BY SIGNATURE & DATE	FINDING AND/OR EVALUATION	NCR WRITTEN YES/NO	CORRECTIVE ACTION, CLOSURE DATE, AND SIGNATURE OF PERSON CLOSING ITEM
	Jim [unclear] [unclear] 11-30-78	such responses. VIII. Summary and Conclusion of DG by Carl Weidner IX. Closing comments by CPCo This would include asking NRC what needs the final report they have to close out.	No	NA
<p>Held meeting on response to open items in NRC inspector's report held 11/17/78 Present attending C. Margaglio W. Bird P. Martinez L. Weisbach G. Lickhorne A. [unclear] T. Bette J. Kottmuller J. Weisbach P. [unclear] B. [unclear]</p> <p>Continued</p>	Donall [unclear] 11-30-78	<p>1) FSAR conflicts - a. Dipan just mentioned the differences in [unclear] b. suggested it should cover the [unclear] [unclear] c. [unclear] [unclear] [unclear] d. [unclear] [unclear] [unclear] e. [unclear] [unclear] [unclear] f. [unclear] [unclear] [unclear] g. [unclear] [unclear] [unclear] h. [unclear] [unclear] [unclear] i. [unclear] [unclear] [unclear] j. [unclear] [unclear] [unclear] k. [unclear] [unclear] [unclear] l. [unclear] [unclear] [unclear] m. [unclear] [unclear] [unclear] n. [unclear] [unclear] [unclear] o. [unclear] [unclear] [unclear] p. [unclear] [unclear] [unclear] q. [unclear] [unclear] [unclear] r. [unclear] [unclear] [unclear] s. [unclear] [unclear] [unclear] t. [unclear] [unclear] [unclear] u. [unclear] [unclear] [unclear] v. [unclear] [unclear] [unclear] w. [unclear] [unclear] [unclear] x. [unclear] [unclear] [unclear] y. [unclear] [unclear] [unclear] z. [unclear] [unclear] [unclear]</p>	No	NA

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on 12-11-78

CONSUMERS POWER COMPANY
PROJECT QUALITY ASSURANCE SERVICES
DAILY LOG SHEET

DISCIPLINE: AME Civil
DATE: November 30, 1978
PAGE 5 OF 5

ACTIVITY	ENTERED BY SIGNATURE & DATE	FINDING AND/OR EVALUATION	NCR WRITTEN YES/NO	CORRECTIVE ACTION, CLOSURE DATE, AND SIGNATURE OF PERSON CLOSING ITEM
	<p><i>Donald E. Thum</i> 11-30-78</p>	<p>(3) NRC Question 36.2.2 FSAR Section 2.5.4.5.1 Item 41100410 suggested that "VII" be split into 2 items: (a) NRC Question 4 (b) NRC report response Response to this question has been sent into the NRC. It was suggested that meeting be held with H. Muelgahn after the meeting on items of proprietary nature, slip later it was agreed to discuss this during the regular meeting. (4) structural aspects of the existing attachment - cracks in walls are being monitored.</p>	<p>No</p>	<p>NA</p>
<p>10th meeting with a Kirk Anderson, a Wilson, 1 Paul Shelton NRC meeting and NRC report to be prepared for the meeting.</p>	<p><i>Donald E. Thum</i> 11-30-78</p>	<p>All items in NRC inspection report will be reviewed.</p>	<p>No</p>	<p>NA</p>

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Copy sent to Section Head
on 12-11-78

Bechtel Associates Professional Corporation

777 East Eisenhower Parkway
Ann Arbor, Michigan

Mail Address: P.O. Box 1000, Ann Arbor, Michigan 48106



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MEETING NOTES NO. 901

MIDLAND PLANT UNITS 1 AND 2

CONSUMERS POWER COMPANY

BECHTEL JOB 7220-101

DATE: December 4, 1978
PLACE: Midland Jobsite
SUBJECT: Meeting with CPCo and NRC Regarding Settlement Problem
for Diesel Generator Building and Other Structures
FILE: 0279, C-2645

ATTENDEES:

Bechtel

S.S. Afifi
W.L. Barclay
J.P. Betts
A.J. Boos
B. Dhar
W.F. Ferris
Y.K. Lin
A.S. Marshall
P.A. Martinez
B.C. McConnel
G.L. Richardson
M.O. Rothwell
N. Swanberg
K. Wiedner

CPCo

W.R. Bird
T.C. Cooke
D.E. Horn
C.A. Hunt
D.B. Miller
D.E. Sibbald
R.M. Wheeler

Bechtel
Consultants

C.J. Dunicliff
(Instrumentation)
R.B. Peck (Soil)

NRC

R. Cook
G. Gallagher
D. Gillin
L. Heller
D. Hood

STAMMARIS EX 7

- ATTACHMENTS:
- 1) Memo to S.A. Varga, Chief, Light Water Reactors Branch No. 4 from D. Hood, Project Manager, Light Water Reactors Branch No. 4
 - 2) Agenda for Meeting with NRC at Midland on 12/4/78
 - 3) CPCo letter Serial CSC-3663 dated 12/7/78
 - 4) List of Documents Presented in the Meeting

PURPOSE: The purpose of the meeting was to inform the NRC of the status of the settlement problem of the diesel generator building and other structures at the Midland plant. Attachment 1 from the NRC states their purpose for the meeting. Attachment 2 was adopted as the agenda for the meeting.

SITE VISIT: The participants from the NRC except G. Gallagher, accompanied by Bechtel and CPCo representatives, visited the diesel generator building, service water pumphouse, condensate tank foundations, retaining walls for cooling pond, tank farm (including borated water storage tanks area), and radwaste building at the Midland plant site on December 3, 1978.

ITEMS DISCUSSED:

1) History

Bechtel presented a brief description of the plant arrangement and settlement monitoring program. The heavier Category I and Category II structures like the containment buildings and the major part of the auxiliary and turbine buildings, are founded on glacial till, the natural soil. Also located on glacial till are the major part of the service water pump structure (Category I) and other Category II pump structures. The settlement of these structures are within the predicted range and did not cause any problem.

The rest of the plant structures, both Categories I and II, are founded on plant area fill. The Category I structures are a part of the auxiliary building, i.e., loading bay, the diesel generator building (DGB), part of the service water pump structure, and the underground emergency diesel oil tanks. The settlement monitoring program indicated that the settlement of the DGB was greater than expected. It was reported under the provisions of 10 CFR 50.55a due to the magnitude of investigative tests and the required analysis of test results.

The available settlement data of the DGB was then reviewed. It was noted that when the ductbanks were separated from the DGB, the east end of the building settled by approximately 2 inches, whereas there was no significant settlement at the west end. Bechtel attributed this difference in settlement to the absence of any deep vertical duct bank at the west end of the building.

2) Soil Exploration

After the settlement problem of the DGB was observed, an extensive subsurface investigation (e.g., soil boring program, dutch cone penetration tests, and various laboratory tests of soil samples) was performed to evaluate the plant fill. The results of the tests indicated soil properties which varied from poor to good.

Bechtel has not yet investigated the causes of the problem because their attention has been directed toward correcting the situation as quickly as possible. However, the consultants, Dr. Peck and Dr. Hendron, were asked this question at a meeting in Urbana on November 7, 1978. The following is a brief summary of Dr. Peck's response.

- a. The fill is of very variable quality, but the records of fill placement do not support this.
- b. It may be difficult, and maybe even impossible, to find out the causes for this variability.
- c. It could be due to:
 1. Variability of the soils in the backfill (there are both sands and clayey sands). The NRC has already mentioned this in one of their letters.
 2. The fill may have been placed dry of optimum, and became saturated as the water table rose when the cooling pond was filled. Had measurements of change in water table and settlement been available, it might have been possible to evaluate this.
 3. This initial fill may have been satisfactory, as the record shows, but the excavations for duct banks, piping, etc may not have been so well backfilled because most of that work would have involved hand compaction.
- d. Most fills are not homogeneous and this is not always found out. In any case, why the fill got to this state is now irrelevant to the problem of correcting the situation.

The NRC emphasized that the office of inspection and enforcement believed cause determination to be mandatory to preclude repetition of a similar problem.

3) Consultants' Recommendation

- a. Soil Consultant Dr. R.B. Peck stated that bearing capacity was not a problem but settlement is the real problem. The corrective action must limit future settlement to an acceptable degree. Hence, preloading of the entire area was recommended as a means of consolidating the fill.

The data from the instrumentation in the soil would help to indicate when satisfactory consolidation had been achieved. It is anticipated that a major part of settlement should occur rapidly as the area is being preloaded. The actual time required for desired consolidation would be difficult to predict at this time.

- b. Instrumentation Consultant C.J. Dunnicliff described the soil instrumentation and the monitoring program for concrete cracks. Soil movement and variation in pore water pressure at three different elevations in the fill will be measured by Borros anchors and piezometers. Width of existing cracks in the walls will be monitored at four selected locations by specially designed electrical strain gages.

4) Status Report

Bechtel provided a status report of the activities for resolution of the problem.

The soil boring program has been completed, and soil samples have been sent to the laboratory of Goldberg-Zoino-Dunnicliff & Associates. The four vertical electrical duct banks entering the DGB were separated from the building foundation to allow free movement of the building.

The following activities are in progress:

- a. Foundation settlement monitoring ✓
- b. Construction of the DGB structure to add loads to the existing foundation
- c. Preparation for placing surcharge in the DGB area ✓

The future activities planned are:

- a. Place surcharge in the area as recommended by the consultant.
- b. Raise the ground water table by raising the pond elevation to the highest operating level.
- c. Monitor the selected utility in and around the building. The NRC expressed their concern for additional loads due to surcharge on existing utilities like condensate lines.
- d. Verify the structure and utility integrity after surcharge operation is complete.
- e. Investigate other Category I structures on structural fill.
- f. Review and modify the FSAR as required to reflect as-built conditions.

5) Schedule

Bechtel presented key schedule data for the project. Composite project completion at the end of November 1978 was approximately 58% (engineering 86% and construction 54% complete). Unit 2 hot functional is scheduled to begin in 19 months (July 1, 1980). Fuel load is scheduled 4 months later (November 1, 1980). The earliest requirement for completion of the Unit 2 diesel generators (two cells out of four) was January 1980 in order to provide backup protection during cold hydro. The present completion requirement is March 1980 to provide backup protection to the reactor coolant pumps during hot functional tests. The late completion schedule requirement consistent with the overall project schedule is under study. The approximate date will be June 1980.

Assuming resolution of turbine building basement wall support requirements by December 8, 1978, placement of surcharge materials beginning on January 2, 1979, and a 5-month consolidation period, a potential delay of 2 to 3 months to the present requirement of a March 1980 completion date is anticipated. Preliminary investigations indicate that a late requirement of June 1980 to support the fuel load schedule could be met. The NRC stated that, per the present schedule, the safety evaluation report (SER) will be issued by June 1979, based on information received 2 months prior to that date. A supplement to the SER will be issued 2 months after the original issue. It appeared that the present forecast of the diesel generator building problem resolution was consistent with the SER issue dates.

6) Responses to the NRC Inspector's Report Dated November 17, 1978

The open items in the NRC inspector's report were discussed. It was agreed that conflicts identified in agenda items VII(a), (1) through (4) will be resolved by Bechtel, and FSAR changes will be incorporated as required. It will also be verified whether there is any conflict between PSAR commitments and the FSAR.

Questions regarding Specification 7220-C-210 (Agenda Items VII(a), (5) through (7)) were discussed. The NRC clarified that, in addition to a $\pm 2\%$ tolerance in moisture content, they were concerned whether the material being tested was related to the appropriate proctor. Because of a wide variation in soil properties, an error in selecting a proctor curve could result in a large variation in compaction. It was agreed that a written response to this NRC inspector's report would be provided by Bechtel/CPCo.

7) Comments from NRC

The NRC indicated that this settlement problem would likely be included in the public hearing for the operating license of the Midland plant. The NRC considered the preload program to be an experimental method. However, the licensee can proceed with the

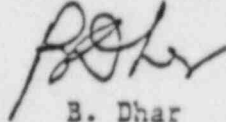
preload program at its own risk. The results of the consolidation will be reviewed by the NRC before acceptance. It must be demonstrated that the original requirements of the construction permit had been met or exceeded.

8) Remarks from CPCo

CPCo has summarized their remarks to the different agenda items in their letter to Bechtel, Serial CSC-3663 dated December 7, 1978 (Attachment 3).

ACTION ITEMS:

- | | | |
|---|----|---|
| Bechtel
Construction | 1) | Bechtel agreed to provide the NRC with a list of equipment which was utilized for compacting the fill from el 618' to el 628' in the diesel generator building. |
| Bechtel
Engineering/
Construction | 2) | All of the drawings and documents presented in the meeting will be sent to the NRC via attachments to MCAR 24 interim reports and the response to the NRC inspector's report dated November 17, 1978. Attachment 4 lists all items presented. |
| Bechtel/
CPCo | 3) | A written response is to be provided to the NRC inspector's report dated November 17, 1978. |
| Bechtel | 4) | The FSAR change notices will be issued as required to resolve conflicts in the FSAR. |


B. Dhar

BD/js
1/16/5

1 building as a result of the 50.53 (e) that was filed
2 in September of 1973?

3 A I believe construction had been stopped for awhile
4 and then, I believe, it was decided that -- to con-
5 tinue on with construction because it would add more
6 weight to the structure and would facilitate addi-
7 tional settlement if additional settlement was going
8 to take place.

9 Q And during this period of time, from when Consumers
10 first became aware of the settlement of the diesel
11 generator building, up until this December 4th meeting
12 with the NRC, why was Consumers, if you know, meeting
13 with the NRC during this time period?

14 A Again, it was to inform them of what was going on at
15 the site, what our investigation was and what we were
16 finding and also to establish corrective action to
17 be taken.

18 Q All right. Now, you indicated a moment ago that you
19 had a meeting in November to prepare for the meeting
20 with the NRC in December, on December 4, 1973.

21 I'd like to focus your attention on the
22 meeting that you had in November of 1973, the pre-
23 paration meeting.

24 You indicated, and correctly so, that Mr.
25 Gould asked you about your log for this November meeting

1 and one of your log entries, is that correct?

2 A Yes, he did.

3 Q This is Page 2 of 5 of your log of November 30, 1978,
4 is it not?

5 A November 30th, yes, it is.

6 Q Now, Mr. Goold drew your attention to one specific
7 line in your log entry, did he not?

8 A Yes, he did.

9 Q He asked you or had you read the sentence concerning
10 status report for Bechtel and a line that reads:

11 "Chuck would state that borings are com-
12 plete in all areas. Testing is complete for
13 diesel generator building. Also, no settlement
14 in other areas was to be mentioned."

15 Can you explain what the discussion was
16 at the November 30, 1978, meeting regarding this par-
17 ticular portion of your notes as reflected in your
18 log?

19 A The statement "Also, no settlement in other areas was
20 to be mentioned," was to be a positive statement.
21 It was to indicate to the NRC that we did not have
22 excessive settlement in other areas and therefore that
23 was to be mentioned, the fact that we did not have
24 settlement in other areas.

25 Q Now, at your meeting on December 4th with the NRC, was

1 the focus of that meeting -- the discussion, I should
2 say, of that meeting focused on Category 1 structures?

3 A To the best of my recollection it was Category 1
4 structures.

5 Q Can you tell us what was meant or what is meant by
6 Category 1 structures out at Midland?

7 A They are the structures that are considered to be
8 safety-related, in other words. Also, Q, as we men-
9 tioned earlier, Q soils. They were on the Q-list and
10 they are the safety-related structures or equipment or
11 piping or whatever it is that it pertains to.

12 Q Now, you attended the December 4, 1978, meeting with
13 the NRC, did you not?

14 A Yes, I did.

15 Q All right. And after that meeting did you receive
16 copies of the notes of both the Nuclear Regulatory
17 Commission and also Bechtel's minutes of that meeting?

18 A Yes, I believe, I did.

19 Q All right. And let me show you what has been marked
20 as Exhibit 412 and 413 and ask you if you can recognize
21 those for the record.

22 A Exhibit 412 is an NRC inspection report and it's --
23 in fact, it's really meeting minutes from the meeting
24 that was held December 4, 1978, at the site. And
25 the report was prepared by Darl Hood, the project

1 manager at the time for NRR Nuclear Agency.

2 Q And looking at Exhibit 412, does -- that is the inspec-
3 tion report of the NRC meeting of December 4, 1978.
4 Does it indicate copies of those notes were sent to
5 Consumers and the intervenors, Frank Kelly, Attorney
6 General, and others?

7 A Yes. Sent to Frank Kelly, Mary Sinclair, Wendall
8 Marshall, and Mr. Howell from Consumers Power Company,
9 Myron Cherry, among other individuals.

10 Q And Exhibit 413, can you identify those?

11 A 413 is the Bechtel meeting notes for the same meeting,
12 the meeting that was held December 4, 1978.

13 MS. WOODS: All right. Now, your Honor,
14 I would move for the admission of both of those
15 exhibits. I would note that Exhibit 413, the Bechtel
16 minutes of the December 4 meeting, are already con-
17 tained in an exhibit that Mr. Goold introduced, CPC
18 1197, but for ease of reference we would simply ask
19 that they be given a separate exhibit number here
20 today.

21 We would move 412 and 413.

22 MR. GOOLD: No objection as to 412, your
23 Honor.

VOIR DIRE EXAMINATION

1

2 BY MR. GOOLD:

3 Q As to 413, Mr. Horn, did you get a copy of DTX 413
4 at or about the time it was indicated?

5 A I'm not sure what time I received a copy of this.

6 Q Have you reviewed it for completeness with respect
7 to the summary of the meeting before today?

8 A I reviewed only a portion of it.

9 Q Did you have any problem with the part you reviewed?

10 A No.

11 Q As far as completeness was concerned?

12 A No.

13 Q What portion did you review?

14 A The first sentence on to the history, No. 1 on Page 2
15 of the meeting minutes.

16 Q Beginning there, continuing to where?

17 A The two paragraphs there.

18 Q That is all of this you looked at?

19 A Yes. I looked at some of the attachments in the
20 back.

21 MR. GOOLD: Well, no objection, your Honor.

22 THE COURT: Exhibits 412 and 413 may be
23 received.

24 (Defendant's Exhibits Nos. 412 and
25 413 were received in evidence.)

CROSS-EXAMINATION (Continued)

1
2 BY MS. WOODS:

3 Q Now, Mr. Horn, you had the meeting on November 30
4 to prepare for your December 4th meeting and you were
5 -- and you ran through what would be discussed with
6 the NRC.

7 In looking at the minutes of the December
8 4, 1978, meeting with the NRC, I'd first like to draw
9 your attention to the minutes of the NRC, Exhibit
10 412.

11 On Page 1 of those minutes does it indicate
12 the structures that were discussed at the meeting?

13 A It indicates the history of the structures on the first
14 page under No. 2.

15 Q And what structures were discussed at the meeting?

16 A The containment, borated water storage tank, diesel
17 generator building and pedestals, auxiliary building,
18 service water intake.

19 Q And in looking at Page 2 of the NRC's minutes of the
20 December 4th meeting, was the NRC provided with any
21 information on December 4th as to the status of
22 settlement at these various Category 1 structures?

23 A Yes, their -- as was indicated on the second page of
24 the notes.

25 Q And what was the NRC told on December 4, 1978, regarding

1 these Category 1 structures?

2 A Containment was between a quarter of an inch to five-
3 eighths of an inch over a year and a half. Auxiliary
4 building, approximately one-eighth of an inch and
5 the central portion. Service water pump structures,
6 zero to one-eighth of an inch. And diesel generator
7 building, three to four inches since footing was
8 poured October 1977 and walls in the spring of 1978.

9 Q This settlement information that was contained -- to
10 the NRC in December, in the December 4, 1978, meeting,
11 was that the result of any settlement monitoring
12 program that had been instituted out at the site?

13 A Yes, there was a settlement monitoring program that
14 had been instituted at the site.

15 Q And when did that settlement monitoring program begin?

16 A I believe it began on some of the structures in
17 1977.

18 Q What began in June of 1978 as shown in the NRC minutes
19 regarding the settlement monitoring program? Do you
20 recall?

21 A Some of the other structures may have began in '78.

22 Q All right. Now, utilizing, also, to refresh your
23 recollection, the Bechtel minutes of exactly the same
24 meeting, the December 4th meeting, that is Exhibit
25 413, was there any discussion as to other structures

1 and settlement potential of other structures at the
2 Midland site in the December 4th, 1978 meeting with
3 the NRC?

4 And let me draw your attention to Page 2
5 of the Bechtel minutes, Exhibit 413.

6 A Yes. It talked about the Category 1 structures and
7 also Category 2 pump structures.

8 Q And what information was told to the NRC on December
9 4, 1978, regarding the settlement of these structures?

10 A Settlement of these structures are within the predicted
11 range and did not cause any problem.

12 Q And is that what you and the others discussed with
13 Bechtel during your November 30 meeting in preparation
14 for this December 4th?

15 A I believe so, yes.

1 Q Now, Mr. Goold asked you some questions when he was
2 asking you about this December 4th meeting and he asked
3 you whether or not at the meeting there had been any
4 discussion of the chlorination building, of the
5 transformer pads, specifically.

6 Prior to the December 4th meeting, we saw a
7 moment ago in your log that you had attended a meeting
8 on October 25th, 1978 in which there had been some
9 discussions -- and you just told us about 'em -- of
10 various structures on the site, including the
11 transformer pads and the chlorination building; is that
12 correct?

13 A Yes.

14 Q Now, Mr. Gallagher, you've also told us, did not attend
15 this meeting on October 25th. Did you ever discuss with
16 Mr. Gallagher the topics that went on during this
17 October 25th meeting?

18 A I believe I discussed the -- this particular meeting
19 with him on October 27th.

20 Q All right. And, in fact, your log for October 27th
21 indicates, does it not, that on that date you went
22 through your notes that we just took a look at from the
23 October 25th meeting. You went through them with Mr.
24 Gallagher?

25 A Yes, I did.

1 Q That was approximately six weeks before the December
2 4th meeting; is that correct?

3 A Yes.

4 Q Now, after the December 4th, 1978 meeting, did the NRC
5 advise you and Consumers that it was going to begin an
6 investigation out at the diesel -- out at the Midland
7 site?

8 A Yes. Mr. Gallagher came in with a Mr. Jerry Philip from
9 NRC and advised us that they were on an investigation
10 of the settlement of the diesel generator building.

11 Q And as reflected in your log for December 11th, what
12 transpired with the NRC regarding this investigation?

13 A Well, they began interviewing many people from the site,
14 many people -- and that included field engineering, U.S.
15 Testing personnel, Bechtel QC, I believe Bechtel QA and
16 Bechtel field engineering, I believe they even
17 interviewed a foreman of Bechtel.

18 They interviewed Consum -- possibly, Consumers
19 people. They did not interview myself directly,
20 although they did ask me many questions. I did not
21 consider it to be an interview, closed-door sessions
22 like they had with the other individuals.

23 They interviewed personnel in Ann Arbor.
24 There were -- I think there was at least one or two
25 trips to Ann Arbor interviewing project engineering

Rusch G

BECHTEL ASSOCIATES PROFESSIONAL CORPORATION

MIDLAND PLANT UNITS 1 & 2

JOB 7220

ADMINISTRATION BUILDING

FOUNDATION SETTLEMENTS

ALONG COLUMN LINE 0.4

Prepared by:

GEOTECHNICAL SER
December, 1977.

90517270

Attach E

~~INTRODUCTION~~

Early in September, 1977, we were requested by project engineering to assist in reviewing conditions surrounding footing settlements during construction of the Midland Project Administration Building. The foundation location plan for this building is shown in Figure 1. The affected foundations are those along Column Line 0.4.

The following data are presented to enable construction and engineering in evaluating the settlements of these footings.

BACKGROUND

The original ground at the Midland site was at approximately Elevation 608 in the vicinity of the administration building. After ground surface preparation, plant area fill was placed to approximately Elevation 636. An excavation was later made to about Elevation 610 to accommodate construction of the steam tunnel. Figure 2 shows a cross-section of the tunnel and the approximate excavation scheme. After construction of the tunnel, the west side of the tunnel excavation was backfilled to approximate Elevation 620 to construct the foundations along Column Line 0.4 of the administration building. After foundation construction, the remainder of the excavation was backfilled with sand to grade as shown in Figure 2.

During the early part of September, Geotech was made aware of settlements along the Column Line 0.4. The settlement data are given in Table 1.

FIELD OBSERVATIONS

During the week of September 19-23, 1977, several site reviews were made by engineering, construction, and Geotech personnel. These took place

H. H. S.

and after the removal of the subject footings.

Upon removal of Column PA 0.4, it was noted that the soil under and adjacent to it was soft. This was confirmed by pushing a 3/4" ^Ø steel bar with little effort approximately two feet into the ground, by walking on the soil and noting its spongy characteristics, and by pushing of a shovel with little effort.

Tests taken at that time in and adjacent to PA 0.4 included moisture content, density, and unconfined compression. These tests also were taken at Column LY 0.4.

After these field observations, it was decided that two borings should be taken to further evaluate the conditions along Column Line 0.4.

At that time, Bechtel Construction's decision was that all affected footings be removed.

BOREDINGS

On September 27 and 28, 1977, two test borings were completed at footings LY 0.4 and HY 0.4. At footing LY 0.4, standard penetration tests (SPT) and Shelby tubes (ST) were taken. At footing HY 0.4, standard penetration tests were taken.

Borings included visual inspection and description of soils, Q_p tests (compressive strength... by the pocket penetrometer method) and any visual observations of water conditions (loss or gain).

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K. H. Miller 6

Samples for proctor testing were also taken as shown in log of holes, 115, 116, and 117.

The boring logs are shown on Figures 3 through 7.

TESTING PROGRAM

Shelby tubes taken from boring 117 were submitted to U. S. Testing Laboratory for unconfined compressive tests.

Samples taken at foundations 7A 0.4 and 111 0.4 were also taken by U. S. Testing personnel and unconfined compression tests were made. Results of testing are given in Table 2.

It was also decided to run Proctor tests on the samples taken directly under and adjacent to footings in order to determine the standard to be used in calculating the in situ percent compaction. These results are found in Figures 8, 9, and 10.

The Proctor curve in Figure 8 was used to calculate the in situ percent compaction using the in situ dry density data reported by the field. This information is compared in Figure 8 with the percent compaction previously reported. This comparison shows that the percent compaction was in all cases lower than that previously determined.

In order to illustrate the effect of a reduced percent compaction on the strength of soil, the data of California Bearing Ratio (CBR) tests previously made on three identical samples of the Highland soils are presented in Table 11. The samples were compacted at three levels of compaction effort, which

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Attachment 6

resulted in compressive energies of 56,000 ft-lb/ft³, 20,000 ft-lb/ft³, and 12,400 ft-lb/ft³, respectively. It is seen that the pressure values for a penetration of 0.1" at the maximum dry density reduced from 94.5 psi to 5 psi by reducing the compressive energy from 56,000 ft-lb/ft³ to 12,400 ft-lb/ft³.

CONCLUSION

Based on available data the material under and adjacent to the subject footings, (Elevation 612-622) had insufficient bearing capacity to support the foundations.

The backfilled earth that the soil in question (below 612) appears adequate and this conclusion is supported by SPT, bearing and compression tests.

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Attach C

Administration Building
Anchor Bolts for Col. Line 0.4
Top Bolt Elev. 634' - 2-1/2"
Bot Bolt Elev. 1, Sec. 3

The Columns and Grade Beam
For Column Line 0.4 Shows
Settlement: Per As Built
Elevations Taken 8-23-77

<u>Column</u>	<u>Elevation</u>	<u>Settlement (in)</u>
P2	634.10	0.11
N ₂	634.03	0.17
N ₁	634.01	0.20
N ₃	634.05	0.16
N ₄	634.02	0.19
N ₅	633.93	0.23
N ₆	633.93	0.23
N ₇	633.92	0.29

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MIDLAND UNITS 1 & 2
 ADMINISTRATION BUILDING EXCAVATION
 UNCONFINED COMPRESSION TESTS

Sample No.	Sample Location	Sample Elevation	Unconfined Compression Strength Lbs Per Sq Ft	Allowable Bearing Value Lbs Per Sq Ft	Percent Strain	Remarks
1	PA - .04	622.0	730	625	20.0	
2	PA - .04	621.0	487	420	20.0	
A	PA - .04	612.0	1904	1709	6.7	
B	PA - .04	611.0	633	546	20.0	
3	LH - .04	622.0	9.4	788	12.0	
4	LH - .04	621.0	2001	1792	5.0	
ST-1	Boring LH	617.5	4241	3653	10.3	
ST-2	Boring LH	615.5	2145	1849	20.0	
ST-3	Boring LH	603.0	5945	5123	9.1	
ST-4	Boring LH	597.5	3137	2704	20.0	
ST-5	Boring LH	588.0	2877	2423	20.0	

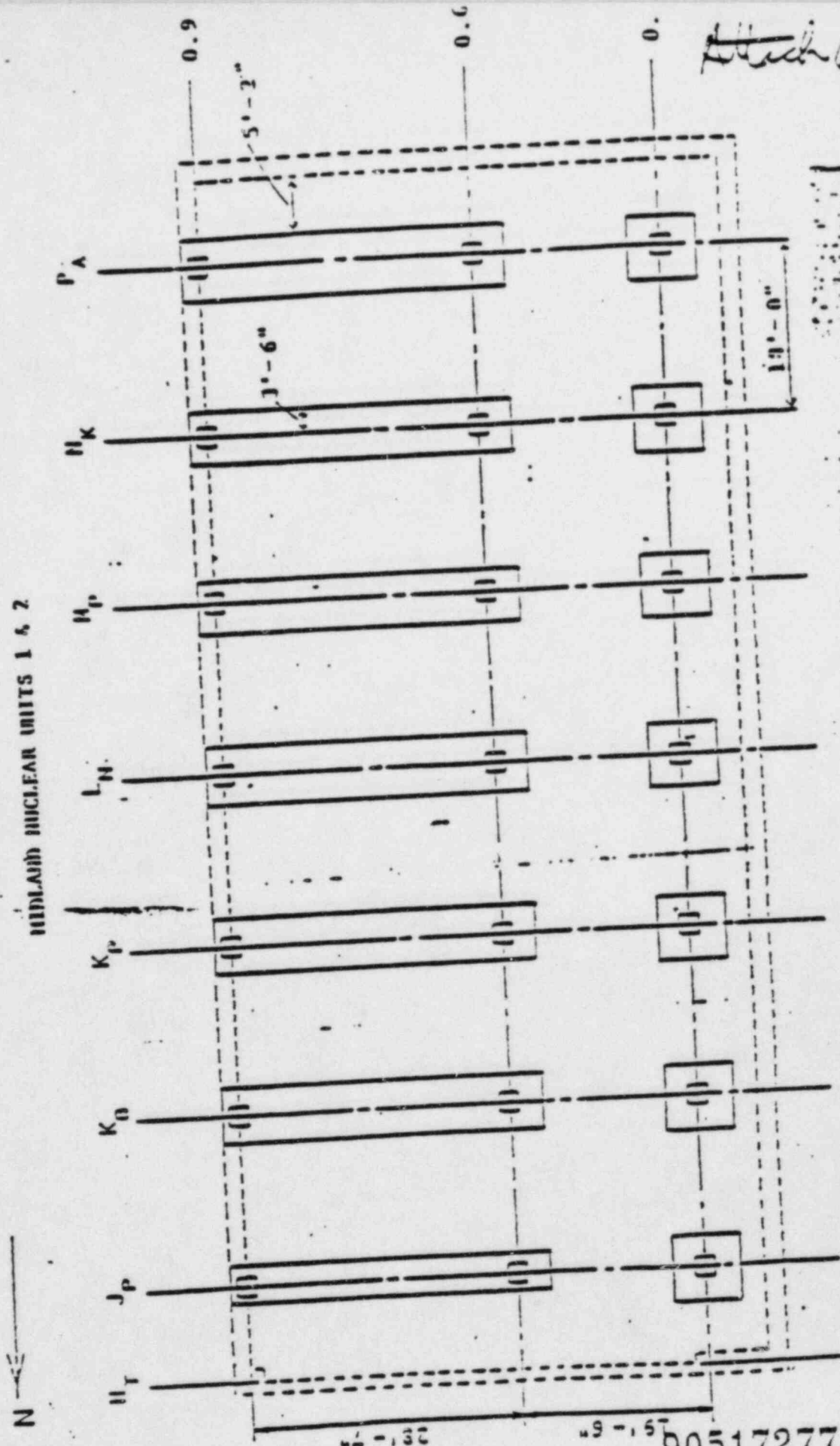
Handwritten signature

Figure 1

FOUNDATION LOCATION PLAN

ADMINISTRATION BUILDING

HIGHLAND NUCLEAR UNITS 1 & 2

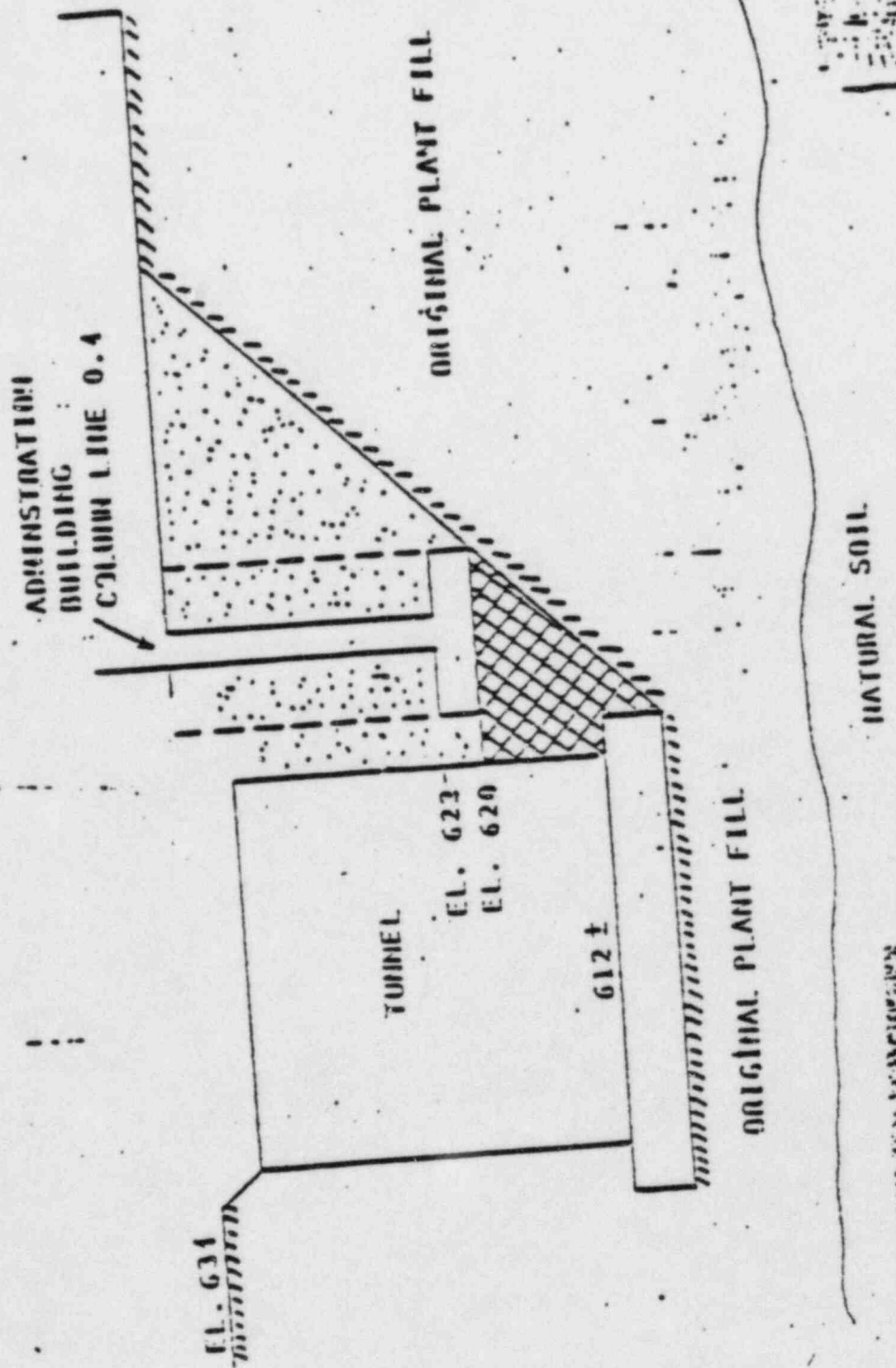


Attach 6

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Attch. 6

Figure 2



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Sheet 6

BORING LOG

MIDLAND NUCLEAR PLANT 7220 1-1

ADMINISTRATION BLDG. APPROX. 2' E OF FOOTING @ D.4-LH 90°

DATE: 9/2/77 9/29/77 SINGLETON (ABEL DRILL) CME-550 5"

18 622.0 (SEE NOTES COL)

140# / 18"

NONE

JERRY B. GIVENS

DEPTH (ft)	PENETRATION BLOWS				CORRECTION	REMARKS AND CLASSIFICATION	CORRECTION
	100'	200'	300'	400'			
622.0					622		
619.5					620	2.5' - 2.5' GRYT GAAVELLY CLAY (CL) (SPIN)	5" AUG
617.0					619.5	2.5' - 2.5' SANDY CLAY, GRYT W. TRALS TO LITTLE GRAVEL, LOW TO MEDIUM PLASTICITY, HARD (CL)	8.5' CASING
614.5	35	11	13	22	617.0	7' - 25.5' BROWNISH GRYT (FILL)	11.4" ROLLER
612.0	37	13	17	20	614.5	12' LARGE COBBLE (? BENT TUBE)	RE-CLIP WATER
609.5	29	10	14	14	612.0	1.5' INCREASE IN SAND CONTENT	8.5'
607.0					609.5	15.5' 1" STONE	SLIGHT DECPA
604.5	31	17	16	15	607.0	22' STONE	2.5'
602.0					604.5	27.5' STIFF TO MEDIUM STIFF	USED GLAZING POUND
599.5	19	6	9	10	602.0	25.5' - 27.5' MEDIUM PLASTICITY	ING T SEAL
597.0					599.5	27.5' SAND SEAM - LOOSE? (POOR RECOVERY AREA - TUBE PUSHED EASILY) (FILL)	SAVES
594.5	10	4	5	5	597.0	31' - 33' SANDY CLAY, GRYT, STIFF	PLES IN
592.0					594.5	15' MEDIUM PLASTICITY (CL)	1/2" =
589.5	20	8	9	11	592.0	33' - 35' SILTY SAND, TAN W. LITTLE MUSHY BROWN COLOR, FINE TO MEDIUM GRAINED, MEDIUM DENSE (SPP) (CL)	2" OP
587.0					589.5	35' - 40.5' SILTY SAND, GRYT, FINE TO MEDIUM GRAINED, VERY DENSE, MIST (SPIN)	3" OP
584.5					587.0	38.5' - 42.5' FINE GRAINED	4" OP
582.0					584.5		5" OP
579.5					582.0		6" OP
577.0					579.5		7" OP
574.5					577.0		8" OP
572.0					574.5		9" OP
569.5					572.0		10" OP
567.0					569.5		11" NO PUSH
564.5					567.0		12" NO ENOUGH (ABOUT 1/2" - 1/3" SAND)
562.0					564.5		WATER 5.0' A CASING
559.5					562.0		HOLE WITH COMPLE

9/2/77

9/20/77

TOTAL DEPTH = 43.5'
EL. BOTTOM = 576.5

90517279

BORING LOG

Plot 6

MIDLAND NUCLEAR PLANT 7220 1-1 LN2

ADMINISTRATION BLDG.

2' NORTH OF LN

90°

SINGLETON (A) DRILL CASE-550

5"

5'

6/29/77 6/29/77 1 622 (SEE HOLE "LN")

N/A

NONE

JERILY B. GIVETUS

PENETRATION BLOWS			DEPTH	DESCRIPTION AND CLASSIFICATION	REMARKS
100'	200'	300'			
			622	0-2.5 SAND BACKFILL	5" AUGER
			619.5	2.5-5' COMPACTED CLAY	5" TOOL
			617	TOTAL DEPTH = 5' EL. BOTTOM = 617	BULK SAND FOR COMPACTED TEST FROM 2.5'-5' M COMBINED WITH 2" SAMPLE FROM HOLE LN2 HOLE BACK WITH SOIL AFTER WORK
					REFER TO BORING LN2 FOR INFO CONC SOIL PRO.

90517280

Attachment 6

BORING LOG

MIDLAND NUCLEAR PLANT 7220

1-1

LN

ADMINISTRATION BLDG.

2' WEST OF LNA

50°

SINGLETON (ASBLD) CME-550

5"

622

(SEE HOLE "LN")

N/A

NONE

JERRY B. CIVENS

DATE	TIME	DEPTH	PENETRATION BLOWS			ELEVATION	DESCRIPTION AND CLASSIFICATION	REMARKS
			100'	200'	300'			
						622		
		0'-2.5'					SAND BACKFILL	5" AUGER
		2.5'-3'				619.5	COMPACTED CLAY	5' TOOK
		3'-5'				617	TOTAL DEPTH = 5'	SAMPLE
							EL. BOTTOM = 617	COMPACT
								TEST FA
								2.5'-5'
								COMBINS
								WITH B
								SAMPLE
								HOLE L
								HOLE BA
								WITH S
								AFTER C
								REFER
								BORING
								"LN" FO
								INFO. CO
								JNG SO
								PROFIL

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ADMINISTRATION BLDG.

LN

BORING LOG

MICLAND NUCLEAR PLANT 7220

1-1

90°

ADMINISTRATION BLDG. AT E OF FOOTING 0.4-H-

5/25 5/25 SINGLETON (ABEL DRILL) ONE STD 5"

10

631 (SEE NOTES COL.)

JERRY B. GIVENS

1407/18"

NONE

DEPTH (FEET)	PENETRATION BLOWS				ELEVATION	DESCRIPTION AND CLASSIFICATION	REMARKS
	10'	20'	30'	40'			
631					631	0-11.5' SILTY SAND, TAN (BACKFILL) (SPISM)	5" AUGER. 0.5' SET CALLED BY TRACER AT BIT USING CALCULATION
619.5	8	2	3	5	619.5	11.5-12' SILTY CLAY GASTISH BROWN, GRAVEL TO 1/2" DIA. TO MEDIUM STIFF, MEDIUM PLASTICITY, MEDIUM (CL)	#10p = 1.5 #20p = 0.5
615	5	1	2	3	615	12-28.5' SILTY CLAY, BROWNISH GRAY, LITTLE GRAVEL, VERY STIFF TO HARD, MEDIUM PLASTICITY, MEDIUM (CL)	#30p = 4.5 #50p = 4
	25	7	12	13			
	20	8	9	11			
	12	10	12	6			
	22	8	10	12	625	28.5-47' SAND, CLAY FAUNIC BROWN, VERY STIFF, MEDIUM PLASTICITY, MEDIUM (CL) FLEET OF SAND SPREADING THROUGH TO MEDIUM SAND	#50p = 3 #60p = 3
	30	10	15	15			
	10	2	5	5			
	15	5	6	5			
	111	15	10	7	584	47-53' FINE SILTY SAND, GRAY, VERY DENSE, TRACE OF SANDS, CLAYEY SILT LENSES, SLIGHT MOISTURE (SM)	#70p = 1 (BASE) #80p = 1 LITTLE
					581	TOTAL DEPTH = 50' EL. BOTTOM = 581'	#10 NO #10 NO

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ADMINISTRATION BLDG.

Field 6

SORING LOG

MIDLAND NUCLEAR PLANT

T220

1-1

HT

ADMINISTRATION BLDG.

1.0' NORTH OF HOLE HT

90°

9/29/77 9/29/77

SINGLETON/ABELDAN/CHE-550

5"

14.5

631

(SEE HOLE "HT")

N/A

NONE

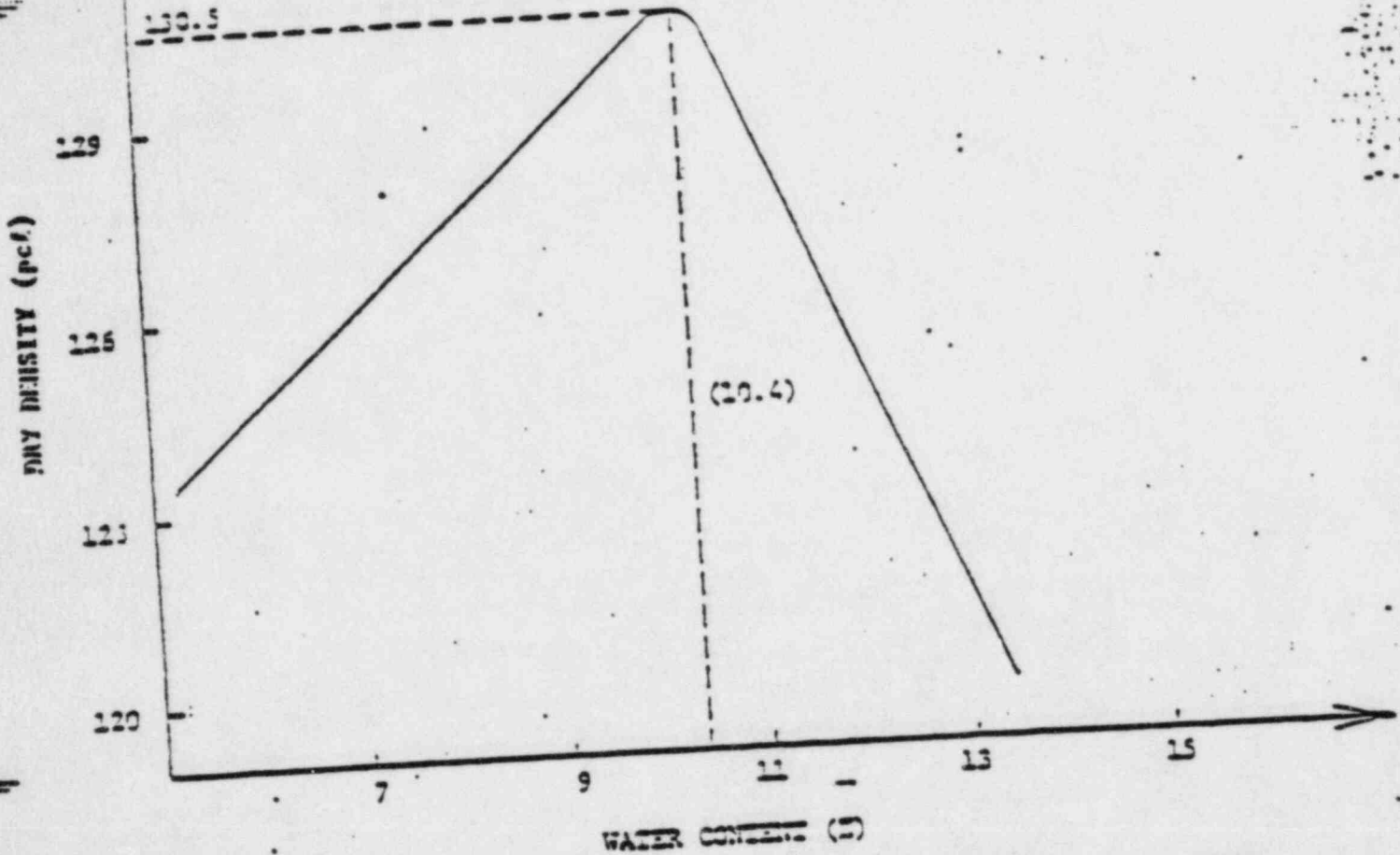
JERRY B. GIVENS

DATE	TIME	DEPTH	PENETRATION BLOWS			ELEVATION	CORRECTION	REMARKS AND CLASSIFICATION	TEST NO.
			100'	200'	300'				
						631			
								0'-11.5' SAND BACKFILL	5 AUGER 14.5' T20 BULL SAM FOR COMP TEST FC 11.5-14.5
						619.5		11.5-14.5 COMPACTED CLAY	HOLE BCL WITH SOI AFTER C
						616.5		TOTAL DEPTH = 14.5' BL BOTTOM = 616.5	REFER T BORING HT FOR MORE IN CONCERN SOIL PRO

90517283

Attaching

LOCATION: ...
 CRUSH: SA-0.4
 SAMPLE: SIP 290
 JOB: 7222-002



Std. Compaction Data Used			Field Data		Original Calculated % Compaction	From Above Data % Compaction
Name	$T_d(max)$	W_o	$T_d(f)$	W_{of}		
SIP 262	123.9	11.8	117.5	17.5	94.0	97.0
			120.5	18.0	97.0	92.3
SIP 269	127.3	10.0	127.5	13.3	101.6	97.7
SIP 270	124.6	11.1	118.7	16.7	95.7	91.0
SIP 273	117.0	15.2	108.5	19.5	92.7	83.1

$T_d(max)$ = Maximum dry density as determined for a particular compaction test

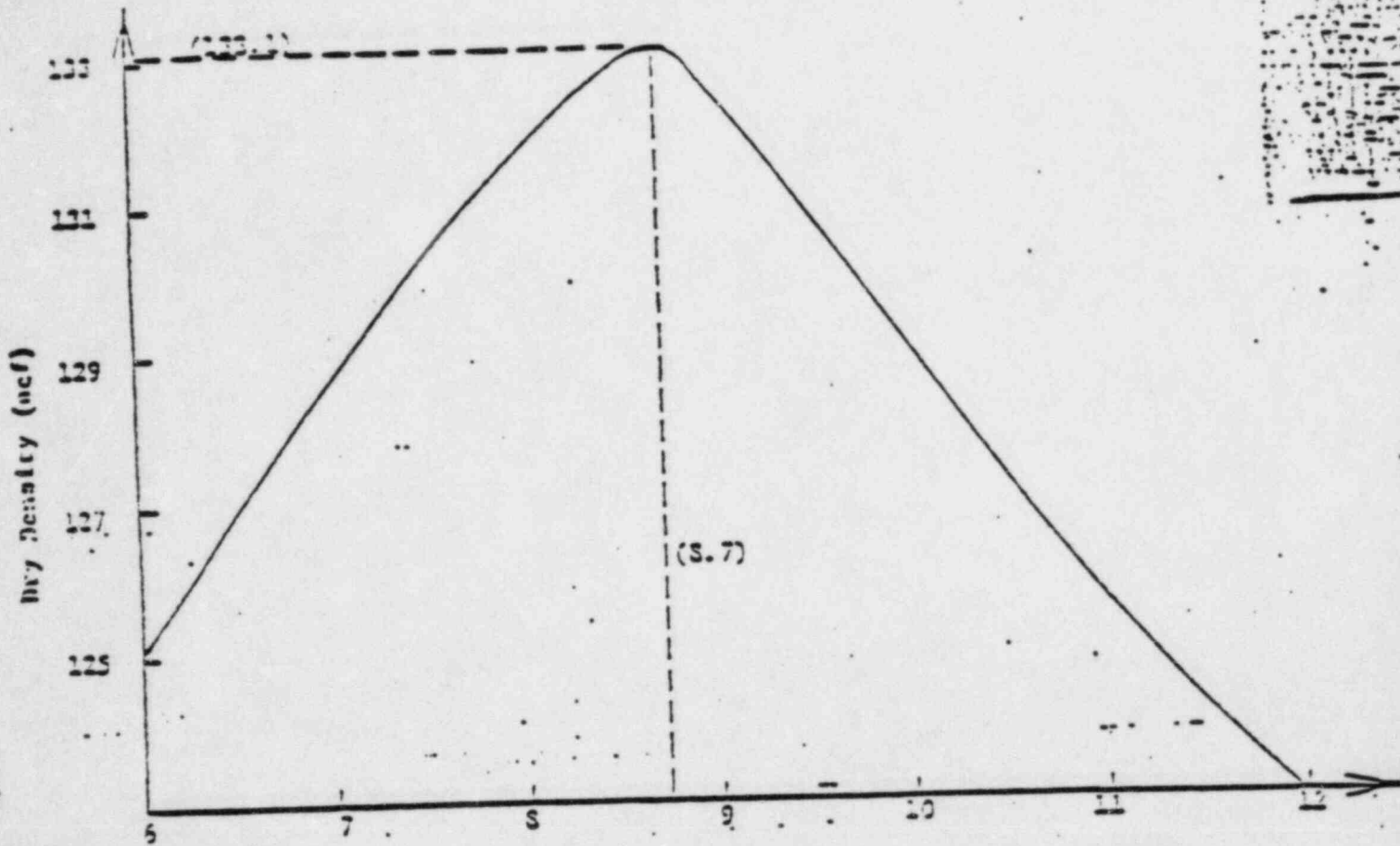
W_o = Corresponding optimum water content

$T_d(f)$ = Field dry density

W_{of} = Corresponding field moisture content

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Attach 6



MOISTURE CONTENT %

LOCATION: Administration Building

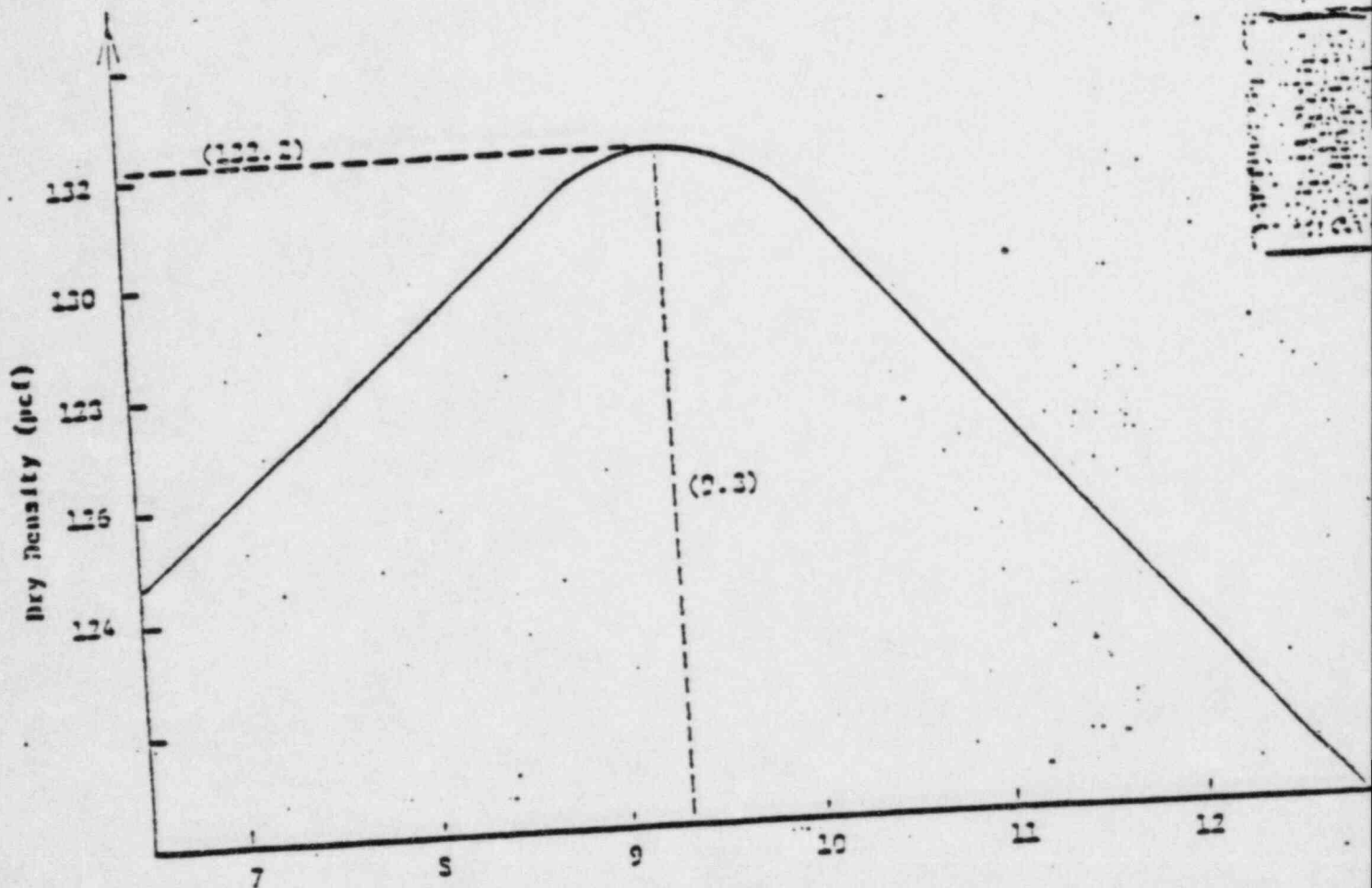
COLOR: LT-0.4

SAMPLE: 312-289

JOB: 7220-001

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~~Attache~~



MOISTURE CONTENT %

LOCATION: ADMINISTRATION BUILDING

COLOR: H-0.4

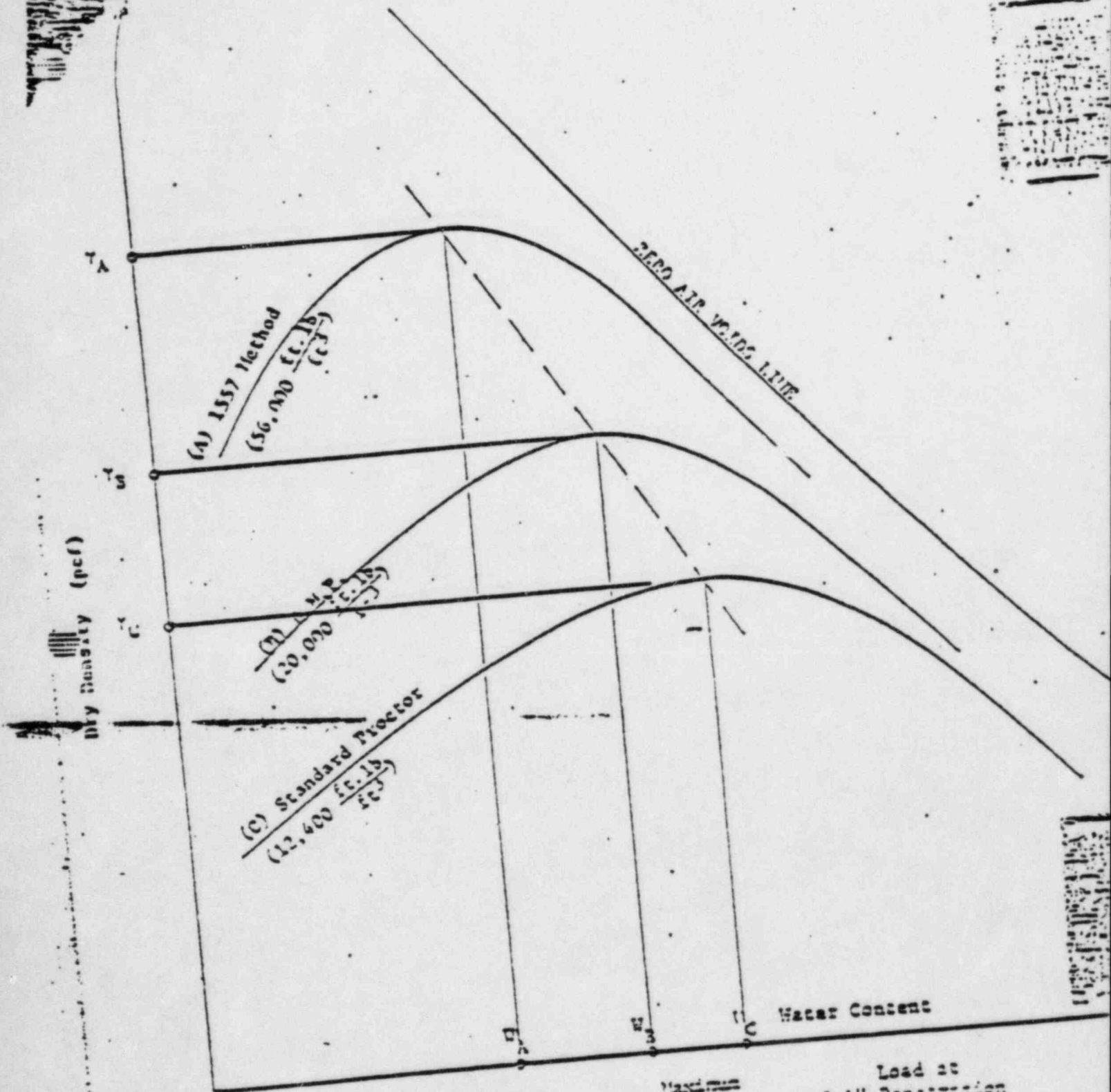
SAMPLE: EP-300

JOB: 7220-001

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COMPARISON OF 3 DIFFERENT STANDARDS

Attachment C



	<u>Optimum Water Content</u>	<u>Maximum Dry Density</u>	<u>Load at 0.1" Penetration</u>
A	12.7(%)	124.5(pcf)	94.5 (psi)
B	14.0(%)	117.0(pcf)	57.2 (psi)
C	15.0(%)	112.0(pcf)	

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