QUALITY RELATED

FIC-1.100
2/25/80
Revision 2

CONTROLLED

BECHTEL POWER CORPORATION

Field Instruction

FIC - 1.100 Q

Q-Listed Soils Placement Job Responsibilities Matrix

This supersedes FIC 1.100 Revision 1, Dated 12/4/79.

TO: All Civil Field Engineers & Civil Craft Superintendents.

1.0 PURPOSE

This field instruction is written to provide a definition of job responsiblities for Q-Listed soils placement pursuant to Field Procedure FPG-3.000.

2.0 SCOPE

This field instruction applies to all Q-listed placement on the Midland Nuclear Project.

3.0 REFERENCES

Field Procedure FPG-3.000; Job Responsibilities of Field Engineers, Superintendents, and Field Subcontract Engineers.

Specification 7220-C-211; Technical Specification for Backfill.

4.0 RESPONSIBILITIES

The duties and responsibilities of the following individuals are defined in this instruction:

a. On-Site Geo-Tech Soil Engineer

b. Field Soils Quality Control Engineer

c. Lab Quality Control Engineer

d. Geo-Tech Soils Engineer

e. United States Testing Co. Lab Technician

5.0 INSTRUCTION

This instruction provides detailed job responsibilities instructions for Q-listed soils placement. It is provided as an amplification to FPG-3.000 and is complimentary to the directions provided in Specification 7220-C-211 and Quality Control Inspection Record C-1.02. Any questions on this instruction should be refered to the Lead Civil Field Engineer.

Attachments: The attached memos from Project Engineering list the qualified compaction equipment and methods per sections 8.5 and 8.6 of Specification C-211. The attached memo's BEBC-3633 and BCBE-2772 describe the duties of the On-Site Geo-Tech Soils Engineer with regard to surveillance of soils-related testing operations. This surveillance will be documented on a Field Engineers report by sample/test number monitored. The specific procedures and steps in the procedure(s) observed will be stated and the results of the surveillance recorded on the Field Engineers report.

Prepared By: G. M. Kozemik 2/12/80 GMM 20 Feb 80 / Date

Project Field Engineer: JJ Gilmartin, [illegible] 2/20/80 Date

Reviewed By:

PFQCE: [illegible] Barclay 2-25-80 Date

LQAE: R.C. Holler 2-25-80 Date

Approved By:

Consumers Power Company: [illegible] 3-5-80 Date

Site Manager: [illegible] 2/25/80 Date

SB107863

Atch 1
to
FIC 1.100

MATRIX FOR
Q-LISTED SOILS
PLACEMENT

WORK OPERATION →	1 SELECTION OF AREA TO BE FILLED	2 AREA STRIPPED AND/OR PREPARED	3 SELECTION OF FILL MAT'L EQUIP., AND SIZE DETERMINATION	4 MATERIAL DELIVERY AND PLACEMENT	5 CONDITION AND COMPACT	6 TEST FILL	7 REVIEW TEST
ON-SITE GEOTECHNICAL SOILS ENGINEER	COORDINATES WITH CRAFT SUPT. AND NOTIFIES Q.C.	MONITORS SUB-GRADE QUALITY AND/OR PREPARATION. CALLS FOR TESTING AS REQ'D DOCUMENTS THIS ACTIVITY ON A FIELD ENGINEERS REPORT (DOCUMENTATION TO INCLUDE APPROVAL OF SUBGRADE & ANY TEST PERFORMED).	COORDINATES WITH CRAFT SUPT & QC EVALUATES SIZE OF FILL AREA TO DETERMINE TESTING FREQUENCY. ⚠1 ENSURES THAT COMPACTION EQUIP IS QUALIFIED TO SPECIFICATION REQUIREMENTS AND RECORDS TO SAME ARE RETAINED	SAND: MONITORS MAT'L (FREE OF ORGANICS, ETC.) & LIFT THICKNESS PLACEMENT CLAY: CALLS FOR TEST IN BORROW AREA (AS REQ'D) & MONITOR MAT'L QUALITY & LIFT THICKNESS	MONITORS COMPACTION PROCESS INCLUDING MOISTURE CONTROL FOR CLAY ⚠2	CALLS FOR TEST AT PROPER FREQUENCY & AT LOCATION HE DESIGNATES. OBSERVES TESTING OPERATION IN ACCORDANCE WITH NEBC-3633 AND NCBE-2772 (ATTACHED).	REVIEWS TEST RESULTS. IN CASE OF FAILING TEST WORK WITH CRAFT SUPT. QC TO EFFECT REMEDIAL ACTION
QUALITY CONTROL LAB ENG. & FLD. QUALITY CONTROL	FIELD Q.C. INITIATES QCIR C-102 & REVIEWS FOR OPEN NCR's & DR's - LAB OPENS C-1.05 IR WEEKLY	FIELD Q.C. INITIATES A DAILY SOIL REPORT ON EACH AREA OF PLACEMENT - SUB-GRADE APPROVAL IS DOCUMENTED ON DAILY SOILS REPORT & ON QCIR. FIELD Q.C. VERIFIES THAT THE SUBGRADE IS PREPARED AND THAT ALL NECESSARY TESTS BY U.S.T. HAVE BEEN TAKEN.	FIELD Q.C. VERIFIES THAT EQUIP. IS QUALIFIED, VERIFIES THAT MAT'L SELECTED MEET GRAD. REQUIREMENTS (IF APPLIC.) & IS CORRECT FOR AREA BEING PLACED.	FIELD Q.C. MONITOR INSTALLATION OF MAT'L-LIFT THICKNESS, CHECK EQUIP. BEING USED TO LIFT THICKNESS-VERIFIES MAT'L IS NOT FROZEN, FREE OF ORGANICS & FREE OF TRASH & DEBRIS-VERIFIES THAT MOISTURE TESTS ARE TAKEN FOR CLAY AS REQUIRED	FIELD Q.C. MONITORS COMPACTION PROCESS & DOCUMENTS METHOD & EQUIP. USED. VERIFY THAT COMPACTION IS UNIFORM IN ALL AREAS OF PLACEMENT. VERIFIES THAT MOISTURE TESTS ARE TAKEN FOR CLAY AS REQUIRED.	FIELD QC VERIFIES TEST FREQ., WITNESSES TEST & VERIFIES LOCATIONS. LAB QC VERIFIES PROPER METHODS ARE EMPLOYED WHEN RUNNING R.D.'s & PROCTORS IN LAB.	LAB & FIELD QC REVIEW TEST RESULTS FOR PASS/FAIL & LOCATIONS. IDENTIFY REWORK AND/OR RETEST AS REQUIRED.
GEO-TECH SOILS ENGINEER	X	← PROVIDES OVERVIEW AND INPUTS TECHNICAL ASSISTANCE AS JOB CONDITIONS WARRANT →					
UNITED STATES TESTING CO.	X	TAKES TESTS AS REQUESTED BY ON-SITE GEO TECHNICAL SOILS ENGINEER	X	PERFORM MOISTURE TEST AS REQUESTED BY ON-SITE GEO-TECHNICAL SOILS ENGINEER	PERFORM MOISTURE TEST IN BORROW AREA WHEN REQUESTED BY ON-SITE GEO-TECHNICAL SOILS ENGINEER	PERFORMS TEST AT LOCATION REQUESTED BY ON-SITE GEO-TECHNICAL SOILS ENGINEER	FURNISH TEST RESULTS TO Q.C. & ON-SITE GEO-TECHNICAL SOILS ENGINEER

SH-2784

ATTACH. 2
TO
FIC 1.100

RECEIVED
SEP 28 1979

BECHTEL MIDL

BECHTEL ARB
810-223-6032 CLG 810-226-9497
TWX 5560 9-28-79 17:39

ATTN: J. F. NEWGEN

BEBC- 3301

SUBJECT:
CPCO/MIDLAND PLANT - JOB 7220
SIOLS WORK COMPACTION
FILE: 0274, C-211, C-210, C-0465

REFERENCE: QUALITY ASSURANCE STOP WORK REPORT 6

THIS IS A COMPLETE RESPONSE TO THE REFERENCED Q/A STOPWORK REPORT 6. THE RAMMER-TYPE COMPACTOR (POGO STICK) RV4B HAS BEEN SATISFACTORILY QUALIFIED FOR USE IN COMPACTING SILS REQUIRING THE FOLLOWING:

1) 80% AND 85% DENSITY FOR STRUCTURAL BACKFILL SAND AND RANDOM SANDS WITH 4 INCH LAYERS AND 8 PASSES.

2) 90% AND 95% DENSITY DETERMINED IN ACCORDANCE WITH ASTM D1557 METHOD D FOR CLAYEY SILS WITH 4 INCH LAYERS AND 8 PASSES.

THE TEST FILLS FOR QUALIFYING THE RAMMER-TYPE COMPACTOR WERE MONITORED BY THE ONSITE GEOTECHNICAL ENGINEER.

M VELASTEGUI, FOR
L H CURTIS
ANN ARBOR/ 7220-001/JS

BECHTEL MIDL

Sit. 7955

ATCH 3
TO
FIC 1.10

BECHTEL ARB
TWX 5283 8/7/79 14:03

ATTN: J.F. NEWGEN

BEBC-3162
SUBJECT: CPCO/MIDLAND PLANT JOB 7220
QUALIFICATION OF COMPACTION EQUIPMENT
FILE: 0274, C-211-PR

THIS TWX LISTS WHICH EQUIPMENT IS QUALIFIED FOR Q-LISTED AND NON-Q-LISTED FILL PLACEMENT, AS REQUIRED.

EQUIPMENT TYPE	APPLICABLE MATERIAL	REQUIRED PASSES & THICKNESS
"J" FOOT WACKER (MODEL GVR 220 V)	STRUCTURAL AND RANDOM RANDOM SAND	4" LIFT, 6 PASSES
M-B-W VIBROTARY (MODEL GD 7000)	STRUCTURAL AND RANDOM SAND	4" LIFT, 6 PASSES
VIBRO PLUS SELF-PROPELLED (MODEL CA-25D)	STRUCTURAL AND RANDOM SAND	6" LIFT, 10 PASSES

THE ABOVE EQUIPMENT WAS QUALIFIED ON TEST STRIPS AND BY ACTUAL USE IN NON-Q-LISTED AREAS.

RL CASTLEBERRY
ANN ARBOR/7PE2118/7220-001/ER

BECHTEL MIDL

SB167866

Bechtel Associates Professional Corporation

Inter-office Memorandum

ATCH 4 TO FIC 1.100

CORRECTED COPY

To [redacted]

Subject L.E. Davis

Midland Plant Units 1 & 2
Job 7220
Earthwork - Qualification of Compaction Equipment
File: 0274, C-211-PR

Copies to
S. Blue
P. Corcoran
L. Curtis
J. Wanzack
Com Log

Date November 16, 1979

From L.H. Curtis

Of Engineering

At Ann Arbor

RECEIVED
NOV 2 01979
BECHTEL POWER CORP.
JOB 7220
PER _____

Reference: IOM from S.S. Afifi to L.H. Curtis, 9/4/79

The following equipment have been qualified for use based on test fills and field tests monitored by geotechnical services (reference).

A. Structural and Random Sands

1. Wacker vibratory plate with 8-inch outriggers (model DVU 3001)
   (a) all area requiring 80% RD
   (b) 4-inch lifts and eight passes

B. Clays

1. Vibro plus (model CA-25 PD)
   (a) All areas requiring 90% compaction
   (b) Five to six-inch lifts and eight passes per lift

2. Wacker J-foot tamper (model GVR 2204)
   (a) All areas requiring 90% compaction
   (b) Four-inch lifts and six passes per lift

3. Vibro plus dynapact (model CF-43)
   (a) All areas requiring 90% compaction
   (b) Eight-inch lifts and six passes per lift

4. Wacker vibratory plate with 8-inch outriggers (model DVU 3001)
   (a) All areas requiring 90% compaction
   (b) Four-inch lifts and six passes per lift.

for M.O. Rothwell
L.H. Curtis

Rao/sg
11/14/4

8107867

a-1 Atch X5 to FIC 1.100

Bechtel Power Corporation

Interoffice Memorandum

TELECOPY

To L. H. Curtis

File No.

Subject Job 7220 Midland Project
Onsite GeoTech Soils Engineer
Surveillance of Testing
Operations
BCBE-2772

Date February 13, 1980

From L. E. Davis

Of Construction

Copies to

At Midland, MI Ext.

P. J. Corcoran
J. P. Betts

Reference: BEBC-3633, dated January 30, 1980

The referenced memorandum was received by Field Engineering on February 5, 1980. This memo includes the following directions:

> "The onsite GeoTechnical soils engineer shall observe the testing operations at least once a day while testing is in progress. The testing operations to be observed shall include field density and moisture tests, laboratory proctor tests, gradation tests, plotting of zero airvoid curves, etc. Tests to be observed will be selected by the onsite GeoTechnical soils engineer. The selection will be random, based on tests being conducted on a particular day and varied to his satisfaction such that all phases of testing are being conducted correctly ..."

Based upon discussion among field personnel and telephone conversations with Project Engineering, the field interprets this to mean that not all backfill related tests conducted each day must be observed but that at least one of the test procedures on any day of testing must be observed.

We also interpret this direction to mean that all test procedures related to backfill operations must be observed often enough so that the onsite GeoTechnical soils engineer can be satisfied as to the correctness and efficiency of testing operations and can document such observation.

SB107868

5024, REV 1/78

As directed by the reference, the field will incorporate the reference in Field Instruction FIC-1.100 (Q) by February 22, 1980, including the above interpretation, unless direction to the contrary is received from Project Engineering.

L. E. Davis

LED/GK/jrh

Achmt 2 6
to
FIC 1.100

Bechtel Associates Professional Corporation

Inter-office Memorandum

BEBC-
3633

To L.E. Davis

Date January 30, 1980

Subject Midland Plant Units 1 & 2
Job 7220
Response to 10 CFR 50.54
Questions

From L.H. Curtis

Of Engineering

At Ann Arbor

Copies to File: 0274, C-211PR, C-0465

W. Barclay
S. Blue
P. Corcoran
L. Curtis
L. Dreisbach
R. Rixford
J. Wanzeck

Reference: Response to NRC Question 23, Part (3), Section 5, Action Item 22

The referenced action item requires that project engineering and geotechnical services develop guidelines for surveillance of testing operations by the onsite geotechnical soils engineer.

It is requested that field engineering incorporate the following guidelines into the appropriate field instruction and forward a copy of the revised field instruction to project engineering by February 22, 1980.

Guidelines for Surveillance of Testing Operations:

The onsite geotechnical soils engineer shall observe the testing operations at least once a day while testing is in progress. The testing operations to be observed shall include field density and moisture tests, laboratory proctor tests, gradation tests, plotting of zero airvoid curves, etc. Tests to be observed will be selected by the onsite geotechnical soils engineer. The selection will be random, based on tests being conducted on a particular day and varied to his satisfaction such that all phases of testing are being conducted correctly and are providing the necessary control of the earthwork operations. The onsite geotechnical soils engineer shall inform appropriate authorities if the operations are carried out incorrectly and/or if there are any other methods or tests that could be utilized to improve the control or provide increased assurance that testing operations are carried on correctly and effectively.

The onsite geotechnical soils engineer's daily report should show what testing operations were observed and any recommendations for improvements which may have been made.

for L.H. Curtis

SR/ht
12/5/1

CORRECTED COPY

Bechtel Associates Professional Corporation

Inter-office Memorandum

To [redacted]

Subject L.E. Davis

Midland Plant Units 1 & 2
Job 7220
Earthwork - Qualification
of Compaction Equipment
File: 0274, C-211-PE

Copies to

S. Blue
P. Corcoran
L. Curtis
J. Wanzeck
Com Log

Date November 16, 1979

From L.E. Curtis

Of Engineering

At Ann Arbor

RECEIVED
NOV 2 01979
BECHTEL POWER CORP.
JOB 7220
PER _____

Reference: IOM from S.S. Afifi to L.E. Curtis, 9/4/79

The following equipment have been qualified for use based on test fills and field tests monitored by geotechnical services (reference).

A. Structural and Random Sands

1. Wacker vibratory plate with 8-inch outriggers (model DVU 3001)
   (a) all area requiring 80% RD
   (b) 4-inch lifts and eight passes

B. Clays

1. Vibro plus (model CA-25 PD)
   (a) All areas requiring 90% compaction
   (b) Five to six-inch lifts and eight passes per lift

2. Wacker J-foot tamper (model GVS 2004)
   (a) All areas requiring 90% compaction
   (b) Four-inch lifts and six passes per lift

3. Vibro plus dynapact (model CF-43)
   (a) All areas requiring 90% compaction
   (b) Eight-inch lifts and six passes per lift

4. Wacker vibratory plate with 8-inch outriggers (model DVU 3001)
   (a) All areas requiring 90% compaction
   (b) Four-inch lifts and six passes per lift.

for Norbert Farwell
L.E. Curtis

Rao/sg
11/14/4

SD167872

(X) KK REVISIONS/REVIEW 10/16/79
-J. MICHELSON COMMENTS/10/15/79

(3 NT) QAR

C/t GORDON TURNBOW
QAR FILE

432

Discipline: Civil Engineering Origin: Ann Arbor

Subject: Large Settlements Due to Incorrectly Placed Backfill

Discipline Problem Alert Number: _____

I. APPLICABILITY

These conditions are applicable to all projects where structures are supported fully or partially by compacted backfill material.

3 → WILL INCORPORATE

II. PROBLEM DESCRIPTION

Insufficiently compacted plant area backfill under the diesel generator building was discovered because of excessive settlement during construction. Further investigation by a soils boring program has indicated that both granular and cohesive soils were improperly compacted in other areas of plant fill as well as the diesel generator building. This required extensive reanalysis and/or modifications of the diesel generator building, the service water structure, the feedwater isolation valve pits, and portions of the auxiliary building.

THIS CONDITION WAS INITIALLY PICKED UP BY THE SETTLEMENT MONITORING PROGRAM WHICH WAS DESIGNED TO DETECT SUCH CONDITIONS

Based on a thorough investigation, the most probable causes for the resulting remedial work include the following.

A. All types of compaction equipment used for plant area backfill were not prequalified for lift thickness and number of passes. This was particularly true for the small hand-operated equipment. Except for the heavy earth-moving equipment used to construct the plant area dikes, reliance was placed on acceptance being established by end result ASTM acceptance tests.

2 → B. An ~~audit~~ REVIEW OF TEST RESULTS BY GEOTECH has shown that the testing laboratory failed to obtain meaningful and accurate results after performing the applicable ASTM acceptance tests. Some examples are the following.

1. More than one-half of the test results for relative density and percent compaction were outside the theoretical comparison limit.

2. Incorrect soil indentification and calculation errors were present. PROCEDURES TO CONTROL TESTING ACTIVITIES WERE NOT PROVIDED BY THE TESTING CONTRACTOR.

3. Retests used to clear failing tests were not representative of the material that failed.

C. The quality assurance (QA) and quality control (QC) departments ~~only~~ provided a surveillance program in lieu of ~~establishing~~ an inprocess, in-depth inspection program. In addition, a continuous, thorough review of the testing methods being performed was not carried out.

III. CORRECTIVE ACTION TAKEN WHERE PROBLEM OCCURRED

A. The structures are being modified to compensate for the in situ soil conditions using the following solutions:

1. Underpinning by the use of caissons and piles for portions of structures partially supported by fill

2. Reduction of residual settlement by surcharge loading the structure totally supported by fill

3. Elimination of the possibility of liquefaction of extensive sand backfill areas during a seismic event by installing a permanent dewatering system

B. The earthwork specification has been revised, ~~so that all soil compaction requirements are clearly defined in the specification.~~ The specification now requires that both density testing and compaction methods be established which include the number of passes for a given lift thickness for all approved equipment.

C. QC rewrote its inspection plans to implement the requirements in the specifications which included verification of equipment qualification. QC also verified the methods used to qualify placements.

D. A resident geotechnical soils engineer has been assigned to the site to oversee the backfill operation.

E. The soils testing laboratory has been made aware of all testing discrepancies and has taken actions to prevent recurrence.

F. All of the construction equipment to be used for compacting the various types of soils at the site has been qualified to a maximum lift thickness with a specified number of passes.

IV. ACTION TO BE TAKEN BY BECHTEL PROJECTS

A. ~~The backfill compaction criteria for project earthwork specifications should have a method basis as well as performance~~

criteria for acceptance; i.e., each type of compaction equipment should be qualified at the jobsite for the respective type of soils to be compacted. This qualification includes lift thickness and number of passes. The final acceptance criteria are still to be based on testing by the appropriate ASTM acceptance standard.

B. A project soil engineer and a field soil engineer should be assigned to each major project. The project soil engineer is assigned by the geotechnical services department and reports to the head of the soils group in the engineering office. The field soil engineer is on the project construction staff and reports directly to the construction superintendent. The field soil engineer will be hired by Bechtel construction or retained through a subcontract with an outside organization specializing in soil engineering. Project engineering and the geotechnical services group will approve the qualifications of the candidate for field soil engineering and monitor the adequacy of his technical performance. The project and field soil engineers will have the following duties.

1. The project soil engineer's responsibilities will include, as a minimum, the coordination of all project soil engineering activities, the continuous review of soil-related construction activities, and the monitoring of the technical performance of the field soil engineer.

2. The field soil engineer's responsibilities will include, as a minimum, the monitoring of fill placement activities, testing laboratory activities, foundation excavations and pile and/or cassion foundation installations. In addition, he will coordinate all soil-related activities between project engineering/geotechnical services and construction, and forward progress reports to project engineering.

C. Quality assurance manuals or vendor procedure manuals for the soils laboratory testing should be reviewed by geotech as well as project engineering.

D. A maximum limit of the number of times a proctor curve may be used as representative of the material being placed should be established. The procedures manual should be reviewed by geotech to ensure that proper controls are outlined.

E. To minimize errors in testing, the soils testing laboratory should include the following practices in its testing procedures manual.

1. Cohesive Soils - The moisture content of the field densities cannot fall outside the zero air voids curve for the respective specific gravity.

2. Granular Soils - The stockpiled material should be tested for relative density by both the wet and dry methods as defined in the ASTM standards to ensure that the maximum density attainable will be used in placement.

F. Backfill Under Structures

1. To ensure that proper compaction is obtained, the frequency of plotting proctor curves or maximum/minimum density tests should be increased.

2. Consideration should also be given to performing static plate bearing tests as defined in the ASTM standards. The project or field soil engineer should have the option of requesting this type of test when appropriate.

3. TESTING SPECIFICATIONS SHOULD CLEARLY CALL OUT THAT IN PLACE COMPACTION TESTS SHALL BE TAKEN FOR EACH PLACEMENT.

8 — NO —

V. ACTION TO BE TAKEN BY THE TPO CHIEF CIVIL/STRUCTURAL ENGINEER

A. TPO Specifications C-441 Rev 6 and C-442 Rev 0 which are the materials testing services specifications for both nuclear power plants and fossil fuel power plants are to be revised to eliminate the soils laboratory section.

B. New TPO soils laboratory testing specifications are to be issued by February 1, 1980. In addition to the information presently in TPO Specifications C-441 and C-442, these specifications should be expanded to include the following items:

1. Establish a limit on the number of times a proctor curve may be used as representative of the material being placed.

2. Require a check to ensure that for cohesive soils the moisture content of the field densities does not fall outside the zero air voids curve.

3. Require stockpiled granular soils should always be tested for relative density by both the wet and dry methods as defined in the ASTM standards.

4. REQUIRE PROCEDURES TO CONTROL TESTING OPERATIONS.

9 — GOOD!

10 — OK

C. Reevaluate and revise as necessary the soils sections of the following TPO Specifications by February 1, 1980.

C-033 Rev 1	Site Grading
C-052 Rev 0	Pressure Water Piping, Furnishing and Installing
C-053.2 Rev 1	Furnish and Installing Yard Fire Protection System
C-054 Rev 0	Storm Sewer, Furnishing and Installing
C056.1 Rev 1	Furnishing and Installing Culverts
C-058 Rev 2	Constructing a Sanitary Sewer
C-062.1 Rev 0	Circulating Water Pipe Installation (Steel)
C-062.2 Rev 0	Circulating Water Pipe Installation (Concrete)
C-314 Rev 0	Circulating Water Pipe Installation (Fiberglass)
C-234 Rev 2	Structural Excavation and Earthwork Construction

WILL ATTEMPT TO INCORPORATE

11 — D. REVISE DESIGN GUIDES FOR STRUCTURES WHERE EXTENSIVE BACKFILL OPERATIONS ARE NECESSARY BECAUSE OF UNDERGROUND FACILITIES.

VI. FURTHER INFORMATION

For further information contact G. Tuveson, Ann Arbor office, (313) 994-7727.

VII. FURTHER COORDINATION

Reevaluation and modifications to the TPO specifications should be coordinated with the geotechnical services department of the H&CF division.

bc:
H. W. Wahl
J. P. LeBlanc
W. G. Jones
R. Hermeston
K. Wiedner
P. A. Becnel
P. K. Hansen
E. A. Rumbaugh
R. L. Castleberry
J. F. Newgen
[redacted]
L. A. Dreisbach
W. G. Moring
S. L. Blue
S. E. Afifi

Bechtel Power Corporation

777 East Eisenhower Parkway
Ann Arbor, Michigan

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

November 16, 1978

Route	Info.	Act.	Copy To
QA MGR.			
QA ENGRS			X
PQAE 7220			
LQAE 7220			
PQAE 2312			
PQAE 12447			
PQAE 12179			
QC			
QE			
PSQD			
SFPD QA MGR.			
QA SECY			
FILE HQ.			

Grey Howard
file - Midland

BLC-6801

Mr. G. S. Keeley
Project Manager
CONSUMERS POWER COMPANY
1945 West Parnall Road
Jackson, Michigan 49201

Midland Units 1 and 2
Consumers Power Company
Bechtel Job 7220
CONTINUATION of DIESEL GENERATOR BUILDING WORK
Files 0614/2801
Reference BLC-6747, Martinez to Keeley, Nov. 1, 1978.

Dear Mr. Keeley:

This letter is to advise you of recent activities relating to the Midland diesel generator building and modification to the activities previously identified in the Reference.

A meeting was held with the soil and instrumentation consultants, Dr. Peck, Dr. Hendron, and Mr. Dunnicliff, on November 7, 1978. Drs. Peck and Hendron strongly recommended surcharging the diesel generator building area to incur most of the settlement prior to plant operation, determine the effects of this settlement and then adjust building elevations as required. The alternate approach discussed in the Reference, of accepting the building's anticipated settlement, has two major drawbacks in the views of the consultants. First, it is not feasible to predict the long term settlement from the boring samples due to the large variation in samples. The settlement will have to be predicted based on soil monitoring. Second, if there are to be difficulties with the underground utilities due to the settlement it would be better not to have them occur when the plant is operating.

Based on the above recommendation, our proposed activities in the Reference were outlined to the consultants. The consultants advised making the installation of soil instrumentation the highest priority so that a data base can be developed prior to applying surcharge. They also advised using for greater effectiveness a lower depth of surcharge extended further from the building perimeter. They felt that approximately a 15-foot depth placed in increments of 10 and 5 feet with 20-foot berm placed with 2-to-1 slope should be sufficient but the soil monitoring data may indicate if more surcharge, a maximum of 20-foot depth, or a longer consolidation time is required.

In addition, the consultants recommended that the cooling pond be filled to its operating level of elevation 627 just after surcharge is placed, but after it was explained that the filling may take 30 to 60 days they recommended proceeding with filling the pond as rapidly as possible. They concurred that construction should also continue on the structure to add load early in the surcharge period.

Construction has been proceeding with the proposed activities. However, due to existing conditions some modification to the monitoring program before releasing electrical ducts is required. The south ends of the two condensate pipe encasements have been exposed. The condensate pipe centerlines were found to be located slightly below the centerline of the encasement sleeves. We will proceed to measure the gap at the top and to install vertical rods on the pipe and encasement to permit monitoring of any relative movement during surcharging. On the north ends we will be monitoring only the gaps from inside of the turbine building.

Construction will conduct the activities related to preloading in accordance with directions issued by Project Engineering. Project Engineering will base the preloading plan on the consultants' recommendations.

While we have received approval to proceed with limited construction and are proceeding to the point of concrete placement, we again request your approval to proceed with concrete construction of the building as soon as possible.

Very truly yours,

P. A. Martinez
Project Manager

PAM/pp

cc: Mr. D. B. Miller
Mr. T. C. Cooke

PM meeting - call Lori

Telephone call

BY P. A. Martinez OF Bechtel Proj.Mgmt.

TO G. S. Keeley OF CPCo Proj.Mgmt.

DATE September 7 , 78 TIME

SUBJECT DIESEL GENERATOR SETTLEMENT JOB NO 7220, MIDLAND 1 & 2

H. W. Wahl
P. A. Becnel
J. P. LeBlanc
R. L. Castleberry
J. F. Newgen
S. L. Blue
E. A. Rumbaugh
K. Wiedner
F. E. Meyer
[redacted]
B. R. Hubal
P. K. Hansen
R. Hermeston
L. A. Dreisbach
W. G. Moring
W. G. Jones

Advised Keeley that our investigations show the diesel building settlement problem to be potentially serious and we feel it should be reported to the NRC under 50:55(e) requirements. Although it is not clear that any safety question would exist, the analysis is likely to be extensive and if remedial action has to be taken it could also be extensive. The diesel generator building and foundations are on engineered fill and while indications are that the fill tested out satisfactorily when placed, it is apparent that some of this fill for some reason now does not meet the specified compaction requirements. Soil testing by a firm in Boston is expected to take about two weekds. Our own top soils expert Ferris will be on-site on September 12 and in Ann Arbor on September 13 and we would be able to brief Consumers Power further after that date.

Keeley indicated he had been following this problem and at this point would ask his people to prepare a press release. He asked to meet at the Site on Thursday, September 14, at 12 noon for further briefing and addressing potential solutions. Keeley concurred with Bechtel's investigative efforts to determine if the problem exists elsewhere on-site.

P. A. Martinez

PAM/pp

Telephone call

ROUTE

BY Al Boos OF B Field

TO John Heinh/Gordon Tuveson B AAo

DATE 8/21 '78 TIME 1:30

SUBJECT Settlement of Diesel Gen Bldg JOB NO. 7220

Diesel Generator Bldg - settlement first noted in 7/78 - worst case noted 3¼"

Background: all structures on 6"± mudmat

Field has been recording settlements for last month or so — Al described measurements made to date (see attached page). Al further noted that the pedestal foundation slab have settled more than the bldg — in some cases it appears that the structural wall is spanning over the mudmat (i.e. a ruler can be inserted between the mudmat and structural foundation.

Field needs immediate support — i.e. the 24 hr clock for repeatability has started @ noon.

Field would like Geotech, Proj. Engr on site yet today. I promised to call back later with arrangements.

SB 108919

AAO-822

Telephone call

page 2 of 2

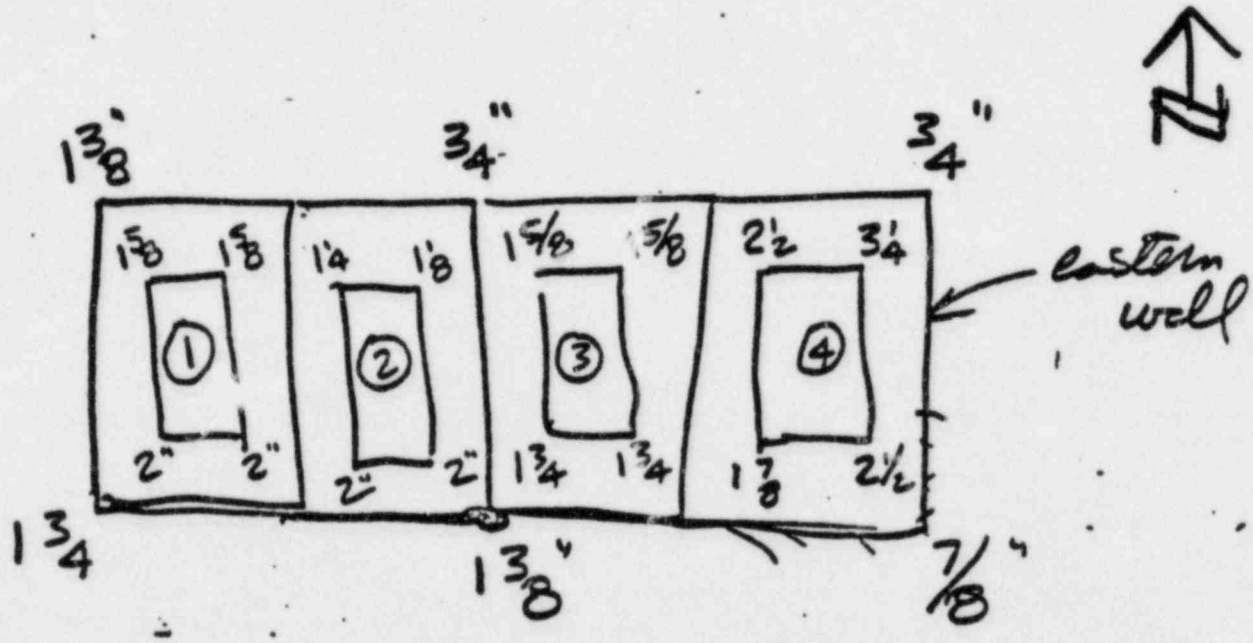
phones Newgen – 517-631-9396
Boos – 517-835-9404

BY _____ OF _____ ROUTE _____

TO _____ OF _____

DATE _____ 19 _____ TIME _____

SUBJECT _____ JOB NO. _____



1.) no crushing @ the edge

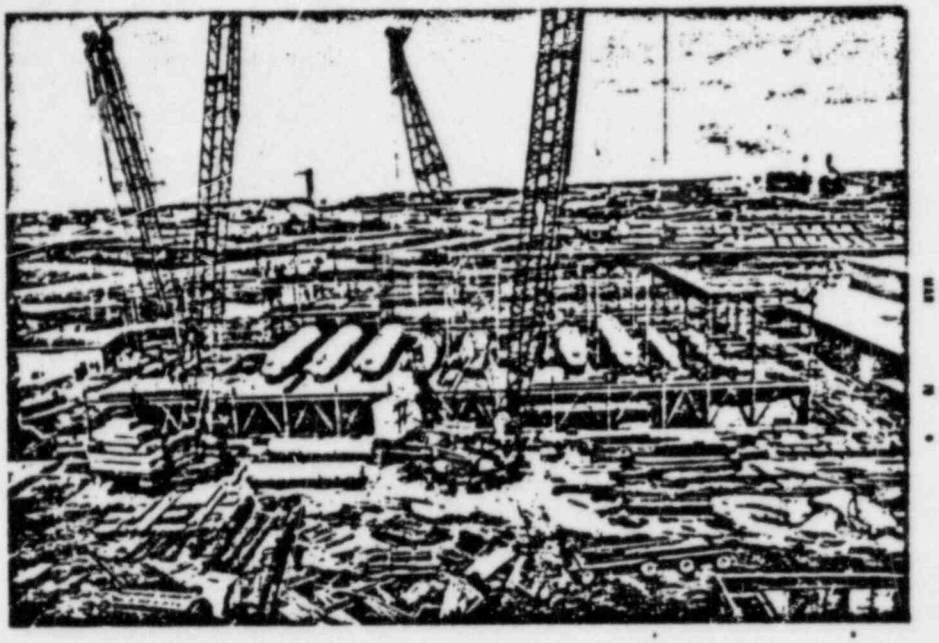
2) work slab settling, the eastern wall appears to be spanning

3) D/G Bldg up to Elev. 650 ±, no slab poured yet for mezz floor

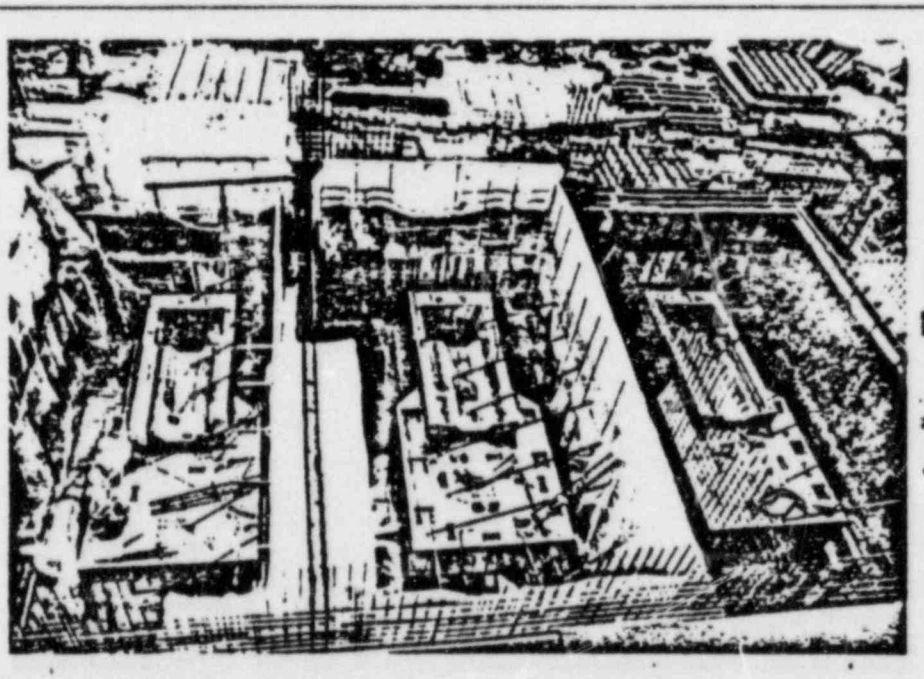
4) settlement greatest

SBG8920

AAO-572



Evaporator Building
833



Diesel Generator Pads
834

CONFIDENTIAL

Bechtel Power Corporation

Inter-office Memorandum

To J. A. Rutgers

Subject November 13, 1979, Response to Question 23 NRC [redacted] Midland Project Job 7220

Copies to H. W. Wahl, S. L. Blue, J. O. Wanzeck, P. A. Becnel, S. I. Heisler

832

Date November 20, 1979

From J. Milandin

Of Quality Assurance

At Ann Arbor

5/1/80 Cpt R. Sen, Member of Project Task Force UST Issue

The purpose of this memorandum is to record a Bechtel position on a point introduced in the subject response by CPCo.

During the finalization of the subject response on 11/12/79, and as a result of the CPCo in-house review by Messrs. Howell, Keely and Marguglio on November 10, Mr. Marguglio directed that the following typical revision be added to the response to Part 1, in sub-sections 3.6, 3.7, 3.8, 3.9 and 3.10, following any reference to US Testing test results. The revision was: "--- test results, or satisfactory evaluation of the test results."

The purpose of this addition, according to Mr. Marguglio, was that CPCo did not wish to support a pre-empted version of the situation involving test results. His logic was that as written, without the revision, only the test results were incorrect. CPCo's position was that the lack of correct evaluation of the test results could also have lead to the situation which placed reliance on the test results.

I consulted with Phil Becnel and Jim Wanzeck of Geo-Tech concerning this matter. We concluded that the statement implies that Bechtel was responsible for evaluating the test results supplied to us by US Testing. Jim Wanzeck's view of "evaluation" of test results implies that one would review the calculations and data used in arriving at the test results to assess the technical accuracy of the report. Certainly this was not intended by Bechtel, nor, was it expected of the inspectors and field engineers who used these test results from US Testing. They simply looked at the values that were called out on the report for conformance to specifications.

I explained the foregoing to Mr. Marguglio, who did not agree with this interpretation and insisted that the report reflect his revision. I informed him that Bechtel's position was otherwise and, however, the report would be issued as he had directed. I also pointed out to him that Bechtel has committed in sub-section 3.10 to requesting US Testing to demonstrate to the cognizant engineering representative that test procedures equipment and personnel used

for quality verification testing for other than NDE and soils were and are capable for providing accurate test results. I pointed out that this was, in effect, the proper interpretation of evaluation. In view of this information, however, he maintained his position as previosuly stated.

As you recall, I informed you of this difference in interpretation of the revision, and, as requested, I am documenting this for any further action you may consider appropriate.

J. J. Milandin

JM/le
JM-79-113

MEETING NOTES
MIDLAND PLANT UNITS 1&2
CONSUMER POWER COMPANY
BECHTEL JOB 7220-101

DATE: July 27, 1979; 9:00 a.m. to 1:30 p.m.

PLACE: Ann Arbor, Michigan, Conference Room 8(B)3A

SUBJECT: Review Proposed Monitoring System with Dewatering Consultant

ATTENDEES:

Bechtel	Consultants
B. Dhar*	R. Loughney
S. Lo	
C. McConnel	
S. L. Blue*	
K. Bailey	
D. Wheeler*	
W. C. Paris, Jr.	

*Part-time

ITEMS DISCUSSED:

1. It was decided to monitor the fines at the subcontractor's return line where it discharges into the eductor tank, and monitor the ground water flow with a water meter at the subcontractor's discharge line.
2. The water testing will be conducted using a 1-liter Buchner Funnel.
3. The individual dewatering wells will be tested monthly for information only. The results will be given to the on-site Field Geotechnical Engineer.
4. Any material removed from the subcontractor's eductor tank will be collected, and sieved over a No. 200 mesh screen. The sieved portion will be examined by the on-site Field Geotechnical Engineer.
5. All dewatering wells within the Turbine Building will be installed with stainless steel well screen so that they may be converted to part of the permanent dewatering system at a later date if necessary.
6. Specific dewatering wells located outside the Turbine Building may be installed with a 6-inch well screen upon approval by the on-site Field Geotechnical Engineer.

W. C. Paris, Jr.

WCP/nm

SB169422

[redacted]

B. Richardson
→ c: [illegible] AFIF

Bechtel Power Corporation

Post Office Box 2167
Midland, Michigan 48640

RECEIVED
MAY 02 1979
KARL WIEDNER

April 25, 1979

U. S. Testing Company
1415 Park Avenue
Hoboken, New Jersey 07030

Attention: Dave Edley

FILE
TASK GR
7220-101

Job 7220 Midland Project
Subcontract 7220-C-208
Meeting Notes
C-208-B-364

Dear Mr. Edley:

Attached for your information and files please find one copy of meeting notes for the jobsite meeting held on Monday, April 9, 1979, at Hoboken, New Jersey.

Very truly yours,

J. F. Newgen
Project Superintendent

JFN/LFS/DLP/km

Attachments

P. BECWEL

Route	Info.	Act.	Copy To
QA MGR.	X		
QA SECTY			
SPEC QA MGR.		X	X
MARTINEZ WIEDNER			
PSSD			
QE			
GC			
PCAE 1219			
PCAE 1246?			
PCAE 2912			
PCAE 1220		X	
PCAE 1221			

RECEIVED
ANN ARBOR
QUALITY ASSURANCE
MAY 1 '79

FILE NO.

SB169476

MEETING NOTES

U. S. TESTING, CONSUMERS POWER COMPANY AND

BECHTEL POWER CORPORATION

DATE: April 9, 1979

PLACE: U. S. Testing Headquarters, Hoboken, NJ

SUBJECT: See Below*

ATTENDEES:		
	E. Basile	U. S. Testing Company
	E. Zadena	U. S. Testing Company
	E. Edley	U. S. Testing Company
	M. Anzelmo	U. S. Testing Company
	J. Spelz	U. S. Testing Company
	B. Marguglio	Consumers Power Company
	D. Worn	Consumers Power Company
	R. Wheeler	Consumers Power Company
	D. Palmer	Bechtel Power Corporation
	G. Richardson	Bechtel Power Corporation

I)* Ben Marguglio opened the meeting by establishing the following agenda:

1) Describe the problems relating to the Midland soils problem.

2) What U. S. Testing thinks may be the problem: where did U. S. Testing contribute to the problem?

3) What did U. S. Testing say to the NRC during the NRC investigation.

II) Ben Marguglio presented the following to describe the types of problems:

1) Inconsistencies in the SAR

2) SAR Requirements not translated accurately/clearly into the specifications.

3) Requirements for testing were not totally stated. Callout for proctor not total story.

4) Interpretations were varied and not released through normal specification channels.

5) Client suspects there was not a total understanding of the process by any one individual. Lack of expertise.

6) There may have been incorrect proctor selection.

7) There may not have been timely corrective action in identifying the extent of the problem and identification of the problem as opposed to fix.

[redacted]

8) Accountability for inspection may have been lacking.

Who inspected
What inspected
How inspected, etc.

9) U. S. Testing may have utilized to a sampling process without sufficient historical background on the process.

10) U. S. Testing may have failed to qualify the test or the inspection process.

Ben added that all of the above contributed or could have contributed to the problem.

III) The main discussions during the meeting centered around the above. The following is a brief description of the important points of this discussion.

1) Ben discussed the conflicting test methods in specification C- 210 and asked what U. S. Testing did to assure themselves that they had a clear Specification to work to.

U. S. Testing responded that their direction to use Bechtel modified proctor came from Bechtel as did direction of when to take moistures. There was nothing in writing - direction was verbal.

U. S. Testing added that it was not their responsibility to determine when or where to take a test.

U. S. Testing clearly stated that U. S. Testing responsibility was for performing the testing and not to inspect as to where and when testing is to be performed - this is a Bechtel responsibility.

Question by Don Horn concerning moisture, compaction, and fitting of sample to the proper proctor was directed to U. S. Testing. Inherent error and judgement could be highly contributary factors in giving the wrong result.

U. S. Testing stated that variables exist within a soils testing program that can cause erroneous data. U. S. Testing suggested that the testing agency be given more autonomy in making decisions. It was suggested that possibly the testing agency would serve best if it were responsibile directly to the Client.

Ben stated that on Consumers Power Company jobs (future) he expects U. S. Testing to assure that specification interpretations/changes are obtained officially - and added that U. S. Testing Q A should not allow this to happen.

U. S. Testing responded that their Contract does not provide for this type of QA involvement.

2) Ben asked what type of mechanism U. S. Testing used to determine when a new proctor was required.

U. S. Testing responded that this was (is) normally triggered by the lab technician during selection of the proctor in response to a field test.

U. S. Testing added that there are no procedures to cover this operation; that it is a judgement operation that would be difficult to procedurize.

Ben summarized the problem of direction during testing as being unsatisfactory and a more stringent direction process between Contractor and Subcontractor would be required, particularly that any change in test or specification changes must be received in writing prior to implementation.

3) Ben asked who notified U. S. Testing when a new proctor was needed.

U. S. Testing responded this was an ongoing item and proctors were taken as a regular thing and were taken at material changes and new borrows - again there were no procedures.

U. S. Testing stated that they could not remember ever being requested by Bechtel to take a sample specifically to develop a proctor.

U. S. Testing added it was not their responsibility to maintain the test frequency and that they were not privileged to quantity information.

Question of frequency revealed that:

1) 10,000 yard frequency test was not accurately followed as related to exact yardage being moved but was an ongoing check basis based on frequency roughly correleted with yardage - this was done because exact yardage movement was not immediately available to prompt the precise frequency implied by the specification.

U. S. Testing added they felt that they did more than their Contract required in:

Determining new sources and material changes where new proctors are required.

Selection of the appropriate proctor to compare to the field density.

Over involvement with Canonie.

4) Ben asked how U. S. Testing identified the proper curve to use when the curve may be six months old.

U. S. Testing responded, they kept approximately 15 samples to be used.

Ben inquired what the field procedure was in determining when a new proctor is needed. U. S. Testing responded that:

1) Judgement factor by experienced field personnel determines a large portion of the decision.

2) If characteristics changed, or a new borrow was started then an additional proctor would be made .

Ben added following statement:

For Consumers Power Company projects U. S. Testing should take the attitude that, in the absence of a controlled single source or specific designation for a change in soils, the most conservative approach should be taken.

5) General discussion on testing calculations:

A) Some conflicts noted in D. Horn's audits - U. S. Testing should consider.

B) All test reports submitted to Bechtel Q. C. for review - does not include actual calculations.

C) There normally was not a plot of field test results on the proctor curves - no comparisons to zero air-voids curve.

D) If test plots on wrong side of zero air-voids curve there is an error (per D. Edley).

E) Errors are inherent in test methods being applied:

Troxler has $\pm$ 3% error.

Results are conservative.

6) Ben asked what U. S. Testing thought might be the problem - U. S. Testing had no input.

7) Ben asked if U. S. Testing had recommendations for future work - U. S. responded:

A) Take a look at the role you want the test lab to perform.

B) U. S. Testing added that it was Bechtel's responsibility to determine when a new proctor is needed.

C) Review area of what is acceptable material.

Ben requested that U. S. Testing provide Consumers Power with testimonial information that was provided to the NRC during the interviews covering the soils investigation at Midland.

[redacted]

U. S. Testing inquired whether Bechtel would object to this release. Bechtel Subcontracts representative stated that there would be no objection.

The dialogue of these interviews is attached.

Prepared by:

David L. Palmer 4-26-79
David L. Palmer Date

MEETING NOTES No.
MIDLAND PLANTS UNITS 1 AND 2.
CONSUMERS POWER COMPANY

Date: December 8, 1978
Place: Albuquerque, New Mexico
Subject: Foundation Investigation for Diesel Generator Building and Other Structures.

Attendees:

Bechtel	CPCo	Consultant
W. Ferris	R. Wheeler	R.B. Peck
S. Afifi		
G. Tudeson		

Purpose

To obtain recommendations from the consultant on various problems related to surcharge loading the Diesel Generator Building and foundation requirements for other structures built or to be built on plant area fill. Dr. Peck does have a copy of all the soil borings and available test data.

Diesel Generator Building

1.) Surcharge loading along side Turbine Building wall.
   a. Use surcharge formulas such as those shown in the more recent foundation books such as Bowles or Spangler's text book. Also use at rest case ($K_o \approx 0.7$) for the earth pressure when calculating the tie rod forces.

SB169524

Q.) Were there Q. problems in soils at th time?
A.) I believe that Bechtel Q.A. and Consumers Power Company Q.A. were active in soils during this time period (fall of 1978), but I have no specific recollection.

Q.) Is the BMP and type of materials specified for the Diesel Generator fill normal for construction?
A.) I had no interface with Project Engineering and Design.

Showed QCIR SC-1.05 (a Bechtel Q.C. report form).

Q.) Are you aware of Q.C. field activities and responsibilities in soils?
A.) I am aware that they have a program and functions to fulfill, but not of their specific requirements.

Q.) Do you think that Canonie was aware of the specification for compaction and what it was being tested for?
A.) I have no specific knowledge, but assume that they were aware of their job requirements.

Q.) Was Bechtel working soils in addition to Canonie during this time period (1977)?
A.) Yes.

Q.) When did Canonie quit working?
A.) In 1977, there was a big push to be off site for deer hunting season which began November 15th.

Q.) Why are you working to D-1557 now?
A.) Q.C. direction with a memo from Cheek to Siple of 9/29/78 (copy attached).

Q.) What is random fill?
A.) It could be any of several types of material.

Q.) Why would they call random fill just clay?

Cheek to Siple memo was shown. The statement "Random Fill (Clay)" was pointed out.

Q.) If it could be other materials, why would he (Cheek) define it as clay?
Q.) Did he know the difference?
A.) My interpretation of this memo was that it was addressing testing and that he was distinguishing test procedures for granular vs. cohesive soils.

Q.) Do you have anything you wish to add to this discussion?
A.) No.

[redacted]

Bernie Thompson & Roger Smith
NRC Interviews of 1-22-79 & 1-23-79
Same day - validity was established?!

Q.) Was it difficult to determine what proctor value to use by comparison to the jar samples?
A.) No

Q.) Who gave you the locations and elevations for the tests?
A.) Generally the labor foreman or sometimes the laborers.

Q.) Who selected the site for the test?
A.) The laborers would prepare the site of the test where the foreman selected most of the time. In some instances we would select the exact site in the general area for which the test was requested.

Q.) How often were either Q.C., or Engineering present at the time of the test?
A.) Very seldom.

Q.) Did Q.C. do surveillance on your test activities in the field on a regular basis?
A.) No, not that we were aware of.

Q.) How often did they observe you doing the tests?
A.) Very seldom.

Q.) Do you know what their requirements are for surveillance of soils?
A.) No. I have not had access to that information.

Q.) Were they short of people to do this work?
A.) I cannot answer that question.

Q.) Did they have qualified people for this work?
A.) I cannot answer that question.

Q.) Who was in charge of soils for Q.C.?
A.) Primarily, Daryl Osborn.

Q.) Did he have other responsibilities besides soil work?
A.) Yes. To the best of my knowledge, he had other areas of responsibility.

Q.) Were there grade stakes available for elevations?
A.) Very seldom.

Q.) How were elevations determined?
A.) Mostly from nearby buildings where elevations were written on the walls.

Q.) Were locations established by the use accurate measuring devices?
A.) No. They were usually by walking off from a wall or just eyeballing the distance.

Q.) Were lift thicknesses measured?
A.) Not in my presence.

Q.) Were the areas free of debris prior to the placement of fill material?
A.) I cannot answer that question.

Q.) Did Q.C. make sure that areas were free of debris before placement?
A.) I cannot answer that question.

Q.) How were retests done? Did they (Bechtel) supply you with a sample?
A.) Retests were taken by a technician as close to the original test as possible at the request of Bechtel when they felt the area was ready for a retest. No, Bechtel did not supply us with a sample.

Q.) Was special attention given to test areas?
A.) Yes, although not a common occurance, I did feel that special attention was given to test areas on certain occasions.

Q.) Can you recall such occasions?
A.) Yes.

Q.) Would you discribe such instances?
A.) Roger spoke of a test on the 30" SWI discharge line. Bernie mentioned a test in the same area.

Q.) Did the foreman asking for the tests know the requirements for the frequency of tests?
A.) I cannot answer that question.

Q.) Were lift thicknesses reasonable or were they excessive?
A.) Generally yes, however there were occasions that they were not.

Q.) How was the moisture controlled prior to placement?
A.) Prior to August of 1977, there was no control of moisture prior to placement. After that date until the spring of 1978, one moisture was taken in the morning from the stockpile.

Q.) How was the moisture reported?
A.) The moisture was given to Q.C. and Engineering.

Q.) Was the moisture associated with a proctor value?
A.) No, it was not at this time.

[redacted]

NRC DIESEL GENERATOR BUILDING SOILS INVESTIGATION
at the Midland, Michigan, Project Site

Interviewers: Gene Gallagher, NRC Soils Specialist
G. A. Phillip, NRC Investigation Specialist

Interviewee: John Speltz, U.S. Testing Site Project Supervisor

The following notes were generated from notes taken by John Speltz during an interview in the Consumers Power Company conference room on 12/14/78.

Q.) Did you see a conflict in C-210 (earthwork specification) between BMP (Bechtel Modified Proctors) and ASTM D-1557?
A.) Yes, there was an area of concern in section 13.

Q.) What criteria were you working to?
A.) The BMP, as indicated on our reports.

Q.) What is your period of activity on site?
A.) Since December, 1976.

A letter to Church (Subcontracts) from Valenzano (Engineering) of 6/10/74 was shown. Section 13.7 of C-210 was pointed to in the letter.

Q.) What does modified Proctor mean to you?
A.) ASTM D-1557 modifying ASTM D-698.

Q.) Do modified Proctor, BMP, and D-1557 mean the same?
A.) No.

Q.) Does BMP and modified Proctor mean the same?
A.) No.

Showed telecon Hook (Bechtel Q.A. onsite) to Rao (Ann Arbor, Project Engineering), October, 1977, and telecon Teague (Lead Civil Field Engineer) to Rao, October 10, 1977 (copy attached), noting that either D-1557 or BMP can be used.

Q.) What was your source of direction on this?
A.) Verbally, as mentioned in a note on top of the original of the telecon.

Q.) Do you feel Hook or Teague were responding to you (John Speltz)?
A.) No, not to me directly.

Q.) Who would respond to you with this information?
A.) Bechtel Q.C.

Q.) Why is the response so late? → ref: Oct 10, 77 date
A.) I have no information on that.

Q.) Were there other areas where soil work was going on?
A.) What work are you referring to?

SB169482

[redacted]

b. It was indicated that a 12" diameter culvert pipe would be used to protect the tie rods with the rods placed along the invert of the pipe

c. Large concrete blocks, properly designed, could be used as a gravity wall to retain the earth along the turbine building

2.) It is not necessary to break up the mud mat in the diesel generator building before the surcharge load is applied

3) The current design is based on an upper limit of 20 feet of surcharge above grade. Increments of preload may be 10 feet over the whole area, monitor settlements for one week, then add 5 more feet of fill, monitor for another week and finally add 5 feet of additional fill.

4) Rebound measurements of the Borris points are to be taken frequently. Temperature corrections are not necessary, but the ambient air temperature should be recorded.

5) Rebound measurements should be helpful in predicting the soil modulus values for seismic analysis

SB169525

6) Obtain several sets of readings of the measurement devices before preloading above grade with [redacted]

with the surcharge

7) Bearing capacity should not be a problem. We should determine the angle of internal friction for the soil, based on preloading conditions. Use soil to support the ground floor slab inside the building. Investigate bearing capacity using formulas which include overburden and the angle of internal friction as well as the cohesion.

8) Dr Peck does not consider it necessary to conduct a soils boring program after removing the surcharge We may consider hand digging a shallow test pit to evaluate bearing capacity by the use of pocket penetrometer and load testing

9) Alternate Solutions:

a) In the event there is a bearing capacity problem after preloading, a mat foundation could resolve the question. It may be desirable to have a mat design available.

b) Obtain a three dimensional model of where the sand under the foundation is located. Use the borings and the construction records. Determine the groutability of this sand.

10) CPC's letter to P. Martinez, dated 12-7-78 was not discussed. Condensate water line concrete encasement may be in contact with the building

SB16952

[redacted]

sump on the south side of the building. A hard spot may be formed which could cause the building to hang up. It would appear desireable, where the duct bank comes in contact with the sump, to cut the duct bank loose. This should be investigated in more detail or be monitored during installation of the surcharge.

11) Building cracks should be mapped before and after preloading.

12) Rationale

The final loads will be smaller than the surcharge loads. It should be possible to obtain an upper limit of future settlements which should not exceed the rebound from preloading

Other Areas of the Site

1) Transformer foundations south of Turbine Building

The settlement data and the soil borings were reviewed. If differential settlements develop, it will be because of the properties of the shallow soils, therefore a low surcharge would help. Dr. Peck recommended that the transformer pads be surcharged to their design load and in addition 5 feet of soil be used to surcharge the remainder of the transformer foundation pit. Prior to surcharge loading check with the manufacturer on the

amount of differential movement the buss can accomodate and the tilting the transformer can withstand

2) Tank Farm, North of Auxiliary Building

The two borated water storage tanks are Class 1, and the other two tanks located in the center of the tank farm are not Class 1. The ring foundations installed and settlements are nominal. Tanks can be used for preloading the soil. Monitor the settlement of the tanks and check the piping. The piping may need to be adjusted after testing. The water may be required to be left in the tanks for an extended period (several weeks) until a settlement curve is established. The ground water should also be monitored during this period.

3) Guard House

The soil borings indicated that the material under the foundation should be removed or a pile foundation be used. Drive H-piles 15 feet into the till

4) Bullock Creek Pipe Bridge

Use pile foundation

5) Radwaste Building

Settlements are only nominal at this time, continue to monitor. At present, no action is required.

6) Retaining Walls

The borings do not indicate any additional problems are to be expected. Therefore monitor settlement in normal manner.

7) Clorination Building

The superstructure is very light, and the borings do not indicate that any additional action needs to be taken

8) Condensate Storage Tanks

The borings do indicate that there is a problem. The fill is settling under it's own weight. Consider preloading the tank area. Decide on February 15, 1979, after reviewing Diesel Generator data, if preloading must be done. Preloading, if required, should extend to a distance of 20 feet from the tanks

---

SB169529

G. A. T

[redacted]

Bechtel Associates Professional Corporation

Inter-office Memorandum

RECEIVED
AUG 0 6 1979
KARL WIEDNER

To R. L. Castleberry

Date 3 August 1979

Subject Midland Units 1 and 2
Job 7220-001
NRC Meeting July 18, 1979

From S. S. Afifi

Of Geotechnical Services

At Ann Arbor 10 D 5
7220-79-145

Copies to S. L. Blue w/o
H. H. Burke/W. R. Ferris w/a
J. O. Wanzeck w/a
P. A. Martinez w/a
K. Wiedner w/a
1320, 3130

REFERENCE: IOM S. S. Afifi to R. L. Castleberry, dated July 25, 1979

Attached you will find C. H. Gould's summary of his presentation at the July 18, 1979 meeting. This has been re-written and the summary presented on the above reference is superceded. I understand this was requested by Mr. Keeley of CPCo and should be transmitted as soon as possible.

Jow Wanzeck for/SSA
S. S. Afifi

JOW/nm
Attachments

8170009

[redacted]

Remedial Measures For
Electrical Penetration Areas
and Isolation Va

This is a brief report on the proposed re
penetration areas of the auxiliary buildi
pits. The objective of the remedial mea
of a questionable measure as evidenced b
the remedial measure has the objective o
capacity with structural elements which
foundations to underlying undisturbed gl
to existing structures and construction
this it is planned to utilize the struc
to bridge over some of the questionable
caissons at the extremities of the elec
shall have sufficient capacity to supp
and live loads of the electrical penet
being supported by the control tower a
the isolation valve pits is to tempora
mine them by removing all materials t
till is encountered and filling the e

The plan of attack for performing the

1. Locally dewater the soil above
It is essential that the loose
excavation under the structure
dewatering system shall be ins
of any excavation. The dewate
majority of the eductors will
turbine building. The discha

2. Temporarily support the isola
spanning between the buttress
wall at the ground surface.

3. Excavate an access shaft adj
of approximately 7 feet belo
would then proceed laterally
extreme edge of the electri

4. Install jacked caissons at t
area foundation as the reac
for the following reasons:

   a. It will be possible to
   excavating material
   ground from under the
   and buttress access

   b. It is known that ther
   backfill area which w
   provides man-size wo

To R. L. Castleberry

Subject Midland Units 1 and 2
Job 7220-001
NRC Meeting July 18, 1979

Copies to S. L. Blue w/o
H. H. Burke/W. R. Ferris w/a
J. O. Wanzeck w/a
P. A. Martinez w/a
K. Wiedmor w/a
1320, 3130

REFERENCE: IOM S. S. Afifi to R.

Attached you will find C. H. Gould'
the July 18, 1979 meeting. This has
presented on the above reference is
requested by Mr. Keeley of CPCo and
possible.

JOW/nm
Attachments

Bechtel Associates Professional Corporation

Inter-office Memorandum

To R. L. Castleberry

Date 3 August 1979

Subject Midland Units 1 and 2
Job 7220-001
NRC Meeting July 18, 1979

From S. S. Afifi

Of Geotechnical Services

At Ann Arbor 10 D 5
7220-79-145

Copies to S. L. Blue w/o
H. H. Burke/W. R. Ferris w/a
J. O. Wanzeck w/a
P. A. Martinez w/a
K. Wiedner w/a
1320, 3130

REFERENCE: IOM S. S. Afifi to R. L. Castleberry, dated July 25, 1979

Attached you will find C. H. Gould's summary of his presentation at the July 18, 1979 meeting. This has been re-written and the summary presented on the above reference is superseded. I understand this was requested by Mr. Keeley of CPCo and should be transmitted as soon as possible.

Jo Wanzeck for/SSA
S. S. Afifi

JOW/nm
Attachments

[redacted]

Remedial Measures For Electrical Penetration Areas and Isolation Valve Pits

This is a brief report on the proposed remedial measures for the electrical penetration areas of the auxiliary building and the adjacent isolation valve pits. The objective of the remedial measures is to replace bearing capacity of a questionable measure as evidenced by soil sampling data. The design of the remedial measure has the objective of replacing the suspect soil bearing capacity with structural elements which extend from the existing concrete foundations to underlying undisturbed glacial till while minimizing disturbances to existing structures and construction operations. In order to accomplish this it is planned to utilize the structural capacity of the penetration area to bridge over some of the questionable underlying materials by providing caissons at the extremities of the electrical penetration areas. These caissons shall have sufficient capacity to support approximately one-half of the dead and live loads of the electrical penetration areas with the remaining one-half being supported by the control tower area. The proposed method for supporting the isolation valve pits is to temporarily support them in place, totally undermine them by removing all materials to a depth at which undisturbed glacial till is encountered and filling the excavation with lean concrete.

The plan of attack for performing the work is as follows:

1. Locally dewater the soil above the glacial till in the affected areas. It is essential that the loose granular soils be dewatered to permit excavation under the structures without significant loss of ground. The dewatering system shall be installed and the water drawn down in advance of any excavation. The dewatering system is a curtain cut-off type. A majority of the eductors will be installed from the lower basement of the turbine building. The discharge will be monitored for piped fines.

2. Temporarily support the isolation valve pit by the use of needle beams spanning between the buttress access shaft and turbine building foundation wall at the ground surface.

3. Excavate an access shaft adjacent to the isolation valve pits to a depth of approximately 7 feet below the bottom of these pits. The excavation would then proceed laterally as a drift until the excavation reaches the extreme edge of the electrical penetration area.

4. Install jacked caissons at this location utilizing the electrical penetration area foundation as the reaction. The jacked caisson method has been selected for the following reasons:

   a. It will be possible to jack through loose sands and soft clays without excavating material from within the caisson thus preventing loss of ground from under the electrical penetration area, turbine building and buttress access shaft.

   b. It is known that there are sizable concrete obstructions in the backfill area which will be encountered by the caissons. A caisson provides man-size working room for demolition of the concrete obstructions.

c. Likewise, the man-size working room of the caisson will permit direct excavation of highly compacted sands and/or clay as well as the glacial till (caissons penetrate the glacial till a minimum of 5 feet).

d. The caisson provides access for direct visual inspection of the glacial till for the initial determination of bearing capacity (final bearing capacity is by load test).

5. Concrete the caisson and load test same.

a. Load test one caisson under each electrical penetration area at 2.0 times design capacity.

b. Load test each caisson individually at 1.5 times design capacity.

c. Load test all caissons as a group at 1.0 times design capacity or 1/4" of vertical structure movement, whichever occurs first.

d. Upon completion of any tests the caissons are to be left in a pre-stressed state to prevent any settlement.

6. Install support of excavation system along the turbine building foundation wall and connect it to the access shaft and the jacked caissons. The jacked caissons which were previously installed under the electrical penetration area will temporarily act as support of excavation for the excavation under the isolation valve pit. The containment structure and the buttress access shaft form the remainder of the excavation enclosure under the isolation valve pit.

The support of excavation system along the turbine wall foundation will also act to:

a. Support the temporary additional load imposed on the foundation wall by the needle beams which support the isolation valve pit at the surface.

b. Support the turbine building vertical loads within the zone of influence of the excavation under the isolation valve pit.

7. Excavate all material from underneath the isolation valve pits to a depth at which undisturbed glacial till is encountered.

8. Fill the excavation under the isolation valve pit with lean concrete backfill to within 7 feet of the existing foundation.

9. Place structural concrete in the drift under the isolation valve pit and the access area used for installation of caissons underneath the electrical penetration area.

10. Dry pack and transfer isolation valve pit load to the lean concrete backfill.

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The design of the caisson is based upon a very conservative caisson tip pressure of 25 kips per square foot (KSF) for straight sided caissons. This provides a tip load intensity of approximately one-tenth that normally associated with jacked piling, and will bring the long term settlement into line with expected settlements of the balance of the auxillary building. The bearing strata pressure is limited to 20 KSF for straight sided caisson. If the bottom of the jacked caissons are belled in the glacial fill, the design tip pressure is reduced to 17.7 KSF. The bearing strata pressure associated with belled caissons is not relevant. The steel shells for the jacked caissons are neglected in calculating the structural capacity of the caisson.

The bearing pressure on the glacial till below the isolation valve pit is only nominally increased by the substitution of concrete for earthen fill.