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Bechtel Associated Professional Corporation  
Ann Arbor, Michigan

TECHNICAL SPECIFICATION  
FOR  
SURCHARGING OF THE  
DIESEL GENERATOR BUILDING AREA  
FOR THE  
CONSUMERS POWER COMPANY  
MIDLAND PLANT UNITS 1 AND 2  
MIDLAND, MICHIGAN

**UNCONTROLLED**

SB1234-10

No		DATE	REVISIONS	BY	CHK	APP
1		12-12-70	Issued for construction	<i>[Signature]</i>		
ORIGIN		 CONSUMERS POWER COMPANY MIDLAND PLANT UNITS 1 AND 2 MIDLAND, MICHIGAN		JOB No 7220		
				SPEC DES GUIDE No		REV
				7220-C-81		0

8405260098 840517  
PDR FOIA  
RICE84-96 PDR

TECHNICAL SPECIFICATIONS  
FOR  
SURCHARGING OF THE  
DIESEL GENERATOR BUILDING AREA

CONTENTS

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SB123441

1.0 SCOPE

1.1 ITEMS INCLUDED

- 1.1.1 Furnishing and placing of granular fill material for surcharging purposes
- 1.1.2 Fabricating and placing of concrete block weights for surcharging purposes
- 1.1.3 Designing, fabricating, and installing retaining measures to prevent granular fill from encroaching on adjacent areas
- 1.1.4 Gradation analysis of fill material prior to fill placement
- 1.1.5 Density testing of surcharge fill during placement
- 1.1.6 Removing and disposing of granular fill material and concrete weights upon completion of surcharging activities

1.2 RELATED ITEMS NOT INCLUDED

- 1.2.1 Furnishing and placing structural or plant area fill
- 1.2.2 Furnishing and placing structural concrete
- 1.2.3 Settlement and utilities monitoring and data acquisition
- 1.2.4 Interpreting data obtained from surcharging activities

2.0 QUALITY STANDARDS

2.1 GENERAL

Work under this specification is not considered a quality -related activity. The quality of items and services shall be controlled to meet the requirements of this specification.

SB123442

## 2.2 REFERENCED CODES AND STANDARDS

<u>Sponsor</u>	<u>Number</u>	<u>Subject</u>
ASTM	D 1556-64 (1974)	Density of Soil in Place by the Sand- Cone Method
ASTM	D 2167-66 (1977)	Density of Soil in Place by the Rubber Balloon Method
ASTM	C 136-76	Sieve or Screen Analysis of Fine and Coarse Aggregates
ASTM	D 1140-54 (1971)	Amount of Material in Soils Finer Than the No. 200 Sieve

3.0 SUBMITTALS

## 3.1 FORMS

Laboratory and field test results under the scope of this specification shall be reported on standard forms currently in use on the Midland project.

## 3.2 DATA SUBMITTAL REQUIREMENTS

3.2.1 Gradation analysis reports for the proposed fill material shall be submitted to project engineering prior to starting placement of the preload fill.

3.2.2 In-place density reports and daily placement records shall be submitted to project engineering on a weekly basis.

4.0 MATERIALS

## 4.1 GRANULAR FILL

Granular fill for surcharging purposes shall be pit run sand and shall be free of debris, brush, peat, sod, organic, perishable, or deleterious matter. Snow, ice, or frozen material shall not be used.



#### 4.2 CONCRETE BLOCK WEIGHTS

Concrete block weights shall be fabricated as shown on the drawings from 3,000 psi minimum concrete as specified in Specification 7220-C-230(Q).

### 5.0 INSPECTION AND TESTING

#### 5.1 GRANULAR FILL

- 5.1.1 Prior to placement of fill, representative samples shall be obtained and gradation analysis performed in accordance with ASTM C 136 and ASTM D 1140. Thereafter, gradation analysis shall be performed once per week for each source of sand.
- 5.1.2 During placement of fill, in-place density tests shall be performed in accordance with ASTM D 1556 or ASTM D 2167. Four tests shall be performed in each building bay for every 5-foot layer of material placed. The test location shall be at about 20-foot intervals in the north-south direction, starting about 10 feet south of the diesel generator building north wall.
- 5.1.3 Daily records shall be kept as to the location and quantity of fill placed. Quantity of fill shall be based on truck weight tickets.

### 6.0 FIELD OPERATIONS

#### 6.1 GRANULAR FILL

- 6.1.1 Fill may be placed by methods determined by the Field Engineer in lifts not to exceed 5 feet. Bulldozers or front-end loaders may be used as needed to spread and shape fill material.
- 6.1.2 Fill shall be placed to the elevations and dimensions shown in the drawings. Fill placement within 3 feet of any settlement monitors or permanent building structure shall be made with extreme care in order to prevent damage.

6.1.3 Unless directed otherwise by engineering, the difference in elevation of the fill across any wall shall not exceed 5.0 feet in order to evenly load the structure.

6.1.4 In lieu of fill around the exterior of the building, concrete block weights may be used, provided the total weight, loading area, and geometry are equivalent to the indicated granular fill as shown in the drawings.

6.2 FILL-RETAINING MEASURES

6.2.1 Measures shall be provided at locations shown on the drawings to prevent the surcharge fill from encroaching on adjacent areas and structures. Prior project engineering approval is required for these fill-retaining measures.

6.2.2 Retaining measures may be concrete blocks, cribbing, temporary bulkheads, or other devices.

6.3 CONCRETE BLOCK WEIGHTS

6.3.1 Selected areas, as shown on the drawings, shall be surcharged using block weights of cast concrete.

6.3.2 Prior to placement of concrete weights, a cushion of sand or other compressible material shall be provided to protect existing structures from damage.

6.4 PRELOAD REMOVAL

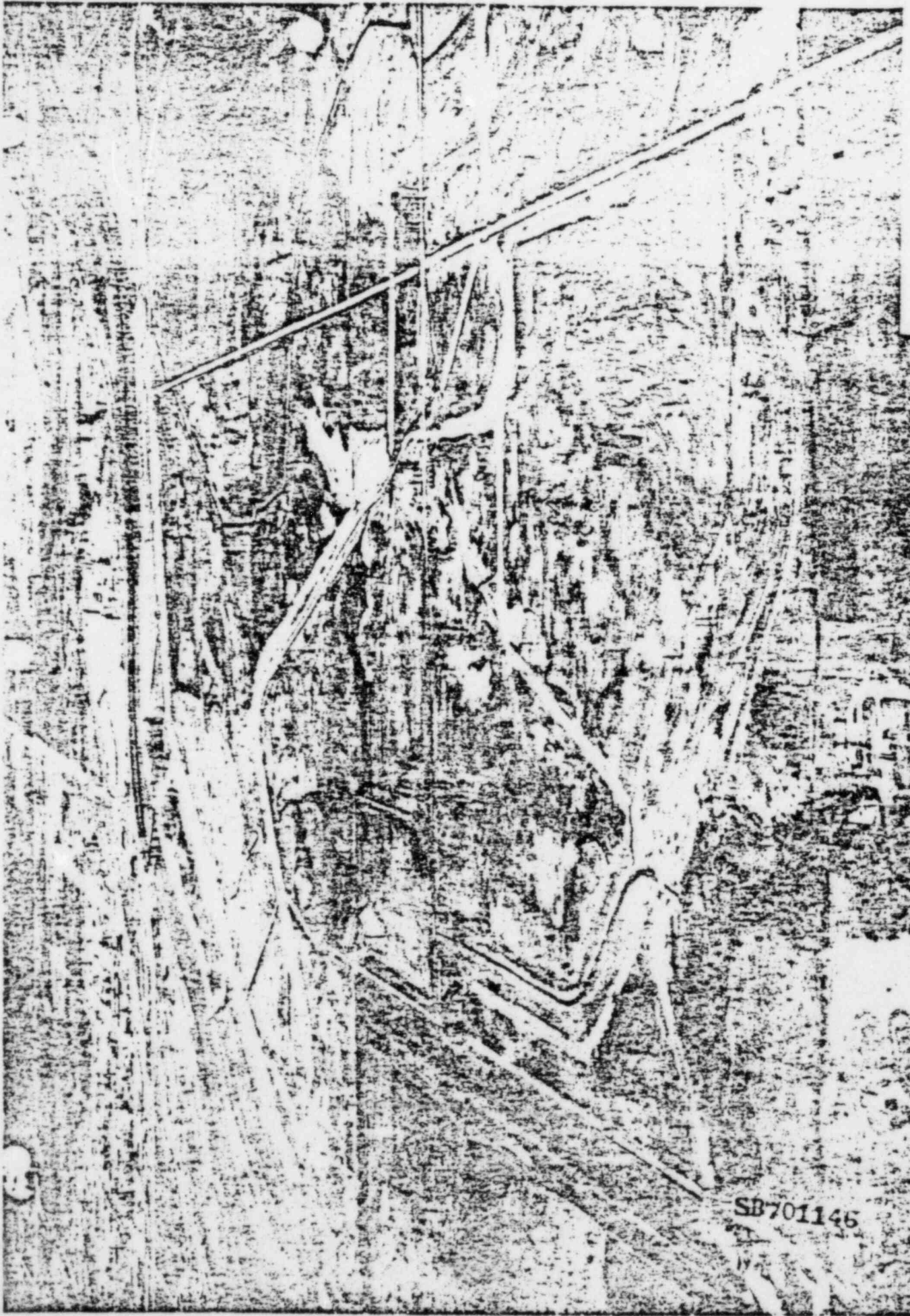
6.4.1 Upon completion of the surcharge operation and based on direction from project engineering, fill and concrete weights shall be removed. In removing surcharge, the precautions of Sections 6.1.2 and 6.1.3 shall apply.

6.4.2 Fill may be removed in stages as directed by project engineering.

6.4.3 Granular fill within the building shall be removed to elevation 628' to permit inspection of the contact between the building footings and underlying material.

*used  
- site*

SB123446



SB701146

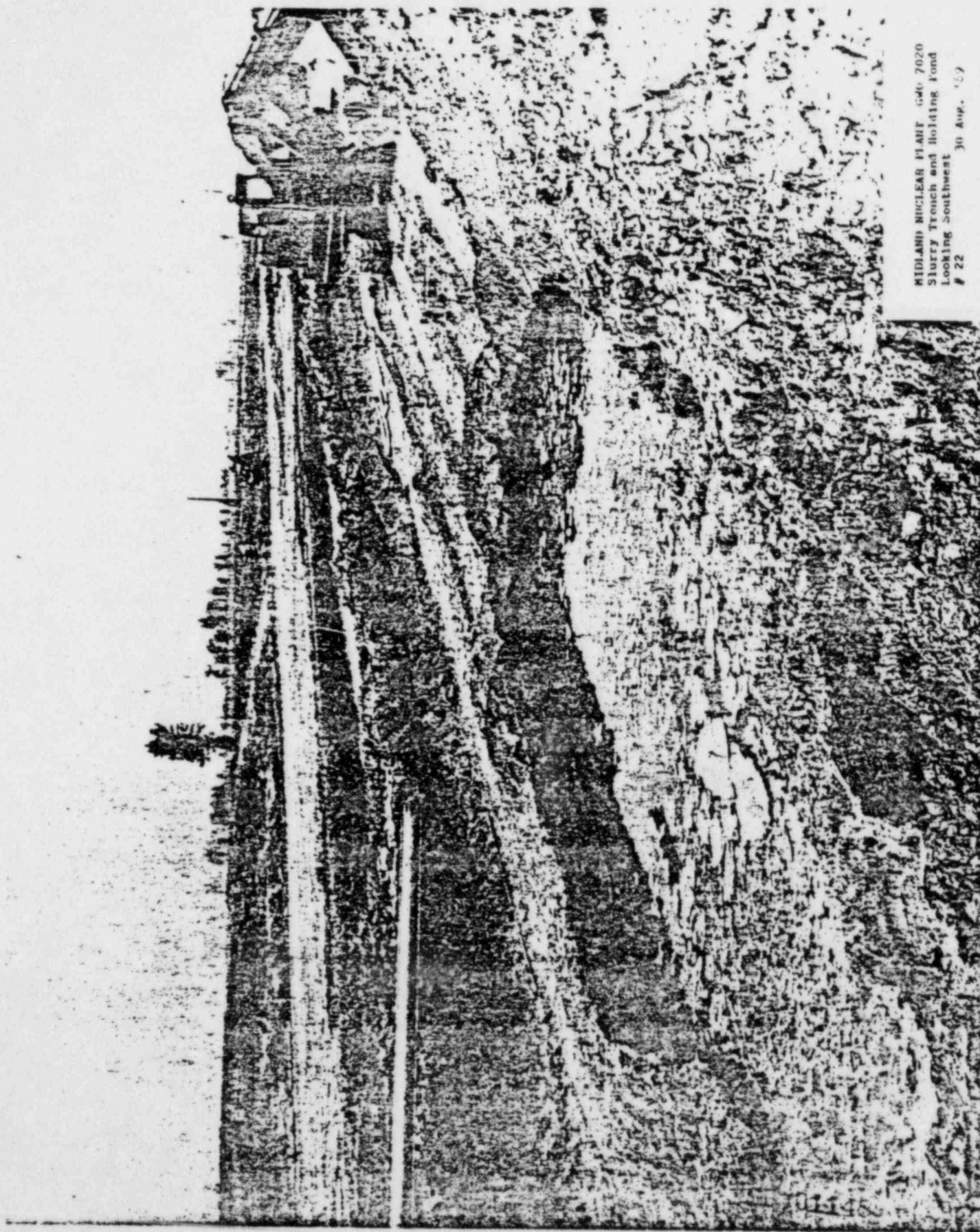
MIDLAND HULL-FLAR PLAFF GVO 7020  
Looking for a midland partner of





MIDLAND NUCLEAR PLANT GWO 7020  
Looking east - southern portion of

SB7011-17



MIDLAND NUCLEAR PLANT GMG 7020  
Slurry Trench and Holding Pond  
Looking Southwest  
# 22 30 Aug. '59



MIDLAND NUCLEAR PLANT GMG 7020  
Keyway Cut for Inspection Trench  
On North Plant Drive Looking East  
#19 30 Aug. '69

SB701143

Minutes of Meeting

Held at Canonie Construction Company

6/17/69

Subcontract 7220-C-10

A meeting was held at Canonie Construction Company on 6/17/69 in South Haven, Michigan to reach an understanding on the various items prior to awarding of the subcontract. The following were in attendance:

Carl Meader, Consumers Power Company  
Chuck Hunt, Consumers Power Company  
Tony Canonie, Canonie Construction Company  
Ray Holden, Canonie Construction Company  
Jim Collins, Canonie Construction Company  
Jack Marsden, Canonie Construction Company  
Melvin J. Mitchell, Bechtel Corporation  
Strat Pohtos, Bechtel Corporation

Items discussed and agreements reached are as follows:

1. It was pointed out that restrictions not in evidence at the time of the bid now exist with regard to the work to be performed. A drawing was given to Canonie indicating types and locations of these restrictions. These restrictions consist of property not yet purchased and/or vacated and purchased property upon which access is limited until after crops are harvested this fall. It was agreed that these restrictions would not delay start of work or create additional cost to Bechtel.
2. A joint survey effort will be made by Canonie and Bechtel for determining quantities for pay purposes. The borrow area, the dike and railroad embankment and the plant site area will be cross sectioned after clearing and prior to excavation or fill.
3. Embankment Foundation Dewatering, Item 2 of Price Schedule, will be paid at Canonie's cost, without addition of overhead. Canonie will submit work sheets to Bechtel on a daily basis showing labor, material and equipment used. Prior to commencing this work, Canonie will furnish a price list of equipment, maintained and operated, they anticipate to be used.
4. Canonie will furnish a unit cost per foot and unit cost per hour for performing the probing required to determine water level on dike areas.
5. Approved for Construction drawings will be the basis for the work to be performed and bid units will apply to quantities thereon.
6. Junk lying about the property not listed in the Price Schedule, such as abandoned cars, boiler casings, etc. will be removed. Cost of removing is covered by the clearing units and no additional compensation is required.

SB701150

Addendum Page A-1

Subcontract 7220-C-10  
Exhibit Sheet C  
Sheet 4 of 5

7. Canonie is to remove the county farm buildings after they are vacated. The vacating date is scheduled for 12/1/69. All other buildings are to be removed by Dow. Any building foundations on pond site above elevation +15 are to be removed or lowered to that elevation by Canonie.
8. The existing brine lines running through work area are to be protected by Canonie from damage and there will be no additional compensation for this. New brine lines are to be installed by Bechtel along the west dike between the dike and drainage ditch. This work will be coordinated for maximum efficiency of installation by both parties.
9. There is a "hold" on cooling pond baffle pending results of flow studies with the model.
10. A permit is required from the Corps of Engineers prior to dredging to the river from the outlet box. It is estimated that it will take 3 to 4 months to get. It is not anticipated that this will delay building of the outlet box itself.
11. A permit is required from the Michigan Water Resources Commission prior to starting any work in the flood plain. This involves the plant site, east cooling pond dike and railroad embankment areas. A meeting is scheduled by the Commission on June 23, 24, or 25 to handle this permit. Chuck Hunt stated that approval looks favorable. Canonie stated that 2 to 3 weeks delay beyond the above date would not affect the schedule and date of this phase of the work nor require any additional compensation. However, if a longer delay was experienced, he would expect Bechtel to provide relief on this phase of the schedule, but in any event the plant site and railroad embankment areas would be completed this year.
12. The plant site, railroad section of dike and railroad embankment are priority areas of work required.
13. Canonie will hold a pre-job meeting with Henry DeLuca, International representative of the Operating Engineers, prior to starting of work. Canonie will try to work out an arrangement whereby any work stoppage by Bechtel forces will not affect his work nor any work stoppage by his forces will affect Bechtel work.

SB701151

Subcontract 7220-C-10  
Exhibit Sheet "C"  
Sheet 5 of 5

XC 6-15-79  
Bechtel Associates Professional Corporation  
Inter-office Memorandum

To R. L. Castleberry Date 10 May 1979  
Subject Midland Units 1 & 2-Job 7220-101 From S. S. Afifi  
Underpinning at Midland Of Geotechnical Services  
Copies to A. Almuti w/a At Ann Arbor 10(D)5  
S. L. Blue 7220-79-72  
~~R. Dhar w/a~~  
E. H. Burke/W. R. Ferris w/a  
P. A. Martinez  
G. A. Tuveson w/a  
J. O. Wanzeck w/a  
K. Wiedner w/a  
1320, 3410

Attached is a copy of memorandum prepared by K. Ware regarding his thoughts on underpinning the auxiliary building wings and service water pump structure at Midland.

*S. S. Afifi*  
S. S. Afifi

SSA/lap  
Attachment

SB700759



# Bechtel Incorporated

## Inter-office Memorandum

To S. Afifi

Date May 2, 1979

Subject Underpinning at Midland  
Job No. 7220-101

From K. R. Ware

Of H & CF, Geotechnical Group

Copies to R. A. Schnaible

At Gaithersburg, MD

S. Blue

A. Sanver

J. A. Blanke

✓ (S. Afifi - for distribution as appropriate  
at Ann Arbor)

GEO TECH ANN ARBOR DISTRIBUTION	
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TRAINING	
UTILITY	
WATER	
WASTE	
JOB	FILE
REC'D MAY 04 1979	

The following is a summary of my trip to Ann Arbor and the Midland jobsite:

Sunday, 4-29-79 - Fly to Ann Arbor, Michigan.

Monday, 4-30-79 - Morning - Briefed by Jim Wanzeck, Amin Almuti, Bimal Dhar, and Gordon Tuveson. Next, I gave a slide presentation of the eight underpinning methods used on the Washington, D. C. Metro Project.

Afternoon - Meeting with Mergentime Corp. (see attached Meeting Notice). In the evening I traveled to the jobsite with C. Gould and Jim Wanzeck.

Tues. 5-1-79 - Morning - Tour jobsite.

Afternoon - Meeting with Spencer White & Prentis (see attached Meeting Notice).

Evening - Returned to Ann Arbor.

Wed. 5-2-79 - Morning - Returned to Maryland.

In the course of these meetings we discussed a large number of underpinning techniques for each building. I believe there are two techniques that could be used successfully on each building. However, the methods used for dewatering may affect the success of the work.

Based on visual observations of the sand backfill samples, it is apparent it will have to be dewatered or otherwise stabilized to prevent excessive loss of ground in underpinning pits.

We are presently uncertain about two items: SB700760

May 2, 1979

First, how effectively can the soil be dewatered?

Second, will dewatering cause settlement of some structures due to loss of buoyancy?

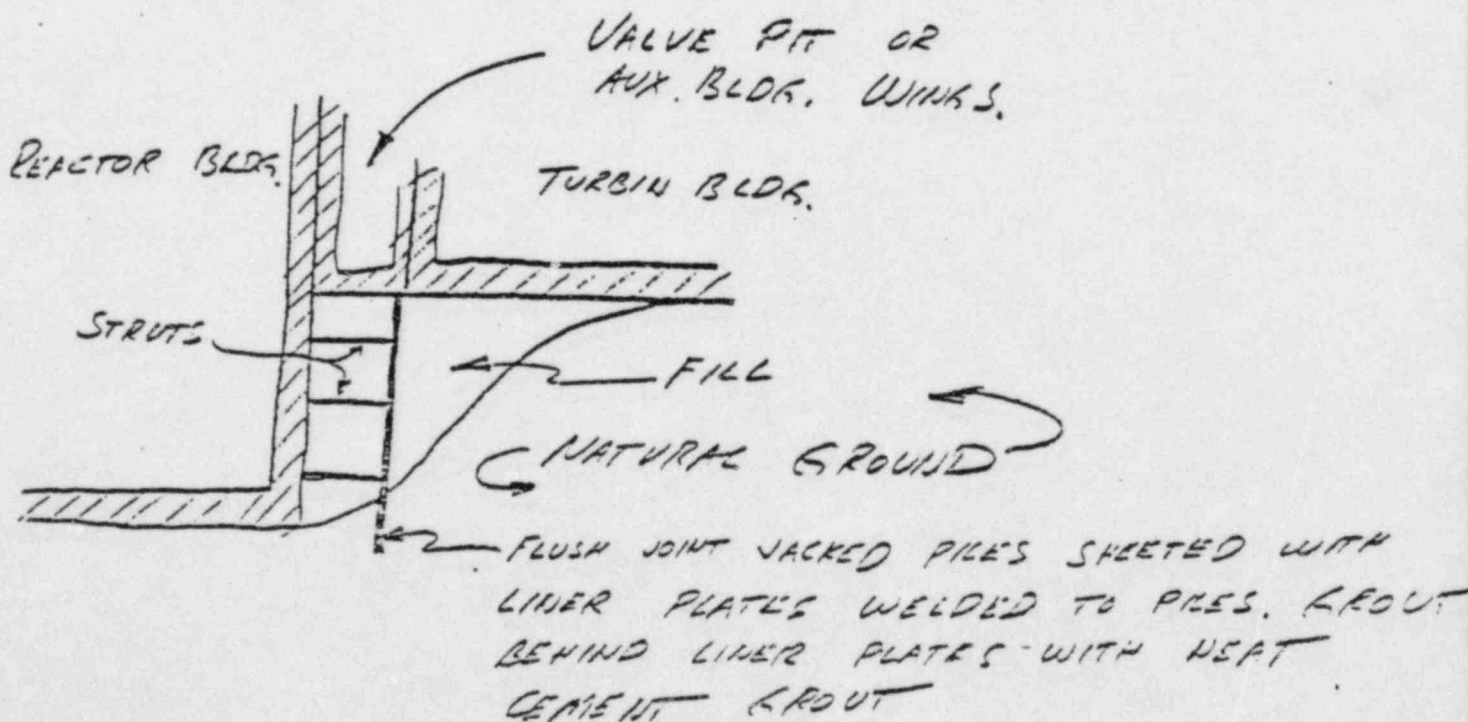
Hopefully, the two dewatering tests that are schedule to be conducted this week will help answer these questions.

Following is an oversimplified description of each technique for the two areas considered.

Units I & II Aux. Building Wings and Valve Pits

Scheme I - Jacked Piles

1. Install jacked piles along the south edge of Valve Pits and the Aux. Building Wings.
2. Excavate the soil, in vertical lifts, between the jacked piles and the Containment Building.
3. Support the soil south of the jacked piles by strut supporting the jacked piles. Sheet between jacked piles with liner plates.
4. Backfill the space between jacked piles and Containment Building with concrete.



SECTION  
NTS

SB700761

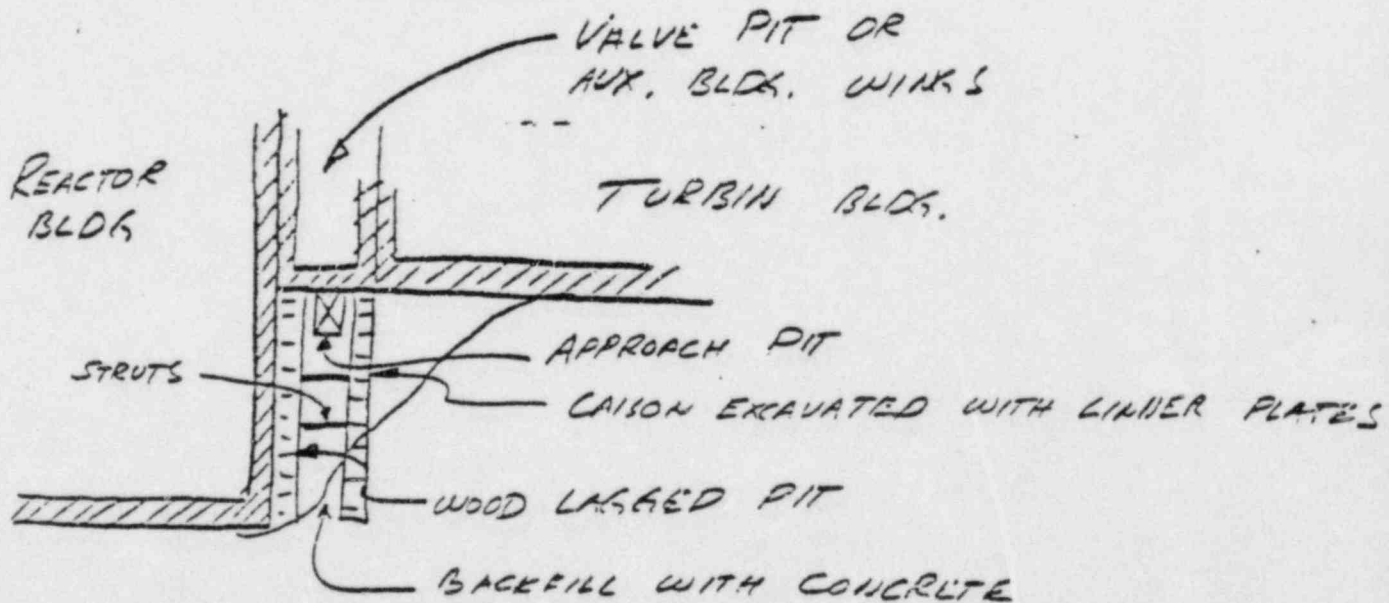


May 2, 1979

Scheme II - Pits

This scheme consists of:

1. Drift in beneath center of Valve Pit and Aux. Building Wings.
2. Excavate pit adjacent to containment down to acceptable bearing material. These pits can be sheeted with conventional lagging boards which will later be removed when the adjacent pit is excavated.
3. Excavate circular pits (4 ft.± diameter) down to embedment in till. These pits will be supported with liner plates.
4. Backfill pits with concrete and drypack top.
5. Excavate central portion.
6. Strut
7. Backfill with concrete.



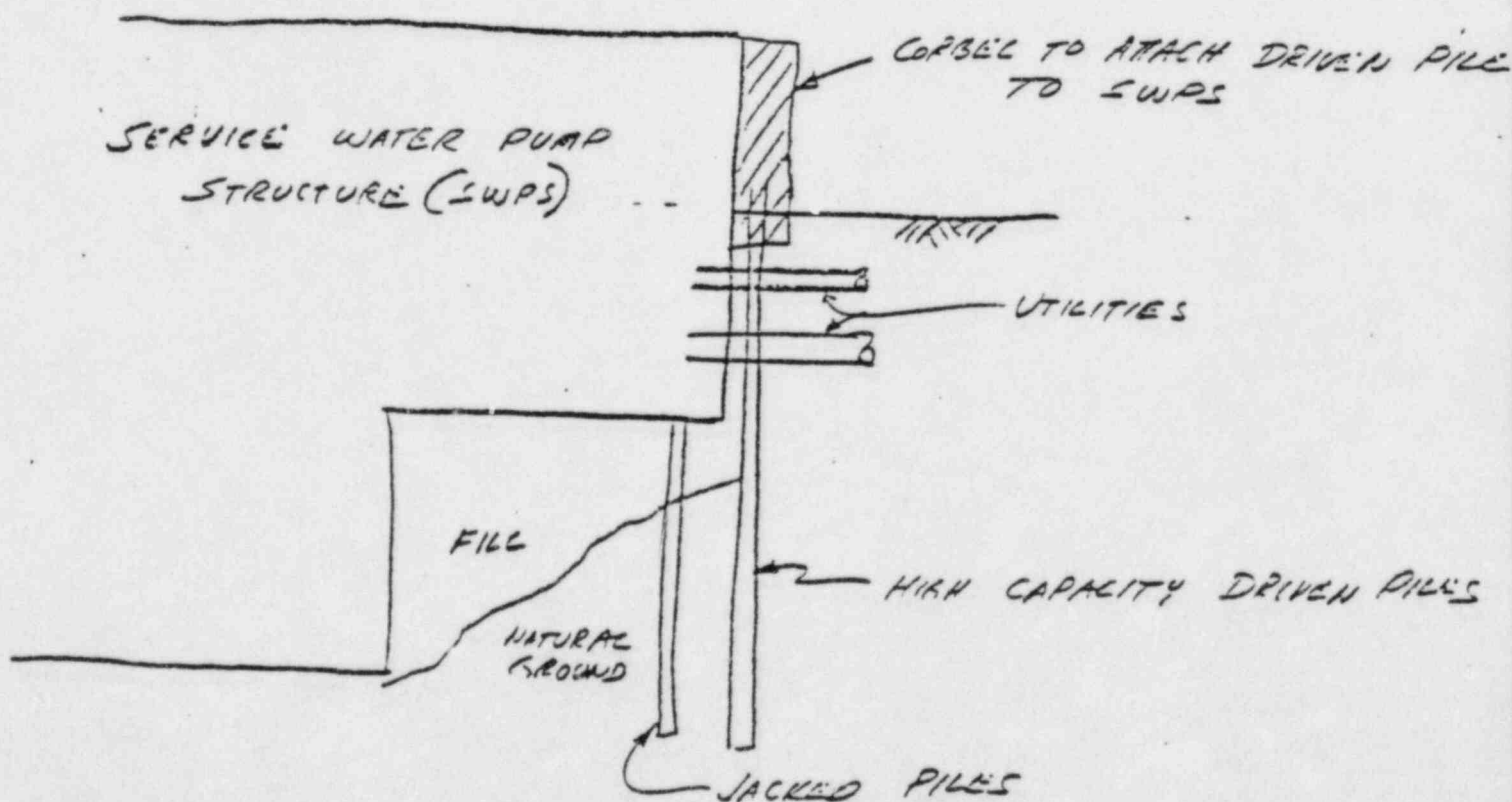
SECTION  
HTS

SB700762

May 2, 1979

Service Water Pump Structure (SWPS)Scheme I - Driven Piles and Jacked Piles

1. Load test a high capacity pile in vicinity of SWPS.
2. Hand excavate between utilities along N.W. face of building wherever piles can be installed.
3. Drive as many high capacity piles as possible along face.
4. Attach driven piles to SWPS.
5. Supplement driven piles with jack piles to obtain required capacity. These jack piles could be installed from inside SWPS or from jacking pits beneath the structure.

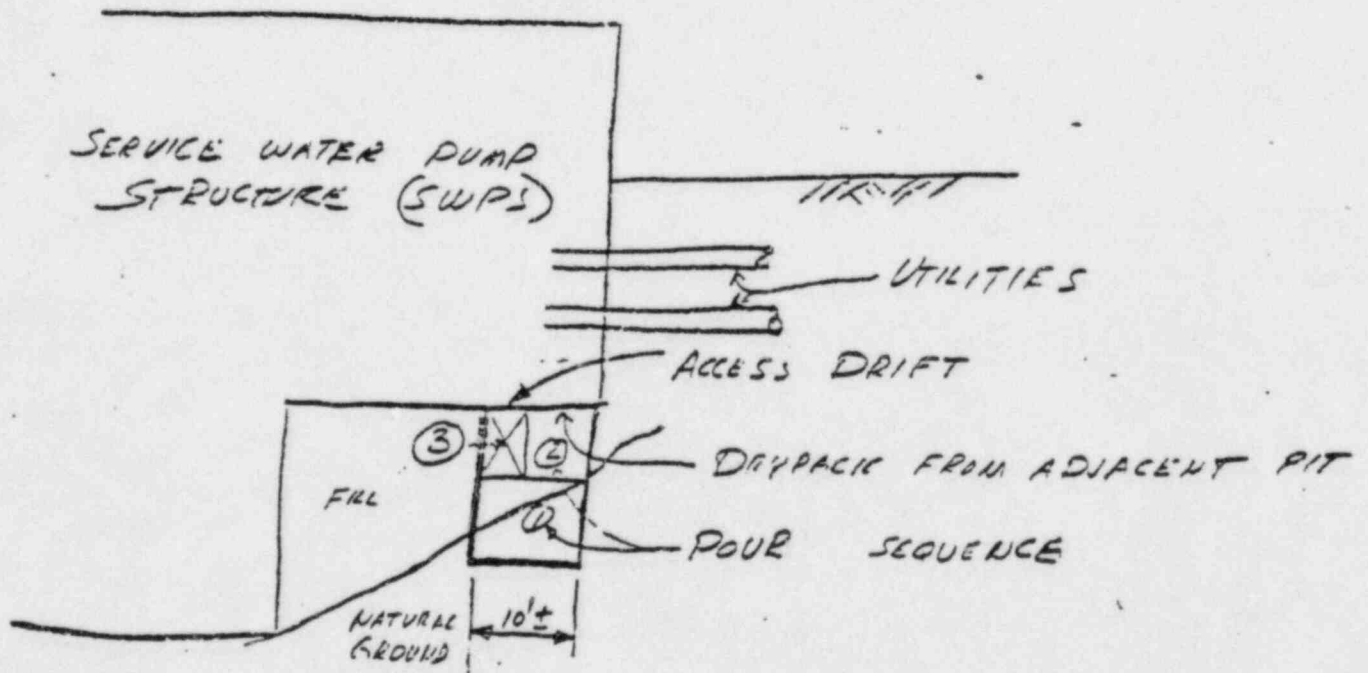


SB700763

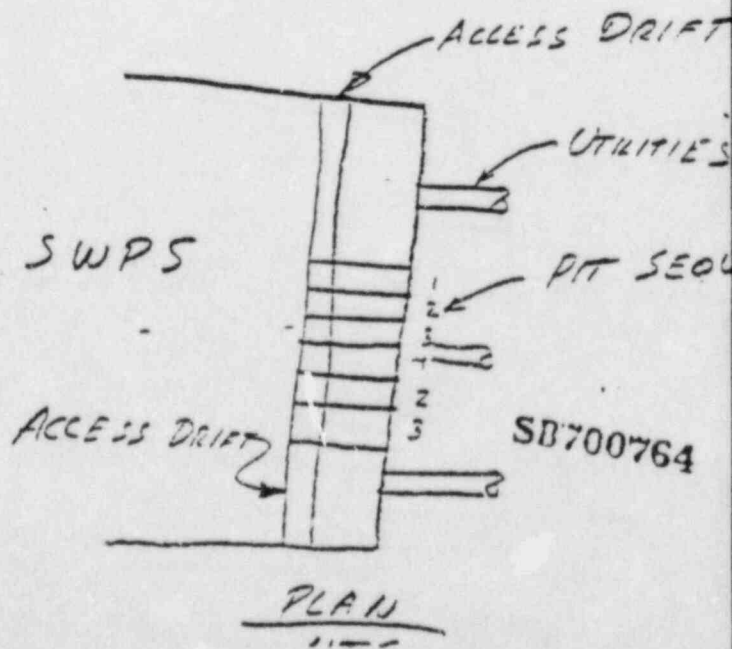
SECTION  
NTS

Scheme II - Pits

1. Hand excavate drift beneath the SWPS.
2. Excavate alternate 4 ft. x 10 ft. pits beneath outer edge of structure down to competent soil.
3. Backfill with concrete.
4. Drypack.
5. Proceed to next pit.



SECTION  
NTS

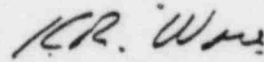


PLAN

May 2, 1979

An alternate to this scheme would be to machine excavate the 10 ft. wide slot the entire length of the building. This would require sheating and shoring both sides of the slot. The shoring beneath the utilities would be critical because it would be necessary to prevent settlement of soil beneath the utilities.

My gut feeling is that Scheme II (Pits) is preferable in all cases. There are too many uncertainties in Scheme I (Piles). However, I recommend that detailed plans and specifications be prepared for both schemes. The contractors should be asked to propose on both schemes. Then we can determine the best approach.



K. R. Ware

KRW:evm

SB700765

# MEETING NOTICE

BECHTEL JOB NO. 7220  
PROJECT MIDLAND

SUBJECT OF THE MEETING  
Meeting with Contractor, SPENCER, WHITE AND PRATTIS  
TO DISCUSS UNDERPINNING OF Aux. Building  
wings and service water structure.

DAY TUESDAY, May 1, 1979

TIME 9:00 AM TO 3:00 P.M.

LOCATION MIDLAND - JOB SITE.

ATTENDEES "BECHTEL." CONSULTANTS. CONTRACTOR.  
S. AFFFI C. GOULD SPENCER, WHITE &  
K. WARE (Geotech. GPD) PRATTIS.  
A. ALMUTI / K. WIEDNER  
B. DHAR  
G. TUVESON  
W. JONES.

The addressee, checked above, if unable to attend, is requested to:  
 NOTIFY CHAIRPERSON  SEND REPRESENTATION

PURPOSE OF THE MEETING  
Discuss details of underpinning  
of Aux. Building and service water Pump  
structure.

SB700766

AGENDA ATTACHED  MEETING NOTES WILL BE DISTRIBUTED

CHAIRPERSON G. A. TUVESON PHONE 7067 DATE 4/30/79

GEO TECH	
DISTRIBUTION	
ADM.	
DEPT.	
SO. OF.	
GEO. I.	
REC.	
EMP.	
PROJ. ENG.	
JOB	FILE



# MEETING NOTICE

BECHTEL JOB NO. 7220-101  
PROJECT Midland

## SUBJECT OF THE MEETING

Underpinning and replacement of soil under certain structures

DAY Monday, April 30, 1979

TIME 1:00 p.m. TO 3:00 p.m.

LOCATION 8(B)3 B

## ATTENDEES

<u>Bechtel</u>	<u>Vendor</u>	<u>Consumers</u>
S. Afifi	Mergentime	Representative will
A. Almuti	Corporation	be notified
R. Castleberry (Opt.)		
W. Jones		
G. Tuveson		
K. Wiedner (Opt.)		
T. Johnson (opt.) - -		

The addressee, checked above, if unable to attend, is requested to:

NOTIFY CHAIRPERSON       SEND REPRESENTATION

## PURPOSE OF THE MEETING

1. Background information
2. Procedure for underpinning and soil replacement
3. Dewatering and temporary supports
4. Cost and schedule considerations

AGENDA ATTACHED

MEETING NOTES WILL BE DISTRIBUTED

CHAIRPERSON

PHONE

DATE

A. Almuti

7859

SB700767





ANN ARBOR

MEMORANDUM

Page 1 of 2

TO S. BLUE (GEOTECH) LOCATION ANN ARBOR.  
FROM G.A. TUVESON (CIVIL) DATE JUNE 14, 1970  
SUBJECT CPCO Midland Plant Units 1 & 2 JOB NO. 7220  
Earthwork FILE C-0294, C-211  
Copies to 1. R.L. CASTLEBERRY 2. B. DHAR.  
3. J. HOOK.

Project engineering has completed the review of Dames and Moore report. The purpose of this review was to find out if the project specifications for earthwork (C-211) complies with recommendations made by Dames & Moore.

The following is the outcome of our review.

1. We have disregarded Dames & Moore recommendations for materials and compaction contained in their 1967 & 1968 reports. SB701632

2. The 1967 Dames & Moore Report (Pg. 13) indicates that the degree of compaction should be based on strength & compressibility properties of the compacted materials and type of structures to be supported.

3. The 1969 Dames & Moore report recommends compaction criteria to be 100% BMP and 85% relative density for cohesive and cohesionless soils respectively, for support of structures.



ANN ARBOR

MEMORANDUM

Page 2 of 2

TO S. BLUE (Geotech)

LOCATION \_\_\_\_\_

FROM G.A. TUVESON (CIVIL)

DATE June 14,

19 79

SUBJECT \_\_\_\_\_

JOB NO. \_\_\_\_\_

FILE \_\_\_\_\_

Contd..

Please advise us of any provision to be included in the technical specification in regards to item 2 indicated above.

We also would like to know if the present compaction criteria included in spec. C-211 (rev. 6) is compatible with the Dames & Moore recommendation.

Please advise us of the outcome of your review of the Dames & Moore reports and other comments if any, by June 22, 1979.

Res

*G.A. Tuveson*  
( G.A. TUVESON )

SB701633

# Bechtel Associates Professional Corporation

777 East Eisenhower Parkway  
Ann Arbor, Michigan

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



MEETING NOTES NO. 891  
MIDLAND PLANT UNITS 1 AND 2  
CONSUMERS POWER COMPANY  
BECHTEL JOB 7220

DATE: Friday, December 8, 1978  
PLACE: Albuquerque, New Mexico  
SUBJECT: Foundation Investigation for the Diesel Generator Building and Other Structures  
FILE: 0279, C-2645

ATTENDEES:	<u>Bechtel</u>	<u>CPCo</u>	<u>Consultant</u>
	W. Ferris S. Afifi G. Tuveson	R. Wheeler	R.B. Peck

PURPOSE: To obtain recommendations from the consultant on various problems related to surcharge loading of 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.

ITEMS DISCUSSED:

Diesel Generator Building

- 1) Surcharge Loading Alongside the Turbine Building Wall
  - a. Use surcharge formulas as those shown in the more recent foundation books, such as Bowles' or Spangler's textbook. Also use at rest case ( $k_0 \approx 0.7$ ) for the earth pressure when calculating the tie rod forces.

S.702460

- b. It was indicated that a 12-inch 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 1 week, then add 5 feet of additional 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.
  - 6) Obtain readings of the measurement devices before preloading above grade 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 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) Alternative Solutions
    - a. In the event that there are unanswered questions on bearing capacity after preloading, a mat foundation could resolve the question. It may be desirable to have a mat design available.
    - b. Obtain a three-dimensional picture of the location of sand under the foundation. Use the borings and the construction records. Investigate the groutability of this sand.

- 10) CPGO letter to P. Martinez dated December 7, 1978, was discussed next. Condensate water line concrete encasement may be in contact with the building 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 desirable to cut the duct bank loose where the duct bank comes in contact with the sump. 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 for Surcharge Loading

The final loads will be smaller than the surcharge loads. It should be possible to obtain an upper limit of future settlement which should not exceed the rebound from the 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 the surcharge loading, check with the manufacturer on the amount of differential movement the bus can accommodate and tilting the transformer can withstand. Also, review the underground utilities prior to preloading.

##### 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 are 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. Therefore, it may be desirable to have the piping disconnected until preloading is completed. 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) Guardhouse

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

S. 02485



## 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

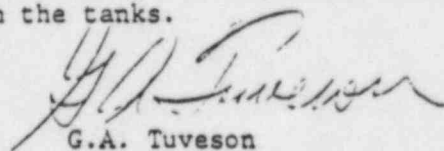
The borings do not indicate that any additional problems are expected. Therefore, monitor the settlement in the normal manner for further evaluation.

## 7) Chlorination 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 its own weight. Consider preloading the tank area. After reviewing the diesel generator data, decide on February 15, 1979, if preloading must be done. Preloading, if required, should extend to a distance of 20 feet from the tanks.



G.A. Tuveson

GAT/bob  
12/21/3

S1702469



BY J. HARTMAN OF MIDLAND EXT 347  
 TO S. RAO OF AAO EXT 7888  
 DATE \_\_\_\_\_ TIME \_\_\_\_\_  
 SUBJECT \_\_\_\_\_ JOB NO \_\_\_\_\_

File C-1700

Holes filled w/ Sand

	SOUTH	EAST
1 OG-1	5136	317
2 OG-2	5140	239
3 OG-3	5141	290
4 OG-4	5146	290
5 OG-5	5150	177
6 OG-6	5152	177
7 T-1	4600	255
8 T-2	4580	230
9 T-3	4590	205
10 T-4	4610	257
11 T-5	4542	230
12 T-6	4568	152
13 T-7	4540	319
14 CT-4	5275	413
15 CT-1	5198	447

Talk to Geotech & Call Hartman  
 Rao



ANN ARBOR

MEMORANDUM

- XC = M. ROTHWELL  
T. JOHNSON  
P. CHEN  
K. WIEDNER

TO S. AFIFI LOCATION GEO TECH  
FROM B. THAR DATE 10-22 19 79  
SUBJECT AUX BLDG WINGS DURING JOB NO 7220  
TEMPORARY DEWATERING CONDITION FILE ~~7220~~

ON PREVIOUS MEETINGS WITH THE CONSULTANTS, DR. PECK AND HENDRON POINTED OUT THE AUX BLDG WINGS WERE CONSTRUCTED UNDER A DRY CONDITION. THE SUBSEQUENT RAISING AND LOWERING THE GROUND WATER TABLE SHOULD NOT INDUCE ANY ADDITIONAL STRESSES OTHER THAN THOSE THE BLDG HAS EXPERIENCE BEFORE. FOR THAT REASON, REINFORCING THE WINGS FOR THE DEWATERING PROCESS WAS DEEMED UNNECESSARY. CIVIL GROUP HAS ATTEMPTED TO VERIFY THIS CONDITION BY STRUCTURAL ANALYSIS. USING CONSERVATIVE ASSUMPTION OF EACH WING CANTILEVERING FROM THE CONTROL TOWER AND SOIL REACTION OF 3 KSF UNDER THE ENTIRE WING AREA. THE ANALYSIS INDICATES OVERSTRESSING AT THE WING - CONTROL TOWER JUNCTIONS. SINCE EXCESSIVE CRACKING OF CONCRETE IS NOT EVIDENT IN THE STRUCTURE, THE ASSUMPTION USED IN THE ANALYSIS IS PROBABLY NOT REALISTIC. THE SOIL MUST BE PROVIDING SUPPORT IN EXCESS OF 3 KSF ESPECIALLY AT AREAS NEXT TO THE CONTROL TOWER

SB706490



ARBOR

MEMORANDUM

2/

LOCATION \_\_\_\_\_

FROM \_\_\_\_\_

DATE \_\_\_\_\_

19 \_\_\_\_\_

SUBJECT \_\_\_\_\_

JOB NO. \_\_\_\_\_

FILE \_\_\_\_\_

GEO TECH IS REQUESTED TO EXAMINE THE BORING DATA TO IDENTIFY THESE AREAS, OR TO INCLUDE THIS TOPIC FOR DISCUSSION IN THE CONSULTANT MEETING TO BE HELD ON OCTOBER 25, 1979.

SB706491



# The University of Michigan

COLLEGE OF ENGINEERING  
DEPARTMENT OF CIVIL ENGINEERING  
ANN ARBOR, MICHIGAN 48109

DISTRIBUTION	
DISC	ACT
INFORM	W/AL
MGR	1
ADMIN	
DRET	
SCRS	2
PA	3
DC	4
AVM	5
FIXC	
Proj Mgr	
Proj Eng	1250
JOB	1220
FILE	3920
REC'D	29 1979

Oct. 15, 1979

HMB/W

Mr. Don Schulze  
Goldberg, Zoino, Dunnycliff & Assoc.  
30 Tower Road  
Newton Upper Falls, MA 02164

RE: Dispersive Soil Tests, Midland Nuclear Project 7220

Dear Mr. Schulze:

We have completed dispersive soil tests on samples of dike stockpile material furnished to us by Bechtel from the Midland Nuclear Project. The tests were requested by Dr. Sherif Afifi, Bechtel Power Company, Ann Arbor, Michigan. Our test results indicate that the dike stockpile samples are not dispersive according to criteria established by Sherard et al (1976), J. of Geotech Engr. Div. (ASCE), Vol. 102, No. GT4.

Approximately 10 pounds of the dike material was sealed in a plastic bag and submitted for testing on 6 October 1979. The soil appeared to be a grey, moist, silty clay with some coarse sand and gravel. It was labeled as clay from the dike stockpile with 62% by weight passing the #200 sieve, I.D. No. 5964, source P-5 from Poseyville test area, requisition no. UST 255 test fill #11. Three smaller, 200-gram samples of the soil were removed at random from the plastic bag for testing.

The dispersive characteristics of the soil were determined by analyzing pore water extracts of the soil samples following the procedure recommended by Sherard et al (1976). The basic procedure is to prepare a saturation extract from the soil samples and determine the total dissolved solids in the extract (TDS in mg/liter) and per cent sodium (% sodium =  $Na^+(100)/TDS$ ). These two measured values are then plotted against one another on a dispersivity chart (see attached figure). A soil is identified as dispersive, non-dispersive, or questionable depending upon which zone it falls into on the chart. The following criteria apply:

Zone A-Dispersive

Case histories and pinhole tests confirm that soils

58706639

Zone B-NON Dispersive

The great majority of these soils are non-dispersive. A small percentage of exceptional soils in Zone B erode in the pinhole test exactly the same as do soils in Zone A.

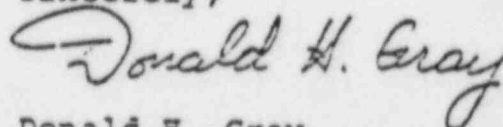
Zone C-Questionable Dispersivity

Soils in this group range from dispersive to non-dispersive (according to case history). A few of these soils give intermediate reaction in pinhole tests with some apparent colloidal erosion but at a very slow rate compared with Zone A.

If test samples fall in Zones A or B a definitive diagnosis is obtained from a pore-water or saturation extract analysis alone. On the other hand, if they plot in Zone C, then another type of dispersion test (e.g., pinhole test or SCS dispersion test should be run as well).

The three samples of the dike material tested all fell all within Zone B Non-Dispersive as shown in the attached figure. We can conclude that this material is unlikely to be dispersive. Consequently no additional dispersion tests are recommended at this time.

Sincerely,



Donald H. Gray  
Professor of Civil Engineering

DHG:smm

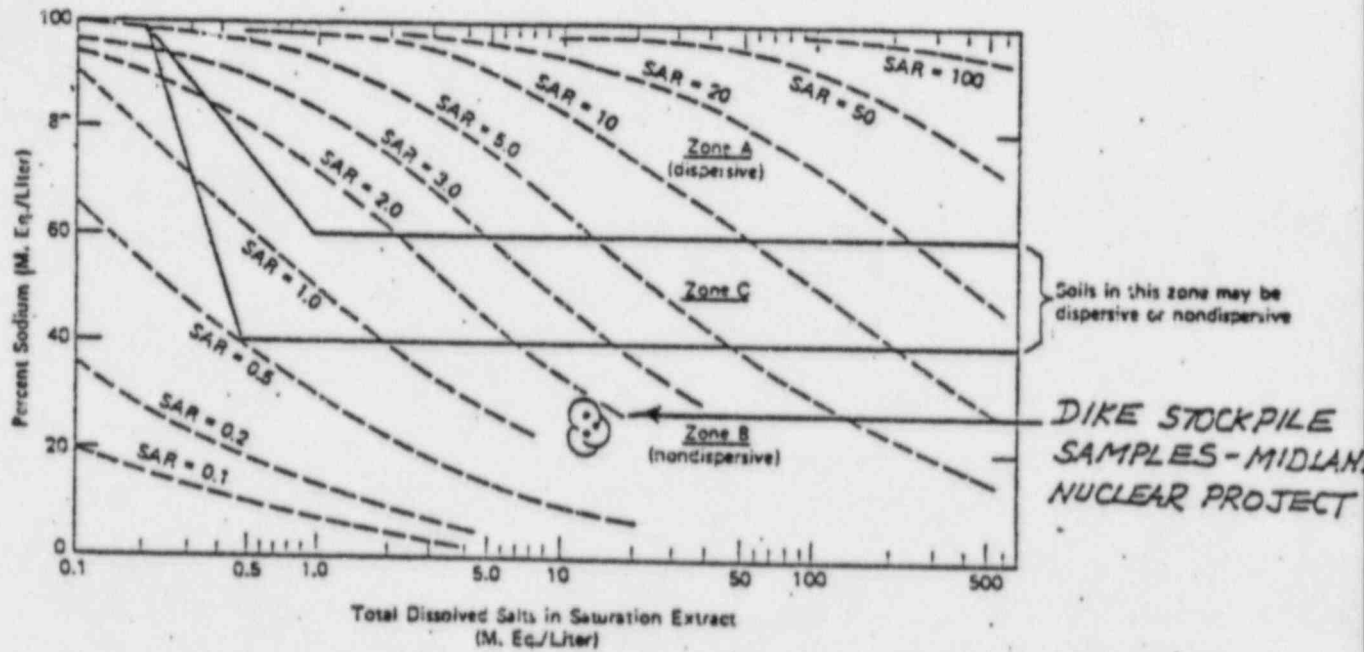
Encl.

CC: Dr. Sherif Afifi  
Bechtel Power Co.  
P.O. Box 1000  
Ann Arbor, MI 48106



# DISPERSIVITY CHART

from Sherard et al (1976)



## TEST RESULTS

SAMPLE NO.	TDS meq/l	Na <sup>+</sup> meq/l	% Na <sup>+</sup>
1	15.7	4.0	26
2	13.5	3.8	28
3	15.1	3.5	23

SB7066-11



# Telephone call

ROUTE J. C. Hink *96H*  
 BY C. A. Hunt of CPCo - Jackson R. L. Castleberry  
 To R. L. Rixford *A.E. 9-20-74* of E-Ann Arbor xc: J. H. Allen  
 DATE 9-19-74 TIME 9:30 File xc: C-210PL, C-114C  
 SUBJECT Method of Compaction of Plant Area Fill JOB No. 7220

Chuck called to express a concern on the part of Consumers' personnel about what they feel is a lack of control of compaction in the plant area fill.

~~Chuck asked why Canonic was not using a roller for compaction in the plant area. I told him the specification required only that the end result be 95% of ASTM 1557 - there was no restriction on the equipment used to attain it. After a lengthy discussion on this point, we addressed the added "responsibility" this lack of control places upon the inspector. Chuck wanted to know where the inspector was instructed how to assure adequate compaction in the absence of a formal compaction procedure. I told Chuck that this was the inspector's job - to make sure we get proper placement, compaction, etc.~~

Chuck finally agreed that a phone call (followed up by an IOM) to the field, reminding them that increased vigilance on the part of the inspectors would be required in areas where compaction methods aren't specified would satisfy CPCo's concern about control of compaction in the plant area.

*this commitment  
 satisfied by [signature]  
 dated 8-7-75  
 RLR*

SB709616

CL#406

C-210 PL

Bechtel Associates Professional Corporation

Inter-office Memorandum

To P. A. Martinez  
Subject Midland Plant  
Dike Construction  
Moisture Content  
Copies to ~~Frank R. Rufford~~  
R. K. Sullivan  
1320,3410

Date 11 October 1973  
From J. H. Allen  
Of Geotechnical Services  
At Ann Arbor - B

Construction personnel at the site have indicated to me that they are finding it extremely difficult to meet the present moisture specifications for some of the material being placed in the dike and for the fill going into Bullock Creek. Presently, the specifications call for placing the fill with a moisture content not exceeding a range from 2% dry to 2% wet of optimum. The majority of the material being placed is slightly wetter than this. Either the construction of this area will have to be stopped or the specifications will have to be relaxed slightly.

Based on laboratory test data, compaction data, and location of the material being placed, this specification can be relaxed with the following stipulations.

The optimum moisture content range can be specified as 2% dry to 5% wet of optimum provided that if the moisture content exceeds 2% wet of optimum the fill shall be placed with a compactive effort equal to at least 95% of the Bechtel modified proctor test result (20,000 foot pounds effort). This will be done at no additional cost to Bechtel. This also applies only to zone 2 material which is placed in the Bullock Creek area and in other selected areas of the dike as specified by the Bechtel representative. The moisture control specifications originally written for zone 1 material still apply to zone 1 material. That is, zone 1 material must be placed within a moisture content range of 2% dry to 2% wet.

The above change in allowable range of optimum moisture content for the zone 2 material may result in more than four passes of compaction equipment. However, as pointed out above, this additional effort will not be at the expense of Bechtel since it is being done to allow construction to continue and give the contractor the best utilization of his equipment and people.

J. H. Allen  
J. H. Allen

JHA:mbh

SB709617