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Enclosure 2

31/86



DEPARTMENT OF THE ARMY
DETROIT DISTRICT, CORPS OF ENGINEERS
BOX 1027
DETROIT, MICHIGAN 48231

NCEED-T

SUBJECT: NRC Midland Project, Request for Additional Borings and Existing
Soil Data - Revision No. 1

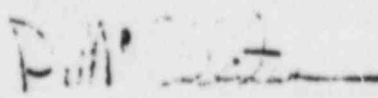
U.S. Nuclear Regulatory Commission
Dr. Robert E. Jackson
Division of Systems Safety
Mail Stop P-314
Washington, D.C. 20555

Dear Dr. Jackson:

Inclosure 1 to our letter of 27 March 1980 has been revised and attached
hereto. The two maps provided indicating boring locations remain unchanged.

FOR THE DISTRICT ENGINEER

1 Incl
As stated


R. McCallister
Chief, Engineering Division

B40B150015 B40718
PDR FOIA PDR
RICE84-96

INCLOSURE 1

1. It is requested that the applicant furnish the boring logs listed below indicating when and how these were taken, the type of sampling, and samples taken:

Pull down holes PD-1 thru PD-27* (35 holes)
LOW-1 thru LOW-13 & W-1 thru W-4 (18 Holes)
TW-1 thru TW-5 & PZ-1 thru PZ-48 (53 holes)
OW-1 thru OW-3 & OL-1 thru OL-6 (holes)
TEW-1 thru TEW-7 & Q-1 thru Q-12 (19 holes)
*Includes 8A, 20A, 20B, 20C, 15A, 15B, 15C, & 27A.

2. Locations, boring logs and test data from any other drill holes taken in 1979 and 1980 are also requested.

3. Dutch cone penetrometer data from holes P-1 thru P-13 must also be provided.

4. Information is requested on all piezometers that were installed to monitor problems related to plant fill. The information should include the number and location, the time of installation, the type of filter around the piezometer, the installed depth, and the type of piezometer.

5. All piezometer readings for each installation with dates and times are required.

6. The data and information requested in paragraphs 1 thru 5 above is needed to verify the applicant's computations and conclusions and to make any needed computations for the dewatering analysis, the seismic analysis and the settlement analysis.

7. A need exists for additional borings, since random exploratory borings throughout the plant site have revealed pockets of soft clay subject to settlement and or consolidation and loose sands subject to liquefaction. A need also exists to check the results of the proposed remedial measures of surcharge loading, at the Diesel Generator Building and the dewatering plan.

a. In the case of the Diesel Generator Building, check borings must be made in the vicinity of borings which identified low "N" values in the clay and sand fill. The proposed borings shall be carried into the glacial till and all samples, including those in the glacial till, tested as indicated below.

The boring locations are as indicated on the attached map. All soil for the full depths of the borings shall be classified according to the Unified Soil Classification System. Any tests necessary to classify the soil shall be accomplished. Unit weight and moisture content of all samples should also be determined. The samples obtained from any cohesive strata shall be tested. The tests for cohesive material shall be a consolidation drained and undrained triaxial shear tests (R&S) and a consolidation test with restraining load equal to the load in place at the strata depth the sample represents. The sands shall be tested in direct shear for a loose and dense condition and the relative density of the sand in situ determined.

b. Where piling or caissons are proposed to underpin the Service Water Building and Auxiliary Building - feed water valve pits which are located on fill, the load bearing capacity of the bearing strata must be determined. The capability to resist lateral shearing stresses that could be induced in low "N" value soil subjected to seismic action must also be determined. The same tests required for soil samples obtained from the new borings at the Diesel Generator Building shall also be made on soil samples from new borings for these buildings.

c. The questionable site area fill may have a counterpart in the cooling pond embankment which was constructed contemporaneously with the site fill. It is requested that exploratory continuous drive borings be taken at a number of points along the north and east embankments, omitting the slurry trench cutoff areas which are positively sealed. The approximate boring locations are as indicated on the attached map of the cooling pond. Upon completion of drive boring a second undisturbed boring shall be made adjacent to the disturbed boring to sample cohesive soils. The tests on the soil samples obtained from the borings in the embankments shall include the following tests, consolidated - drained triaxial shear tests, (cohesive samples) Atterberg limits and all soils classified according to the Unified Soil Classification System. The drive borings shall be continuously sampled using a standard split spoon sampler. The hole shall be held open using a hollow stem auger or casing. Particular attention shall be paid to ground water conditions during and after completion of drilling. In the case of Hole 5, the boring should be drilled to the depth of the cooling pond bottom while the remaining borings need penetrate only 5 feet into underlying residual soils unless soft ground indicates a need for further hole penetration.

8. Summary of Requested Drilling

a. Diesel Generator Building - 4-6 holes around the perimeter of the building. Samples of all strata from ground surface into the glacial till (Holes 8-13). Include downhole, crosshole and surface geophysical tests to establish insitu compression and shear moduli for floor response spectra design check mentioned on pg. 18 Q VII-4 of Interim SER.

b. Auxiliary Building - Take two borings around the proposed support piling or caisson for remedial grouting of loose sands and soft clays adjacent to pile or caisson to stiffen piles and adjoining ground against lateral loading. Borings need to penetrate to glacial till. (see attached map for boring locations - Holes 4 & 5.)

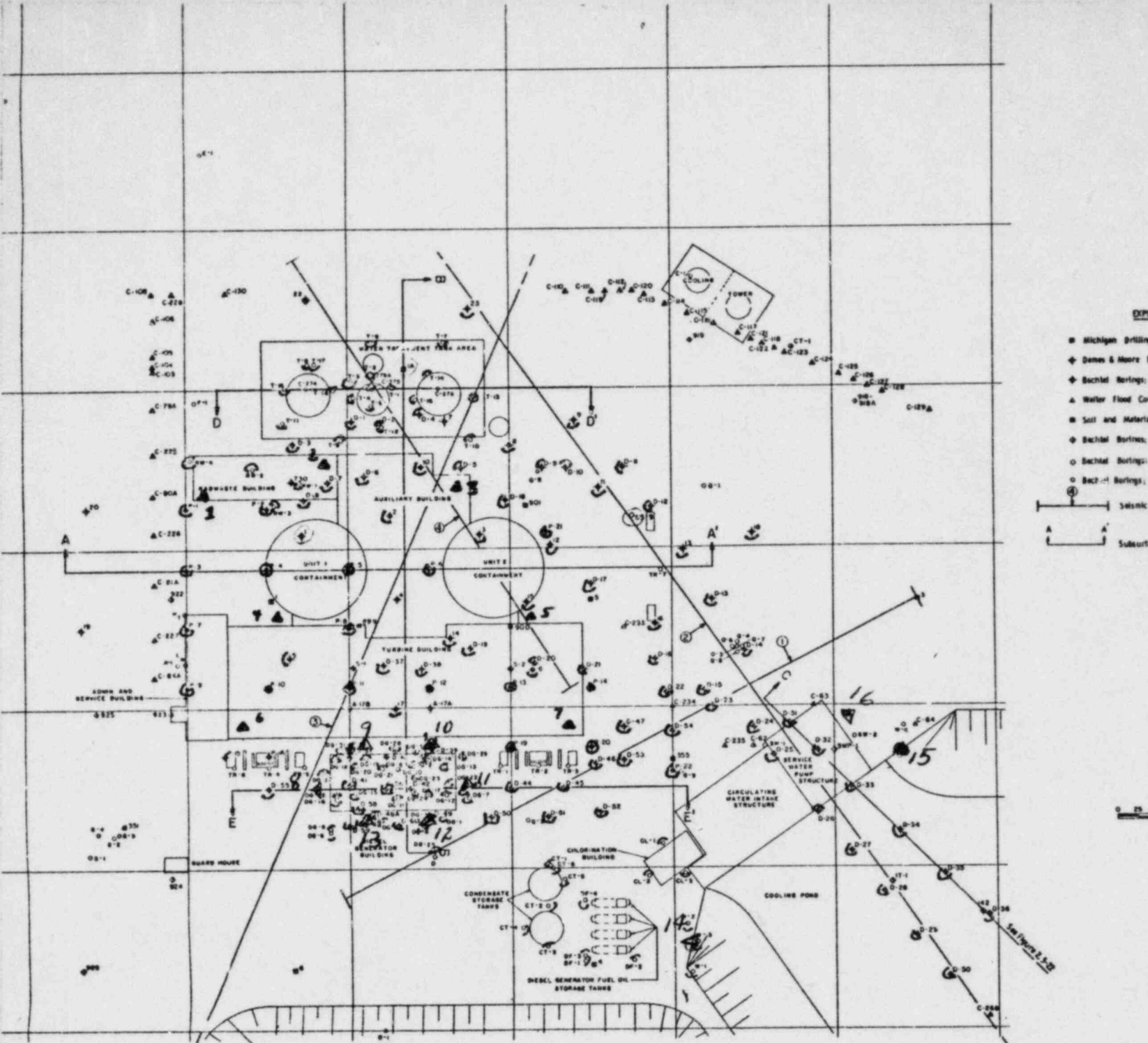
c. Service Water Building - A boring (Hole 16) shall be made as indicated on the attached map to and into the glacial till. All samples obtained shall be classified according to the Unified Soil Classification System also consolidation, drained and undrained triaxial compression tests made on cohesive soil samples and direct shears for a loose and dense condition shall be made on all granular soil samples, as specified in paragraph 7B.

d. Plant Area Borings - If feasible some borings should be taken under the Radwaste and Turbine Buildings to determine if unwatered pockets exist or persist. Suggested boring locations would be as indicated on the attached map. Further investigation could be needed after the results of these borings are obtained. No borings presently exist in these areas. The borings should be cased or hollow stem auger borings with drive samples every 2-1/2 feet through the fill. The holes should be converted to dewatering holes or used for piezometers (Holes 1, 2, 3, 6 & 7).

e. The site visit of 27 or 28 February 1980 turned up two differential settlement points on the retaining wall adjacent to the Service Water Pump Structure. Two borings, Holes 14 and 15 as indicated on the attached map shall be taken to investigate this problem. Tests required are consolidation tests, triaxial compression tests, Atterberg limits and gradation tests made on cohesive soils, and direct shear for loose and dense conditions and gradation tests made on granular soils.

f. In all new borings made, the water table shall be determined.

• After Fi
• Before



EXPLANATION

- Michigan Drilling Company Borings; 1956 & 1968
 - ◆ Jones & Moore Borings; 1968 & 1969
 - ◆ Bachtel Borings; 1970
 - ▲ Water Flood Company Borings; 1967 & 1970
 - Soil and Materials Engineers Inc. Borings; 1973
 - ◆ Bachtel Borings; 1973 & 1974
 - Bachtel Borings; 1977 & 1978
 - Bachtel Borings; August through October 1978
- Seismic Survey Line
- Subsurface Profile Section Line

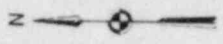
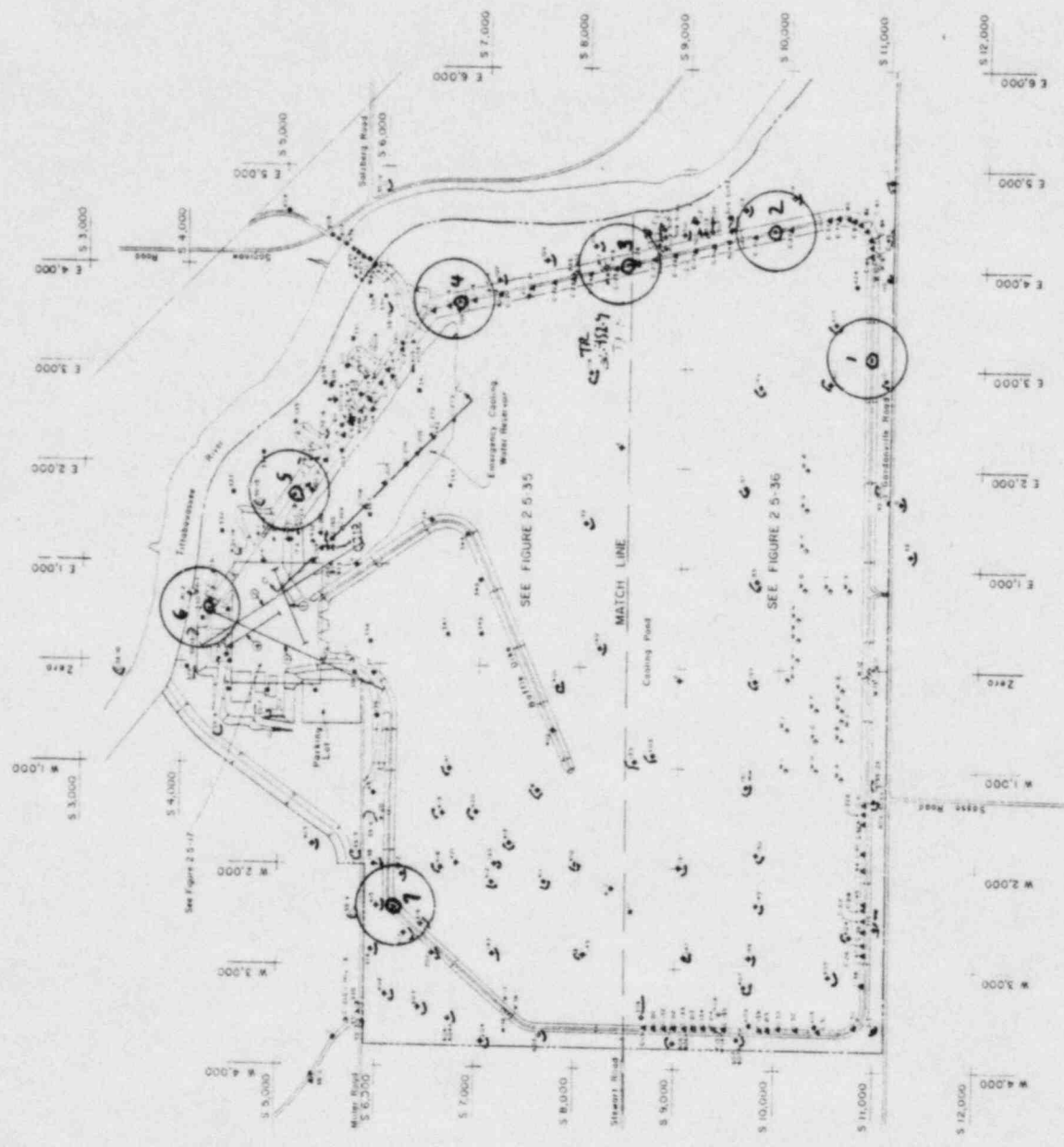


0 25 50 100 150 200
SCALE IN FEET

**CONSUMERS POWER CO
MIDLAND PLANT UNITS
FINAL SAFETY ANALYSIS**

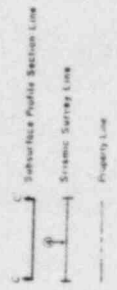
Plant Area Boring F:
(SK-G-43, Rev 3)

FSAR Figure 2.5-17



EXPLANATION

- Michigan Drilling Co. Borings, 1935 & 1968
- Jones & Moore Borings, 1968, 1969 & 1970
- Beckwith Borings, 1970
- Water Field Co. Borings, 1969 & 1970
- Scott & Metcalf, Ergek, Borings, 1973
- Bricker Borings, 1973 & 1974
- Beckwith Borings, 1977 & 1978



NOTES

1. See notes and locations of Spill and B-rise wells. See Figure 2 5 17.
2. See flow line locations in the lower Black Area. See Figure 2 5 17.

