

**FORM EQP 5111 ATTACHMENT TEMPLATE B3  
HYDROGEOLOGIC REPORT**

This document is an attachment to the Michigan Department of Environment, Great Lakes, and Energy's *Instructions for Completing Form EQP 5111, Operating License Application Form for Hazardous Waste Treatment, Storage, and Disposal Facilities*. See Form EQP 5111 for details on how to use this attachment.

The administrative rules promulgated pursuant to Part 111, Hazardous Waste Management, of Michigan's Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (Act 451), R 299.9506, R 299.9508, and R 299.9612 and Title 40 of the Code of Federal Regulations (CFR) §§264.94, 264.95, 264.97, 264.98, 270.13(10)(I), and 270.14(b)(19) establish requirements for hydrogeologic reports for hazardous waste management facilities. All references to 40 CFR citations specified herein are adopted by reference in R 299.11003.

This license application template addresses requirements for a hydrogeologic report for the hazardous waste management units and the hazardous waste management facility for the Dow Silicones Corporation (Dow Silicones) facility in Midland, Michigan. This template includes hydrogeologic report requirements, waiver demonstrations, and alternative information requests for operating license applications. This hydrogeologic report supplies information to support the groundwater monitoring program, or groundwater monitoring waiver request, proposed and included in Template B5, Environmental Monitoring Programs.

**Applicant for Operating License for Existing Facility:**

- ☒ R 299.9506 hydrogeologic report
- ☐ A waiver for the hydrogeologic report is requested for one or more units
- ☐ Alternative information is proposed for information required in the hydrogeologic report for one or more units
- ☐ A waiver is requested for groundwater monitoring requirements for one or more units, and is included in Template B5

**Applicant for Operating License for New, Altered, Enlarged, or Expanded Facility:**

- ☐ R 299.9506 hydrogeologic report
- ☐ A waiver is requested for groundwater monitoring requirements for one or more units, and is included in Template B5

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EPA 1992. *RCRA Groundwater Monitoring Draft Technical Guidance Document*. Document Number 530-R-93-001. November.

### **B3.A HYDROGEOLOGIC REPORT WAIVER REQUEST**

[R 299.9508(2)]

- ☐ The Hazardous Waste Unit is not a landfill, surface impoundment, waste pile, or land treatment unit, all hazardous waste management activities take place inside or under a structure that provides protection from precipitation and runoff, and the unit is in compliance with the facility design and operating standards found in R 299.9604.

Dow Silicones is not requesting a waiver from the hydrogeologic report. This facility includes a landfill. The tank storage and container storage facilities are located on the surface of the landfill.

### **B3.B SITE HYDROGEOLOGY**

[R 299.9506 (1)(a) through (g) and 40 CFR, Part 265, Subpart F, and §§270.13(l), 270.14(b)(19), and 264.97]

This section presents information on hydrogeology of the Dow Silicones facility, including a summary of existing information, identification of aquifers and uses of aquifers. Maps and geologic cross sections of the facility are presented and existing contamination is identified. Much of the hydrogeologic information is based on the hydrogeologic report submitted with previous license applications. This information has been updated with subsequent monitoring data and other information.

#### **B3.B.1 Summary of Existing Information**

[R 299.9506(1)(a)]

Dow Silicones facility is located in the southern portion of the City of Midland in Section 26 of Midland Township; Township 14N, Range 2E. Figure B3-1 is a reproduction of the U.S. Geological Survey Topographic map which displays the location of the regulated units (800/1000 Block Landfill, 806 Tank Farm and 809 Container Storage Building) at the Dow Silicones facility (USGS). This topographic map shows locations of domestic, municipal, industrial, oil, and gas wells and borings within 1 mile of the site as determined from EGLE's Geowebface Water Well Records; Historical Scanned Water Well Records, and Oil and Gas Well Records.

Figure B3-2 is a detailed map of the Dow Silicones facility with a scale of 1" = 200'. The elevations of the ground surface in the Dow Silicones facility range from approximately 630 feet (USGS) in the northeast corner to 617 feet in the southwest corner. Northeast of the facility the surface elevation increases to over 670 feet in 1.5 miles. The surface of the land southwest of the facility slopes towards the Tittabawassee River, which is located southwest approximately 1,000 feet away. The ground elevation between the facility and the northeastern bank of the Tittabawassee River is about 620 feet. The land elevation drops quickly at the riverbank to about 590 feet.

Lingle Drain is a deep drainage ditch that flows through the eastern and southern portions of Dow Silicones facility to Tittabawassee River. The drain is contained within steep banks on Dow Silicones's property. Portions of the drain are in an underground pipe. The surface elevation of the water in Lingle Drain is approximately 615 feet (USGS) at the northern border of the facility. Lingle Drain originates as the outfall from the City of Midland's Wastewater Treatment Plant. Monitoring information and data are summarized in this module. Detailed information on the monitoring program is presented in Module B5 (Environmental Monitoring Programs).



### **B3.B.1(a) Geological Setting**

In the south Midland area, 150 feet to over 400 feet of unconsolidated glacial sediments overlie older sedimentary rocks. The unconsolidated glacial sediments, referred to as glacial drift, were deposited during the Pleistocene glacial period when glaciers advanced and retreated over the Midland area. These sediments form the hydrologic units which are discussed in this hydrogeologic report.

A great deal of work has been done to understand the hydrogeologic conditions underlying Dow Silicones' Midland, Michigan facility. Data have been gathered from many sources. Data on subsurface conditions has come largely from (1) logs of mineral wells and borings, (2) geotechnical reports prepared for the design of new, or the evaluation of existing, engineered structures, and (3) field work focused on defining the hydrogeology beneath the facility. Many mineral wells and borings have been drilled in the Midland area, predominantly as coal borings and brine wells. These wells and borings typically penetrated the glacial drift and the bedrock. The records of these mineral wells are a good source of information on the lithology of the deeper glacial formations, the depth to bedrock, and the bedrock stratigraphy.

The logs of borings and wells drilled deeper than 50 feet and located in the south Midland area have been summarized and evaluated in order to define the geology of the glacial drift and the bedrock beneath the area. The records of these borings/wells are presented in Appendix B3-1, and their locations are shown on Figure B3-1.

The deep wells and borings can be divided into deep monitoring wells (DMW), observation wells (OW), and deep plugged holes (DP). Each type of deep well and boring is labeled with a letter prefix (given above) and an identifying number.

Additional field work has been done specifically to evaluate the occurrence, movement, and interconnections of ground water under the Dow Silicones facility. This work includes drilling and geophysically logging holes drilled to the bedrock, installing monitoring wells, determining ground water gradients, sampling and analyzing ground water samples, and performing pump tests.

Six geologic cross sections have been assembled along the cross section traces shown in Figure B3-2 from logs of wells and borings that are located on Dow Silicones plant site. The cross sections are presented in Figures B3-3, B3-4, B3-5, B3-6, B3-7 and B3-8. There are five stratigraphic units illustrated in these cross sections that are present under most locations at the Dow Silicones Facility:

- Bedrock;
- Regional Aquifer;
- Glacial Till;
- Lakebed Clay; and
- Surface Sand.

The unit names are derived from the relative position and/or geologic genesis of each unit. These units can be divided into two groups: consolidated sedimentary rocks and unconsolidated glacial sediments. The consolidated sedimentary rocks will hereafter be referred to as "bedrock", and the unconsolidated sediments make up the other four units. The remainder of this section discusses each of the stratigraphic units.

## Bedrock

The bedrock is Paleozoic in age and lies beneath the unconsolidated glacial sediments in the Midland area. These rocks are a member of the Saginaw Group of Pennsylvanian Age. This group consists mainly of shales with occasional seams of coal, sandy shales, and sandstone beds. The sediments which formed these rocks were deposited in the Michigan Basin approximately 300 million years ago. In the past, the bedrock was explored for its economically significant coal deposits, especially in Section 35 south of Dow Silicones and in Bay County to the east. Many of the wells and borings shown on Figure B3-1 are from deep brine wells and exploratory coal borings which were drilled into the bedrock. Boreholes in Section 35 (-25 43 on Figure B3-1) penetrated coal seams approximately 1 to 10 feet thick. The drillers' logs from these borings are the major source of information used to characterize the bedrock. The bedrock in the Midland area was explored for economic coal deposits, but the actual coal mining took place in nearby Bay County just east of the Midland area. The sandstone beds located within the shale are identified on the geophysical logs in Appendix B3-3.

The records of the deep wells and borings indicate that the top of the bedrock has a great deal of vertical relief in the south Midland area. The elevation of the bedrock surface ranges from less than 200 feet to more than 500 feet above sea level (hereafter referred to as USGS). Significant relief in the bedrock surface under the Dow Silicones facility is documented in the well logs. The bedrock surface is recorded at approximately 490 feet (USGS) in boring DMW-8. The surface of the bedrock was not encountered at well Test 1, which is located east of the landfill near Waldo Road and was drilled to 221.7 feet (USGS).

R.D. Mathews (*A Geologic Report on Pre-Pleistocene Geomorphology and Potential Groundwater Resources and Midland, Michigan mapped ancient river valleys on the bedrock surface through the south Midland area*, 1963) and those maps are presented in Figure B3-9. The bedrock contours in the vicinity of the Dow Silicones facility were updated through the use of boring records that document the bedrock surface. The arrows indicate the direction of the pre-glacial stream flow, not the direction of the present ground water flow.

The 1963 bedrock contour map indicates a valley cutting directly across the middle of the Dow Silicones facility from northeast to southwest. When developing the bedrock contour map, Mathews used a method of equal spacing of contour lines on the valley walls; therefore, some discrepancies exist between Mathews' contours and the recorded depth to bedrock at a given point. R.D. Mathews' (*A Geologic Report on Pre-Pleistocene Geomorphology and Potential Groundwater Resources and Midland, Michigan*) general outlines of the valleys are none the less valid as proved by recent drilling. In addition, a gravity survey in Sections 23, 24, 25, 26, 35, and 36 confirms the general direction of the bedrock valley in Sections 25, 26, and 35. The location of the gravity anomaly is included in Figure B3-9.

Deep borings at the Dow Silicones facility confirm the presence of an underlying bedrock valley but indicate that the valley is shifted slightly to the southeast. DMW-8, DMW-10, DMW-11, and 3138 (26-16) are the only four borings that actually penetrate the bedrock surface on-site. DMW-8 and DMW-10 lie just north of the landfill and penetrate the bedrock surface at 542 feet (USGS) and 527.4 feet respectively. The top of the shale was identified by the sharp rise in gamma radiation observed in the geophysical logs presented in Appendix B3-3. Boring 3138 (26-16) contacted the top of the bedrock at an elevation of 200 feet (USGS). This boring is the only boring drilled on the northeast edge of the Dow Silicones property that penetrates the bedrock. DMW-11 is located in the southwest corner of the landfill and contacts the bedrock surface at 505.3 feet (USGS). Cross

sections J-J' and E-E' show how the bedrock slopes upward toward the north end of the landfill. In the southeast corner of the site map, bordering Saginaw Road, DMW-9 was drilled to a depth of 373.3 feet (USGS). The boring was not drilled down to the bedrock though boring 3013 (35-8), located approximately 1300 feet south of DMW-9, penetrated the bedrock surface at 359.6 feet (USGS). Boring OW-3 was drilled to a depth of 438 feet on the south border of the Dow Silicones property, and no bedrock was encountered. Approximately 1,100 feet southeast of OW-3, boring 35-43 penetrated the top of the bedrock at 481 feet (USGS). To the east, Test Well 1 was drilled to an elevation of 221.7 feet (USGS) and still did not contact the bedrock surface. These borings confirm the presence of the bedrock valley mapped by R.D. Mathews (*A Geologic Report on Pre-Pleistocene Geomorphology and Potential Groundwater Resources and Midland, Michigan*) in 1963.

### Regional Aquifer

The Regional Aquifer consists of glacial outwash material and almost always lies directly on the bedrock surface beneath the south Midland area. The exception to this is an area directly south the site and Salzburg Road where the bedrock rises and the Regional Aquifer is not present (Figures B3-9 and B3-10). The thickness of the Regional Aquifer varies; in some places the aquifer is 30 feet thick, and in other areas is over 250 feet thick.

The sand and gravel which form the Regional Aquifer are not derived directly from the shale and sandstones of the bedrock but are outwash deposits that were fed from debris within the glaciers as they retreated northward into the Saginaw Basin. The amount of locally derived bedrock fragments was examined in well Test 1 (26-15). The boring record for Test 1 (26-15) indicates that the Regional Aquifer was penetrated at approximately 440 feet USGS and that the amount of shale present increases with depth. Near the base of the boring, the log indicates that the shale and sandstone bedrock fragments made up 10% to 20% of the unconsolidated sediments.

The deep wells and borings on-site indicate that the top of the Regional Aquifer has a great deal of vertical relief. As stated previously, the Regional Aquifer typically lies directly upon the bedrock. Mathews' (1963) modified bedrock contour map, Figure B3-9, is indicative of the type of vertical relief present in the Regional Aquifer. On the Dow Silicones site, the elevation of the top of the Aquifer ranges from 400 to 600 feet (USGS).

Eleven wells and four borings on the Dow Silicones facility property have penetrated the Regional Aquifer. Of the eleven wells, six are in the immediate vicinity of the landfill, and the other five surround the property boundary. All four borings drilled into the Regional Aquifer lie just north of the landfill. Figure B3-10 shows the piezometric surface of the Regional Aquifer based on May 2021 data. Tables B3-2 and B3-2b provides historical piezometric data.

Cross section G-G' illustrates a relatively high bedrock area. The Regional Aquifer is higher along this cross section as it drapes over the top of the bedrock high. Two of the borings on cross section G-G', 800-002 and 800-003, are hollow stem auger borings with split spoon samples. The well logs (Appendix B3-2) clearly indicate that the top of the Regional Aquifer is at 593 feet and 596 feet (USGS) in borings 800-002 and 800-003, respectively. At DMW-8 the Regional Aquifer is 47 feet thick and rises up to 590 feet (USGS). Geophysical logs for DMW-4A, DMW-6A, DMW-8, and DMW-10 are contained in Appendix B3-3 and were used in the geological interpretation of the sediments.

The elevation of the top of the Regional Aquifer decreases from the bedrock high to the southwest, south, east, and west. Cross section E-E', Figure B3-3 shows the decrease in elevation southwest

of the bedrock high. DMW-9 (26-8), located southwest of the topographic high along Saginaw Road, penetrated the top of the Regional Aquifer at an elevation of 404 feet (USGS). The boring for DMW-9 was terminated in a clay layer within the Regional Aquifer and did not penetrate the top of the bedrock. Dow Chemical boring 3013 (35-8) was drilled approximately 1300 feet southeast of DMW-9 (26-20) and penetrates the top of the Regional Aquifer at an elevation of approximately 455 feet and the bottom of the Regional Aquifer around an elevation of approximately 365 feet.

DMW-11 is located directly between DMW-9 and the bedrock high along cross section G-G'. DMW-11 penetrates the Regional Aquifer from 587 feet to 527 feet (USGS). As shown on cross section E-E', these elevations correspond to the top of the elevated portion of the Regional Aquifer on the bedrock high and the lower portion of the Regional Aquifer in the bedrock valley.

West of the landfill soil borings DH-4 and DH-5 were drilled to 525 and 484 feet (USGS), respectively. Neither of the deep borings penetrated the Regional Aquifer but were terminated in the Glacial Till (See borings logs in Appendix B3-2).

Cross section J-J' (Figure B3-8) shows the decrease in the elevation of the Regional Aquifer as we move off the bedrock high toward the east. Deep wells Test 1 (26-16) and OW-1 (26-12) are screened in the Regional Aquifer in the bedrock valley. Both of these wells penetrate the top of the Regional Aquifer near an elevation of 440 feet. The total thickness of the Regional Aquifer at Test 1 (26-16) and OW-1 (26-12) is unknown, but these borings indicate that it is at least 200 feet thick.

## **Glacial Till**

The Glacial Till is present over the entire south Midland area. The Glacial Till was deposited by glaciers that moved over the area. The Glacial Till ranges in thickness from 10 feet to over 200 feet. Depending on the location, bottom and top elevations of the till can differ drastically. The Glacial Till usually lies directly over the Regional Aquifer, except where the Regional Aquifer is absent and the Glacial Till lies directly upon the bedrock highs.

The Glacial Till consists of an extremely stiff, poorly sorted, grayish blue, sandy and silty clay with occasional pebbles. The Glacial Till can be identified during drilling procedures by the presence of pebbles, "rigid" drilling, and a sandy, silty texture in the clay. These characteristics help distinguish it from the Lakebed Clay. The Glacial Till unit is predominantly a mixture of sand, silt, and clay, with the clay fraction (less than 5 microns) averaging about 30%. This is in direct contrast to the Lakebed Clay unit where the clay fraction usually exceeds 50%.

Three samples were collected from borings that penetrated the Glacial Till in the Dow Silicones landfill area. Borings 1000-105, 106, and 107, presented in Appendix B3-2, recorded permeabilities ranging from  $5 \times 10^{-7}$  cm/sec to  $2.6 \times 10^{-8}$  cm/sec. The Glacial Till displays distinctly different physical characteristics than the Lakebed Clay. The interface between the two stratigraphic units can be determined by blow counts, percent moisture, natural weight, and unconsolidated compression strength (PSF) which were measured in most of the borings shown on Figure B3-2 (logs located in Appendix B3-2). The Glacial Till can be recognized by blow counts usually greater than 20 per 6 inches; moisture content less than 10%; unconfined compression strength greater than 20,000 PSF; and weight above 140 PCF (lbs/ft<sup>3</sup>). The 700- series boring logs present a good example of the physical characteristics of the Glacial Till.

Twelve samples were collected from the upper 15 feet of the Glacial Till unit on Dow Chemical Company's Salzburg Landfill site south of Dow Silicones and were analyzed for permeability, Atterberg limits, pH, and particle size. Permeability values ranged from  $1.2 \times 10^{-7}$  to  $2.5 \times 10^{-8}$

cm/sec, with 82% of the samples less than  $1.0 \times 10^{-7}$  cm/sec. The liquid limit and plastic limit averaged 20.4 and 8.4, respectively, which are notably lower values than measured for samples of the Lakebed Clay. The pH ranged from 8.0 to 9.0, and the unit is a mix between the SM, SC, SC-SM, CL-ML, and CL in the United Soil Classification.

The Glacial Till unit is interbedded occasionally with fluvial sands and gravels that were deposited during glacial times by rivers flowing in and about the glaciers. The geophysical logs clearly indicate the presence of these occasional fluvial sand subunits within the till. Although these Till Sands can at times be 10 feet thick, they usually are not laterally traceable over any extended length. The Till Sands vary in thickness, occur sporadically, and can appear at any depth within a Glacial Till sequence. Four wells (DMW-1, DMW-2, DMW-3, and DMW-7), located on site, are interpreted as being screened in sand subunits in the Glacial Till. These wells are screened in Till Sands that range between 1 and 12 feet in thickness. DMW-1 is located on the east end of the facility (cross section J-J', Figure B3-8) and is screened at the base of a 12-foot Till Sand. DMW-3 is displayed on cross section E-E' (Figure B3-3) and is screened in a 5.5 feet thick Till Sand.

DMW-7 is screened in a sand subunit south of the landfill, as displayed in cross section F-F'. The geophysical log for DMW-7 clearly delineates the thin Till Sand sandwiched in the Glacial Till. Cross section F-F' (Figure B3-4) displays the 5-foot Till Sand in DMW-7. DMW-7 was replaced in 2009. Two new borings were completed within 15 feet of DMW-7, and these borings confirmed the very limited extent of the till sand at this location.

All the Glacial Till sands identified during this study are isolated from other permeable zones by the Lakebed Clay and Glacial Till. Section B3.B1 (b) presents results of pump tests that are the basis for this conclusion.

The Glacial Till, along with the Lakebed Clay, acts as an impermeable boundary as it separates the Surface Sand unit from the Regional Aquifer. Around the Dow Silicones facility the Glacial Till can vary drastically in thickness. In DMW-10 the till is only 10 feet thick over the Regional Aquifer, while in DMW-9 the till is 200 feet thick.

### **Lakebed Clay**

The Lakebed Clay unit lies directly upon the Glacial Till in the greater south Midland area. As the name implies, this unit was deposited when the area was covered with water. This happened at the end of the last glaciation as the ice caps retreated northward across the Huron basin. Ancient shoreline features indicate that the greater Midland area was once a near-shore, shallow, water environment. This can be interpreted by the stratification of the Lakebed Clay with the interbedding of coarse grained sediment. Ancient shorelines can be observed about 2 1/2 miles south of the Dow Silicones facility. Beach ridges and small dune complexes can be observed from a car in this area and can be traced on the 7.5 minute Midland South Quadrangle (USGS, 1973) in Sections 2, 3, 4, 9, 10, and 11 of Ingersoll Township (T13N R2E). These shorelines and lakebed deposits can also be easily identified in the Soil Survey of Midland County, Michigan (Hutchison, 1979; see map 59).

The Lakebed Clay is distinctly different than the Glacial Till clay in that it consists of stratified clay layers that are mixed with varying amounts of sand and silt. Distinct layers of sand, sandy gravel and silt are interbedded within this clay and represent a small fraction of the total unit. The Lakebed Clay unit is usually detected by its plastic consistency (due to high moisture content), brownish color, and low penetration resistance. Extensive test results distinguishing the physical characteristics of the sediments can be found in Appendix B3-4. During construction of the Dow

Silicones facility's landfill, five samples were collected from the Lakebed Clay and analyzed for permeability. Boring series 1000-105, -106, -107 recorded permeabilities ranging from  $1.2 \times 10^{-7}$  to  $1.8 \times 10^{-8}$  cm/sec.

During the hydrogeologic study of Dow Chemical's Salzburg Landfill site, 63 Lakebed Clay samples were collected and analyzed for permeability, Atterberg limits, pH, and particle size. Laboratory permeability ranged from  $3.1 \times 10^{-6}$  to  $1.4 \times 10^{-8}$  cm/sec, with 86% less than  $1.0 \times 10^{-7}$  cm/sec. Clay particles (less than 5 microns) comprise a significant fraction of all samples ranging from 23.4% to 96.2% with an average of 56.3%. The liquid limit ranged from 13.0% to 56.5% and averaged 36.2%. The plastic limit ranged from non-plastic to 35.8 and averaged 16.65. The pH ranged from 7.3 to 8.9. Using the Unified Soil Classification, the unit is predominantly a CL clay with subordinate amounts of CH, SC, SP-SM, ML-CL, and ML soils.

As shown in the cross sections, the Lakebed Clay is very consistent in thickness beneath Dow Silicones' facility. The Lakebed Clay unit was differentiated from the underlying Glacial Till based upon penetration blow counts, percent moisture, natural weight, and unconsolidated compression strength (PSF). One or more of these physical properties were tested for in soil samples from the borings shown on the site map Figure B3-2, except the 86 series. The information is contained on the boring logs in Appendix B3-2. The Lakebed Clay samples usually had a lower penetration resistance, typically less than 20 blows per 6 inches and moisture content greater than 10%. This can be compared to the Glacial Till samples which typically had penetration resistance over 20-30 blows per 6 inches, and less than 10% moisture content. The natural weight and unconsolidated compression strength generally increased when the boring encountered the Lakebed Clay/Glacial Till interface. The Lakebed Clay usually has compression strength less than 8,000-10,000 PSF (lbs/ft<sup>2</sup>). The unit weight was usually less than the Glacial Till and measured around 120-130 PCF (lbs/ft<sup>3</sup>). Boring series 600, 700, and 800, which surround the landfill, are good examples of the differing physical characteristics that distinguish the Lakebed Clay and the Glacial Till.

### ***Clay Mineralogy and Cation Exchange Capacity***

Samples from both the Lakebed Clay unit and the Glacial Till unit, collected from the Dow Chemical Salzburg Landfill, were analyzed for their clay mineralogy and cation exchange capacity. X-ray diffraction analyses indicated that 62% to 64% of the clay in both units is illite; 17% to 25% is chlorite plus kaolinite; and 11% to 20% are expandable clays, which, in these samples, are alteration products of chlorite. The cation exchange capacity measured low in all samples, ranging from 6.2 to 14 milliequivalents per 100 grams.

The structure of illite is characterized by fixed (non-exchangeable) potassium ions between two planes of oxygen atoms. This forms a very rigid crystalline unit that impedes water penetration between crystal layers. Because of this rigid structure, only limited swelling occurs when saturated. The low cation exchange capacity is due to the high percentage of illite in which the potassium ions between successive crystal layers are fixed.

Calcite ( $\text{CaCO}_3$ ) and dolomite ( $\text{CaMg}[\text{CO}_3]_2$ ) were also found in the samples, although no quantitative measures were made. The presence of these minerals contributes to the buffering capacity of the clay, which means that the alkaline pH of the clay is not easily lowered.

These tests, along with the permeability tests discussed in preceding sections, indicate that the underlying clay is well suited for such uses as landfill or lagoon liners and is also well suited as the base material for the hazardous waste facilities. It is non-swelling clay with high chemical stability and low permeability. The underlying clays will not swell or shrink appreciably with changing

moisture content. Naturally occurring, continuous layers of the clays underlying Dow Corning Hazardous Waste Facilities provide a natural barrier to prevent migration of chemicals to the Regional Aquifer.

### **Surface Sand**

The Surface Sand unit exists as a thin veneer of sand on much of Dow Silicones. The unit is usually comprised of highly stratified fine sand and silt with thin layers of clay. The unit is particularly silty and clayey near the bottom. The thickness of this unit varies from 0 to 15 feet. Eight shallow wells are screened at the base of the Surface Sand unit around the hazardous waste landfill site. Cross section G-G' (Figure B3-5) shows two wells, SMW-28-1 and SMW-28-2, that are screened in this unit. The bottom of the Surface Sand unit rarely extends below 620 feet (USGS) around the landfill, and most of the shallow monitoring wells that border this area are set just above the interface of the Lakebed Clay and Surface Sand units.

Within the Dow Silicones complex some land surface areas have been altered by excavation and filling. This is especially true where industrial development has altered the land topography. In this case, it is not always possible to determine the depositional history of the surface sand unit. Cross section H-H' (Figure B3-6) shows an area along the east border of the landfill that has been interpreted as fill. In this area, it is difficult to determine if a Surface Sand exists.

### **B3.B.1(b) Hydrogeology**

Ground water is present in all four unconsolidated glacial deposited formations beneath the Dow Silicones facility. The circumstances in which it is found are described as follows:

#### **Regional Aquifer**

The Regional Aquifer is the uppermost aquifer that lies beneath the Dow Silicones facility. It is the only hydrogeologic unit of unconsolidated sediments in the area that is capable of yielding a significant amount of water. Water levels collected from South Midland area wells that penetrate the Regional Aquifer are presented in Table B3-1 and B3-1b, and piezometric surfaces of the Regional Aquifer (Deep Wells) and Surface Sand (Shallow Wells) are contoured in Figures B3-10 and B3-11. The contours on Figures B3-10 and B3-11 indicate that the ground water flow on the east side of the property is diverging into the bedrock valleys where the Regional Aquifer is the thickest. No ground water flow is recorded south of Salzburg Road due to absence of the Regional Aquifer due and the bedrock high. Historical piezometric data are presented in Tables B3-2 and B3-2b.

The ground water gradient and velocity of movement can be calculated for the Regional Aquifer beneath the Dow Silicones site. The ground water gradient under the Dow Silicones facility is calculated to be approximately 0.00031 or 1.65 feet per mile based on the September 1984 water level data. The gradient was measured between well 3013 (35-8) and well 3138 (26-16). The velocity of the water (V) in the Regional Aquifer can be roughly estimated. The estimated value for permeability (K) is 100 gal/day/ft<sup>2</sup>, and the porosity is estimated at 25%. Given these values,

$$V = \frac{100 \text{ gal/day/ft}^2 \times 0.00031}{0.25 \times 7.48 \text{ gal/ft}^3} = 0.0166 \text{ ft/day}$$

The direction and velocity of ground water flow is calculated to be northeasterly at 0.0166 ft/day or 6.06 ft/yr. At this rate it would take 170 years for the ground water to move 1050 feet beneath the landfill.

Discharge of groundwater from the Regional Aquifer under the Dow Silicones facility is currently unknown. It is believed that the primary discharge lies somewhere downgradient of the Dow Silicones facility. The low permeable Glacial Till and Lakebed Clay units prevent ground water flow from discharging upward to the land surface.

Recharge to the Regional Aquifer is also unknown. The high piezometric surface or high static water level indicates a confined aquifer. The water levels rise above the confining clay layer beneath all of the Dow Silicones facility. In DMW-9, located by the Saginaw Road boundary, the static head is above the land surface resulting in a flowing well. West of DMW-9 the elevation of the land surface rises above the piezometric surface of the Regional Aquifer, hence, none of these artesian wells are flowing.

The hydraulic gradient between the Regional Aquifer and the thin saturated zone in the Surface Sand also reflects the increase in the ground elevation toward the northeast. In the southwest corner of the Dow Silicones facility near Saginaw Road, the Regional Aquifer has an Artesian head which is approximately 15 feet higher than the static head in the shallow surface sands. For example, water levels measured in the shallow well 3S-1 are at least 15 feet below the water levels measured in Regional Aquifer well DMW-9 (see Tables B3-1, B3-2). The static water level in DMW-9 is 626 feet (USGS), and nearby the water level in well 3S-1 which is screened in the Lakebed Clay at 16 feet, is approximately 609 feet (USGS). This relationship again indicates that there is an upward hydraulic gradient in this area, from the Regional Aquifer toward the Lakebed Clay and Surface Sand units. In this area there is not a possibility for ground water migration downward from the Shallow Surface Sands and Lakebed Clays to the Regional Aquifer due to the measured upward vertical gradient and the 200-foot layer of clay that separates the two units. The thick Glacial Till and Lakebed Clay units act as an aquitard and inhibit the upward flow of ground water from the Regional Aquifer.

Near the landfill, the piezometric surface of the confined Regional Aquifer is at an elevation of approximately 620 to 624 feet (USGS). The water levels observed in the shallow monitoring wells that border the landfill are frequently above the Regional Aquifer level. For example, the highest water level in DMW-4A is 625.01 feet, while the lowest recorded water level in SMW-28-1 is 625.66 feet. A similar relationship is typically observed between DMW-6A and SMW-61. Therefore, a potential does exist for recharge of the Regional Aquifer by the shallow groundwater in sand around the landfill. In addition, the Regional Aquifer is closer to the ground surface in the area of the landfill than in the area that borders Saginaw Road to the facility's southwest. Darcy's Law can be used to determine the elapsed time it would take shallow ground water to migrate through the clay layers and into the Regional Aquifer.

$$t = \frac{DO}{Ki}$$



The variables are as follows:

D = vertical distance between the two wells  
O = porosity of the Lakebed Clay and Glacial Till  
K = permeability of the Lakebed Clay and Glacial Till  
i = vertical gradient  
 $i = \frac{H}{T}$  = change in Head  
T = thickness of clay layer

DMW-4A and SMW-28-1 located on the northwest corner of the landfill were used to determine the time of migration from the Surface Sand unit to the Regional Aquifer. DMW-4A is screened in the Regional Aquifer and SMW-28-1 is screened in the base of the Surface Sand and at the top of the clay. The two wells are separated by 28 feet of clay that has an average permeability of  $1.3 \times 10^{-7}$  cm/sec. The piezometric head between the two wells is downward with an average gradient of three feet. The porosity of the clay is taken to be about 50%.

$$t = \frac{(28 \text{ ft})(.5)}{(0.13 \text{ ft/yr})(3 \text{ ft}/28 \text{ ft})} = \sim 1,000 \text{ years}$$

The vertical travel time (t) through the Lakebed Clay and Glacial Till is approximately 1,000 years at the north end of the landfill. This is the minimum travel time it would take for vertical migration of groundwater to penetrate downward to the Regional Aquifer beneath the Dow Silicones facility property. Vertical travel time would only become greater under other areas of the facility due to increased thicknesses of the underlying clays.

The other possible transport process by which contaminants can move within porous media is molecular diffusion. The vertical travel time by molecular diffusion (t) through the Lakebed Clay unit and the Glacial Till unit is given by the formula:

$$t = H^2 / 22.1 D_v$$

H = The thickness of the Lakebed Clay and Glacial Till Units  
D<sub>v</sub> = Vertical diffusion coefficient  
T = Time for the concentration at distance H to reach 0.001 C<sub>o</sub>  
C<sub>o</sub> = Concentration of a parameter at the top of the clay  
0.01 = Approximate ratio between the concentration at top of the clay (possible leachate) and the detection limit of a particular parameter.  
z = Depth from concentration source (top of clay) to detection point

This is derived as follows. The governing equation is:

$$dC/dt = \frac{D_v d^2 C}{dz^2}$$

The solution being:

$$\frac{C}{C_o} = \text{erfc} [z / \sqrt{4D_v t}]$$

For example, if C (at a depth where z = H) is to be controlled to 0.001 C<sub>o</sub> where (C<sub>o</sub> = concentration at z = 0), then the argument of the erfc is 2.35. Therefore, z = H = 2.35 (4 D<sub>v</sub>t)<sup>0.5</sup> and H<sup>2</sup> = (2.35)<sup>2</sup>(4D<sub>v</sub>t).

$$\text{Solving for } t, t = H^2 / (5.52) (4D_v) = H^2 / 22.1 D_v.$$

The diffusion coefficient of ions and neutral molecules in water is on the order of  $5 \text{ to } 10 \times 10^{-6} \text{ cm}^2/\text{sec}$ . The effects of tortuosity and reduced cross-sectional area in the till and clay material reduce the vertical diffusion coefficient ( $D_v$ ) to the level of  $1 \times 10^{-7} \text{ cm}^2/\text{sec}$ . Because of the structure of the Lakebed Clay and Glacial Till units, the horizontal diffusion coefficient ( $D_h$ ) is an order of magnitude larger. The horizontal diffusion would be the 10 or approximately three times faster than vertical diffusion.

One factor which would serve to reduce the effective diffusion coefficient in both the vertical and horizontal directions is the adsorption capacity of the clay. The adsorption capacity of the clay affects cations and organic molecules. The adsorption process can be represented as being at equilibrium between the concentration in the water (C) and the concentration on the solids (S).

The formula is:

$$S = K'C, \text{ where } K' \text{ is the adsorption coefficient.}$$

$K'$  can vary greatly, but  $K'$  values of 10 to 1,000 are common for cations and 1 to 10 for organics. Polar organics which are more soluble are also more strongly adsorbed by clays. Adsorption reduces the effective diffusion coefficient by the factor  $K' + 1$ . Anions are not usually adsorbed, but the negatively charged clay particles create an exclusion volume for anions which reduce the cross-sectional area for transport of the anions. For cations the net result is to reduce the effective  $D_v$  to the range of  $1 \times 10^{-9}$  to  $1 \times 10^{-12} \text{ cm}^2/\text{sec}$ .  $D_v$  for neutral organics is reduced somewhat, and anions have a  $D$  value in the order of  $5 \times 10^{-8} \text{ cm}^2/\text{sec}$ .

Using a conservative estimate of  $1 \times 10^{-7} \text{ cm}^2/\text{sec}$  for  $D_v$ , the vertical travel time to the Regional Aquifer by diffusion through a 200 ft. clay layer, as observed in the southwest corner of the facility, is approximately  $5.3 \times 10^5$  years.

$$t = [(200 \text{ ft})^2 / (1 \times 10^{-7} \text{ cm}^2/\text{sec})(22.1)] [(30.48 \text{ cm/ft})^2] [3.17 \times 10^{-8} \text{ yr/sec}] = \text{approx. } 5.3 \times 10^5 \text{ years}$$

In the same time, the horizontal distance traveled would be approximately 600 feet.

The calculations noted above indicate that under present static head conditions, the time for ground water to move by gravity downward from the Surface Sand into the upper-most aquifer is quicker than molecular diffusion transport processes. This means that diffusion is not a viable process by which contaminants can reach the uppermost aquifer.

In the area of the landfill, the same conclusion is reached. The vertical travel time ( $t$ ) through the Lakebed Clay and Glacial Till units by molecular diffusion is approximately  $1 \times 10^4$  years using the same formula as previously referenced. The minimum thickness of the clay layer is determined to be 28 feet thick under the landfill.

$$t = [(28 \text{ ft})^2 / (1 \times 10^{-7} \text{ cm}^2/\text{sec})(22.1)] [30.48 \text{ cm/ft})^2] [3.17 \times 10^{-8} \text{ yr/sec}] = \text{approx. } 10,000 \text{ years}$$

The dispersion from a source within the northern area of the landfill would be approximately 90 feet horizontally and 28 feet vertically over 10,000 years. The vertical ground water flow by gravity as calculated would take 1,000 years compared to the 10,000 years by molecular diffusion. The vertical flow of ground water by molecular diffusion is not a viable process by which contaminants could reach the Regional Aquifer.

## Pump Test Data

Three aquifer tests have been completed at the Dow Silicones facility. The purpose of the two initial tests was twofold: First, the tests were initiated to see if the Regional Aquifer that underlies the landfill was directly connected to the Regional Aquifer observed to the east and southwest. Second, the tests were performed to determine any hydraulic connections between the Regional Aquifer and the observed Till Sands. The third test was done to confirm assumptions about the continuity of the Regional Aquifer.

The first pump test was performed on June 15, 1984. DMW-4A, screened in the Regional Aquifer, was pumped for 6.5 hours at 50 gallons per minute (gpm). The response was measured in nearby DMW-6A and in distant wells DMW-1 (26-6), DMW-2 (26-7), DMW-3 (26-8), OW-1 (26-17) and OW-2 (26-13). The drawdown response of DMW-6A was approximately two feet. It was determined that the length of the test was insufficient to determine if any of the other wells showed drawdown from the pumping. A decline in water level was measured in some of the wells but it is unknown whether this was due to pumping or to barometric response of the aquifer. The pump test directly concluded that DMW-4A and DMW-6A are hydraulically connected.

The second pump test was performed in early September 1984. DMW-4A was pumped for a week's duration. During the initial 14-hour period of the test, DMW-4A was pumped at 85 gpm. This rate caused a rapid drawdown in the well to 71.5 feet with no apparent stabilization. The pumping rate was reduced to 40 gpm after 20 hours and the well recovered to a level of 40.5 feet. The pumping rate was increased to 50 gpm after 44 hours and then to 60 gpm after 63 hours. The drawdown was 55.8 feet a short time later. The following summary indicates which wells responded to the pumping of DMW-4A and which wells did not.

Well Pumped	Responding Wells	Formation of Screened Wells	Non-Responding Wells	Formation Screened Wells
DMW-4A	DMW-6A (26-11)	Regional Aquifer	DMW-1 (26-6)	Till Sand
	OW-1(26-17)	Regional Aquifer	DMW-2 (26-7)	Till Sand
	OW-2 (26-13)	Regional Aquifer	DMW-3 (26-8)	Till Sand

A drawdown of several feet was recorded at DMW-6A during pump tests 1 and 2. The drawdown responses of OW-1 (26-17) and OW-2 (26-13) are recorded in Figure B3-12. The drawdown recorded in these two wells was between 0.7 and 0.8 feet. The slight rise during the middle of the test is attributed to the aquifer's response to barometric conditions. The record also indicates recovery data for OW-1 and OW-2 after the pumping was terminated at noon on September 5. The pump test clearly shows that the Regional Aquifer that underlies the landfill is hydraulically connected to the deeper portion of the Regional Aquifer monitored to the east and southeast.

Cross section J-J' (Figure B3-8) shows the aquifer connection to the east and southeast based on data collected from pump test 2. Cross section E-E' infers that the Regional Aquifer is also connected to the southwest area of the Dow Corning facility.

The hydrograph in Figure B3-12 also shows the water level measurements, during pumping, for DMW-1, DMW-2, and DMW-3. The record indicates that there was no response to the pumped well. In support of the pump test results, the driller's logs indicate that DMW-1, DMW-2, and DMW-3 are screened in three unique Till Sands in the Glacial Till. The slight water level fluctuation recorded on DMW-1, DMW-2, and DMW-3 can be attributed to the natural barometric response of

the aquifer. The hydrograph curve differences between these wells can be attributed to the variations in individual well efficiencies and response to barometric pressure changes. The hydrograph response curve for DMW-3 reflects a different appearance due to low resolution of the monitoring equipment used at the location. Overall, this pump test concludes that the Regional Aquifer on the bedrock high under the landfill is connected to the Regional Aquifer in the bedrock valley. The pump test also concludes that no hydraulic connection exists between Till Sands (represented by DMW-1, DMW-2 and DMW-3), and the Regional Aquifer (represented by DMW-4A, DMW-6A, OW-1, and OW-2).

Historical water level data for the wells included in the second pump test are graphed on Figure B3-13. The chart shows water levels DMW-1 range from 627 to 630 feet (USGS), and water levels from DMW-3 vary from 613 to 616 feet (USGS). Water level measurements collected from DMW-4, DMW-5 and DMW-6 range from about 620 to 623.5 feet (USGS) through the summer of 1984 when they were plugged. The hydrograph for past water levels in DMW-4, DMW-5, and DMW-6 is pictured in Figure B3-13.

From 1982 to the summer of 1983, the three curves from DMW-4, DMW-5, and DMW-6 interchange relative water level positions. The fluctuations may be due to old sampling techniques. The techniques involved purging one well for sampling before water level measurements were recorded in any of the other wells. Since 1983, this technique has been replaced and all water level measurements in wells are collected before purging for samples takes place. The hydrograph shows that the data has been more consistent since then.

Two of the three plugged wells were re-drilled and called DMW-4A, and DMW-6A (Figure B3-2). The two new wells were screened adjacent to the old well locations. The hydrograph curve includes the new wells DMW-4A and DMW-6A that were installed in 1984 to replace DMW-4 and DMW-6.

Wells DMW-4, DMW-5, DMW-6, DMW-4A and DMW-6A all show close correlation with respect to water level fluctuations. The correlation is consistent with the hydrogeologic interpretation which states that all of the wells were/are screened in the Regional Aquifer and are in close proximity to one another.

The historical water level data for DMW-1 and DMW-3 (Figure B3-13) shows a significant difference between one and the other. Both of these wells are screened in different confined saturated Till Sands as demonstrated by the second pump test. Therefore, the two wells reflect distinct head levels representative of two unique units. The similar variation with time in all the wells (Figure B3-13) is attributed to common influence of changes in barometric pressure on all of the confined water levels.

The third pump test, completed in 1988, was done to determine if there is an hydraulic connection between the regional aquifer on the bedrock high near the landfill and the regional aquifer in the bedrock valley southwest of the landfill. This third test was also done to determine if hydraulic communication existed between locally observed till sands and the regional aquifer. Appendix B3-5 presents the third pump test. This test concluded that:

- The regional aquifer under the landfill was hydraulically connected to the regional aquifer southwest of the facility. Specifically, DMW-9 and DMW-4A were found to be hydraulically connected.

- The monitoring wells immediately surrounding the landfill (DMW-4A, DMW-6A, DMW-8, DMW-10, DMW-11 and DMW-12) are all located in the regional aquifer that spans the bedrock high under the landfill.
- The till sand at DMW-7 is hydraulically separated from the regional aquifer.

### **Glacial Till**

Though the Glacial Till is saturated, the water is held very tight by the low permeable clay. Within the till are saturated sand and silt layers that are previously referred to as Till Sands or isolated sand units. The amount of water available to a well that penetrates one of these layers is extremely variable. Many of them provide little more than a seep, while others located southeast of the facility in sections 35 and 36 are large enough to provide water to domestic wells. The permeability and extent of these Till Sands affect the yield of wells screened in the unit as well as the degree of connection with a source of recharge. The Till Sands are not interconnected to the Regional Aquifer as the pump tests (Appendix B3-5) and water chemistry show. The distinct water quality difference between the Regional Aquifer and the Till Sands will be discussed in the ground water quality section. There is a slight possibility that the Till Sands that lie near the bottom of the Glacial Till are recharged from the Regional Aquifer.

### **Lakebed Clay**

The Lakebed Clay is saturated where it is covered by the Surface Sand and partially saturated where it is exposed to the surface. Recharge of the Lakebed Clay is by slow infiltration from the overlying Surface Sand unit or from direct recharge where the Lakebed Clay is exposed at the surface. Evapotranspiration and discharge to Lingle Drain or the Tittabawassee River probably account for most of the ground water which is discharged from this unit. Due to the low permeability, the natural discharge from the unit is very slow.

### **Surface Sand**

Infiltration of precipitation forms a thin saturated zone in the Surface Sand. The saturated sand thickness in the shallow monitoring wells around the landfill ranges from less than 2 to 8 feet. The ground water is retarded from downward infiltration by the relatively impermeable Lakebed Clay and Glacial Till units. The piezometric surface of this unit is highly variable due to topographic control of discharge (i.e., location of drainage ditches and storm sewers) and variations of infiltration and evapotranspiration. Figure B3-11 illustrates the piezometric surface of the groundwater in the surface sand in October, 2010. Tables B3-1 and B3-1a summarize historical piezometric data.

The Site Interceptor System (SIS) is a drainage system installed around the perimeter of the entire site. The SIS is designed to intercept shallow groundwater and prevent it from discharging from the site. Water in the SIS is piped to Dow Chemical's wastewater treatment facility.

**B3.B.2 Identification of Aquifers and Their Uses**  
[R 299.9506(1)(b), (c), and (d)]

**B3.B2(a) Uppermost Saturated Zone and Uppermost Aquifer**

The Michigan Administrative Code, R 299.9101(u) defines an aquifer as a geological formation, group of formations, or part of a formation that is capable of yielding a significant amount of groundwater to wells or springs". RCRA regulations have the same definition (40 CFR 260.10).

***Surface Sand***

The uppermost saturated zone is the **Surface Sand unit**, although it is not saturated to the surface or at all locations. The shallow ground water in the Surface Sand unit is not capable of yielding a significant amount of ground water to wells or springs and is not an aquifer. There are no known wells in the Surface Sand unit other than monitoring wells, and it is highly unlikely that any production wells will be constructed in the Surface Sand in the future due to the extremely low yield of this unit.

The major element chemistry of the ground water in the thin saturated zone within the Surface Sand is distinctly different from the major element chemistry of the ground water in the Regional Aquifer. These chemical differences in the ground water support the hydrologic separation of the Surface Sand and the Regional Aquifer.

Figure B3-18 is a graph of the measured concentrations of sodium versus calcium for all of the samples from the shallow monitoring wells (SMW's) and all of the samples from the deep monitoring wells screened in the Regional Aquifer, excluding DMW-5 and DMW-10. The shallow ground water in the Surface Sand has higher calcium concentrations than sodium concentrations with a ratio of calcium to sodium ratios greater than 2.4. In contrast, the ratio of calcium to sodium stays low (<0.75), the samples from the Regional Aquifer, and cluster together near the Y-axis in Figure B3-18.

The concentrations of the major anions offer an additional contrast. In the shallow saturated zone in the Surface Sand, the chloride, bicarbonate, and sulfate concentrations all vary (see Table B3-3). The concentrations of bicarbonate and sulfate in the Regional Aquifer are relatively stable while the concentration of chloride changes with changes in salinity. These differences in ground water chemistry support the conclusion drawn earlier that the shallow saturated zone in the Surface Sand is hydraulically separated from the Regional Aquifer.

Phenols, organic silica, benzene, ethyl benzene, toluene and chlorobenzene have been detected in samples from the shallow ground water. The contamination is not associated with the regulated unit and is believed to be associated with activities prior to installation of the perimeter curtain wall and the leachate collection system. Ground water collection systems have been installed around the north, west, and south perimeters of the landfill to contain and collect these residuals. A very limited quantity of seasonal ground water exists along the eastern side of the landfill. Monitoring of Lingle Drain has not detected any contamination arising from the residuals along the eastern perimeter of the landfill.

## **Lakebed Clay**

The **Lakebed Clay formation** has a low permeability and is not an aquifer because it will not yield a significant quantity of water. Shallow monitoring wells screened in the Lakebed Clay typically bail dry and recover slowly.

## **Glacial Till**

The **Glacial Till** is not capable of yielding a significant amount of groundwater to wells or springs, but does contain isolated sand units that yield some water. DMW-1, DMW-2, DMW-3 and DMW-7 are screened in four small sand subunits in the Glacial Till. These sand units are not aquifers because they are small isolated zones in the low permeable Glacial Till which are not capable of yielding a sufficient quantity of water to a well. The subunit screened by DMW-3 is shown in cross section E-E' (Figure B3-3) and is only 5.5 feet thick. The subunit tapped by DMW-7 is shown in cross section F-F' (Figure B3-4) and is only five feet thick.

Some domestic wells located about one mile south of the Dow Corning facility are screened in a sand subunit in the Glacial Till, which is considerably larger than the sand subunits in the Glacial Till beneath the Dow Corning facility.

The major element chemistry of the ground water in sand subunits within the Glacial Till is different from the major element chemistry of the ground water in the Regional Aquifer. DMW-1, DMW-2, DMW-3, and DMW-7 are all screened in unique sand subunits in the Glacial Till. Figure B3-17 is a plot of the measured chloride and sulfate concentrations in samples from the sand subunits at DMW-2, DMW-3, and DMW-7 and samples from the Regional Aquifer at DMW-4 and 4A, DMW-6 and -6A, and DMW-8 (similar to Figure B3-16). The sulfate concentrations measured in samples from the different sand subunits in the Glacial Till are less than 20 mg/L, while the sulfate concentrations measured in the Regional Aquifer range from 36 mg/l to 103 mg/L. DMW-7 also has lower sodium and chloride concentrations (two analyses available) and a higher calcium concentration (one analysis) than the ground water in the Regional Aquifer. The concentrations of calcium, sodium, magnesium, and chloride in the sand subunit at DMW-1 are higher than in the Regional Aquifer. These chemical differences support the geologic interpretation that the sand subunits in the Glacial Till are hydrologically separated from the Regional Aquifer.

Phenols were detected in some of the samples collected from DMW-2 and DMW-3 at or below a concentration of 0.04 mg/L. Phenols are naturally occurring trace organic constituents, and these low levels are attributed to natural causes, not to activities at the Dow Corning facility.

## **Regional Aquifer**

The upper-most aquifer under the regulated units is the **Regional Aquifer**. The regional aquifer extends from the glacial till into the underlying bedrock. This unit is a usable aquifer which is capable of yielding a sufficient quantity of water to a well to act as a supply of water. The DMW-series wells are screened in the Regional Aquifer (with the exception of DMW-1, DMW-2, DMW-3 and DMW-7, which are screened in small sand units within the Glacial Till).

The Regional Aquifer is overlain by the Glacial Till, the Lakebed Clay, and the Surface Sand units (see Section B3.B.1(a)). The two clay units protect the Regional Aquifer from downward migration of contaminants from the land surface. The State of Michigan has no system for classifying aquifers as to their degree of protection from contamination. However, the relative protection from contamination of the ground waters of the state was classified in the *Hydrogeologic Atlas of*

*Michigan* (Western Michigan University, 1981). This classification system appears to meet the objectives of the U.S. Environmental Protection Agency's Priority Ground Water Area Policy. Western Michigan University (1981) classified the usable aquifer, termed the Regional Aquifer in this report, in all of southeast Midland County as being "protected". Protected aquifers must meet at least one of the following criteria:

In the subsurface above the aquifer, there must exist at least:

- a. 15 feet of vertically continuous clay, sandy clay, gravelly clay, etc., or
- b. 30 feet of vertically continuous gravel and clay, sand and clay, etc., or
- c. 15 feet of vertically continuous unfractured impermeable rock such as shale, siltstone, or granite.

From the ground surface, there must exist at least:

- a. 20 feet of vertically continuous clay, sandy clay, gravelly clay, etc., or
- b. 40 feet of vertically continuous gravel and clay, and clay, etc., or
- c. 20 feet of vertically continuous unfractured impermeable rock such as shale, siltstone, or granite.

Investigations of the hydrogeology of the Regional Aquifer beneath Dow Corning's regulated unit confirm Western Michigan University's (1981) classification of the deeper Regional Aquifer as protected by the above definition.

### ***Ground Water Quality in the Regional Aquifer***

The ground water quality in the Regional Aquifer has been monitored at the Dow Corning facility since 1982. The parameters which were monitored include major cations and anions such as sodium and chloride; some trace metals such as arsenic and barium; indicator parameters such as pH, specific conductivity, and total organic carbon (TOC); and select trace organic compounds such as benzene and toluene. The results from Dow Corning's monitoring are included in Appendix B3-6, and the major element chemistry is summarized in Table B3-3. The Dow Corning data in Table B3-3 represents an average of three analyses performed on each parameter (four for pH). Additional data on the ground water quality in the Regional Aquifer has been collected from monitoring wells on Dow Chemical's facility located west and south of the Dow Corning facility, from monitoring wells at the Midland Cogeneration Venture located southwest of Dow Corning's facility, and from some of the domestic wells southeast of the Dow Corning facility.

The salinity of the ground water in the Regional Aquifer increases in the downgradient direction of flow and with increasing depth in the South Midland Area. The increase in salinity is reflected by increases in sodium and chloride concentrations and smaller increases in calcium and bicarbonate concentrations in the ground water (see Table B3-3). Two series of stiff diagrams have been prepared for samples of the ground water in the Regional Aquifer to illustrate the vertical and horizontal changes in the major element chemistry of the ground water.

Stiff diagrams are a pictorial method for comparing the major element chemistry of different water samples. Each stiff diagram is a plot of the milliequivalents of charge per liter of sample (meq/l) which is caused by the concentrations of dissolved cations and anions in the water. The cations



plotted on the Stiff diagrams are sodium plus potassium, calcium, magnesium, and iron; the anions are chloride, bicarbonate ( $\text{HCO}_3^-$ ), sulfate, and carbonate ( $\text{CO}_3^-$ ). The total meq/l of the cations should approximately equal the total meq/l of the anions, and any differences are attributed to the presence of minor ions not included in the diagram and/or analytical errors. Stiff diagrams are helpful in comparing ground water samples because the shapes of the diagrams allow for a visual comparison of water chemistry. The similarities and differences in shape can be related to the similarities and differences in the concentrations of major cations and anions.

Stiff diagrams for ground water samples from the Regional Aquifer are arranged from upgradient sites to downgradient sites in Figure B3-14. The stiff diagrams presented in Figure B3-14 illustrate the increases in sodium and chloride concentrations in the downgradient direction of ground water flow.

The stiff diagrams presented in Figure B3-15 illustrate the increases in sodium and chloride concentrations with depth in the Regional Aquifer. The ground water was sampled at multiple depths during the installation of the Dow Building 1803 (22-4) monitoring well. The stiff diagrams on Figure B3-15 show this strong increase with depth. OW-1 (26-17) is screened in the Regional Aquifer at a depth of 365 feet. The analytical results of a groundwater sample collected from this well fit the trend indicated in Figure B3-15. Further documentation of this trend is provided by ground water samples collected at depth from the Bedrock Valley test well (26-15). The total dissolved solids (TDS) values for these samples were: 1,000 mg/L at 200 feet; 2,700 mg/L at 270 feet; 3,000 mg/L at 270-336 feet; and 4,800 mg/L at 336 feet.

The bedrock is the source of the salinity in the Regional Aquifer. Increases in salinity with depth in the Regional Aquifer may be due to the natural flow of more saline ground water from the bedrock into the Regional Aquifer and/or the leakage of deeper bedrock brines through abandoned coal or oil and gas borings or brine wells. Long, D.T., D.H. ReZabek, M. J. Takacs and T.P. Wilson. (1986, *Geochemistry of Groundwaters, Bay County, Michigan, Michigan Department of Public Health*) evaluated the input to the Regional Aquifer under Bay County which is located west of the Dow Corning facility. They examined the chemistry of the ground water at over 350 wells and concluded that there was a natural upward diffusion of saline ground water from the bedrock into the Regional Aquifer. They also concluded that dewatering operations from old coal mines have left lasting cones of depression and caused locally anomalous ground water chemistry in the Regional Aquifer.

The ground water quality in the Regional Aquifer under the Dow Corning facility does not vary as much as the ground water quality under the south Midland industrialized area or under Bay County. Yet the ground water beneath the facility's relatively small area does show measurable differences in major element chemistry between on-site well locations. Measured chloride and sulfate concentrations in the samples from Dow Corning's deep monitoring wells (DMWs), which are screened in the Regional Aquifer, are graphed in Figure B3-16. This graph illustrates the similarities and the differences found in the major element chemistry of the Regional Aquifer on a local scale. Measured sulfate concentrations range from 36 mg/L to 103 mg/L and measured chloride concentrations range from 128 mg/L to 620 mg/L. The sulfate measurements are not significantly different between these wells, especially between DMW-4 and -4A and DMW-6 or -6A where there is the most information. However, the chloride concentrations are notably different, with samples from DMW-6 and -6A typically just less than 200 mg/l and samples from DMW-4 or 4A typically near 400 mg/L. Though DMW-4 and 4A and DMW-6 or 6A show measurable chemical differences, the pump test data shows that the Regional Aquifer is directly

connected between these two pairs of wells. These chemical differences may be related to the slow flow rate of ground water flow in the Regional Aquifer (section B3.B.1(b)).

Figure B3-16 also shows a similarity in major element chemistry between deep monitoring wells screened in the Regional Aquifer and located both upgradient and downgradient from the regulated units. For example, DMW-9 is located upgradient from the regulated units, and groundwater quality at DMW-9 is very similar to groundwater quality at wells DMW-4A, DMW-10, and DMW-12 located downgradient of the regulated units.

Phenols were sporadically detected in samples from DMW-4, DMW-4A, DMW-6, and DMW-6A. Phenols are a class of naturally occurring organic compounds which are also used in the manufacturing and degradation of many organic chemicals. All of the detected phenol concentrations were below 0.03 mg/L. At these low levels, the sporadic occurrence of phenols in ground water samples collected from the Regional Aquifer may be due to natural organic matter and is not a concern to the ground water quality.

### **B3.B2(b) Groundwater Flow Direction**

Groundwater in the shallow sand unit is collected by the SIS. This water is then treated at Dow Chemical Company's wastewater treatment plant.

Groundwater in the Regional Aquifer generally flows to the north-northwest and west-southwest. Groundwater in the Surface Sand generally flows to the south-southwest. Figures B3-10 and B3-11 show the direction of groundwater flow for the Regional Aquifer and Surface Sand respectively in October, 2010.

### **B3.B2(c) Aquifers Used by Public and Private Wells**

Most of the water used in this area comes from the City of Midland Municipal Water Supply, which draws its water from Lake Huron. The Regional Aquifer and some of the larger sand subunits in the Glacial Till are used as a source of water in the area south of the City of Midland. As discussed in Section B3.B.1(b), the shallow saturated zone in the Surface Sand is not capable of yielding a sufficient quantity of water to act as a source of water.

There is no municipal use of ground water near the Dow Corning facility. The City of Midland obtains its water from Lake Huron and supplies water to homes and businesses to the north and west of the Dow Corning facility. In addition, the Dow Corning facility and the adjacent Dow Chemical facility receive water from the City of Midland. The nearest municipal use of ground water is in the town of Freeland, about 9 miles southeast of the Dow Corning facility.

Domestic water south of the Dow Corning facility is supplied by individual residential wells. Figure B3-1 shows some residential homes located over 1 mile south-southeast of the regulated unit. Since there is no municipal source of water in this area, all of these homes are presumed to have private wells which extend down into sand subunits in the Glacial Till, into the Regional Aquifer where present, or into sandstone beds within the bedrock. Some domestic wells located about one mile south of the Dow Corning facility are screened in a sand subunit in the Glacial Till which is considerably larger than the sand subunits in the Glacial Till beneath the Dow Corning facility. Figure B3-1 also shows the locations of the available well logs for the deep wells and borings, including some of the residential wells, and these well logs are included in Appendix B3-1. Figure B3-1 includes wells and borings identified in the hydrogeological report for the original license application for this facility updated with well and boring information from DNRE sources (Wellogig

System Current Water Well Records; Historical Scanned Water Well Records and Oil and Gas Well Records).

Some of the wells included on Figure B3-1 are brine wells or companion wells for brine wells. When the brine wells were in operation, adjacent companion wells were screened in the Regional Aquifer to supply fresh water to dilute the brine upon reaching the ground surface, which was typically supersaturated with inorganic minerals such as calcite or gypsum.

**B3.B2(d) Other Aquifers**

Other aquifers are not known to be present and there is no reason to believe they are present.

**B3.B.3 Topographic Map**  
[R 299.9506(1)(e)(i) through (v)]

A topographic map, in accordance with 40 CFR §270.14(b)(19), is included in Template A13. This topographic map is at a scale of one inch equal to no more than 200 feet, showing a distance of 1000 feet around the facility perimeter.

**B3.B.3(a) Waste Management Area**  
[R 299.9506(1)(e)(i)]

The topographic map included in Module A13 (Maps) as Appendices 2P-1 and 2P-3 show the waste management and storage areas at the facility.

**B3.B.3(b) Property Boundaries**  
[R 299.9506(1)(e)(ii)]

The topographic map included in Module A13 (Maps) as Figure A13-1 shows the property boundaries for the facility.

**B3.B.3(c) Point of Compliance**  
[R 299.9506(1)(e)(iii)]

The topographic map included in Module A13 (Maps) as Figure A13-1 shows the point of compliance for the facility. The operational point of compliance based on the monitoring program and actual well locations is defined in Section B5.A.3.

**B3.B.3(d) Groundwater Monitoring Wells**  
[R 299.9506(1)(e)(iv)]

The topographic map included in Module A13 (Maps) as Figure A13-1 shows the locations of groundwater monitoring wells at the facility.

**B3.B.3(e) Aquifer Information**  
[R 299.9506(1)(e)(v)]

The topographic map included in Module A13 (Maps) as Figure A13-1 and Drawing 100021134-Y1 included in Appendix C3-4 provides aquifer information at the facility.

**B3.B.3(f)      Extent of Contaminant Plume**  
[R 299.9506(1)(g)(i)]

There is no on-site contamination attributed to the regulated units. Shallow groundwater has been impacted by historical releases. The locations of the impacts do form a distinct contaminant plume. Table B3-4 presents the maximum and most recent concentrations of chemicals detected in the shallow monitoring wells and associated manholes.

**B 3.B.4          Wells and Borings Within One Mile**  
[R 299.9506(1)(f)]

The topographic map included in Module B3 (Hydrogeologic Report) as Figure B3-1 includes the following information.

1. Locations for all domestic, municipal, oil and gas, industrial, and agricultural wells within one mile of the facility, for which logs are available, and
2. Locations of soil borings within one mile of the facility, for which logs are available.

Figure B3-1 includes wells and borings identified in the hydrogeological report for the original license application for this facility updated with well and boring information from DNRE sources (Wellologic System Current Water Well Records; Historical Scanned Water Well Records and Oil and Gas Well Records).

**B3.B.5          Contaminant Plume Description**  
[R 299.9506(1)(g)]

This section is not applicable for the facility, since there is no on-site contamination attributed to the regulated units.

**B3.C   ENGINEERING REPORT FOR PROPOSED GROUNDWATER MONITORING PROGRAM**  
[R 299.9506(2) and (7)]

The engineering information included in the hydrogeologic report supports the proposed groundwater monitoring programs or waiver requests included in this application as Template B5, Environmental Monitoring Programs, and Template B2, Corrective Action.

**B3.D   GROUNDWATER MONITORING PROGRAM**  
[R 299.9506(3) through (5), R 299.9611(2)(b) and (3), R 299.9612, R 299.9629, and 40 CFR, Part 264, Subpart F, except 40 CFR §§264.94(a)(2) and (3), 264.94(b) and (c), 264.100, and 264.101}

The summary of preapplication monitoring information and information included in the engineering report establish the basis for determining the appropriate groundwater monitoring program for each unit at the Dow Silicones facility. The proposed detection monitoring and compliance monitoring programs for applicable units are included in Template B5, Environmental Monitoring Programs. The proposed corrective action groundwater monitoring program for applicable units is included in Template B5, Environmental Monitoring Programs, and Template B2, Corrective Action.

### **B3.E ADDITIONAL INFORMATION REQUIREMENTS**

[R 299.9506(6)]

- ☒ The 800 Block unit is not a landfill, surface impoundment, waste pile, or land treatment unit. The requirements of R 299.9506(6) do not apply.
- ☒ The 1000 Block unit is a landfill, surface impoundment, waste pile, or land treatment unit. Additional information has been included to address requirements necessary to determine site suitability and facility design.

See Section B3.B.1(a) for information on soil borings, bedrock, geotechnical characteristics and geologic cross sections. See Section B3.B.1(b) for water calculations.

#### **B3.E.1 Water Budget Calculations**

[R 299.9506(6)(f)]

A water budget has not been prepared for the Facility at this time.

### **B3.F REFERENCES**

- Hutchinson, D.E. 1979. Soil Survey of Midland County, Michigan. United States Department of Agriculture, Soil Conservation Service.
- Long, D.T., D.H. ReZabek, M. J. Takacs and T.P. Wilson. 1986. Geochemistry of Groundwaters, Bay County, Michigan. Michigan Department of Public Health. ORD 38553.
- Mathews, R.D. 1963. A Geologic Report on Pre-Pleistocene Geomorphology and Potential Groundwater Resources and Midland, Michigan. Unpublished.
- MDEQ. Wellogig System (Current Water Well Records). [http://www.michigan.gov/deq/0,1607,7-135-3313\\_3675\\_3694-16124--,00.html](http://www.michigan.gov/deq/0,1607,7-135-3313_3675_3694-16124--,00.html) –
- MDEQ. Historical Scanned Water Well Records. <http://www.deq.state.mi.us/well%2Dlogs/> -
- MDEQ. Oil and Gas Well Records. [http://www.michigan.gov/deq/0,1607,7-135-3311\\_4111\\_4231-14421--,00.html](http://www.michigan.gov/deq/0,1607,7-135-3311_4111_4231-14421--,00.html) –
- Western Michigan University. 1981. Hydrologic Atlas of Michigan. Department of Geology, Kalamazoo, Michigan.

Table B3-1

## Peizometric Data for the Shallow Saturated Zone (1983-1984)

<u>WELLS</u>	<u>11/7/83</u>	<u>4/11/84</u>	<u>1/25/84</u>	<u>7/27/83</u>	<u>10/17/83</u>	<u>8/15/83</u>	<u>5/25/83</u>	<u>1/25/84</u>
3S-1	609.86							608.32
3S-2								
SMW6-1		625.01			625.07	623.89	624.75	
SMW6-2		623.54			623.05	622.15	624.57	
SMW7-1		621.13			620.88	620.24	623.00	
SMW7-2		624.52			622.10	621.60	625.84	
SMW10-1		624.15			622.62	622.18	623.52	
SMW10-2		622.05				618.91	620.89	
SMW28-1		626.53		625.74	626.29	625.66	627.01	
SMW28-2		627.43		625.21	627.31	629.89	629.04	
SMW28-3				627.26				
25N-1	618.34		613.24					
25N-2	613.76		612.74					
25N-3	618.34		616.53					

**Table B3-1b**  
**Piezometric Data for the Shallow Saturated Zone**  
**(1999 through 2010)**  
**Water Elevation in "feet"**

Date	SMW6-1	SMW6-2	SMW7-1	SMW7-2	SMW10-1	SMW10-2	SMW28-1
4/26/1999	625.93	623.58	621.56	625.21	Dry	622.02	626.09
10/20/1999	623.89	621.98	620.03	621.86	Dry	Dry	625.25
4/12/2000	625.9	623.43	620.19	624.06	Dry	621.98	625.89
10/17/2000	623.86	621.68	619.73	621.86	Dry	Dry	624.12
4/18/2001	625.13	623.35	620.63	624.81	Dry	620.96	625.02
10/30/2001	624.82	622.72	619.86	623.06	Dry	622.02	625.3
4/2/2002	625.84	623.63	620.9	624.61	621.18	Dry	625.74
10/1/2002	623.77	621.82	619.83	620.98	Dry	Dry	624.9
4/21/2003	625.93	623.57	620.78	623.65	623.14	623.06	626.11
10/23/2003	623.47	621.44	619.82	621.3	Dry	Dry	624.72
4/26/2004	625.65	623.67	621.58	624.97	621.65	Dry	624.7
10/19/2004	623.34	621.45	619.73	621.19	Dry	Dry	623.68
4/27/2005	625.93	623.86	621.56	625.55	620.75	Dry	625.9
10/12/2005	623.59	621.78	620.01	621.73	Dry	Dry	624.45
5/2/2006	624.81	623.29	621.87	624.97	Dry	Dry	626.87
10/18/2006	624.42	621.94	620.57	622.48	Dry	Dry	626.39
4/23/2007	625.95	624.33	622.34	625.86	Dry	622.34	627.6
10/11/2007	623.68	621.8	619.92	621.35	Dry	Dry	625.86
4/15/2008	625.94	624.63	621.96	626.21	Dry	622.95	627.97
10/16/2008	624.13	622.23	620.13	622.06	Dry	Dry	626.41
4/13/2009	626.14	623.58	621.62	625.72	Dry	Dry	627.32
10/6/2009	624.01	621.81	620.04	621.37	Dry	Dry	625.94
4/7/2010	625.88	623.47	620.68	624.09	Dry	Dry	627.82
10/7/2010	623.51	621.62	619.99	621.25	Dry	Dry	626.41

**Table B3-1c**  
**Piezometric Data for the Shallow Saturated Zone (2013 through 2021)**  
**Dow Silicones Corporation**  
**Midland, Michigan**

<b>Date</b>	<b>SMW-6-1</b>	<b>SMW-6-2</b>	<b>SMW-7-1</b>	<b>SMW-7-2</b>	<b>SMW-28-1</b>
4/23/2013	626.09	624.40	623.23	626.13	626.66
10/23/2013	623.54	621.99	620.48	622.09	624.56
4/9/2014	625.91	623.90	620.44	625.06	626.18
10/8/2014	623.88	620.68	621.10	623.23	625.91
4/20/2015	626.06	621.74	622.00	625.38	626.35
10/19/2015	623.68	621.00	620.72	623.17	625.26
4/12/2016	626.64	624.22	623.26	626.16	626.64
10/4/2016	623.66	622.10	620.96	623.05	625.37
4/18/2017	625.88	622.93	622.62	625.80	626.37
10/10/2017	623.34	620.90	620.26	622.08	624.64
4/11/2018	625.70	622.82	620.87	625.02	625.17
10/9/2018	624.28	622.54	619.77	623.67	625.94
4/23/2019	625.94	624.08	621.13	625.57	626.59
10/16/2019	624.42	622.88	620.24	624.50	626.38
6/8/2020	624.87	622.83	621.86	624.48	626.04
10/12/2020	623.74	621.62	620.33	622.51	625.09
5/10/2021	624.20	621.79	620.27	623.47	625.40
11/15/2021	624.87	622.01	620.47	624.05	625.71

**Notes:**

Groundwater Elevation in feet



Table B3-2

## Peizometric Data for the Regional Aquifer and Till Sand (1982-1988)

Date	DMW 1	DMW 2	DMW 3	DMW 4	DMW 4A	DMW 5	DMW 6	DMW 6A	DMW 7	DMW 8	DMW 9	DMW 10	DMW 11	DMW 12
06/30/82	629.91		614.79	621.95		621.04	622.08							
09/30/82	626.91		614.04	620.20		620.29	620.38							
01/05/83	628.14		614.66	622.25		621.90	622.17							
04/19/83	629.48		615.63	622.89		623.04	623.30							
07/12/83	629.08		614.58	622.88		622.75	622.91							
09/08/83	628.08		613.33	621.55		621.50	621.61							
11/10/83	628.38		613.92	622.08		622.06	622.21							
07/23/84	629.27		614.10		622.98			623.02						
08/07/84	628.98		613.97		622.40			622.44						
10/23/84	-		-		621.57			621.56						
01/28/85	-		-		623.49			623.50						
05/13/85	-		-		624.33			624.40						
07/15/85	-		612.55		623.15			623.11						
08/08/85	628.09		611.06		-			-						
10/10/85	-		-		623.99			623.98						
01/28/86	629.81		607.96		621.10			623.01						
02/26/86	-		-		624.61			624.65						
02/04/86	-	619.1	-		-			-						
02/24/86	630.92	618.69	612.82		-			-						
03/26/86	630.95	619.35	613.12		624.59			624.64						
04/14/86	-	-	-		624.52			624.48						
05/28/86	630.78	620.09	612.64		-			-						
09/29/86	-	-	-		624.78			625.00						
11/05/86	-	-	-		625.07			625.23						
04/7-8/87	-	-	-		624.72			624.72						
6/23-24/87	630.35	619.50	612.34	-	623.88			623.15						
10/21/87	-	-	-	-	-			-			626.00			
10/22/87	-	-	-	-	-			-	624.46	625.10	-			
10/31/87	-	-	-	-	-			-	-	-	-	625.10	625.40	625.08
04/06/88	-	-	-	-	624.77			624.80	-	-	625.89	624.73	624.97	624.76

- = water level not measured.

**Table B3-2b**  
**Piezometric Data for the Regional Aquifer and Till Sand**  
**(1999 through 2010)**  
**Water Elevation in "feet"**

Date	DMW4A	DMW7	DMW7R	DMW8	DMW9	DMW10	DMW11	DMW12
4/26/1999	623.02	623.11	-	622.91	623.58	622.88	623.35	622.95
10/20/1999	621.32	621.96	-	621.34	621.91	621.33	621.52	621.36
4/12/2000	622.97	622.48	-	622.97	623.83	622.98	623.32	622.99
10/17/2000	622.39	622.33	-	622.38	623.16	622.38	622.73	622.4
4/18/2001	624.7	623.26	-	624.7	625.5	624.71	625.1	624.72
10/30/2001	622.58	622.58	-	622.57	623.5	622.56	622.93	622.6
4/2/2002	624.91	623.62	-	624.91	625.5	624.9	625.32	624.93
10/1/2002	622.7	622.38	-	622.73	623.5	622.75	623	622.76
4/21/2003	623.21	621.92	-	623.16	623.68	623.16	623.51	623.19
10/23/2003	622.12	621.69	-	622.15	622.75	622.16	622.44	622.18
4/26/2004	624.74	623.17	-	624.78	625.33	624.79	625.13	624.84
10/19/2004	622.49	621.85	-	622.54	623.04	622.55	622.77	622.57
4/27/2005	625.02	623.47	-	625.07	625.496	625.07	625.42	625.09
10/12/2005	622.85	622.16	-	622.89	623.41	622.89	623.14	622.91
5/2/2006	625.38	624.14	-	625.43	625.43	625.42	625.86	625.43
10/18/2006	623.57	622.84	-	623.63	623.263	623.6	623.93	623.63
4/23/2007	625.77	624.33	-	625.74	620.6	625.73	626.79	625.74
10/11/2007	622.7	622.57	-	622.77	-	622.75	623.01	622.76
4/15/2008	625.21	623.79	-	625.28	625.01	-	625.64	625.27
10/16/2008	623.82	622.24	-	623.88	623.85	626.14	624.18	623.87
4/13/2009	625.66	623.28	-	625.66	626.17	625.63	625.95	625.64
10/6/2009	623.55	-	-	623.65	623.42	623.58	623.84	623.62
4/7/2010	624.94	-	-	625.03	624	625.63	625.37	625.02
10/7/2010	623.46	-	-	623.52	622.67	623.45	623.69	623.49

**Notes:**

- 1) DMW7 was abandoned in summer of 2009 and was replaced by DMW7R. Water elevation not measured due to unavailability of TOC for DMW7R.
- 2) DMW9 is a flowing well.
- 3) DMW10 is now a flush mount well installed in June 2008. Water elevations reflect updated TOC measured after being flush mount.

**Table B3-2c**  
**Piezometric Data for the Regional Aquifer and Till Sand (2013 through 2021)**  
**Dow Silicones Corporation**  
**Midland, Michigan**

Date	DMW4A	DMW6A	DMW9	DMW10	DMW11	DMW12
4/23/2013	625.90	--	**	625.68	626.10	625.76
10/23/2013	623.42	623.29	624.78	621.76	623.67	623.43
4/9/2014	625.32	625.24	**	623.37	625.77	624.41
10/8/2014	623.47	623.54	625.53	623.57	623.81	623.58
4/20/2015	625.65	625.56	625.65	625.62	626.08	625.64
10/19/2015	624.50	624.54	625.65	624.60	624.96	624.61
4/12/2016	626.36	626.48	625.57	626.44	625.73	626.49
10/4/2016	623.63	623.50	625.23	623.57	623.79	623.54
4/18/2017	626.22	626.25	625.65	626.28	626.96	626.24
10/10/2017	624.28	624.98	625.65	624.42	624.74	624.55
4/11/2018	626.14	626.88	628.03	626.21	626.44	626.19
10/16/2018	625.54	624.94	629.00	624.99	625.35	625.04
4/24/2019	626.13	626.11	628.89	626.12	626.45	626.12
10/14/2019	624.65	624.53	622.66	624.78	625.11	624.76
6/22/2020	626.49	626.40	628.43	626.45	626.79	626.57
10/14/2020	624.11	624.04	627.76	624.10	624.45	627.45
11/16/2021	626.26	626.34	626.80	626.55	626.60	626.35

**Notes:**

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Not available

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DMW-9 is an artesian well, so the pressure head is measured at the gauge and added to the top of casing to calculate the groundwater elevation. There is a new apparatus installed, which needs to be surveyed.

Groundwater Elevation in feet

**Table B3-3**  
**Major Element Chemistry**

(All units are mg/l except pH which is standard units.)

Well Number	Date		Sodium		Sulfate		Carbonate		Iron		pH	
			Regional	Calcium	Magnesium	Bicarbonate	Chloride	Potassium				
DMW-1	26-6	01-Jul-82	511	508	104	7	200	NM	1760	0.97	NM	7.4
DMW-1	26-6	01-Oct-82	1616	1476	271	9	194	NM	4891	4.3	NM	7.4
DMW-1	26-6	06-Jan-83	766	1026	152	6	200	NM	3436	2.7	NM	7.5
DMW-1	26-6	20-Apr-83	353	530	113	<1.0	230	NM	1767	2	NM	7.1
DMW-1	26-6	09-Sep-83	423	640	123	2	223	NM	1700	1.7	NM	7.5
DMW-1	26-6	10-Nov-83	753	860	187	2	160	NM	1600	2	NM	7.4
DMW-1	26-6	11-Nov-83	753	860	187	2	160	NM	1600	2	NM	7.4
DMW-1	26-6	07-Sep-84	320	467	83	5	187	NM	6233	1.6	NM	7.5
DMW-1	26-6	08-Aug-85	450	490	100	2	220	NM	2420	1.7	NM	7.6
DMW-1	26-6	28-May-86	NM	600	NM	5.167	220	NM	3367	1.54	NM	NM
DMW-1	26-6	12-Nov-86	590	580	101	5	290	NM	1930	2.3	NM	7.5
DMW-1	26-6	25-Jun-87	NM	NM	NM	NM	NM	NM	NM	NM	NM	7.3
DMW-2	26-7	24-Jul-84	70	98	44	7	220	2.4	170	12	12	8
DMW-2	26-7	04-Nov-85	70	95	31	5	235	NM	223	5	NM	8.2
DMW-2	26-7	17-Dec-85	51	89	NM	3	NM	NM	170	2.2	NM	NM
DMW-2	26-7	05-Feb-86	NM	NM	NM	NM	NM	NM	117	0.03	NM	NM
DMW-2	26-7	25-Feb-86	NM	95	NM	5	NM	NM	150	0.65	NM	NM
DMW-2	26-7	28-May-86	NM	90.67	NM	5	250	NM	15.7	0.18	NM	7.625
DMW-2	26-7	26-Aug-86	NM	100	NM	5	NM	NM	NM	0.76	NM	NM
DMW-2	26-7	17-Nov-86	NM	NM	NM	NM	NM	NM	NM	NM	NM	8
DMW-2	26-7	25-Jun-87	NM	68	NM	14	NM	NM	90	0.44	NM	7.7
DMW-3	26-8	01-Jul-82	44	167	18	7	153	NM	248	0.93	NM	7.4
DMW-3	26-8	01-Oct-82	41	152	18	6	157	NM	244	0.44	NM	7.3
DMW-3	26-8	06-Jan-83	41	154	20	9	150	NM	256	0.9	NM	7.9
DMW-3	26-8	20-Apr-83	39	170	17	<1	170	NM	267	1.1	NM	7.5
DMW-3	26-8	09-Sep-83	37	180	17	2	173	NM	290	0.65	NM	7.9
DMW-3	26-8	10-Nov-83	51	180	27	2	110	NM	263	0.4	NM	7.8
DMW-3	26-8	11-Nov-83	51	180	27	2	110	NM	263	0.4	NM	7.8
DMW-3	26-8	07-Sep-84	127	160	36	5	173	NM	260	0.71	NM	8
DMW-3	26-8	16-Jul-85	41	150	18	3	190	NM	260	0.51	NM	8
DMW-3	26-8	28-May-86	NM	160	NM	5	170	NM	257	0.3	NM	7.9
DMW-3	26-8	13-Nov-86	27	150	16	5	230	NM	240	0.37	NM	8.1
DMW-3	26-8	25-Jun-87	NM	NM	NM	NM	NM	NM	NM	NM	NM	7.7
DMW-4		01-Jul-82	121	193	32	48	142	NM	453	0.86	NM	6.15
DMW-4		01-Oct-82	126	195	36	51	141	NM	500	0.84	NM	7.8
DMW-4		06-Jan-83	91	194	33	44	142	NM	471	1	NM	8.1
DMW-4		20-Apr-83	133	233	41	46	157	NM	620	1.8	NM	7.4
DMW-4		09-Sep-83	140	333	43	46	175	NM	473	1.2	NM	NM
DMW-4		11-Nov-83	163	387	56	51	113	NM	527	2.3	NM	7.1
DMW-4		14-Jul-83	NM	NM	NM	54	159	NM	510	NM	NM	8
DMW-4		04-Aug-83	127	190	37.8	NM	NM	NM	NM	NM	3.4	NM
DMW-4A	26-9	07-Aug-84	42	160	20	86	157	NM	413	0.18	NM	8
DMW-4A	26-9	23-Oct-84	81	230	20	63	148	NM	373	0.38	NM	7.8
DMW-4A	26-9	30-Jan-85	36	110	14	42	130	NM	123	1.9	NM	8.3

**Table B3-3**  
**Major Element Chemistry**

(All units are mg/l except pH which is standard units.)

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Well Number	Date		Sodium		Sulfate		Carbonate		Iron		pH	
			Regional	Calcium	Magnesium	Bicarbonate	Chloride	Potassium				
CP04	27-11	01-Aug-83	113.5	40.2	32.17	116	230	0	65	0.66	1.9	NM
CP05	27-12	01-Aug-83	31.6	72.6	10.6	12.7	170	1.1	64	1.24	1.8	NM
CP07	35-18	01-Aug-83	85.4	241.1	26.46	20.6	156	0	469	3.56	2.9	NM
CP08	35-19	01-Aug-83	64.5	316.6	21.11	59	150	0	576	5.14	4	NM
CP10	35-20	01-Aug-83	33.9	79.8	12.73	23.4	155	5.8	83	1.68	3.8	NM
CP12	34-1	01-Aug-83	55.9	84.4	17.78	31.2	205	1.3	92	0.75	2.5	NM
CP13	34-2	01-Aug-83	10.5	97	11.92	23.5	78	5	120	0.18	13.9	NM
CP15	33-1	01-Aug-83	10.3	21.8	2.73	2	16	4.5	5	0.25	3.8	NM
CP17	33-2	01-Aug-83	55.9	53.7	14.64	20.6	200	1.1	34	0.75	1.8	NM
CP18	33-3	01-Aug-83	20.5	56.9	8.44	16.7	145	2	19	2.46	1.6	NM
CP20	33-4	01-Aug-83	1.2	42.3	20.7	17.2	190	1.2	31	6.6	2.2	NM
Waldo 1071		24-May-82	86	236	17	16	170	NM	606	NM	NM	NM
Waldo 1071		17-Aug-82	52	226	27	31	120	NM	502	NM	NM	NM
Waldo 1071		19-Oct-82	53	224	27	34	245	NM	467	NM	NM	NM
Waldo 1071		08-Nov-82	27	195	46	47	230	NM	473	NM	NM	NM
Waldo 1071		11-Jan-83	63	244	31	52	220	NM	518	NM	NM	NM
Waldo 1071		12-May-83	60	254	NQ(4)	42	220	NM	489	NM	NM	NM
Waldo 1119	36-9	03-Nov-83	1	430	0.4	68	160	1.5	490	0.02	1.6	NM
Waldo 1131	36-5	24-May-82	54	244	32	36	140	NM	498	NM	NM	NM
Waldo 1131	36-5	17-Aug-82	42	187	28	37	145	NM	429	NM	NM	NM
Waldo 1131	36-5	08-Nov-82	23	183	23	47	175	NM	421	NM	NM	NM
Waldo 1131	36-5	11-Jan-83	16	260	13	34	175	NM	496	NM	NM	NM
Waldo 1131	36-5	12-May-83	21	276	NQ(10)	26	180	NM	492	NM	NM	NM
Waldo 1131	36-5	15-Sep-83	8	680	13	66	158	NM	497	NM	NM	NM
Waldo 1131	36-5	18-Nov-83	10	260	15	57	159	NM	472	NM	NM	NM
Waldo 1131	36-5	16-Feb-84	18	280	18	60	150	NM	460	NM	NM	NM
Waldo 1185	36-7	03-Nov-83	0.5	340	0.2	60	95	0.9	360	0.04	1.3	NM
Waldo 1215	36-8	24-May-82	43	120	10	17	175	NM	330	NM	NM	NM
Waldo 1215	36-8	17-Aug-82	42	125	24	25	175	NM	282	NM	NM	NM
Waldo 1215	36-8	08-Nov-82	37	109	25	47	180	NM	274	NM	NM	NM
Waldo 1215	36-8	11-Jan-83	51	138	27	42	210	NM	288	NM	NM	NM
Waldo 1215	36-8	12-May-83	49	140	29	31	220	NM	276	NM	NM	NM
Waldo 1215	36-8	15-Sep-83	34	170	25	57	195	NM	288	NM	NM	NM
Waldo 1215	36-8	03-Nov-83	70	320	26	64	170	1.5	500	0.03	5.7	NM
Waldo 1215	36-8	18-Nov-83	30	110	24	57	192	NM	299	NM	NM	NM
Waldo 1215	36-8	16-Feb-84	46	150	25	54	185	NM	290	NM	NM	NM
Waldo 1777		03-Nov-83	5	210	23	50	190	1.8	310	0.13	2.7	NM
Milner 4535		24-May-82	158	76	46	21	290	NM	223	NM	NM	NM
Milner 4535		17-Aug-82	104	67	44	49	305	NM	218	NM	NM	NM
Milner 4535		08-Nov-82	78	40	38	59	405	NM	135	NM	NM	NM
Milner 4535		11-Jan-83	101	35	37	42	255	NM	110	NM	NM	NM
Milner 4535		12-May-83	97	47	38	42	330	NM	133	NM	NM	NM
Milner 4535		15-Sep-83	46	50	34	62	290	NM	152	NM	NM	NM
Milner 4535		18-Nov-83	34	23	28	39	275	NM	99	NM	NM	NM
Milner 4535		16-Feb-84	110	32	35	79	270	NM	110	NM	NM	NM

**Table B3-3**  
**Major Element Chemistry**

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(All units are mg/l except pH which is standard units.)

Well Number		Date	Sodium		Sulfate	Carbonate		Iron	pH			
			Regional,	Calcium	Magnesium	Bicarbonate	Chloride	Potassium				
SMW28-1		15-Apr-87	330	82	73	32	160	NM	857	4.8	NM	7.4
SMW28-1		24-Jun-87	203	43	44	35	197	NM	577	4.37	NM	7.3
SMW28-1		15-Sep-87	320	86	74	24	157	NM	1173	5.8	NM	7.2
SMW28-2		25-May-83	540	14	82	27	610	NM	385	12	NM	7.5
SMW28-2		16-Aug-83	390	20	94	18	553	NM	440	5.9	NM	7.2
SMW28-2		17-Oct-83	395	35	101	27	520	NM	290	24	NM	7.6
SMW28-2		30-Jan-84	305	26	81	23	515	NM	410	8.1	NM	NM
SMW28-2		11-Apr-84	150	15	59	440	690	NM	275	11	NM	7.5
SMW28-2		24-Jul-84	210	20	82	22	5600	NM	440	4.8	NM	7.2
SMW28-2		20-Oct-84	190	16	56	33	457	NM	218	10	NM	7.7
SMW28-2		24-Jan-85	280	15	74	26	770	NM	293	10	NM	NM
SMW28-2		21-May-85	190	18	60	36	540	NM	260	20	NM	7.4
SMW28-2		25-Jul-85	280	26	210	NM	NM	NM	NM	31	NM	NM
SMW28-2		17-Oct-85	197	10	57	44	507	NM	203	11	NM	7.5
SMW28-2		18-Mar-86	173.3	16.3	69	31.7	480	NM	230	8.6	NM	7.4
SMW28-2		11-Jun-86	200	17	60	42	1134	NM	350	6.5	NM	7.03
SMW28-2		14-Aug-86	433	47	133	41	956	NM	320	16	NM	7.35
SMW28-2		12-Nov-86	340	39	73	21	667	NM	170	16.7	NM	7.3
SMW28-2		15-Apr-87	230	18	55	26	477	NM	183	12	NM	7.2
SMW28-2		24-Jun-87	233	18	61	31	517	NM	193	8.7	NM	7.1
SMW28-2		15-Sep-87	200	18	53	22	513	NM	150	7.6	NM	7.3
SMW28-3		27-Jun-83	NM	NM	NM	39	132	NM	370	NM	NM	7
SMW28-3		04-Aug-83	172	7	11.7	NM	NM	NM	NM	NM	8.2	NM
SMW28-3		27-Jun-83	210	11	15	35	160	NM	510	<0.02	NM	NM
1207		04-May-84	38	310	29	56	55	1.8	480	0.03	3.6	NM
1207		09-May-84	38	310	29	56	55	1.8	480	0.03	39	NM
2708	35-14	01-Nov-83	70	260	22	65	200	1.9	380	0.43	3.4	NM
3009	35-5	27-Oct-83	120	300	41	110	190	1.8	430	10	9.1	NM
3010	35-2	04-May-84	37	360	30	70	47	3.6	570	0.02	5	NM
3010	35-2	09-May-84	37	360	30	70	47	3.6	580	0.02	5	NM
3011	35-6	01-Nov-83	90	200	22	78	190	1.8	280	6	4.9	NM
3013	35-8	01-Nov-83	60	340	16	100	220	2.1	420	5.1	5	NM
3065	27-22	02-Dec-83	68	110	17	60	230	2.2	NM	0.96	2.8	NM
3065	27-22	04-May-84	60	160	20	50	220	1.2	250	0.04	2	NM
3065	27-22	09-May-84	60	160	20	50	220	1.2	250	0.04	2	NM
3137	22-3	16-Mar-84	39	160	18	50	170	1	280	0.2	2.6	NM
3138	26-16	01-Apr-84	58	290	19	78	210	1.2	480	0.03	61	NM
Dow Chem.	35-3	31-Mar-83	52	208	31	45	NM	NM	439	5	3.4	NM
Dow Chem.	35-4	31-Mar-83	26	202	20	22	NM	NM	421	ND(.04)	4.2	NM
a209'	22-4	1981	50	155	15	36	162	NM	270	0.51	NM	NM
a257'	22-4	1981	85	220	32	79	215	NM	336	2	NM	NM
a320'	22-4	1981	220	1290	70	186	131	NM	2260	10	NM	NM
CP02	27-9	01-Aug-83	80.1	25.9	29.69	20.4	280	0	16	1.85	2.4	NM
CP03	27-10	01-Aug-83	24.1	89.8	9.39	23.5	160	1.1	70	1.15	1.6	NM

**Table B3-3**  
**Major Element Chemistry**

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(All units are mg/l except pH which is standard units.)

Well Number	Date	Sodium	Sulfate	Carbonate		Iron		pH			
		Regional	Calcium	Magnesium	Bicarbonate	Chloride	Potassium				
SMW10-1	24-Jul-84	NM	NM	NM	NM	NM	NM	NM	NM		
SMW10-1	19-Oct-84	NM	NM	NM	NM	NM	NM	NM	NM		
SMW10-1	24-Jan-85	NM	NM	NM	NM	NM	NM	NM	NM		
SMW10-1	23-May-85	NM	NM	NM	NM	NM	NM	NM	NM		
SMW10-1	25-Jul-85	NM	NM	NM	NM	NM	NM	NM	NM		
SMW10-1	15-Oct-85	NM	NM	NM	NM	NM	NM	NM	NM		
SMW10-1	13-Mar-86	NM	NM	NM	NM	NM	NM	NM	NM		
SMW10-1	11-Jun-86	NM	NM	NM	NM	NM	NM	NM	NM		
SMW10-1	12-Aug-86	NM	NM	NM	NM	NM	NM	NM	NM		
SMW10-1	12-Nov-86	NM	NM	NM	NM	NM	NM	NM	NM		
SMW10-1	23-Apr-87	NM	NM	NM	NM	NM	NM	NM	NM		
SMW10-1	24-Jun-87	NM	NM	NM	NM	NM	NM	NM	NM		
SMW10-1	02-Sep-87	NM	NM	NM	NM	NM	NM	NM	NM		
SMW10-2	25-May-83	1150	28	315	NM	NM	NM	65	NM	6.7	
SMW10-2	16-Aug-83	NM	NM	NM	NM	NM	NM	NM	NM	NM	
SMW10-2	17-Oct-83	NM	NM	NM	NM	NM	NM	NM	NM	NM	
SMW10-2	30-Jan-84	NM	NM	NM	NM	NM	NM	NM	NM	NM	
SMW10-2	11-Apr-84	1100	91	420	NM	NM	NM	4.4	NM	NM	
SMW10-2	24-Jul-84	NM	NM	NM	NM	NM	NM	NM	NM	NM	
SMW10-2	19-Oct-84	NM	NM	NM	NM	NM	NM	NM	NM	NM	
SMW10-2	24-Jan-85	NM	NM	NM	NM	NM	NM	NM	NM	NM	
SMW10-2	23-May-85	NM	NM	NM	NM	NM	NM	NM	NM	NM	
SMW10-2	25-Jul-85	NM	NM	NM	NM	NM	NM	NM	NM	NM	
SMW10-2	15-Oct-85	NM	NM	NM	NM	NM	NM	NM	NM	NM	
SMW10-2	13-Mar-86	635	25	130	NM	NM	NM	3.3	NM	NM	
SMW10-2	11-Jun-86	NM	NM	NM	NM	NM	NM	NM	NM	NM	
SMW10-2	13-Aug-86	NM	NM	NM	NM	NM	NM	NM	NM	NM	
SMW10-2	12-Nov-86	NM	NM	NM	NM	NM	NM	NM	NM	NM	
SMW10-2	23-Apr-87	NM	NM	NM	NM	NM	NM	NM	NM	NM	
SMW10-2	24-Jun-87	NM	NM	NM	NM	NM	NM	NM	NM	NM	
SMW10-2	02-Sep-87	NM	NM	NM	NM	NM	NM	NM	NM	NM	
SMW28-1	25-May-83	785	104	115	59	240	NM	1460	11	NM	7.6
SMW28-1	16-Aug-83	600	130	160	80	225	NM	1400	8.2	NM	7.2
SMW28-1	17-Oct-83	640	135	140	104	200	NM	1100	16	NM	7.6
SMW28-1	30-Jan-84	640	135	150	65	97	NM	1600	13	NM	NM
SMW28-1	11-Apr-84	595	116	145	925	130	NM	2000	12	NM	7.7
SMW28-1	24-Jul-84	370	123	140	170	490	NM	3000	8.5	NM	NM
SMW28-1	20-Oct-84	530	137	147	56	193	NM	1430	12	NM	NM
SMW28-1	24-Jan-85	450	110	130	49	220	NM	1800	9.4	NM	NM
SMW28-1	21-May-85	265	74	70	41	180	NM	1650	9.9	NM	7.6
SMW28-1	16-Jul-85	470	120	140	NM	NM	NM	NM	16	NM	NM
SMW28-1	14-Aug-85	480	113	121	46	148	NM	1167	7	NM	7.6
SMW28-1	17-Oct-85	327	70	84	81	174	NM	1367	8	NM	7.1
SMW28-1	18-Mar-86	293	84	96	64	273	NM	1200	8.9	NM	7.4
SMW28-1	11-Jun-86	307	73	73	45	186	NM	1767	3.2	NM	7
SMW28-1	12-Nov-86	583	106	130	40	270	NM	770	11	NM	7.1

**Table B3-3**  
**Major Element Chemistry**

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(All units are mg/l except pH which is standard units.)

Well Number	Date	Sodium		Sulfate		Carbonate		Iron	pH		
	Regional	Calcium	Magnesium	Bicarbonate	Chloride	Potassium					
SMW6-2	12-Nov-86	730	81	207	16	303	NM	1467	17	NM	7.2
SMW6-2	23-Apr-87	353	46	76	30	237	NM	1387	10.1	NM	7.2
SMW6-2	24-Jun-87	490	62	130	18	310	NM	1637	7.5	NM	7
SMW6-2	02-Sep-87	543	61	127	122	229	NM	2177	4.2	NM	7.1
SMW7-1	25-May-83	585	105	130	255	690	NM	975	7	NM	8.1
SMW7-1	16-Aug-83	400	130	170	289	324	NM	1065	5.3	NM	7.6
SMW7-1	17-Oct-83	450	150	155	245	350	NM	1200	6.3	NM	7.8
SMW7-1	30-Jan-84	485	100	165	148	190	NM	1150	3.7	NM	7.4
SMW7-1	11-Jun-84	410	75	137	41.9	661	NM	1057	17.7	NM	8
SMW7-1	24-Jul-84	243	100	133	200	510	NM	1400	5.7	NM	7.4
SMW7-1	20-Oct-84	470	107	183	160	295	NM	1100	9.5	NM	NM
SMW7-1	24-Jan-85	390	95	170	97	640	NM	1230	8	NM	NM
SMW7-1	21-May-85	270	100	120	92	290	NM	1210	11	NM	7.8
SMW7-1	25-Jul-85	380	88	150	100	340	NM	1000	12	NM	NM
SMW7-1	15-Oct-85	330	75	130	86	370	NM	830	13	NM	7.4
SMW7-1	13-Mar-86	383	97	143	79	1625	NM	1150	4.6	NM	NM
SMW7-1	01-Apr-86	345	54	165	425	550	NM	975	7.7	NM	NM
SMW7-1	13-Aug-86	370	82	137	53	347	NM	913	7.9	NM	7.3
SMW7-1	12-Nov-86	670	87	210	49	473	NM	1066	20	NM	7.1
SMW7-1	23-Apr-87	286	67	95	49	293	NM	1017	6.7	NM	7.3
SMW7-1	24-Jun-87	260	64	94	30	313	NM	1073	6.9	NM	7.4
SMW7-1	02-Sep-87	360	74	105	140	304	NM	269	6.3	NM	7
SMW7-2	25-May-83	285	36	55	155	365	NM	130	8	NM	8.2
SMW7-2	17-Oct-83	200	50	61	195	155	NM	115	2.8	NM	8.2
SMW7-2	30-Jan-84	135	33	49	248	110	NM	115	1.5	NM	8
SMW7-2	11-Apr-84	89	23	44	700	130	NM	105	1.7	NM	8.1
SMW7-2	24-Jul-84	86	28	46	190	1070	NM	100	1.02	NM	NM
SMW7-2	20-Oct-84	153	33	58	257	167	NM	110	4.3	NM	NM
SMW7-2	24-Jan-85	94	17	42	170	710	NM	88	2.9	NM	NM
SMW7-2	21-May-85	77	14	24	140	785	NM	73	2.1	NM	8.2
SMW7-2	25-Jul-85	150	26	54	230	150	NM	100	12	NM	NM
SMW7-2	25-Oct-85	160	23	54	220	310	NM	96	15	NM	8
SMW7-2	13-Mar-86	190	26.7	59	183	153	NM	117	3.3	NM	NM
SMW7-2	11-Jun-86	113	27.7	41	139	233	NM	99	0.96	NM	7.75
SMW7-2	13-Aug-86	113	29	40	550	287	NM	92	0.92	NM	8.3
SMW7-2	12-Nov-86	163	24	41	66	203	NM	74	2.17	NM	8.2
SMW7-2	23-Apr-87	110	26	31	157	127	NM	75	0.67	NM	8.1
SMW7-2	24-Jun-87	107	27	36	173	153	NM	83	0.1	NM	8.1
SMW7-2	16-Aug-87	110	44	46	221	741	NM	165	2	NM	NM
SMW7-2	02-Sep-87	133	28	37	267	129	NM	79	0.58	NM	7.9
SMW10-1	25-May-83	1750	82	220	100	880	NM	1400	49	NM	7.2
SMW10-1	16-Aug-83	2950	120	755	NM	NM	NM	NM	395	NM	NM
SMW10-1	17-Oct-83	3300	99	700	NM	NM	NM	NM	32	NM	NM
SMW10-1	30-Jan-84	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
SMW10-1	11-Apr-84	4400	330	3200	NM	NM	NM	NM	51	NM	NM



**Table B3-3**  
**Major Element Chemistry**

page 6/7

(All units are mg/l except pH which is standard units.)

Well Number		Date	Sodium		Sulfate		Carbonate		Iron		pH	
Regional			Calcium		Magnesium		Bicarbonate	Chloride		Potassium		
DMW-8		23-Jun-87	NM	243	NM	87	NM	NM	253	9.3	NM	7.5
DMW-9		07-Apr-87	30	197	12	42	209	NM	213	0.32	NM	8
DMW-9		23-Jun-87	NM	190	NM	41	NM	NM	240	0.33	NM	7.8
DMW-10		07-Apr-87	25	150	47	81	36	NM	210	4.4	NM	11.1
DMW-10		22-Jun-87	NM	143	NM	103	NM	NM	227	27	NM	11
DMW-12		07-Apr-87	53	150	15	67	13	NM	230	0.3	NM	7.9
DMW-12		22-Jun-87	NM	143	NM	47	NM	NM	257	0.02	NM	7.9
OW1	26-17	24-Jul-84	62	1600	43	230	170	1.1	2700	1.2	18	7.8
OW2	26-13	24-Jul-84	33	460	26	200	200	2.6	770	0.6	14	8
OW3	26-12	24-Jul-84	10	480	5.9	16	48	22	840	17	7	8
SMW6-1		25-May-83	1600	180	130	10	58	NM	1850	3.8	NM	8
SMW6-1		16-Aug-83	1100	205	220	8	240	NM	2395	3.3	NM	NM
SMW6-1		17-Oct-83	1500	400	215	9	110	NM	2750	3.8	NM	7.5
SMW6-1		30-Jan-84	1035	195	180	7.9	21	NM	2700	0.34	NM	NM
SMW6-1		11-Apr-84	810	225	240	1200	1500	NM	2450	6.8	NM	7.5
SMW6-1		24-Jul-84	665	275	235	NM	NM	NM	NM	0.145	NM	8.2
SMW6-1		20-Oct-84	1100	213	260	NM	NM	NM	NM	6.1	NM	NM
SMW6-1		24-Jan-85	1090	193	277	7.5	155	NM	3500	4.2	NM	NM
SMW6-1		21-May-85	1110	217	250	8.5	74	NM	2680	61	NM	NM
SMW6-1		16-Jul-85	940	200	270	NM	NM	NM	NM	6.7	NM	NM
SMW6-1		18-Mar-86	1290	230	353	NM	NM	NM	NM	3.2	NM	NM
SMW6-1		14-Aug-86	1030	213	310	10	30	NM	2667	4.4	NM	NM
SMW6-1		12-Nov-86	850	203	313	11	145	NM	2700	5.3	NM	7.9
SMW6-1		23-Apr-87	936	223	267	15	35	NM	2830	1.5	NM	7.6
SMW6-1		11-Jun-87	1433	257	330	15	136	NM	3370	2.11	NM	8.11
SMW6-1		24-Jun-87	913	220	263	12	170	NM	3143	2.5	NM	7.9
SMW6-1		15-Sep-87	973	240	317	13	67	NM	2697	1.6	NM	7.5
SMW6-1		17-Oct-87	970	167	277	14	58	NM	2900	11	NM	NM
SMW6-2		25-May-83	1750	125	175	25	280	NM	1950	86	NM	6.9
SMW6-2		16-Aug-83	550	110	100	78	208	NM	1145	38	NM	6.8
SMW6-2		17-Oct-83	833	145	140	89	245	NM	1750	49	NM	7.6
SMW6-2		30-Jan-84	695	102	190	27	150	NM	1950	31	NM	7.1
SMW6-2		11-Apr-84	895	120	160	140	150	NM	1900	64	NM	7.3
SMW6-2		24-Jul-84	437	100	137	85	267	NM	1533	19	NM	6.9
SMW6-2		20-Oct-84	550	107	113	7.7	233	NM	1170	35	NM	6.7
SMW6-2		24-Jan-85	470	94	110	33	240	NM	1800	36	NM	7.6
SMW6-2		21-May-85	570	125	84	110	269	NM	1290	37	NM	7.6
SMW6-2		17-Oct-85	570	69	160	53	270	NM	1567	32	NM	NM
SMW6-2		18-Mar-86	850	97	260	NM	NM	NM	NM	12	NM	NM
SMW6-2		11-Jun-86	753	82	183	25	396	NM	1833	3.2	NM	7.15
SMW6-2		25-Jul-86	730	150	220	NM	NM	NM	NM	32	NM	NM
SMW6-2		14-Aug-86	613	71	197	24	261	NM	1567	17	NM	NM

**Table B3-3**  
**Major Element Chemistry**

(All units are mg/l except pH which is standard units.)

Well Number	Date		Sodium		Sulfate		Carbonate		Iron		pH	
	Regional		Calcium		Magnesium		Bicarbonate	Chloride	Potassium			
DMW-4A	26-9	14-May-85	65	210	21	61	180	NM	380	0.45	NM	8.1
DMW-4A	26-9	16-Jul-85	69	220	21	79	180	NM	400	0.46	NM	8.2
DMW-4A	26-9	10-Oct-85	75	130	21	46	160	NM	390	0.47	NM	8.3
DMW-4A	26-9	26-Feb-86	70.5	217	22	66	150	NM	397	0.53	NM	7.9
DMW-4A	26-9	06-Nov-86	74	220	22	54	153	NM	360	0.67	NM	7.6
DMW-4A	26-9	07-Apr-87	62	253	21	59	120	NM	397	0.87	NM	8.1
DMW-4A	26-9	15-Apr-87	78	263	24	57	140	NM	503	1.0	NM	8.1
DMW-4A	26-9	24-Jun-87	61	260	21	67	140	NM	387	0.81	NM	7.8
DMW-4A	26-9	30-Sep-87	56	213	21	59	132	NM	372	0.45	NM	8.2
DMW-5	26-10	01-Jul-82	265	145	75	32	195	NM	740	4.4	NM	7.2
DMW-5	26-10	01-Oct-82	366	141	113	23	202	NM	998	6.4	NM	7.3
DMW-5	26-10	06-Jan-83	341	132	120	27	199	NM	1126	10.5	NM	7.4
DMW-5	26-10	20-Apr-83	347	147	143	20	213	NM	1400	12	NM	6.5
DMW-5	26-10	09-Sep-83	430	187	153	28	233	NM	1133	14	NM	NM
DMW-5	26-10	11-Nov-83	523	163	197	33	137	NM	1133	16	NM	6.8
DMW-5	26-10	14-Jul-83	NM	NM	NM	40	205	NM	1300	NM	NM	7.1
DMW-5	26-10	14-Jul-83	NM	NM	NM	40	205	NM	1300	NM	NM	7.1
DMW-5	26-10	04-Aug-83	320	172	90	NM	NM	NM	NM	NM	3.4	NM
DMW-5	26-10	04-Aug-83	454	175	130	NM	NM	NM	NM	NM	8.7	NM
DMW-5	26-10	27-Jun-83	610	170	230	21	260	NM	1650	17	NM	NM
DMW-6		01-Jul-82	49	136	12	56	133	NM	182	0.76	NM	7.8
DMW-6		01-Oct-82	50	127	15	59	140	NM	170	1.5	NM	7.8
DMW-6		06-Jan-83	47	121	15	55	132	NM	180	2.7	NM	7.9
DMW-6		20-Apr-83	50	143	15	44	150	NM	233	1.9	NM	7.8
DMW-6		09-Sep-83	48	130	16	42	150	NM	187	0.7	NM	NM
DMW-6		11-Nov-83	62	147	24	42	92	NM	193	0.24	NM	7.5
DMW-6		14-Jul-83	NM	NM	NM	50	159	NM	370	NM	NM	8.2
DMW-6		04-Aug-83	46.4	136	14.3	NM	NM	NM	NM	NM	2.5	NM
DMW-6A	26-11	07-Aug-84	26	105	13	74	142	NM	173	0.26	NM	8.1
DMW-6A	26-11	23-Oct-84	49	163	13	47	173	NM	175	0.86	NM	8.1
DMW-6A	26-11	30-Jan-85	52	220	19	60	150	NM	363	0.41	NM	7.8
DMW-6A	26-11	14-May-85	43	120	13	47	160	NM	190	0.60	NM	8.2
DMW-6A	26-11	16-Jul-85	39	120	12	55	170	NM	180	0.47	NM	8.3
DMW-6A	26-11	10-Oct-85	48	90	13	52	150	NM	180	0.48	NM	8.3
DMW-6A	26-11	26-Feb-86	46	117	13.3	51	133.3	NM	190	0.35	NM	7.9
DMW-6A	26-11	15-Apr-86	47	147	15	44	140	NM	190	0.18	NM	8.1
DMW-6A	26-11	30-Sep-86	43	110	12	49	132	NM	168	0.35	NM	8.1
DMW-6A	26-11	06-Nov-86	48	120	12	36	164	NM	170	0.23	NM	7.6
DMW-6A	26-11	08-Apr-87	40	127	12	48	137	NM	227	0.26	NM	8
DMW-6A	26-11	24-Jun-87	44	130	13	51	133	NM	217	0.21	NM	7.9
DMW-7		07-Apr-87	820	80	35	19	151	NM	64	2.7	NM	8.4
DMW-7		22-Jun-87	NM	86	NM	14	NM	NM	72	0.15	NM	8.2
DMW-8		07-Apr-87	62	230	25	75	201	NM	243	6.7	NM	7.8

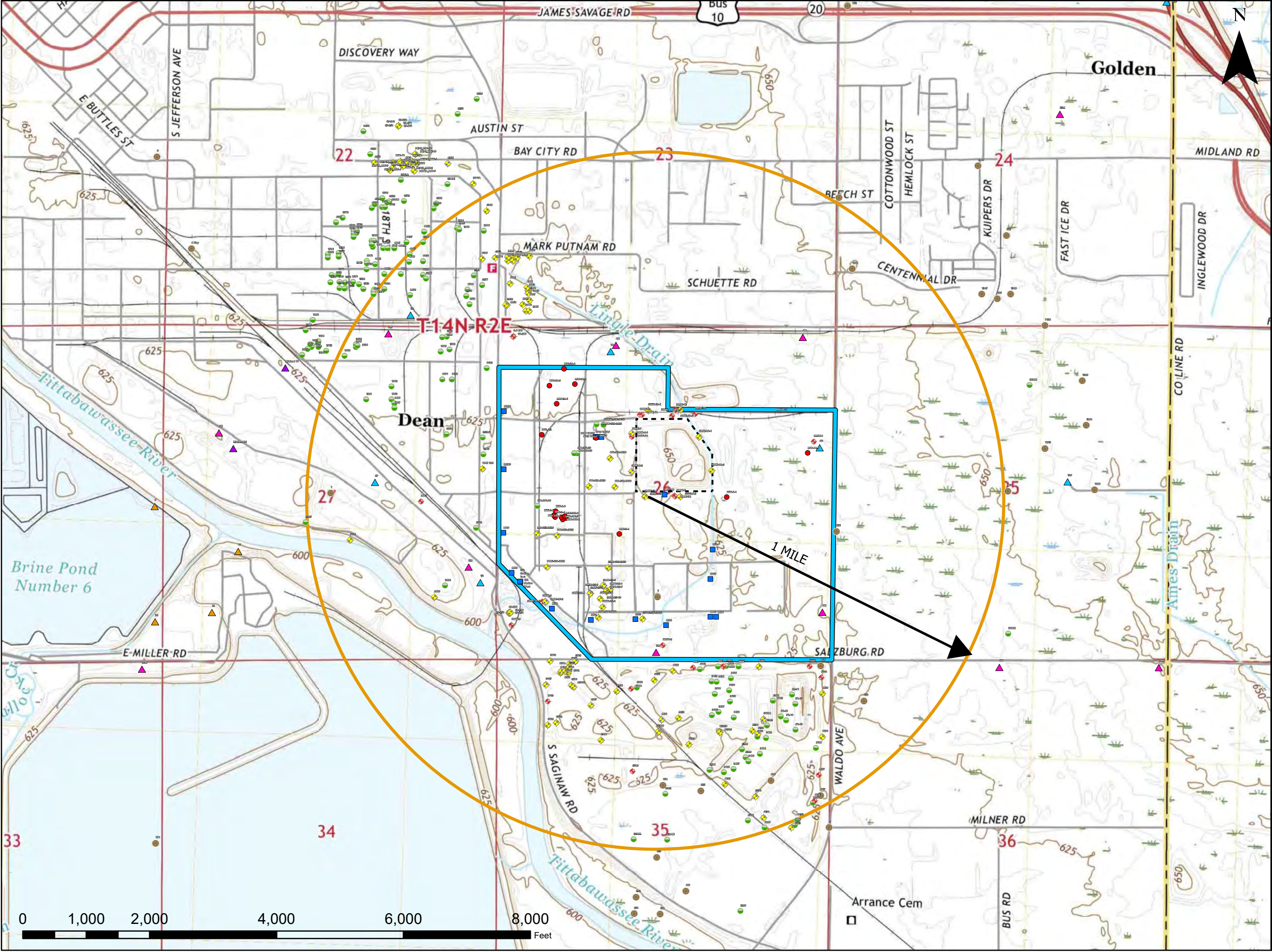
**Table B3-4**  
**Summary of Historic Maximum and Current Analytical Results for Shallow Monitoring Wells**  
**Dow Silicones Corporation**  
**Midland Michigan**

Sampling Location	Analyte units	Lead, dissolved ug/L	Phenol, total ug/L	Benzene ug/L	Ethylbenzene ug/L	Toluene ug/L	Chlorobenzene ug/L
SMW6-1	Current (11/16/2021)	<1.0	<20	<1.0	<1.0	<1.0	<1.0
	Maximum (1983-2021)	170	480	450	7.1	5	84
SMW6-2	Current (11/16/2021)	<1.0	<20	4.9	<1.0	<1.0	260
	Maximum (1983-2021)	60	1,000	4,600	90	50	7,900
SMW7-1	Current (11/16/2021)	<1.0	<20	<1.0	<1.0	<1.0	1.1
	Maximum (1983-2021)	110	180	95	5	5	60
SMW7-2	Current (11/16/2021)	<1.0	<20	<1.0	<1.0	<1.0	<1.0
	Maximum (1983-2021)	160	122	5	5	5	6
SMW28-1	Current (11/16/2021)	<1.0	<20	<1.0	<1.0	<1.0	<1.0
	Maximum (1983-2021)	110	260	93	1	1	10
MH28-11	Current (11/15/2021)	<1.0	<20	<1.0	<1.0	<1.0	<1.0
	Maximum (1983-2021)	5.5	40	<1	<1	<1	<1
MH28-12	Current (11/15/2021)	<1.0	<20	<1.0	<1.0	<1.0	<1.0
	Maximum (1983-2021)	5	<50	<1	<1	<1	<1
MH10-15	Current (11/15/2021)	<1.0	<20	<1.0	<1.0	<1.0	<1.0
	Maximum (1983-2021)	4.7	<50	1.5	<1	<1	<1

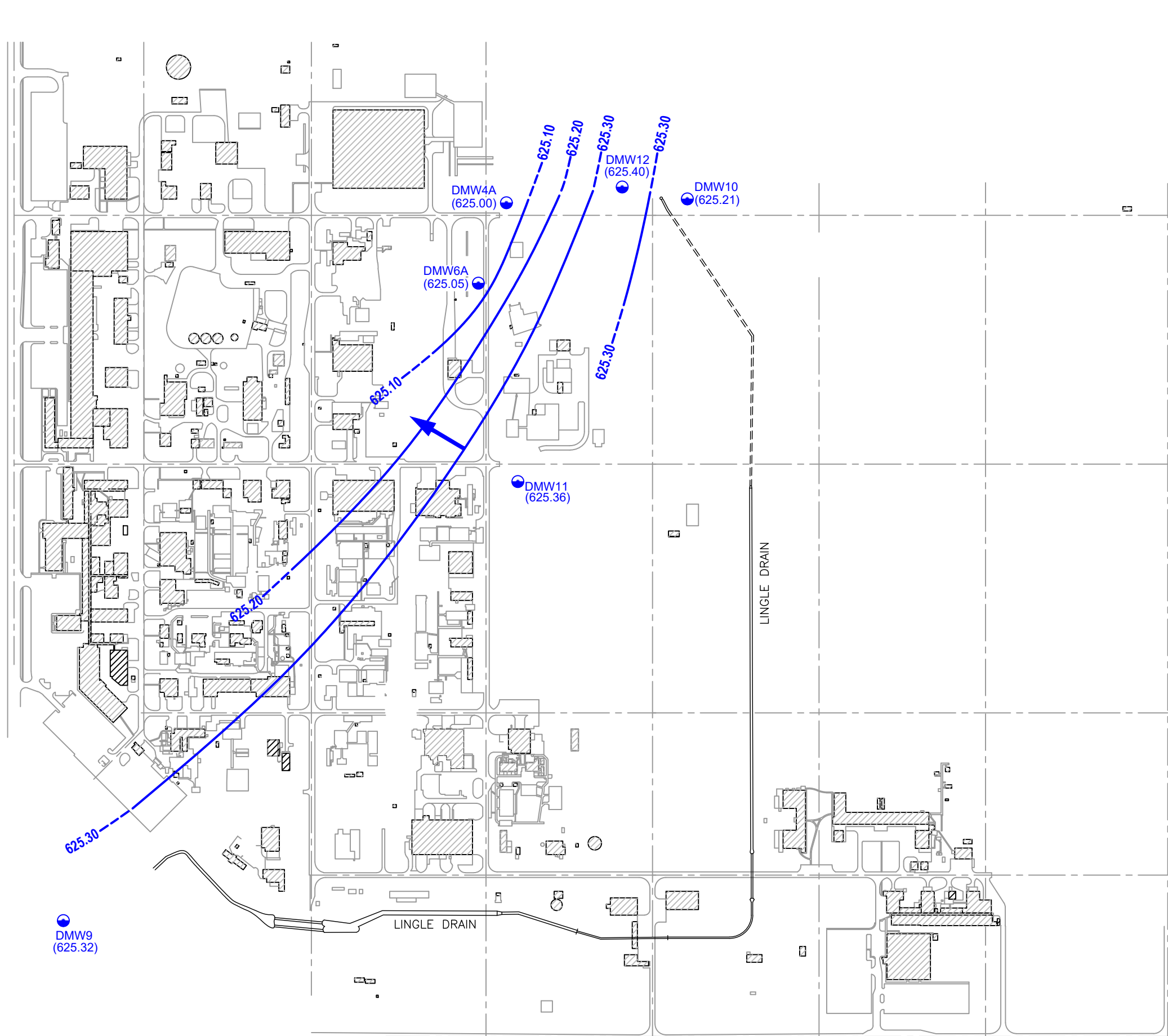
**Notes:**

MH28-11 replaced SMW28-2.



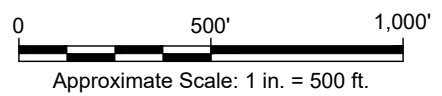






LEGEND:

- BUILDING LOCATION
- LINGLE DRAIN LOCATION (DASHED WHERE UNDERGROUND)
- DEEP MONITOR WELL LOCATION
- 625.30 --- GROUNDWATER CONTOUR (FT)
- (625.40) --- GROUNDWATER ELEVATION (FT)
- FLOW DIRECTION

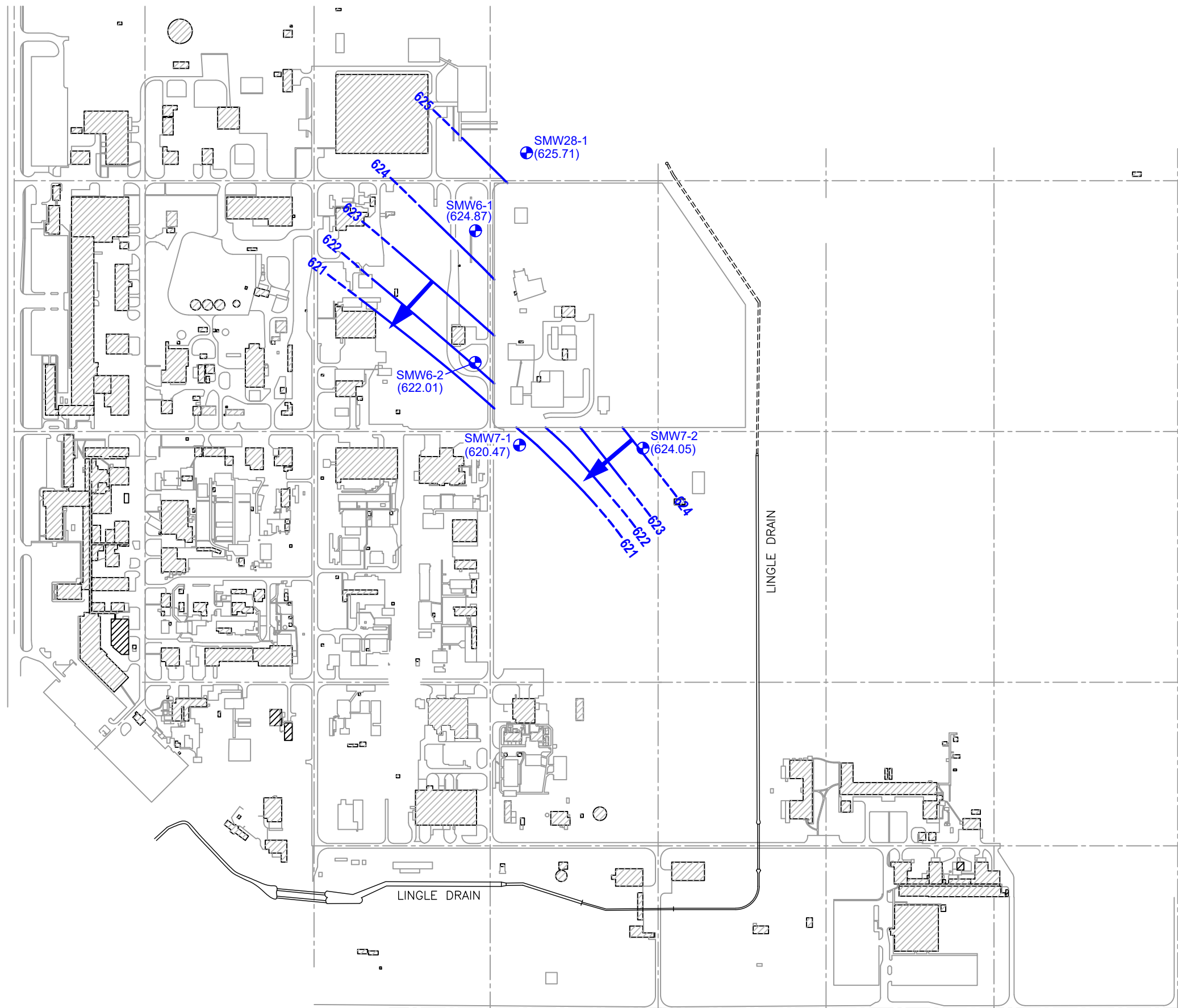


DOW CORNING  
MIDLAND, MICHIGAN

PIEZOMETRIC SURFACE FOR REGIONAL  
AQUIFER - DEEP WELLS  
MAY 12, 2021

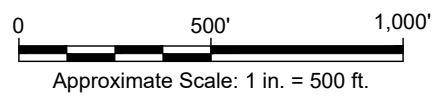
**ARCADIS**

FIGURE  
**B3-10**



LEGEND:

- BUILDING LOCATION
- LINGLE DRAIN LOCATION (DASHED WHERE UNDERGROUND)
- DEEP MONITOR WELL LOCATION
- 625 --- GROUNDWATER CONTOUR (FT)
- (625.71) GROUNDWATER ELEVATION (FT)
- FLOW DIRECTION

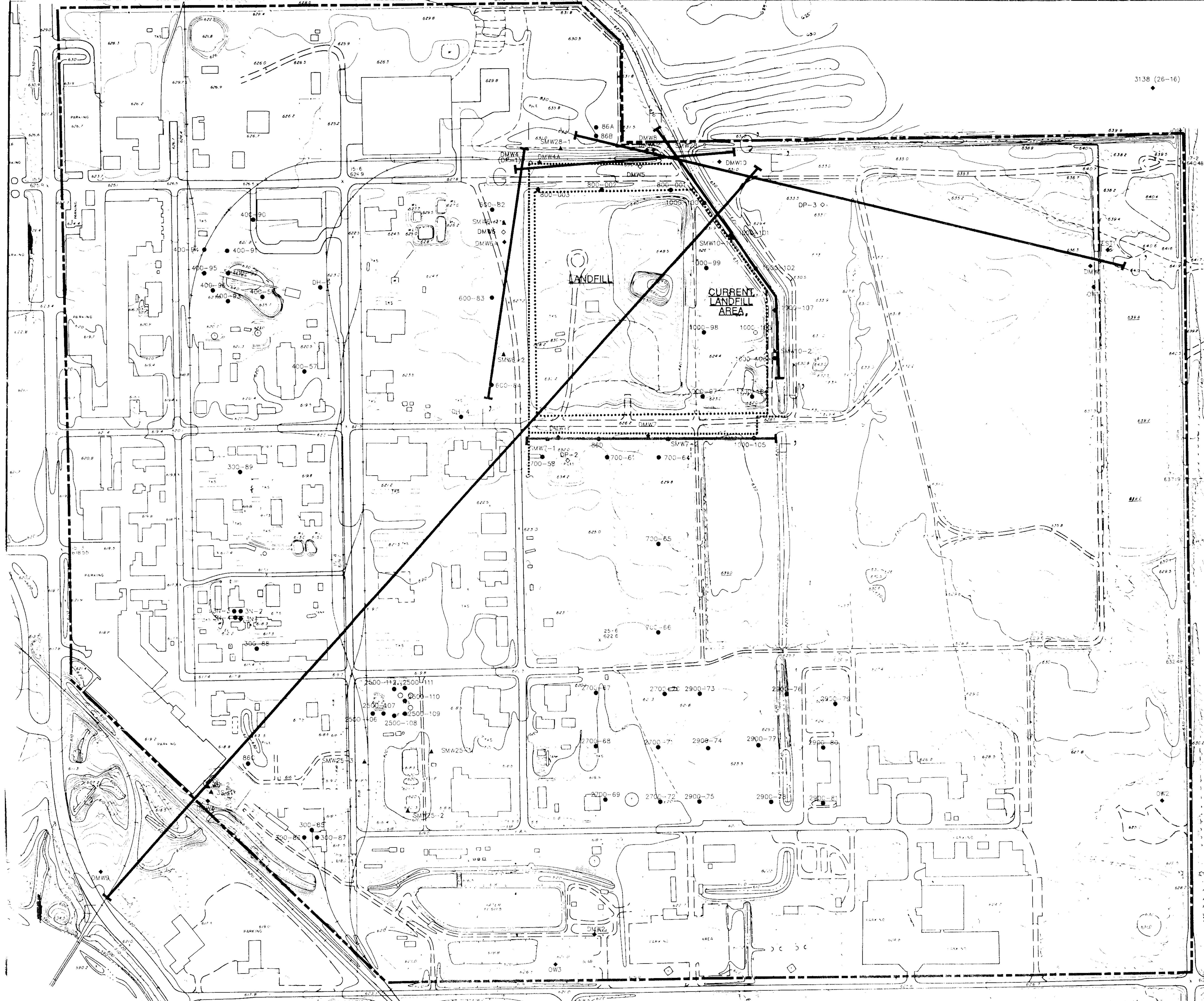


DOW CORNING  
MIDLAND, MICHIGAN

PIEZOMETRIC SURFACE FOR SURFACE  
SAND - SHALLOW WELLS  
NOVEMBER 15, 2021

ARCADIS

FIGURE  
2



# LEGEND

- ◆ DMW-1 = Deep Well Locations
- ◇ DP-2 = Deep Well Locations - Plugged
- ▲ SMW-1 = Shallow Monitoring Well Locations
- 700-58 = Boring Locations
- ..... = Landfill Facility Boundary
- = Dow Corning Property Line
- ..... = Storm Sewer
- 3" = Cross Section Trace

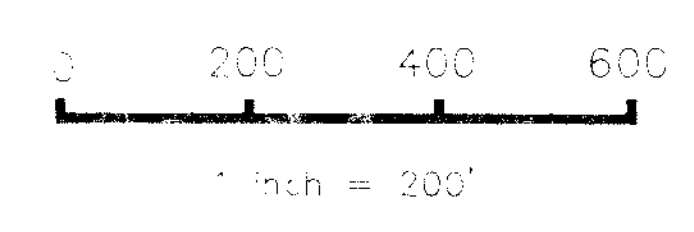
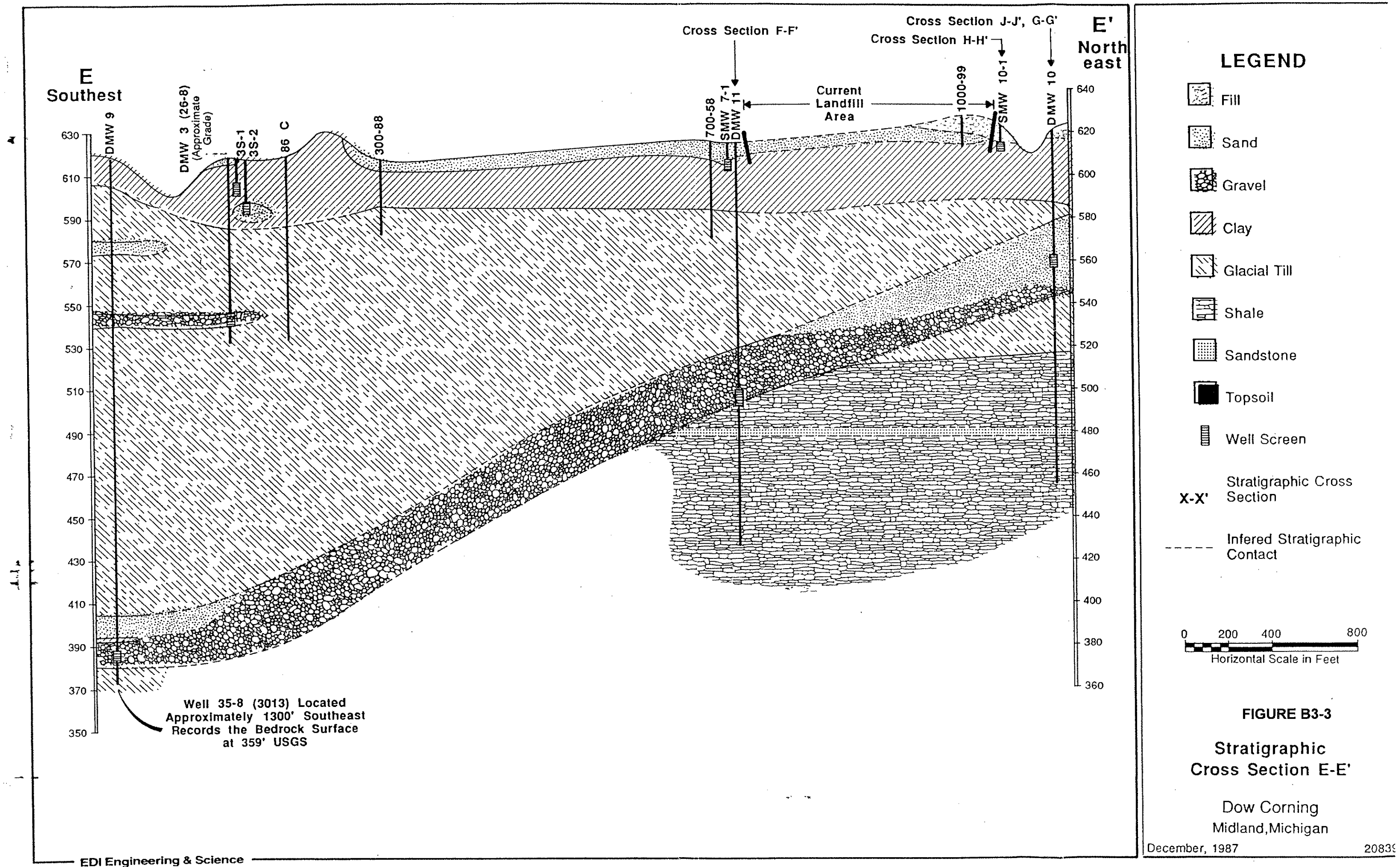
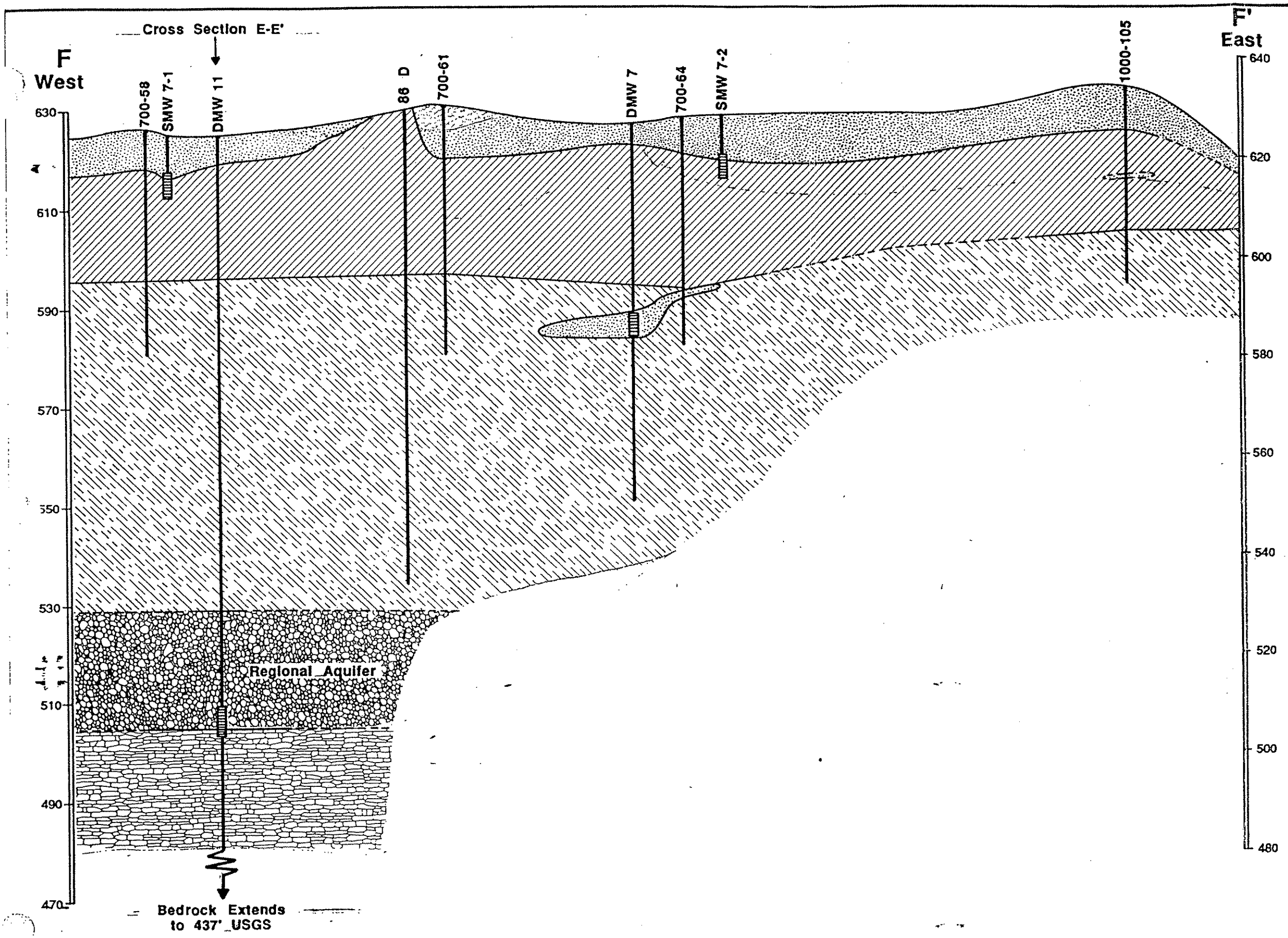


FIGURE B3-2  
 TOPOGRAPHY, CROSS SECTION TRACES AND  
 LOCATIONS OF WELLS AND BORING  
 DOW CORNING CORPORATION  
 MIDLAND, MICHIGAN  
 FEBRUARY, 2010 113830









**LEGEND**

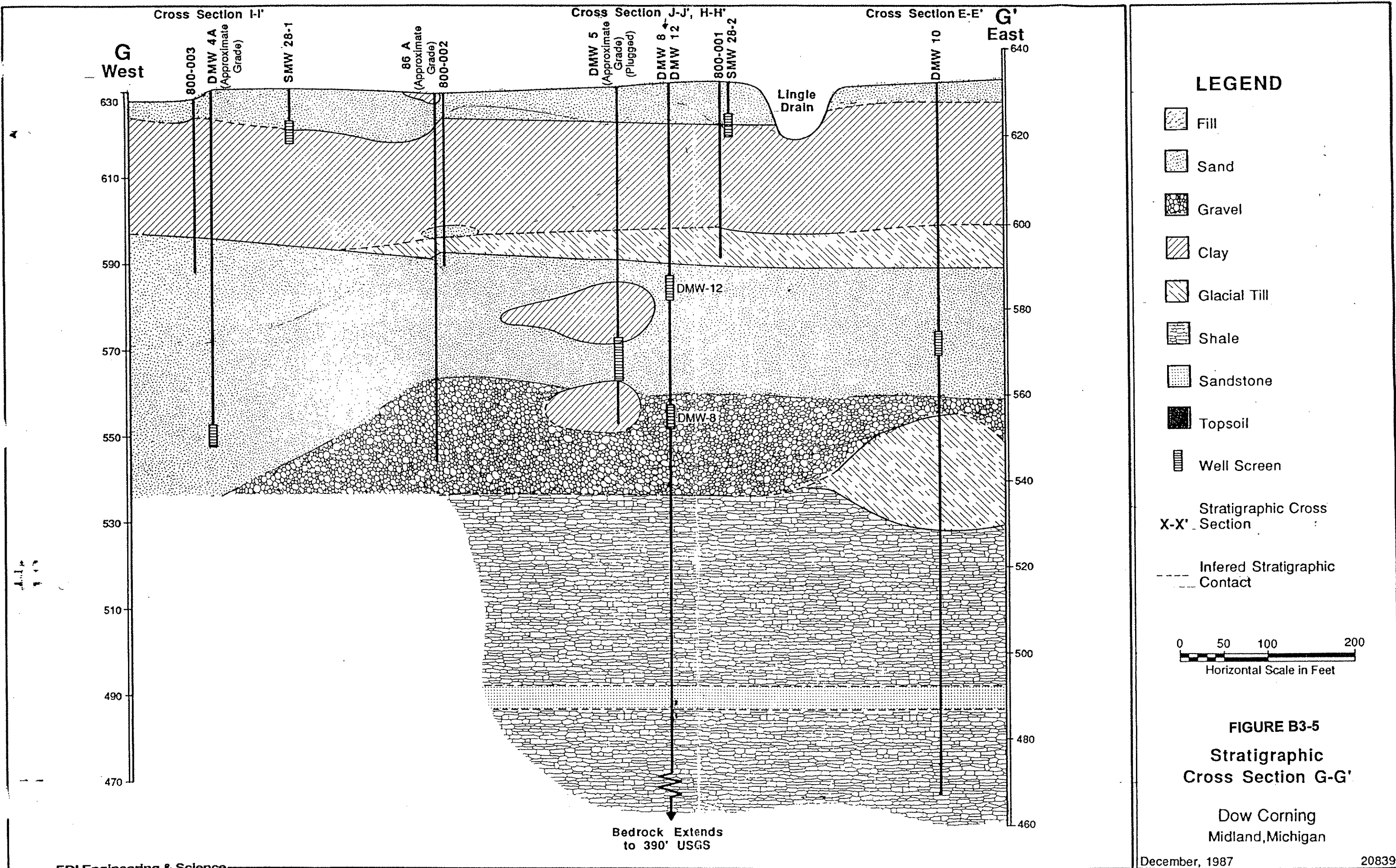
- Fill
- Sand
- Gravel
- Clay
- Glacial Till
- Shale
- Sandstone
- Topsoil
- Well Screen
- Stratigraphic Cross Section X-X'
- Inferred Stratigraphic Contact

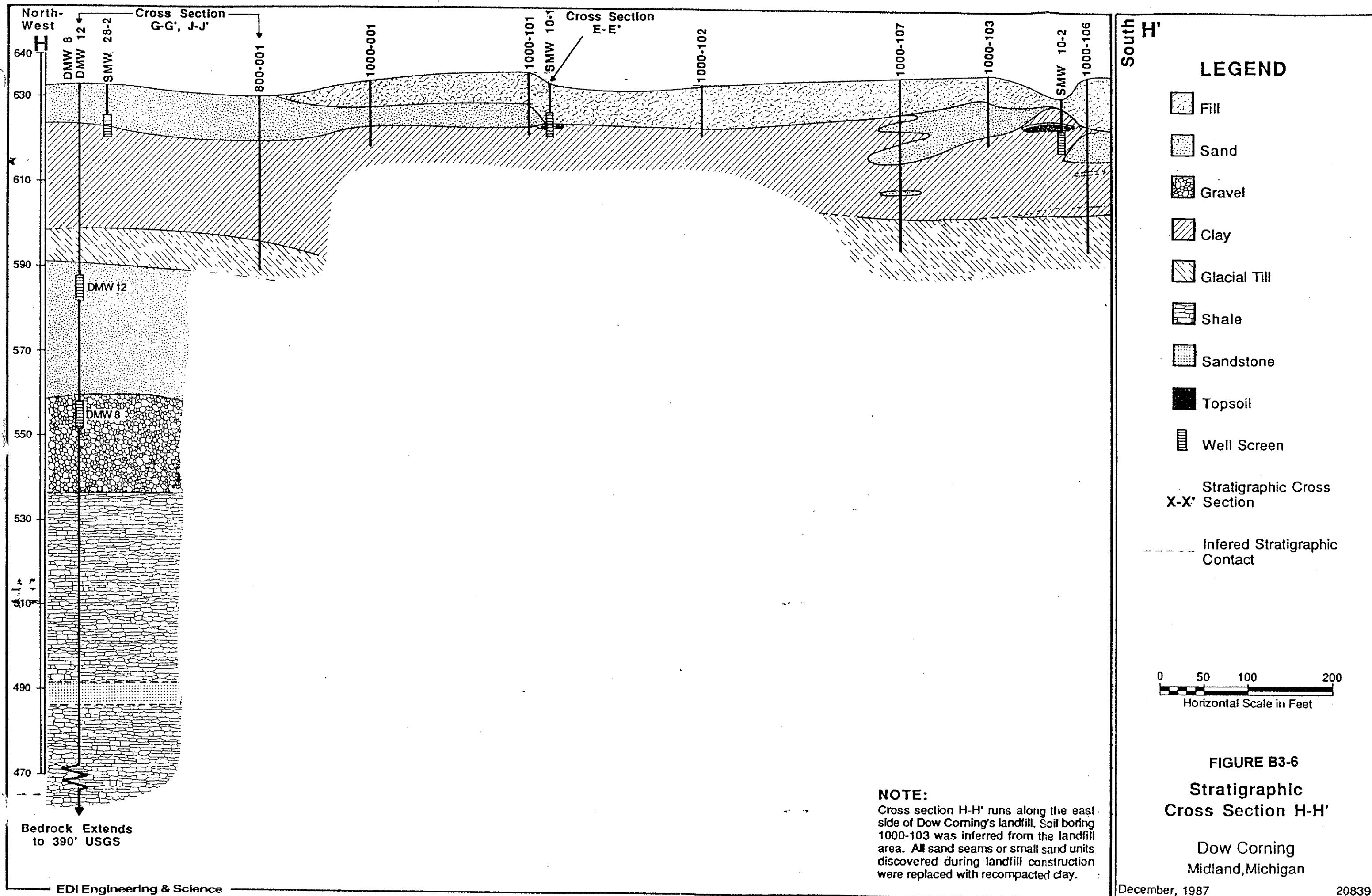
0 50 100 200  
Horizontal Scale in Feet

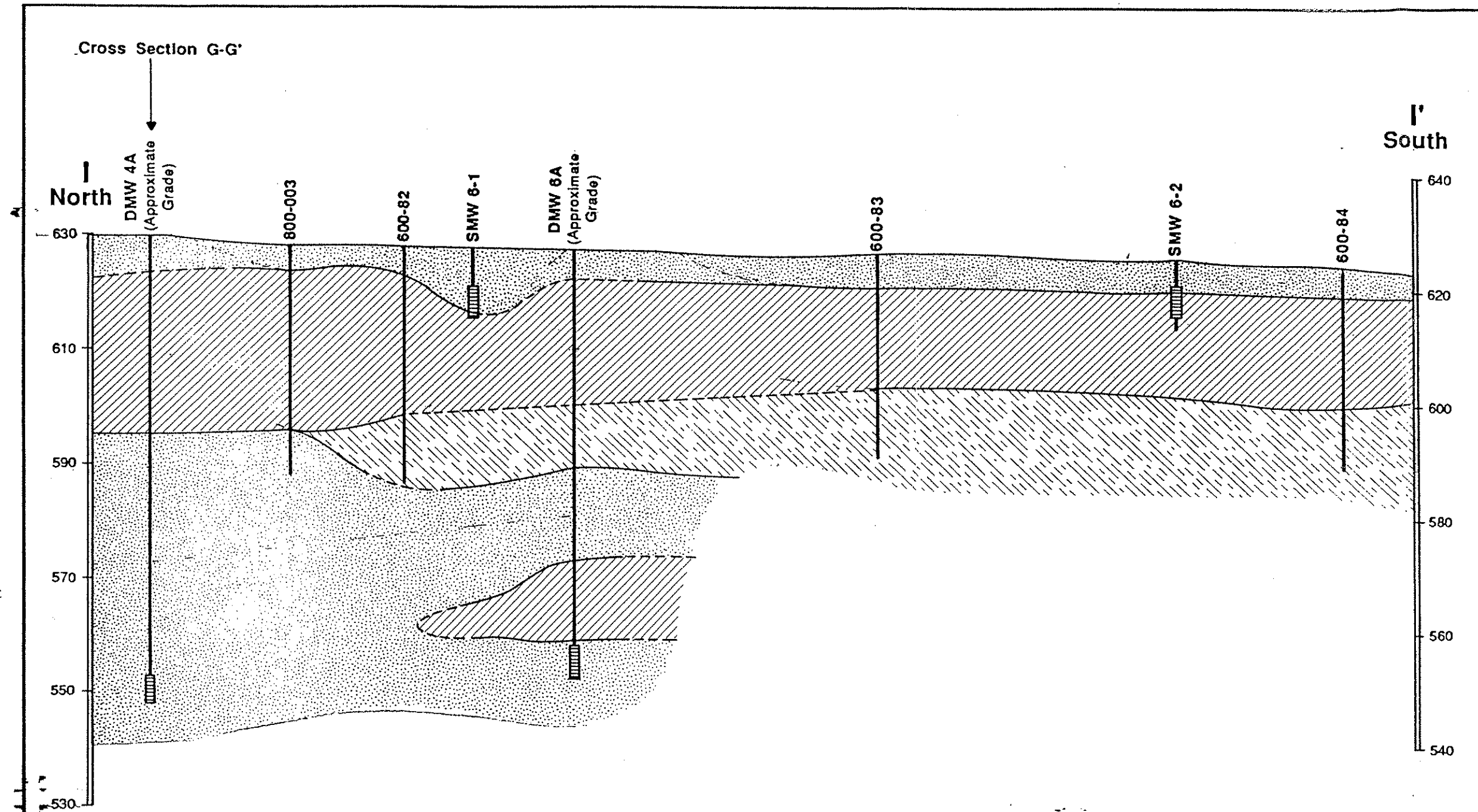
**FIGURE B3-4**

**Stratigraphic Cross Section F-F'**

Dow Corning  
Midland, Michigan







## LEGEND

- Fill
- Sand
- Gravel
- Clay
- Glacial Till
- Shale
- Sandstone
- Topsoil
- Well Screen

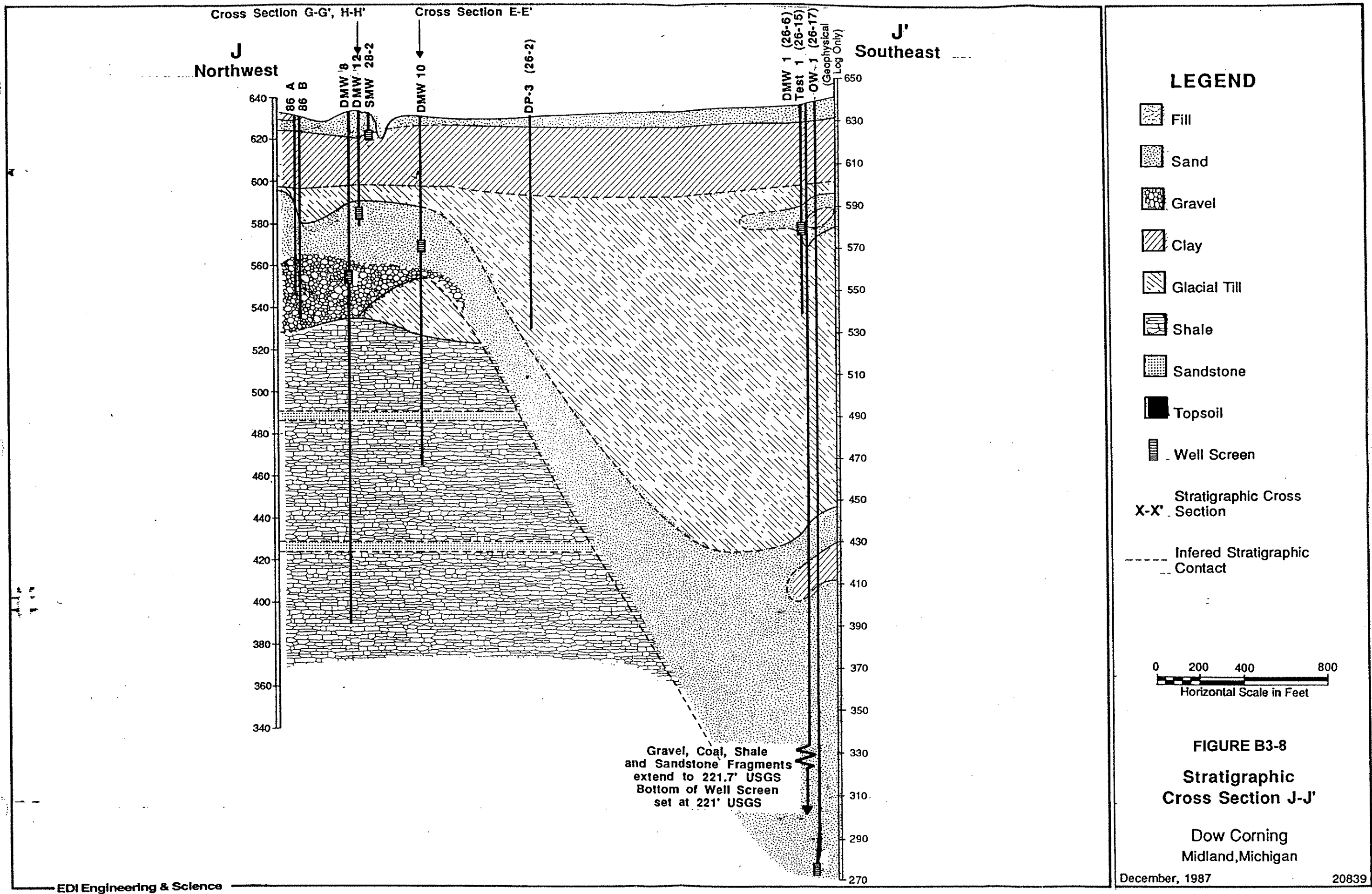
Stratigraphic Cross  
X-X' Section

----- Inferred Stratigraphic  
Contact

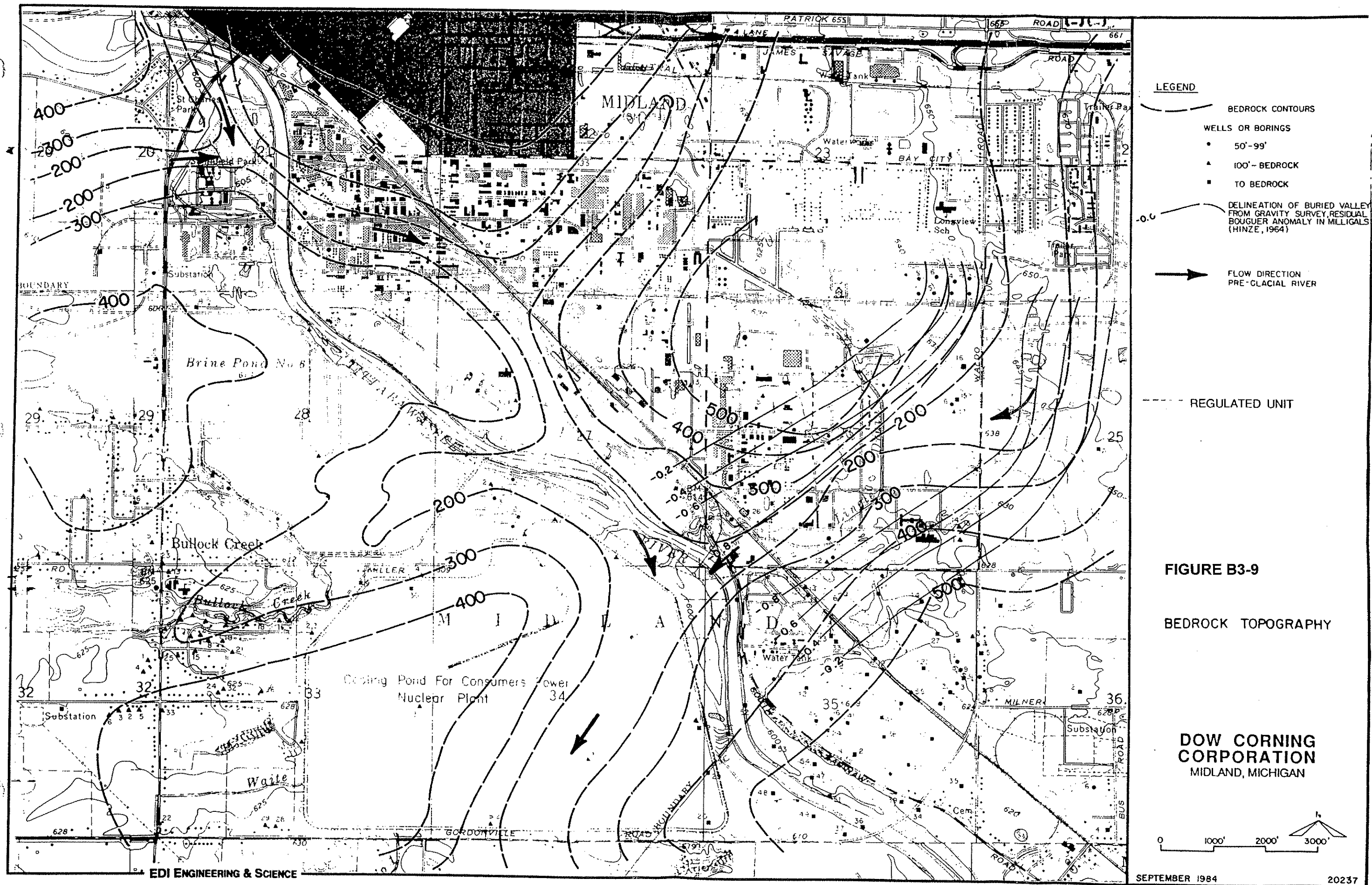
0 50 100 200  
Horizontal Scale in Feet

**FIGURE B3-7**  
**Stratigraphic**  
**Cross Section I-I'**

Dow Corning  
Midland, Michigan







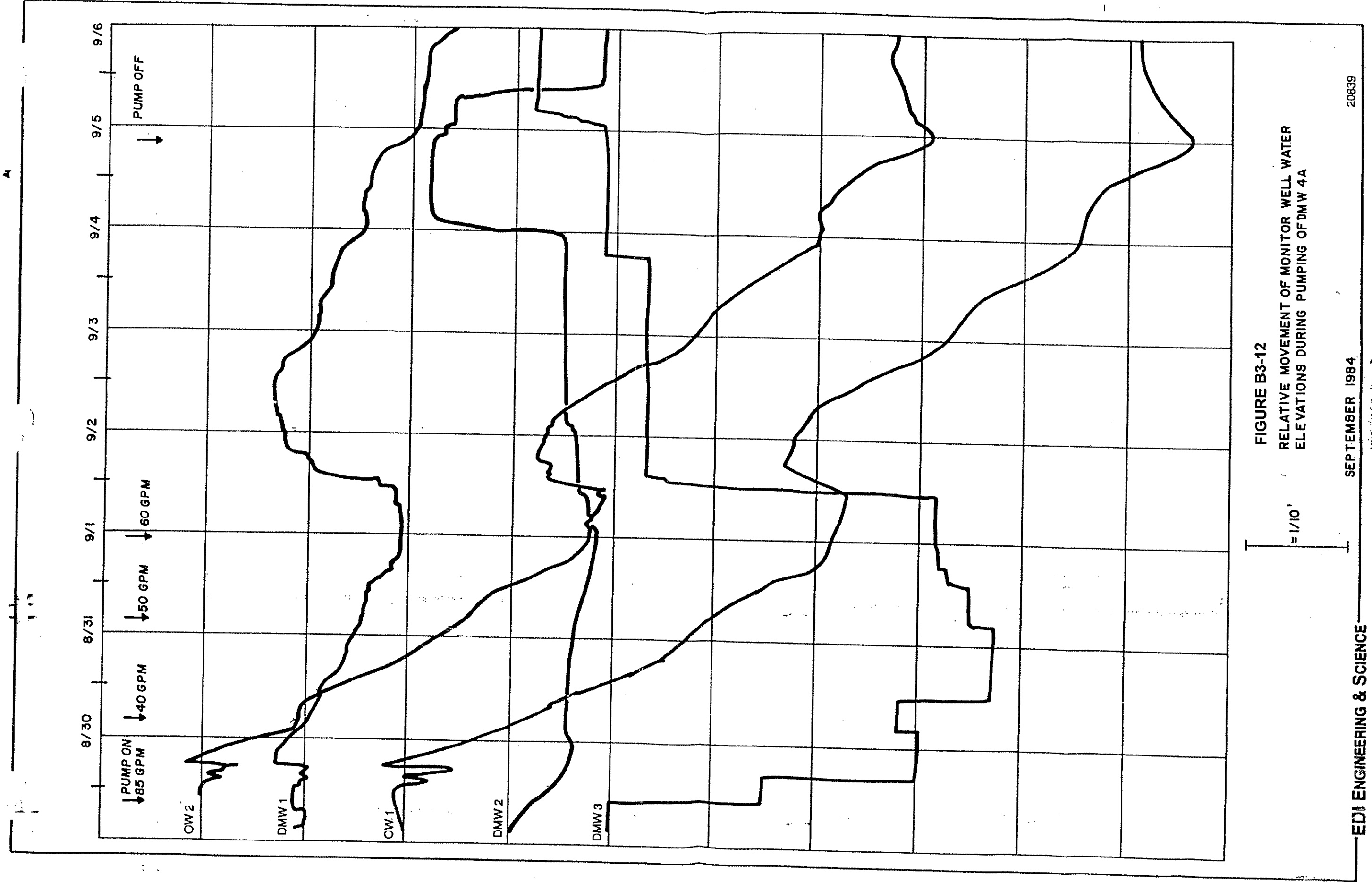
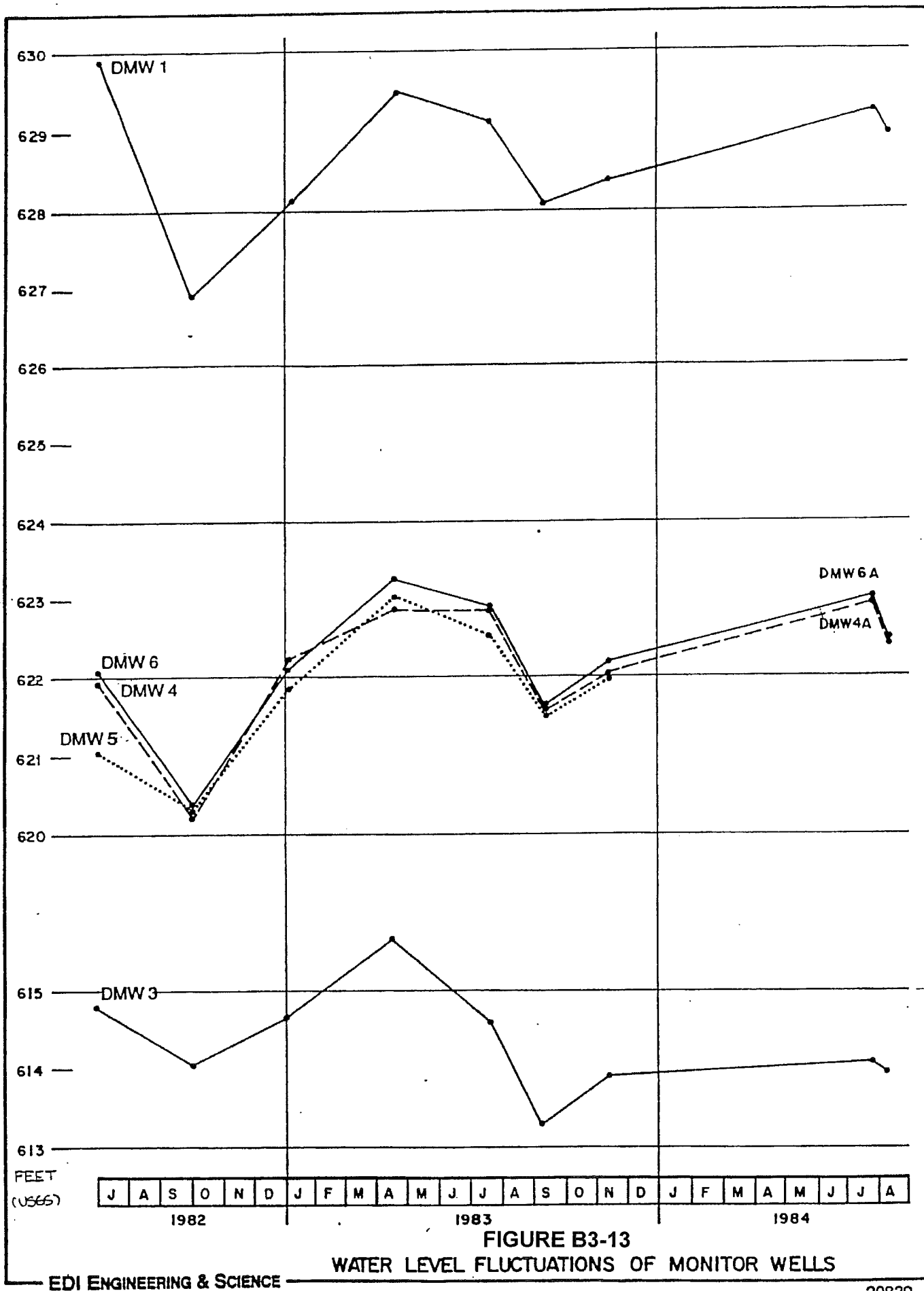


FIGURE B3-12  
RELATIVE MOVEMENT OF MONITOR WELL WATER  
ELEVATIONS DURING PUMPING OF DMW 4A





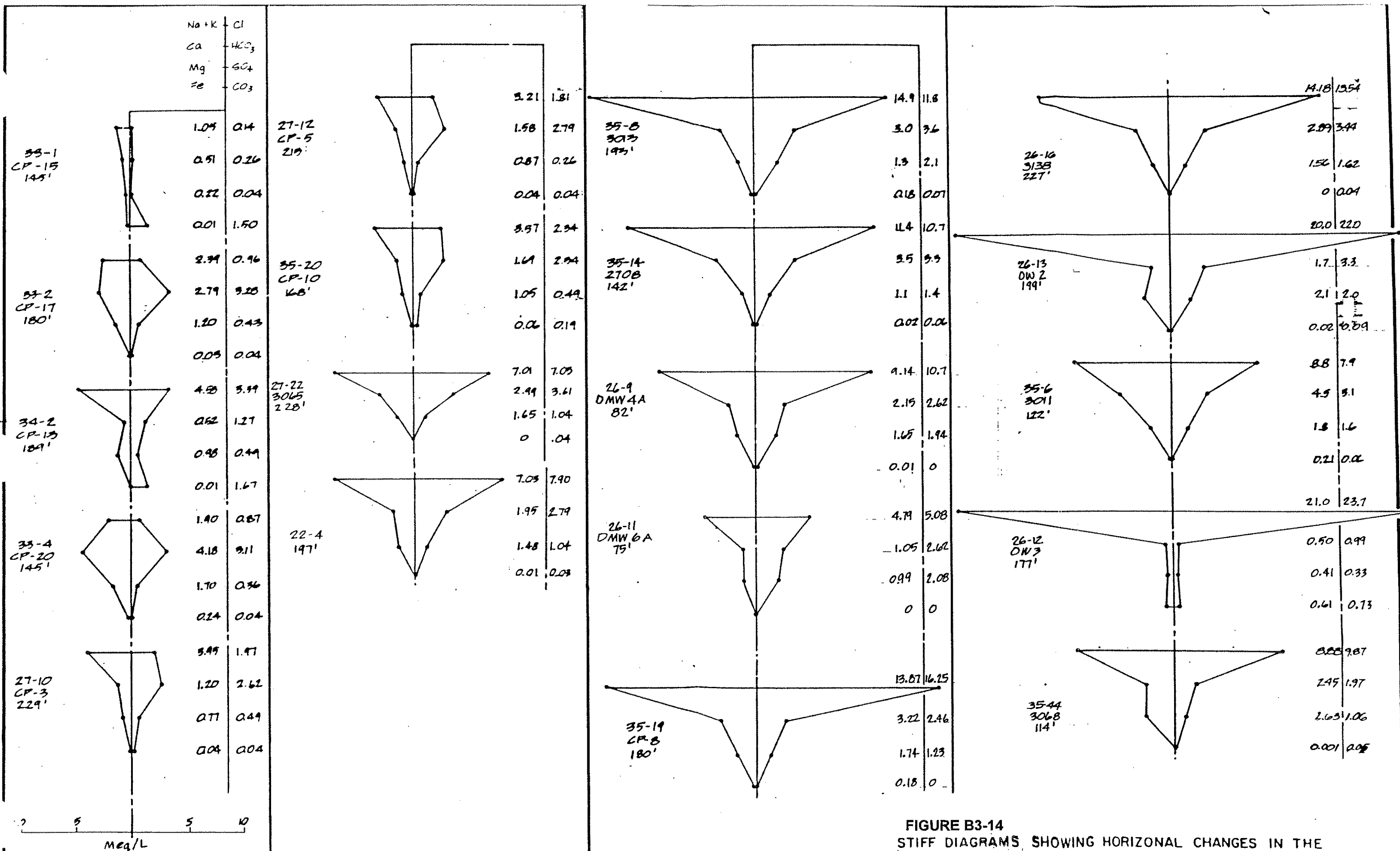


FIGURE B3-14  
STIFF DIAGRAMS SHOWING HORIZONTAL CHANGES IN THE  
REGIONAL AQUIFER.

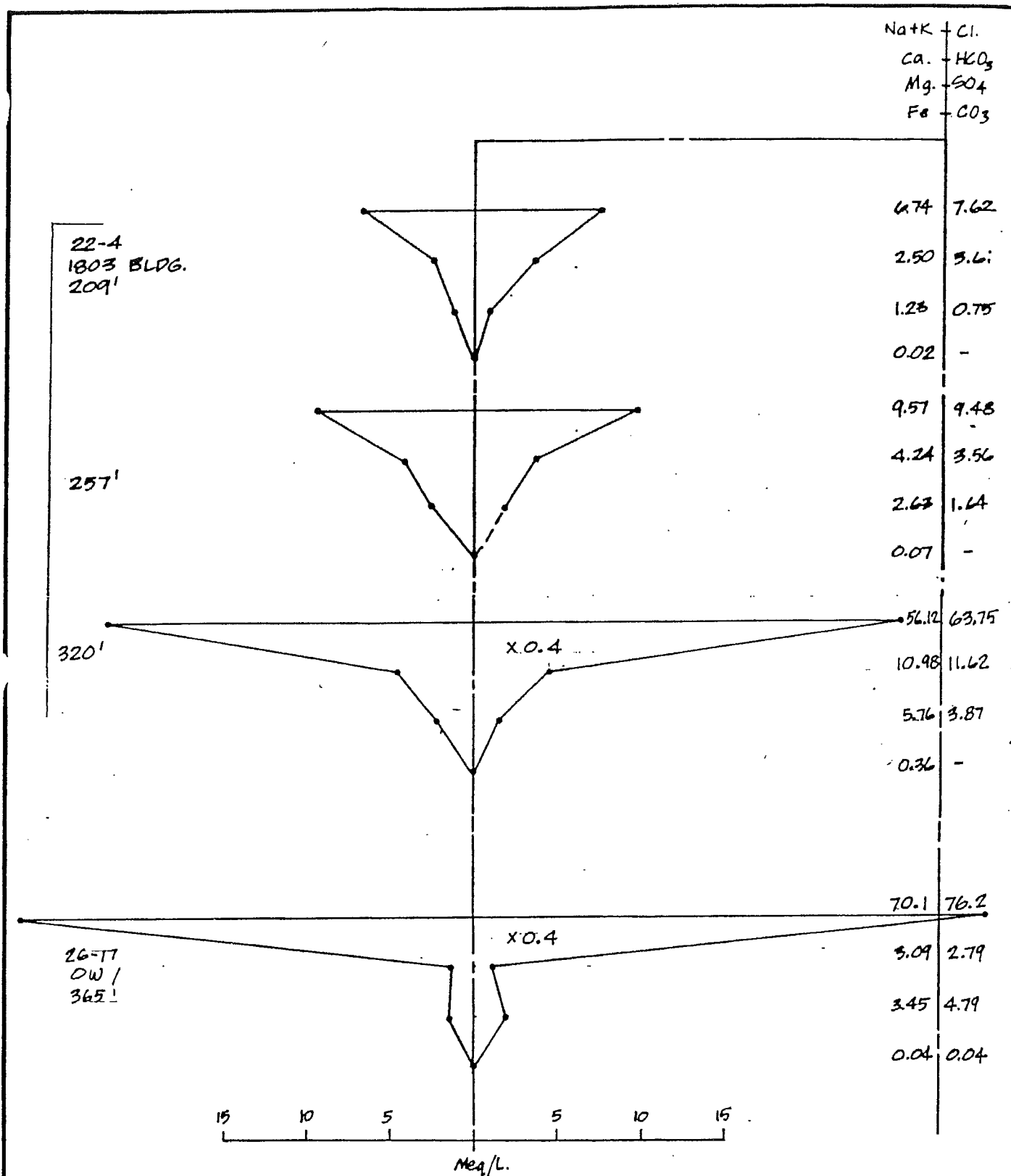


FIGURE B3-15

STIFF DIAGRAMS SHOWING VERTICAL  
CHANGES IN THE REGIONAL AQUIFER

FIGURE B3-16  
**Regional Aquifer Chloride and Sulfate**  
 DMW Wells

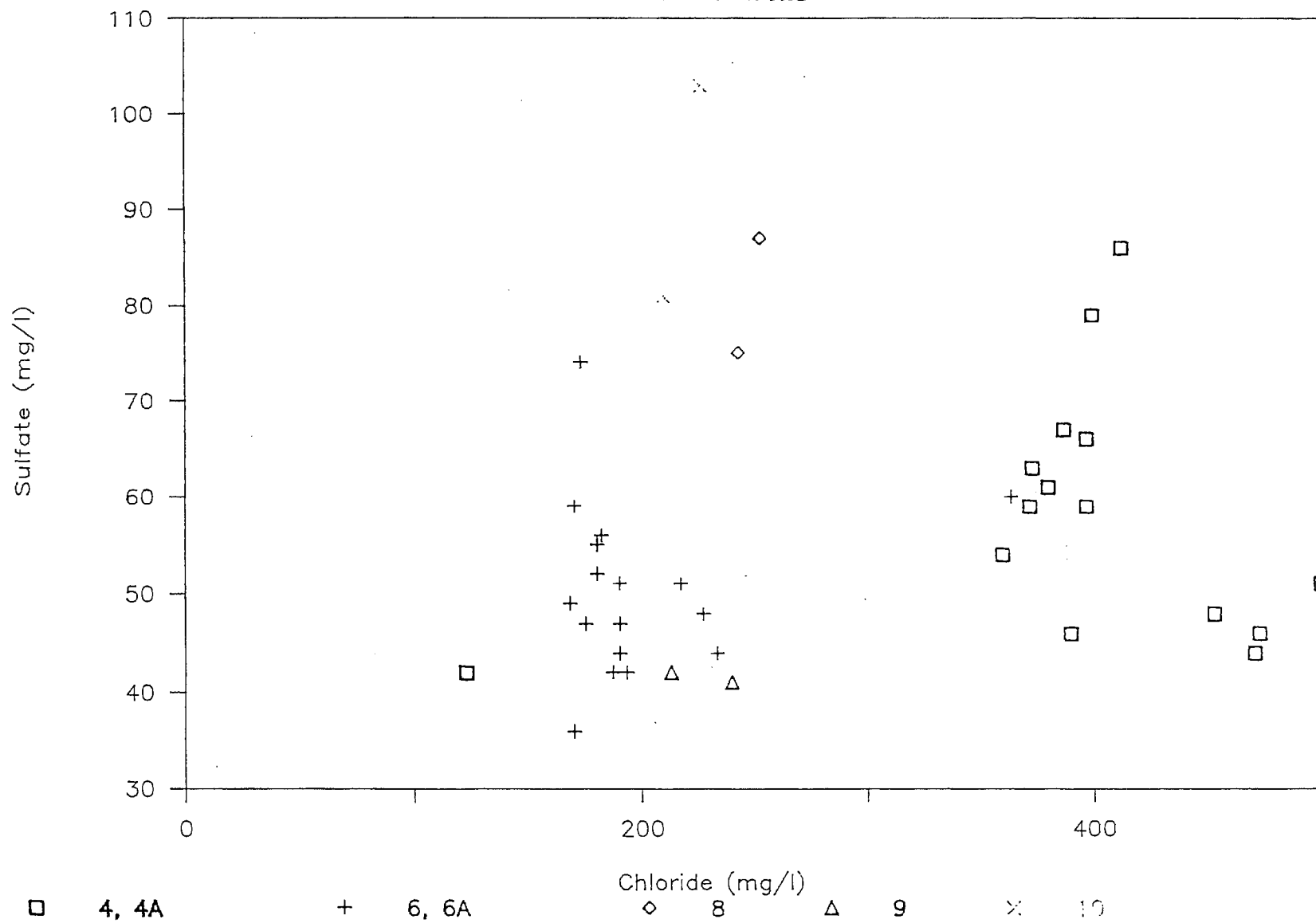


FIGURE B3-17

# Till Sands and Regional Aquifer Chloride and Sulfate

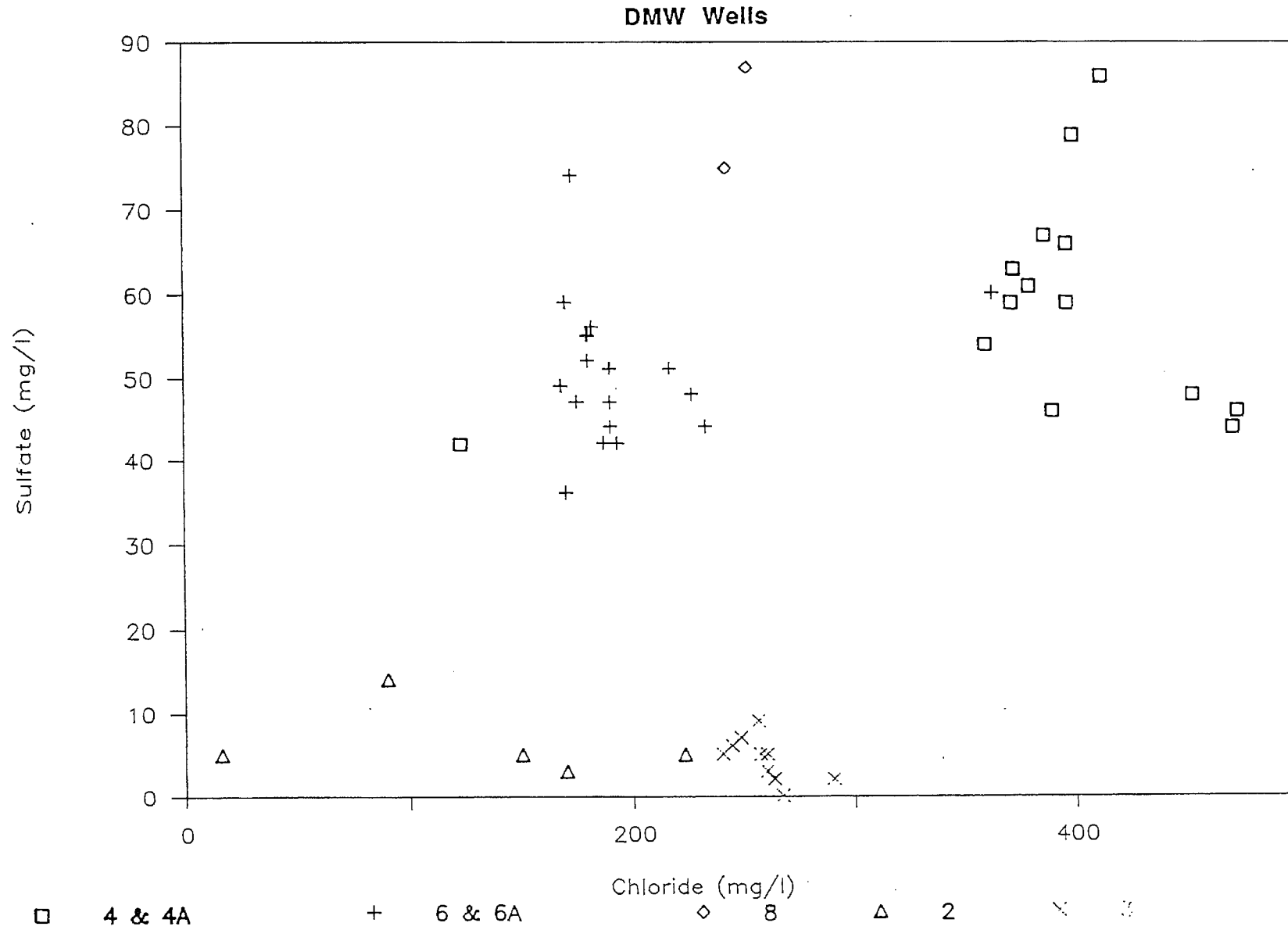
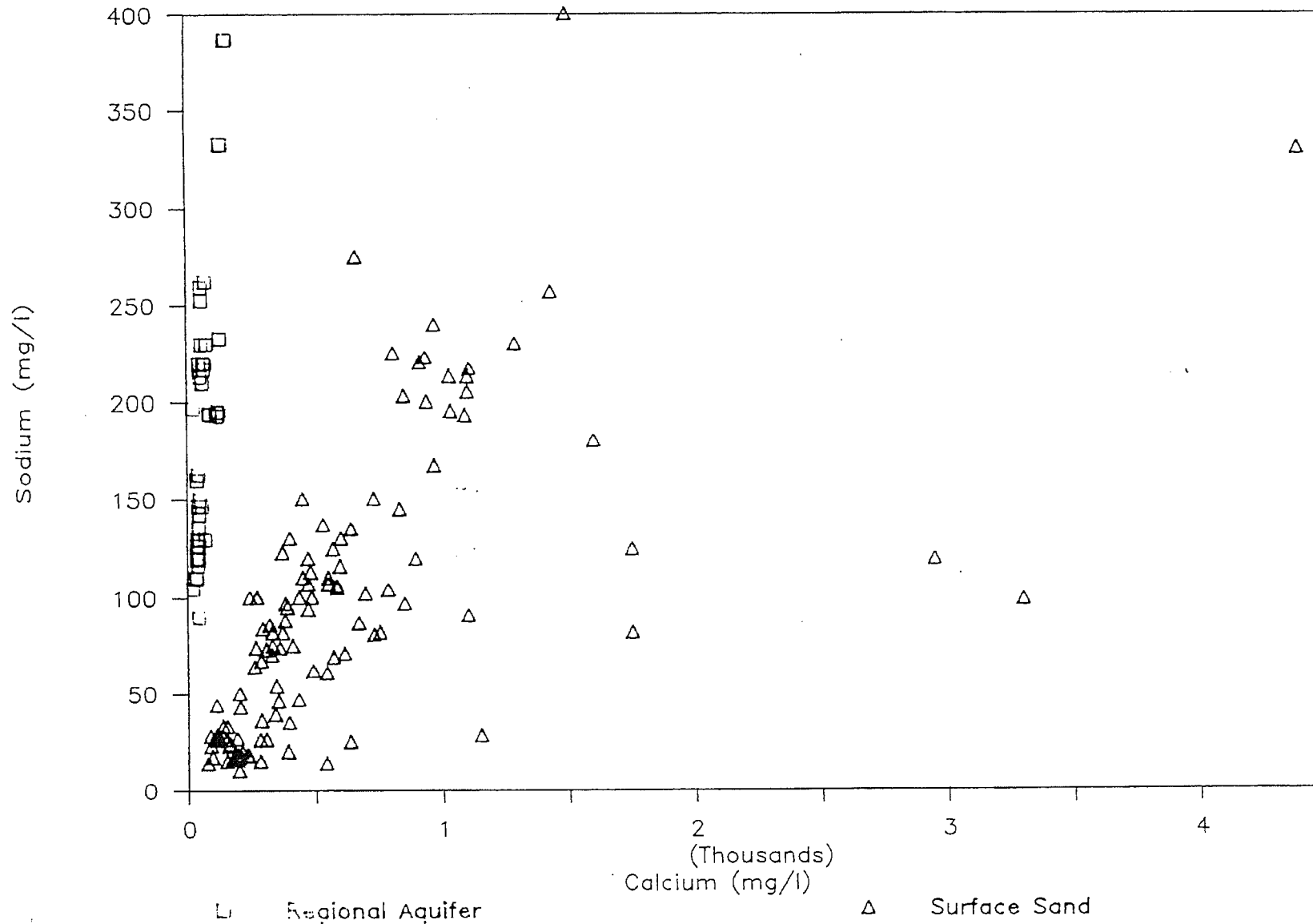


FIGURE B3-18

# Shallow Saturated Zone and Regional Aquifer

Calcium and Sodium



MIDLAND AREA  
BORING AND WELL LOG SUMMARY

Page 1 of 11

Map* Location	Owner's Well Log No.	Owner's Name	Location	Boring or Well	Approx. Elev. (USGS)	Depth (Ft.)	Static W.L. Elev.	Drift or Rock	Remarks
20-1	2704	Dow Chemical	SE NE SE	Boring	604.9	116	-	Drift	
20-2	2438	Dow Chemical	SE SE SE	Observ.	607.2	94	-	Drift	
20-3	691 Bldg	Dow Chemical	NW SE SE	Water	607	320	-	Rock	Companion Well
21-1	2747	Dow Chemical	SW NE NW	Boring	623	155	-	Drift	
21-2	200 Bldg	Dow Chemical	SW SW NE	Ind.	623	464	-	Rock	Well set at 263'
21-3	143 Bldg	Dow Chemical	NE NE SW	Ind.	621	478	-	Rock	
21-4	138 Bldg	Dow Chemical	NW NW SE	Ind.	622	460	582	Rock	Well set at 261'
21-5	137 Bldg	Dow Chemical	SE NW SE	Ind.	619	520	-	Rock	Well set at 500'
21-6	71 Bldg	Dow Chemical	SE NW SE	Ind.	622	490	607	Rock	Well set at 283'
21-7	H & 11th	Dow Chemical	SE SW SE	Ind.		252		Drift	Well set at 252'
21-8	239 Bldg	Dow Chemical	SW NE SW	Ind.	611	238	613	Drift	Well set at 250'
22-1	2703	Dow Chemical	SE SW NW	Boring	632.5	148	-	Drift	
22-2	2706	Dow Chemical	SE NE SE	Boring	629.6	160	-	Drift	
22-3	3137	Dow Chemical	SE SW NE	Observ.	630	275	624	Rock	
22-4	1803 Bldg	Dow Chemical	NE SW NE	Ind.	630	310	615	Rock	
23-1	673	Dow Chemical	SE SE SE	Boring	647.2	58	641.5	Drift	
23-2	674	Dow Chemical	SE SE SE	Boring	645.7	64	640	Drift	
23-3	675	Dow Chemical	SE SE SE	Boring	641.3	54	638	Drift	
23-4	676	Dow Chemical	SE SE SE	Boring	644	60	640.5	Drift	

\* Refer to Figure 2. First number is section number.

MIDLAND AREA  
BORING AND WELL LOG SUMMARY

Page 2 of 11

Map* Location	Owner's Well Log No.	Owner's Name	Location or Well	Boring or Well	Approx. Elev. (USGS)	Depth (Ft.)	Static W.L. Elev.	Drift or Rock	Remarks
23-5	677	Dow Chemical	SW SE SE	Boring	638	52	634.8	Drift	
23-6	678	Dow Chemical	SW SE SE	Boring	638.4	55	635.4	Drift	
23-7	679	Dow Chemical	SW SE SE	Boring	635	49	631.5	Drift	
23-8	680	Dow Chemical	SW SE SE	Boring	638.6	54	632.4	Drift	
23-9	681	Dow Chemical	SW SE SE	Boring	633	50	-	Drift	
24-1	1003	Wolverine Coal	NE NE SW	Boring	665	304	-	Rock	Coal Co. 1907
24-2	23 Monroe	Dow Chemical	NW SW NE	Ind.	670	308	620	Rock	
25-1	-	Handy Bros.	NW NW SW	Boring	635	265	-	Drift	Coal Co. 1905
25-2	-	Handy Bros.	NE NE SW	Boring	648	310	-	Rock	Coal Co. 1906
25-3	-	Handy Bros.	SE NW NW	Boring	650	243	-	Drift	Coal Co. 1906
26-1	DH-1	Dow Corning	SE SE SE	Boring	624	111	-	Drift	
26-2	DP-3	Dow Corning	NE SW NE	Boring	630	100	-	Drift	
26-3	DP-2	Dow Corning	NE NE SW	Boring	625	100	-	Drift	
26-4	DH-4	Dow Corning	SW SE NW	Boring	625	100	-	Drift	
26-5	DH-5	Dow Corning	NE SW NW	Boring	624	140	-	Drift	
26-6	DMW-1	Dow Corning	NE SE NE	Observ.	638	100	581	Drift	Well set at 62'
26-7	DMW-2	Dow Corning	SW SW SE	Observ.	615	100	Dry	Drift	Well set at 73'
26-8	DMW-3	Dow Corning	NW SW SW	Observ.	615	85	-	Drift	Well set at 78'
26-9	DMW-4A	Dow Corning	NE SE NW	Observ.	630	82	620	Drift	Well set at 82'

Refer to Figure 2. First number is section number

MIDDLE AREA  
BORING AND WELL LOG SUMMARY

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Map* Location	Owner's Well Log No.	Owner's Name	Location	Boring or Well	Approx. Elev. (USGS)	Depth (Ft.)	Static W.L. Elev.	Drift or Rock	Remarks
26-10	DMW-5	Dow Corning	NW SW NE	Observ.	631	78	-	Drift	Well set at 68'
26-11	DMW-6A	Dow Corning	NW SE NW	Observ.	627	75	-	Drift	Well set at 75'
26-12	OW-3	Dow Corning	SE SE SW	Ind.	615	177	607	Drift	Well set at 177'
26-13	OW-2	Dow Corning	SE SE SE	Ind.	632	207	624	Drift	Well set at 199'
26-14	-	Dow Chemical	NE SE SE	Ind.	630	155	618	Drift	Old Monroe #8
26-15	Test 1	Dow Chemical	NE SE NE	Ind.	638.7	417	619.2		
26-16	3138	Dow Chemical	SE NE NE	Observ.	640	475		Rock	Well set at 227'
26-17	OW-1	Dow Corning	NE SE NE	Observ.	638	365	621.0	Drift	
26-18	DMW-7	Dow Corning	SE NW NW	Well	636.8	76	624	Drift	
26-19	DMW-8	Dow Corning	NW SE NE	Well	632.8	244	625	Rock	
26-20	DMW-9	Dow Corning	SW SW SW	Well	618.39	245	626	Drift	
26-21	DMW-10	Dow Corning	NE SW NW	Well	630.4	165	625	Rock	
26-22	DMW-11	Dow Corning	SW NE NE	Well	625.3	188	625	Drift	
26-23	DMW-12	Dow Corning	NW SE NE	Well	632.8	53	625	Drift	
26-24	86A	Dow Corning	NE SW NW	Boring	630	85	-	Drift	
26-25	86B	Dow Corning	NE SW NW	Boring	630	96	-	Drift	
26-26	86C	Dow Corning	SW SW NE	Boring	618	85	-	Drift	
26-27	86D	Dow Corning	SW NE NE	Boring	630	96	-	Drift	
27-1	-	Dow Chemical	SW NE SW	Boring	604.6	53	593.6	Drift	

\* Refer to Figure 2. First number is section number.

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MIDLAND AREA  
BORING AND WELL LOG SUMMARY

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Map* Location	Owner's Well Log No.	Owner's Name	Location	Boring or Well	Approx. Elev. (USGS)	Depth (Ft.)	Static W.L. Elev.	Drift or Rock	Remarks
27-2	-	Consumers Power	SE NW SW	Boring	603.9	150	596.1	Drift	
27-3	-	Consumers Power	NE SW SW	Boring	601.5	60	-	Drift	
27-4	3-M	Dow Chemical		Brine		265			
27-5	-	Dow Chemical	SW NE NE	Boring	629.6	50	623.3	Drift	
27-6	-	Dow Chemical	SW NE NE	Boring	630	50	624	Drift	
27-7	-	Dow Chemical	NW NE NE	Boring	629.5	50	624	Drift	
27-8	-	Dow Chemical	NW NE NE	Boring	629.4	50	623.4	Drift	
27-9	CP-2	Consumers Power	NE SE SW	Observ.	634.4	101	-	Drift	Well set at 96'
27-10	CP-3	Consumers Power	NE SE SW	Observ.	634.2	235	-	Drift	Well set at 229'
27-11	CP-4	Consumers Power	SE SW SE	Observ.	633	176	-	Drift	Well set at 50'
27-12	CP-5	Consumers Power	SE SW SE	Observ.	633	220	-	Drift	Well set at 215'
27-13	2705	Dow Chemical	NE SE NE	Observ.	625	160		Drift	
27-14	2746	Dow Chemical	NE NW SW	Observ.	600.5	140		Drift	
27-15	2702	Dow Chemical	NE NE SE	Observ.	620.8	138		Drift	
27-16	-	Dow Chemical	NE SW NW	Oil-Brine	616	5195	-	Rock	Drift to 310'
27-17	-	Handy Bros.	SE SW NE	Boring	623	275		Drift	Coal Co.
27-18	3124	Dow Chemical	SW SE NW	Ind.	620	234	620	Drift	
27-19	655 Bldg	Dow Chemical	NE SW SW	Ind.	606	175	606	Drift	Bldg. 655
27-20	-	Consumers Power	NW SE SW	Dewater	634	74	602	Drift	

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Refer to Figure 2. First number is section number

MIDLAND AREA  
BORING AND WELL LOG SUMMARY

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Map* Location	Owner's Well Log No.	Owner's Name	Location	Boring or Well	Approx. Elev. (USGS)	Depth (Ft.)	Static W.L. Elev.	Drift or Rock	Remarks
27-21	-	Consumers Power	NW SE SW	Dewater	634	65	620	Drift	
27-22	3065	Dow Chemical	NW NW SW	Observ.	598	310	625.23	Drift	Well set at 228'
28-1	2707	Dow Chemical	NW NW SE	Observ.	619.2	148		Drift	
28-2	2745	Dow Chemical	SW NW NE	Observ.	603.8	140		Drift	
28-3	2803	Dow Chemical	NE SE SW	Boring		70		Drift	
28-4	2804	Dow Chemical	SW NW SW	Observ.	611	70	612.3	Drift	
28-5	2805	Dow Chemical	SW NW SW	Observ.	612	70	608.7	Drift	
28-6	3122	Brazos O&G (Dow)	N NW NW	Oil-Brine	613.1	2875	-	Rock	Drift to 220'
28-7	3066	Dow Chemical	SE NW SW	Observ.	614	230	625.94	Rock	Well set at 164'
29-1	-	Wm. Weertz	SE SW SE	Dom.	627	128	617	Drift	
29-2	-	Wm. Wurtz	SW SW SE	Dom.	628	126	625	Drift	
29-3	-	Bullock Crk Schls	SE SW SE	Pub.	630	104	620	Drift	
29-4	-	M. Williams	NW SE SE	Dom.	635	195	625	Drift	
29-5	-	L. Donner	SE SE SE	Dom.	627	172	621	Drift	
29-6	-	A. Tomlinson	NE SE SE	Dom.	625	99	617	Drift	
29-7	-	K. Dingman	NE SE SE	Dom.	625	100	615	Drift	
29-9	-	D. Klein	SW NE SE	Dom.	630	109	600	Drift	
29-10	-	T. March	NW NE SE	Dom.	632	177	617	Drift	
29-11	-	H. Herbert	NE NE SE	Dom.	615	152	615	Drift	

\* Refer to Figure 2. First number is section number.

MIDLAND AREA  
BORING AND WELL LOG SUMMARY

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Map* Location	Owner's Well Log No.	Owner's Name	Location or Well	Boring or Well	Approx. Elev. (USGS)	Depth (Ft.)	Static W.L. Elev.	Drift or Rock	Remarks
29-12	-	First Midland Bk	NE NE SE	Comm.	613	100	613	Drift	
29-13	-	C. Gibson	SE SE NE	Dom.	615	96	615	Drift	
29-14	-	K. Robinson	SE SE NE	Dom.	622	102	617	Drift	
29-15	-	L. Reagle	NE SE NE	Comm.	608	107	608	Drift	
29-16	-	Jacoby Bldrs	SE SW NE	Dom.	623	160	611	Drift	
29-17	-	E. Jacobs	SW SW NE	Dom.	625	156	618	Drift	
29-18	-	Wm. Methner	NE SE SE	Dom.	625	105	610	Drift	
32-1	-	R. Davis	E SE NE	Dom.	625	147	623	Drift	
32-2	-	R. Stillwagon	NE NE SE	Dom.	625	135	621	Drift	
32-3	-	R. Stillwagon	NE NE SE	Dom.	625	160	620	Drift	
32-4	-	E. Holt	SE SE NE	Dom.	625	144	625	Drift	
32-5	-	P. Owens	NE NE SE	Dom.	625	176	617	Drift	
32-6	-	M. Williams	NE NE SE	Dom.	625	121	624	Drift	
32-7	2750	Stewart Consumers Power	NE NW SE	Ind.	626	405	603	Rock	Drift to 214'
33-1	CP-15	Consumers Power	SW NW SE	Observ.	631.9	150		Drift	Well set at 145'
33-2	CP-17	Consumers Power	NW SW NE	Ind.	632.1	185		Drift	Well set at 180'
33-3	CP-18	Consumers Power	NW SW NE	Ind.	632.7	110		Drift	Well set at 110'
33-4	CP-20	Consumers Power	NE NE NE	Ind.	631.5	150		Drift	Well set at 145'
33-5	-	J. Zyonse	SE NW NW	Dom.	613	160	613	Drift	

Refer to Figure 2. First number is section number.

MIDLAND AREA  
BORING AND WELL LOG SUMMARY

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Map* Location	Owner's Well Log No.	Owner's Name	Location	Boring or Well	Approx.		Static W.L. Elev.	Drift or Rock	Remarks
					Elev. (USGS)	Depth (Ft.)			
33-6	-	J. Zyonse	NW SW NW	Dom.	620	153	614	Drift	
33-7	-	C. Doil	NW NW NW	Dom.	615	144	616	Drift	
33-8	-	A. Malpass	NE SW NW	Dom.	620	172	617	Drift	
33-9	-	Champion Co.	NE NW NE	Ind.	607	165	607	Drift	
33-10	-	D. Fick	NE SW NW	Dom.	620	127	616	Drift	
33-11	-	R. Maxson	SE NE NW	Dom.	610	120	616	Drift	
33-12	-	S. Young	NW NW NW	Dom.	625	155	625	Drift	
33-13	-	M. Carey	SE NE NW	Dom.	615	131	615	Drift	
33-14	-	Bullock Crk Schls	NW NW NW	Dom.	625	160	621	Drift	
33-15	-	A. Malpass	NE SW NW	Dom.	623	117	622	Drift	
33-16	-	A. Malpass	SE NW NW	Dom.	612	126	612	Drift	
33-17	-	M. Carey	NE SW NW	Dom.	620	132	620	Drift	
33-18	-	Wm. Dengler	SE NE NW	Dom.	610	120	618	Drift	
33-19	-	J. Wenzel	SW NE NW	Dom.	607	122	617	Drift	
33-20	-	A. Malpass	SW NE NW	Dom.	614	174	613	Drift	
33-21	-	A. Malpass	NW SE NW	Dom.	620	125	620	Drift	
33-22	-	M. Bailey	SW SW SW	Dom.	625	152	621	Drift	
33-23	-	D. Meier	NW NW NW	Dom.	625	165	626	Drift	
33-24	-	D. Hayes	SW SW NW	Dom.	628	184	624	Drift	

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\* Refer to Figure 2. First number is section number.  
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MIDLAND AREA  
BORING AND WELL LOG SUMMARY

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Map* Location	Owner's Well Log No.	Owner's Name	Location	Boring or Well	Approx. Elev. (USGS)	Depth (Ft.)	Static W.L. Elev.	Drift or Rock	Remarks
33-25	-	P. Tomlinson	NW SW NW	Dom.	625	158	626	Drift	
33-26	-	R. Kidder	SW SE NW	Dom.	625	245	624	Drift	
33-27	-	A. Malpass	NW SW NW	Dom.	620	135	623	Drift	
33-28	-	Consumers Power	SE SE SW	Ind.	627	160	622	Drift	
33-29	-	Consumers Power	SE SE SW	Ind.	627	150	622	Drift	
33-30	-	Dow Chemical	NE NE NE	Oil	611.8	4460	-	Rock	Drift to 316'
33-31	-	Handy Bros.	N SE	Boring		221	-	-	1904 Coal Co.
33-32	-	M. Crall	SW SE NW	Dom.	630	182	627	Drift	
33-33	-	F. White	NW NW SW	Dom.	628	164	623	Drift	
34-1	CP-12	Consumers Power	SE SW SW	Observ.	631.1	155.4		Drift	Well set at 151'
34-2	CP-13	Consumers Power	SE SW SW	Observ.	631.4	195		Drift	Well set at 185'
34-3	-	Handy Bros.	SW NE SE	Boring	620	226	-	Drift	1904 Coal Co.
34-4	-	Consumers Power	SW NE NE	Dewater	633.7	57.5	620.7	Drift	
34-5	-	Consumers Power	SW NE NE	Dewater	633.9	53.3	621.1	Drift	
34-6	-	Consumers Power	SW NE NE	Dewater	633.4	52.3	618.6	Drift	
34-7	-	Consumers Power	SW NE NE	Dewater	633.9	49.0	621.4	Drift	
35-1	MW-7	Dow Chemical	SE SE NE	Observ.	623.3	65	568.2	Drift	
35-2	3010	Dow Chemical	SE SE NE	Observ.	624.9	142	592	Drift	Well set at 127'
35-3	MW-8	Dow Chemical	SE SE NE	Observ.	625.4	68	605.8	Drift	

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Refer to Figure 2. First number is section number

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MIDLAND AREA  
BORING AND WELL LOG SUMMARY

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Map* Location	Owner's Well Log No.	Owner's Name	Location	Boring or Well	Approx. Elev. (USGS)	Depth (Ft.)	Static W.L. Elev.	Drift or Rock	Remarks
35-4	MW-9	Dow Chemical	NE SE NE	Observ.	628.7	63	605.6	Drift	
35-5	3009	Dow Chemical	NE SE NE	Observ.	628	166	609.5	Rock	Well set at 158'
35-6	3011	Dow Chemical	NE NE NE	Observ.	624.4	170	624	Rock	Well set at 122'
35-7	3012	Dow Chemical	SW NE NE	Boring	611	164	-	Rock	
35-8	3013	Dow Chemical	NE NW NW	Observ.	615.6	256	618.7	Rock	Well set at 193'
35-9	2402	Dow Chemical	NE SE NE	Boring	624.9	100	616.9	Drift	
35-10	2396	Dow Chemical	NE SW NE	Boring	627.7	100	616.7	Drift	
35-11	2388	Dow Chemical	SW NE NE	Boring	626.8	100	617.8	Drift	
35-12	2366	Dow Chemical	NE NW NE	Boring	626.2	100	617.2	Drift	
35-13	2373	Dow Chemical	NE NE NW	Boring	620.9	100	615.9	Drift	
35-14	2708	Dow Chemical	NE NE NW	Observ.	620.0	235	620	Drift	Well set at 142'
35-15	2201	Dow Chemical	NE SW SE	Boring	618	50	-	Drift	
35-16	2202	Dow Chemical	NW NW SE	Boring	617	50	-	Drift	
35-17	2199-A	Dow Chemical	SW SE NW	Boring	625	50	-	Drift	
35-18	CP-7	Consumers Power	NW NW SW	Observ.	632.4	120	-	Drift	Well set at 115'
35-19	CP-8	Consumers Power	NW NW SW	Observ.	632.9	190	-	Rock	Well set at 180'
35-20	CP-10	Consumers Power	SW SW SW	Observ.	631.3	173	-	Rock	Well set at 168'
35-21	-	Consolidated Coal	SW NW SE	Boring	616	239	-	Rock	1913 Coal
35-22	-	Consolidated Coal	NW SE NE	Boring	623	241	-	Rock	1913 Coal

\* Refer to Figure 2. First number is section number.

MIDLAND AREA  
BORING AND WELL LOG SUMMARY

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Map* Location	Owner's Well Log No.	Owner's Name	Location or Well	Boring or Well	Approx. Elev. (USGS)	Depth (Ft.)	Static W.L. Elev.	Drift or Rock	Remarks
35-23	-	Consolidated Coal	NE SE NW	Boring	624	242	-	Rock	1913 Coal
35-24	-	Consolidated Coal	SE NE SW	Boring	619	240	-	Rock	1913 Coal
35-25	-	Consolidated Coal	NE NE NE	Boring	626	235	-	Rock	1913 Coal
35-26	-	Consolidated Coal	SW SW NE	Boring	622	230	-	Rock	1913 Coal
35-27	-	Consolidated Coal	S NE NE	Boring	624	238	-	Rock	1913 Coal
35-28	-	Consolidated Coal	W SW NE	Boring	622	233	-	Rock	1913 Coal
35-29	-	Consolidated Coal	NW SW SW	Boring	609	179	-	Rock	1913 Coal
35-30	3170	Dow Chemical	SW SE NE	Boring	620	136	-	Rock	No well set
35-31	-	Handy Bros.	SE SE NE	Boring	625	301	-	Rock	1907 Coal
35-32	-	Handy Bros.	SW NE SE	Boring	618	234	-	Rock	1904 Coal
35-33	-	Handy Bros.	NE SE NW	Boring	624	227	-	Rock	1906 Coal
35-34	-	Handy Bros.	SW SE SE	Boring	605	258	-	Rock	1904 Coal
35-35	-	Consolidated Coal	NE SE SE	Boring	619	239	-	Rock	1904 Coal
35-36	-	Consolidated Coal	SW SW SE	Boring	595	220	-	Rock	1904 Coal
35-37	-	Handy Bros.	SW SW SE	Boring	605	210	-	Rock	1904 Coal
35-38	-	Handy Bros.	NE NW SE	Boring	617	223	-	Rock	1904 Coal
35-39	-	Handy Bros.	NW SE SE	Boring	605	230	-	Rock	1904 Coal
35-40	-	Handy Bros.	SW NE SE	Boring	617	254	-	Rock	1904 Coal
35-41	-	Handy Bros.	NW NW SE	Boring	616	265	-	Rock	1904 Coal

er to Figure 2. First number is section number

MIDLAND AREA  
BORING AND WELL LOG SUMMARY

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Map* Location	Owner's Well Log No.	Owner's Name	Location	Boring or Well	Approx. Elev. (USGS)	Depth (Ft.)	Static W.L. Elev.	Drift or Rock	Remarks
35-42	-	Handy Bros.	SE SE NW	Boring	622	230	-	Rock	1904 Coal
35-43	-	Handy Bros.	NE NW SE	Boring	625	232	-	Rock	1904 Coal
35-44	3168	Dow Chemical	NW NE NE	Observ.	627	168	623.46	Rock	Screen set at 114'
35-45	-	Handy Bros.	NE NW SE	Boring	615	199	-	Rock	1904 Coal
35-46	-	Handy Bros.	NE NE SW	Boring	619	260	-	Rock	1904 Coal
35-47	-	Handy Bros.	NE NE SW	Boring	595	215	-	Rock	1904 Coal
35-48	-	Handy Bros.	SW SE SW	Boring	605	233	-	Rock	1904 Coal
35-49	-	Handy Bros.	SE SE SW	Boring	605	210	-	Rock	1904 Coal
35-50	-	Handy Bros.	SW NW SW	Boring	595	226	-	Rock	1904 Coal
35-51	-	Handy Bros.	NE SE SW	Boring	600	209	-	Rock	1904 Coal
35-52	-	Handy Bros.	NE NW SW	Boring	605	204	-	Rock	1904 Coal
35-53	-	Handy Bros.	SW NE SW	Boring	600	228	-	Rock	1904 Coal
35-54	-	Handy Bros.	SE NE SW	Boring	600	214	-	Rock	1904 Coal
35-55	3169	Dow Chemical	SW SE NE	Boring	621	96	-	Drift	No well set
36-1	-	Handy Bros.	SW NW NW	Boring	630	290	-	Rock	1906 Coal
36-2	-	Handy Bros.	SW SE NW	Boring	625	287	-	Rock	1905 Coal
36-3	-	Handy Bros.	NW SW NW	Boring	626	173	-	Drift	1905 Coal
36-4	-	Dow Chemical	SW SW SE	Oil-Brine	621.5	4406	-	Rock	Dry
36-5	1131	Waldo C.W. Witherspoon	NW SW NW	Dom.	625	232	535	Rock	Salt Water at 232'

\* Refer to Figure 2. First number is section number.

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MIDLAND AREA  
BORING AND WELL LOG SUMMARY

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Map* Location	Owner's Well Log No.	Owner's Name	Location	Boring or Well	Approx. Elev. (USGS)	Depth (Ft.)	Static W.L. Elev.	Drift or Rock	Remarks
36-6	1428	Bus	W. LaFever	NE SE SW	Dom.	50	608	Drift	
36-7	1185	Waldo	J. Lewis	SW SW NW	Dom.	65	609	Drift	
36-8	1215	Waldo	M. Hochstetler	NW NW SW	Dom.	134	603	Drift	
36-9	1119	Waldo	Dow Chemical	SW NW NW	Dom.	98	595	Drift	
36-10	Salzburg Rd	Central Transport	NE NW NW	Comm.	630	75	608	Drift	

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\* Refer to Figure 2. First number is section number.



McDOWELL & ASSOCIATES  
Geotechnical Engineers

LOG OF SOIL BORING NO. 2704 20-1

PROJECT Installation of  
Observation Wells

JOB NO. 81-134

LOCATION Dow Facilities

SURFACE ELEV. 604.9 DATE 10-6-77, 12, 13-81 Midland, Michigan

Sample # Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Dry Den Wt. P.C.F.	Unc. Comp. Strength PSF	Str. %
			0'10" Firm moist sandy brown topsoil						
	2								
	4		3'0" Compact moist fine oxidized brown sand and silt	5					
A									
UL	6		Compact moist to wet fine to medium brown sand	7					
	8			8					
B	10			10					
UL			Extremely stiff moist silty blue clay, seams of silt, sand and pebbles	13					
	12			15					
	14								
C				30					
UL	16		16'6" Stone	--					
	18								
D	20			31					
UL			Extremely compact wet fine brown sand, seams of gravel	55					
	22			--					
	24								
E				38					
UL	26			52					
	28			--					
			28'6"						
F	30			40					
UL				58					
	32			--					
	34		Extremely stiff moist sandy gravelly blue clay	35					
G				51					
UL	36			--					
	38								
H	40			42					
UL				55					
	42			--					
	44		42'6"						
I			Extremely stiff moist silty blue clay, sand and pebbles	32					
UL	46			46					
	48			--					
J	50		(Cont'd.)	30					
UL				49					
TYPE OF SAMPLE			REMARKS:		GROUND WATER OBSERVATIONS				
D. - DISTURBED					G.W. ENCOUNTERED AT 3 FT. 3 INS.				
U.L. - UNDIST. LINER					G.W. ENCOUNTERED AT 16 FT. 6 INS.				
S.T. - SHELBY TUBE					G.W. AFTER COMPLETION Wash Boring				
S.S. - SPLIT SPOON					G.W. AFTER HRS. FT. INS.				
R.C. - ROCK CORE					G.W. VOLUMES Heavy				
( ) - PENETROMETER									
			Standard Penetration Test: - Driving 2" O.D. Samples 1' With 140# Hammer Falling 30"; Count Made At 6" Intervals						



McDOWELL & ASSOCIATES  
Geotechnical Engineers

LOG OF SOIL BORING NO. 2704 (Cont'd.) 20-1

PROJECT Installation of  
Observation Wells

JOB NO. 81-134 LOCATION Dow Facilities

SURFACE ELEV. 10-6, 7, DATE 12, 13-81 Midland, Michigan

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture - %	Natural Wt. P.C.F.	Dry Den Wt. P.C.F.	Unc. Comp. Strength PSF	Str. %
	52								
	54								
K				34					
UL	56			51					
				--					
	58								
L	60			32					
UL				47					
	62			--					
	64								
M				29					
UL	66			55					
				--					
	68								
N	70			30					
UL				52					
	72			--					
	74		Extremely stiff moist silty blue clay, sand and pebbles						
O				33					
UL	76			53					
				--					
	78								
P	80			36					
UL				48					
	82			--					
	84								
Q				31					
UL	86			49					
				--					
	88								
R	90			30					
UL				44					
	92			--					
	94								
S				36					
UL	96			45					
				--					
	98								
T	100			39					
UL				49					

(Cont'd.)

TYPE OF SAMPLE  
D. - DISTURBED  
U.L. - UNDIST. LINER  
S.T. - SHELBY TUBE  
S.S. - SPLIT SPOON  
R.C. - ROCK CORE  
( ) - PENETROMETER

REMARKS:

Standard Penetration Test - Driving 2" OD Sampler 1' With  
140# Hammer Falling 30"; Count Made At 6" Intervals

GROUND WATER OBSERVATIONS

G.W. ENCOUNTERED AT 3 FT. 3 INS.  
G.W. ENCOUNTERED AT 16 FT. 6 INS.  
G.W. AFTER COMPLETION Wash Boring  
G.W. AFTER HRS. FT. INS.  
G.W. VOLUMES Heavy



McDOWELL & ASSOCIATES  
Geotechnical Engineers

LOG OF SOIL BORING NO. 2704 (Cont'd.) 20-

PROJECT Installation of  
Observation Wells

JOB NO. 81-134 LOCATION Dow Facilities

10-6, 7,

SURFACE ELEV. DATE 12. 13-81 Midland, Michigan

Sample # Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Dry Den Wt. P.C.F.	Unc. Comp. Strength PSF.	Str %
	102		101'0" Extremely compact moist						
			102'6" clayey gray silt						
	104								
U					32				
UL	106				53				
					--				
	108								
V	110			Extremely stiff moist silty blue clay, occasional seams of silt	37				
UL					48				
	112				--				
	114								
W					30				
UL	116		116'0"		44				
					56				
	118								
	120								
	122		30'6" of 5" pipe with four 5" couplings left in hole.						
	124								
	126								
	128								
	130								
	132								
	134								
	136								
	138								
	140								
	142								
	144								
	146								
	148								
	150								
TYPE OF SAMPLE			REMARKS:  Standard Penetration Test - Driving 2" OD Sampler 1' With 140# Hammer Falling 30"; Count Made At 6" Intervals	GROUND WATER OBSERVATIONS					
D. - DISTURBED				G.W. ENCOUNTERED AT 3 FT. 3 INS.					
U.L. - UNDIST. LINER				G.W. ENCOUNTERED AT 16 FT. 6 INS.					
S.T. - SHELBY TUBE				G.W. AFTER COMPLETION Wash Boring					
S.S. - SPLIT SPOON				G.W. AFTER HRS. FT. INS.					
R.C. - ROCK CORE			G.W. VOLUMES Heavy						
( ) - PENETROMETER									

Drilling In

20-2.

Cleaning Out

# HUGH NELSON

~~Oil, Gas and~~ Water Well Service  
PHONE ~~LU~~ LU-84571

FARWELL, MICHIGAN

*water well at  
691 Bldg.*

*CANW 5835-20  
T.M. 125  
Elev 605*

Order No. 70559-X-F  
February 4, 1957

## Inch Casing

1	-	20	plus 6 inches
2	-	21	2
3	-	19	6
4	-	13	8
5	-	20	2
6	-	21	
7	-	19	6
8	-	13	3
9	-	22	6
10	-	11	4
11	-	11	6
12	-	10	4
13	-	14	2
14	-	11	2

## Formation

From	-	To	
0	-	15	Sand
15	-	35	Sand and Clay
35	-	120	Clay
120	-	135	Clay and Hard pan
135	-	240	Gravel and Clay
240	-	285	Shale
285	-	320	Sandy shale
			Some sand streaks in shel

Static water level 10 ft. from surface.  
Well bailed down to 85 ft. at 15 gal. per minute

239 ft. plus 9 inches

# McDOWELL & ASSOCIATES

10659 Galaxie ...

Ferndale, Michigan 48220

Phone: 313 - 399-2066

21-1

DATE 1-20, 21, 22-82

## LOG OF SOIL BORING

JOB NO. 81-134

BORING NO. 2747

ELEVATION 623 =

PROJECT MON. WELL

LOCATION DOW CHEMICAL  
 1000 N.W. 1/4 A78 MIDLAND

CREW CHIEF JOE HELPER JOHN

### GROUND WATER OBSERVATIONS

G.W. ENCOUNTERED AT	FT.	INS.
G.W. ENCOUNTERED AT	FT.	INS.
G.W. AFTER COMPLETION	FT.	INS.
G.W. AFTER	HRS.	FT.
G.W. VOLUMES		INS.

NOTE

part taking routine penetration test one foot above nominal depth & drive 18".

Sample Elev.	Depth	Legend	Depth of Change	Soil Description (Density, Moisture, Color, Texture, etc.)	Blows / 6" OR FORCE LBS.	Penetration
	0	TIME				
	1			ASPHALT & BASE L. J. 52		
	2		1'0"	MOIST FINE BROWN SAND		
	3					
	4		3'4"	STIFF MOIST SILTY OXID. BROWN SAND.		
	5					
	6					
	7					
	8					
	9					
	10		9'6"	MOIST CLAYEY GRAY SILT		
	11					
	12					
	13					
	14		13'6"	STIFF MOIST SILTY BLUE CLAY		
	15					
	16					
	17					
	18					
	19		28'6"	EXT. STIFF MOIST SILTY BLUE CLAY		
	20					
	21					
	22					
	23					
	24		33'0"	EXT. STIFF MOIST GRAVELLY BLUE CLAY HARD PAN.		
	25					

TYPE OF SAMPLE: D.-DISTURBED U.L.-UNDIST. LINER S.T. - SHELBY TUBE S.S.-SPLIT SPOON R.C.-ROCK CORE

	30	
	35	
A	140	
J.L.		
	45	
B	100	
J.L.		
	55	
	60	
	65	
	70	
	75	
	80	

54'0" EXT. STIFF MOIST GRAVELY BLUE CLAY HARDPAN W/OCC. SEAMS OF SAND.

122'0" EXT. STIFF MOIST SILTY BLUE CLAY PAN, OCC. SEAM OF SILT.

↓

155'

BAILED HOLE AFTER COMPLETION NO INFLO.

<b>PLUGGING PROCEDURES</b> Hole filled with <input checked="" type="checkbox"/> Natural Sells <input type="checkbox"/> Bags Cement <input type="checkbox"/> Bags Bentonite <i>SLURRY</i> Time Taken to plug or grout _____ hrs. <b>DRILLING METHOD</b> Auger size _____ Wash Boring _____ Hollow Auger size _____ Profile _____ Casing size _____ Depth _____ Rotary size _____ Drill Mud _____ Diamond Core size _____ Hand Auger Boring _____ Swamo Suggy or <u>drill</u> used _____ Dozer Rental _____ Hours _____ Remarks: _____ _____ _____ _____		<b>CONSISTENCY: PENETRATION</b> <table border="0"> <tr> <td><b>SAND</b></td> <td><b>CLAY</b></td> </tr> <tr> <td>Very Loose</td> <td>Extremely Soft</td> </tr> <tr> <td>Loosely Compact</td> <td>Very Soft</td> </tr> <tr> <td>Slightly Compact</td> <td>Soft</td> </tr> <tr> <td>Medium Compact</td> <td>Firm</td> </tr> <tr> <td>Compact</td> <td>Stiff</td> </tr> <tr> <td>Very Compact</td> <td>Very Stiff</td> </tr> <tr> <td>Extremely Compact</td> <td>Extremely Stiff</td> </tr> </table>	<b>SAND</b>	<b>CLAY</b>	Very Loose	Extremely Soft	Loosely Compact	Very Soft	Slightly Compact	Soft	Medium Compact	Firm	Compact	Stiff	Very Compact	Very Stiff	Extremely Compact	Extremely Stiff
<b>SAND</b>	<b>CLAY</b>																	
Very Loose	Extremely Soft																	
Loosely Compact	Very Soft																	
Slightly Compact	Soft																	
Medium Compact	Firm																	
Compact	Stiff																	
Very Compact	Very Stiff																	
Extremely Compact	Extremely Stiff																	
<b>GENERAL INFORMATION</b> Boring Offset to _____ Is this hourly job _____ hours this hole _____ Was boring abandoned _____ Why _____ Was gas observed _____ where _____ Note any unusual conditions: _____ _____ _____																		





Water Well at Main Lab.

South of 143 Bldg.

Drilled May and June 1940

267' 10 3/4" 42# Drive pipe

267' - 390' Shale  
390' - 476' Sandstone - water  
476' - 478' Shale T.D.

Drilling In

Cleaning Out

*101 SW 60 N 1/2 Sec. 2*  
*21-4*

# HUGH NELSON

Oil, Gas and Water Well Service

PHONE ~~88-11~~ 118

FARWELL, MICHIGAN

Order #14161-X-EAS  
Well drilled at 153 Eld.

11/10/54

*Elev 622*

4 inch Casing.

1--	23	ft.	plus 6 inches
2--	23	"	
3--	23	"	2 "
4--	22	"	6 "
5--	21	"	6 "
6--	22	"	4 "
7--	21	"	4 "
8--	22	"	2 "
9--	21	"	6 "
0--	11	"	4 "
1--	18		
2--	10		
3--	11		

21 261 ft. plus 2 inches.

From	0 ft.	to	12 ft.	Fill dirt and sand
"	12	"	68	Clay and hard pan
"	68	"	175	Clay
"	175	"	261	Clay and hard pan
"	261	"	275	Sand (very hard) little show of water.
"	275	"	435	Shale
"	435	"	460	Saginaw sand

Water level 40 ft. from surface.

Well bailed down 10 ft. at 25 gal. per minute.

C  
O

P

Y

## THE DOW CHEMICAL COMPANY

613 1) WSE Sec. 21

TINNY RILL

Water Well

Elev 617

Subject: Log of Well at 137 Bldg. - Cell Bldg.

<u>Thickness</u>	<u>Formation</u>	<u>Depth</u>
210'	Clay and hard pan	210'
60	Sand and clay	270
10	Sandy shale	280
26	Sand Rock	306
12	Brown shale	318
83	Light shale	400
5	Fine sand rock	405
15	Sandy shale	420
2	Gray shale	422
6	Fine sand rock	428
22	Gray Shale	450
11	Fine sand rock	461
57	Sand rock	518
2	Black shale	520

500 ft.  
Well

Soap hardness - grams $\text{CaCO}_3$ /U.S.gal.	51
( $\text{HCO}_3$ ) parts per million	195
Total $\text{Cl}_2$ as Cl	4615
Total C. as $\text{CaO}$	496
Total Mg as $\text{MgO}$	136
Total $\text{SO}_4$ as $\text{CaSO}_4$	588
Total Solids	8425

3.65

H. E. Houser

HEH'w

TO: T. B. Shudark  
D. A. Spalding  
J. Sinclair THE DOW CHEMICAL COMPANY  
MIDLAND MICHIGAN

MAIN LABORATORY  
REPORT SHEET

DATE November 15, 1954

CHARGE 33-26

MAIN LAB. NUMBER SSR 207-774

YOUR NUMBER 11-8-54 Depth 450'.

DESCRIPTION Water from cooling vel Bag Plant - 137 Bldg.

ANALYSES OR TEST:

Total Cl' as	ppm NaCl	3238
	ppm Ca	120
	ppm Mg	42
	ppm SO <sub>4</sub>	195
Total Hardness as	ppm CaCO <sub>3</sub>	476
Total Alkalinity as	ppm CaCO <sub>3</sub>	184
	pH	7.4
	ppm total solids	3865

BY G. M.  
cjb

143 Building-Phone 8224  
G. B. Wengert

SIGNED GPW

*water well #71 Bldg.*

21-6  
Cleaning Out

# HUGH NELSON

Oil, Gas and Water Well Service

PHONE 634-113

FARWELL, MICHIGAN

C4 NW SE

Sec. 21

Order #55114 EAS  
5/5/53

## Formation of water well.

Fig. 22

Formation from 0 ft. to 15 ft.				
"	15	"	47	sand
"	47	"	58	clay
"	58	"	67	clay and hard pan
"	67	"	77	muddy sand and clay
"	77	"	87	clay
"	87	"	97	clay
"	97	"	162	clay and hard pan
"	162	"	171	clay
"	171	"	237	muddy sand
"	237	"	245	clay
"	245	"	254	muddy sand
"	254	"	260	clay
"	260	"	283	muddy sand
"	283	"	307	sand and clay
"	307	"	453	stray sand
"	453	"	490	shale
				saginaw sand

Drilling In

21-6

Cleaning Out

*water well #71 Old.*

# HUGH NELSON

Oil, Gas and Water Well Service

PHONE \*\*\* 118

FARWELL, MICHIGAN

Order #55114 EaS

5/5/53

## Description of well

4 inch casing.

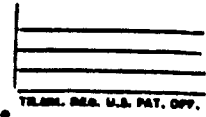
1--	23	ft.	plus	4	inches.
2--	22	"		4	"
3--	21	"		10	"
4--	22	"		2	"
5--	22	"		6	"
6--	22	"		4	"
7--	10	"		9	"
8--	11	"		2	"
9--	10	"		11	"
10--	11	"		4	"
11--	10	"		9	"
12--	11	"		2	"
13--	10	"		2	"
14--	11	"			
15--	14	"		2	"
16--	14	"		4	"
17--	14	"			
18--	12	"		4	"
19--	7	"		3	"

Total 283 ft. plus 10 inches.

Well finished in Saginaw Sand.

Static level of well 15 ft. Draw down to 60 ft. at  
30 gal. per. minute.

ORIGINAL COPY. 1940 BY J. G. PARKER



Water Well at 71 Bldg.

Drilled in April 1953

By - Hugh Nelson

4 1/2" O.D. Casing 284 ft.

Some sand at 300 ft. but  
very little water

Saginaw sand 453 ft.

Total depth 490 ft.

Water level 12 ft.

Draw down to 60 ft.  
at 30 gal. per min.

This well swelled over the  
casing while pulling the bailer

Set pump at 80 ft. on 1 1/2" pipe.

7-29-53 - Lowered pump to  
160 ft. Pump was pumping air.

10-26-53 - Shorted. Pulled  
unit - sent to Reda for repair.

LEFAX, PHILADELPHIA 1, PA., MADE IN U.S.A.

## H &amp; 11th Streets

Drilled March 1966

50175-032 \$4,319.00

By H. Nelson

6" Water Well 252'

25 ft Wire Wound Screen

Develop &amp; Install Equipment

Drill 4" Test Well

## Formation 0-25 Sand

25-110 Hardpan &amp; Clay

110-170 Clay

170-195 Fine Sand &amp; Silt

195-205 Clay

205-252 Sand



Drilling In

*West side  
Power House  
on River Bank*

HUGH NELSON

Oil, Gas and Water Well Service

PHONE 118

FARWELL, MICHIGAN

Order # A 981751EAS <sup>21-8</sup> Cleaning Out

23-12-11

C/S 111 N 53 W Sec 21

T14N R2E

E120. 611  
4/20/54

	4. inch casing
1-- 21	ft. plus 3 inches
2-- 21	" 3 "
3-- 21	
4-- 21	
5-- 20	" 6 "
6-- 21	" 4 "
7-- 21	" 4 "
8-- 20	" 9 "
9-- 20	" 10 "
10-- 10	" 6 "
11-- 9	" 4 "
12-- 10	

240 ft. --- up 6'

From	Formation	to
0	15	Fill sand.
15	42	sand and gravel.
42	95	Clay and hard pan.
95	110	Muddy sand.
110	138	Clay.
138	145	Muddy sand.
145	190	Clay.
190	210	Clay and hard pan.
210	238	Sand.

## THE DOW CHEMICAL COMPANY

July 31, 1942

TO: Mr. J. Sinclair

ATTENTION:

FROM: Mr. W. E. Gruber, Engr. Dept.

SUBJECT: Cold Water Well at West Side Power House

Please be sure the Engineering Department is supplied with the following information on the Cold water well at the West Side Power House when it is completed.

- (1) Static Water level in the well. *48 ft*
- (2) The draw down at capacity of well *5-0 ft*
- (3) Capacity of well *12 gals per min at 5 ft draw*
- (4) Depth of the well *235'-6"*
- (5) Depth of 3" casing in the well *224 ft*
- (6) Type of water bearing strata at bottom of well, drift sand, gravel, or rock, etc. *Drift sand.*  
(To determine size screen required)
- (7) Temperature of water. *54° F*

Very truly yours,

THE ENGINEERING DEPARTMENT

By W E Gruber

WEG/p

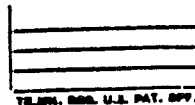
*gpm*

*Screen is installed and well is  
ready for pump.*

*JH*

8-11-42

Water Well At  
West Side Power House



Drilled in 1943

By - Mr. Coal of Cadillac

8-4-52 - Hugh Nelson bailed at  
5 GPM got a large amount of  
rust but no sand in Aug. 1952.

3" Casing 220 ft.

2 pcs. of 3" screen

Total depth 226 ft.

9-2-53 - Set a new jacuzzi  
three stage jet pump - with 3"  
leather cup packer set at 124 ft.  
on 1 1/4" pipe

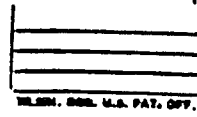
3-24-54 - Sand came in and  
some clay.

3-29-54 - Pulled pump, pushed  
burlap sack to 45' and filled  
3" pipe full of cement.

ORIGINAL COPY. 1952 BY J. G. PARKER

LEFAX, PHILADELPHIA 7, PA., MADE IN U.S.A.

ORIGINAL COPY. 1960 BY J. G. PARKER



West Side Power House

Drilled in April 1954

By - Hugh Nelson

4" Gal. Pipe 232 ft.

Lead top screen 8 ft.

*TOTAL DEPTH* 238

Flowed 1" stream 2' above ground

Bailed down to 15 ft.  
at 20 gal. per min.

Good sand 210 to 238 ft.

LEFAX PHILADELPHIA 7, PA., MADE IN U.S.A.

**McDOWELL & ASSOCIATES**  
Geotechnical Engineers

LOG OF SOIL BORING NO. 2703 22-1  
PROJECT Installation of  
Observation Wells

JOB NO. 81-134 LOCATION Dow Facilities  
632.54 9-29, '30  
 SURFACE ELEV. ~~630.0~~ + DATE 10-1, 2-81 Midland, Michigan

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Dry Den Wt. P.C.F.	Unc. Comp. Strength PSF	Str. %
	2		1'0" Compact moist sandy brown topsoil						
	4		2'9" → Compact moist fine medium organic brown sand						
A	6				5				
UL	8			Compact moist to wet fine brown sand	5				
	10			6					
B	12								
UL	14		9'8"		5				
	16				7				
	18			8					
C	20								
UL	22				5				
	24				7				
	26		Stiff moist silty blue clay, seams of silt						
D	28				4				
UL	30				6				
	32				7				
	34								
E	36								
UL	38				3				
	40				5				
	42			7					
F	44								
UL	46				4				
	48				4				
	50		32'0"	6					
	52								
G	54								
UL	56				4				
	58			5					
H	60				6				
UL	62								
	64								
	66		Stiff moist silty blue clay, layers of silt						
I	68				4				
UL	70				5				
	72				6				
	74								
J	76								
UL	78								
	80								
	82		39'4"						
	84				18				
	86				34				
	88				38				
	90		Extremely stiff moist blue clay, hardpan, high sand and pebble content						
	92								
	94								
	96								
	98								
	100				36				
	102				34				
	104				38				
	106		47'6"						
	108								
	110								
	112								
	114		Extremely compact wet fine gray sand (Cont'd.)						
	116								
	118								
	120				68				
	122			--					

**TYPE OF SAMPLE**

D. - DISTURBED

U.L. - UNDIST. LINER

S.T. - SHELBY TUBE

S.S. - SPLIT SPOON

R.C. - ROCK CORE

( ) - PENETROMETER

**REMARKS:**

Standard Penetration Test - Driving 2" O.D. Sampler 1' With 140# Hammer Falling 30"; Count Made At 6" Intervals

**GROUND WATER OBSERVATIONS**

G.W. ENCOUNTERED AT 6 FT. 6 INS.

G.W. ENCOUNTERED AT 6 FT. INS.

G.W. AFTER COMPLETION Wash Boring

G.W. AFTER HRS. FT. INS.

G.W. VOLUMES Medium



McDOWELL & ASSOCIATES  
Geotechnical Engineers

LOG OF SOIL BORING NO. 2703 (Cont'd.) 22

PROJECT Installation of  
Observation Wells

JOB NO. 81-134

LOCATION Dow Facilities

SURFACE ELEV. 630.0 + DATE 9-29, 30, 10-1, 2-81 Midland, Michigan

Sample # Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Dry Den Wt. P.C.F.	Unc. Comp. Strength PSF.	Str %
	52		51'3" Extremely compact wet fine gray sand						
	54								
K				39					
UL	56		Extremely stiff moist silty blue clay, layers of sand and silt	70					
	58		57'0"	--					
L	60			54					
UL				33/B"					
	62								
	64								
M				32					
UL	66			42					
				--					
	68								
N	70			37					
UL				49					
	72			--					
	74								
O			Extremely stiff moist blue clay, hardpan, high sand and pebble content	28					
UL	76			45					
				--					
	78								
P	80			31					
UL				43					
	82			--					
	84								
Q				30					
UL	86			47					
				--					
	88								
R	90			33					
UL				45					
	92			--					
	94		93'6"						
S				38					
UL	96		Extremely stiff moist silty blue clay, hardpan, occasional sand and pebbles	47					
				--					
	98								
T	100			35					
UL			(Cont'd.)	45					
TYPE OF SAMPLE			REMARKS:		GROUND WATER OBSERVATIONS				
D. - DISTURBED					G.W. ENCOUNTERED AT 6 FT. 6 INS.				
U.L. - UNDIST. LINER					G.W. ENCOUNTERED AT FT. INS.				
S.T. - SHELBY TUBE					G.W. AFTER COMPLETION Wash Boring				
S.S. - SPLIT SPOON					G.W. AFTER HRS. FT. INS.				
R.C. - ROCK CORE					G.W. VOLUMES Medium				
( ) - PENETROMETER									
			Standard Penetration Test - Driving 2" O.D. Sampler 1' With 140# Hammer Falling 30"; Count Made At 6" Intervals						



McDOWELL & ASSOCIATES  
Geotechnical Engineers

LOG OF SOIL BORING NO. 2703 (Cont'd.)

PROJECT Installation of  
Observation Wells

JOB NO. 81-134

LOCATION Dow Facilities

SURFACE ELEV. 630.0 ±

DATE 9-29, 30,  
10-1, 2-81

Midland, Michigan

Sample # Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Dry Den Wt. P.C.F.	Unc. Comp. Strength PSF	Su %
	102								
	104								
U				36					
UL	106			44					
				--					
	108								
V	110			35					
UL				42					
	112			--					
	114								
W				26					
UL	116			35					
				--					
	118								
X	120		Extremely stiff moist silty blue clay, hardpan, occasional sand and pebbles	30					
UL				32					
	122			--					
	124								
Y				28					
UL	126			31					
				--					
	128								
Z	130			28					
UL				33					
	132			--					
	134								
ZA				22					
UL	136			30					
				--					
	138								
ZB	140		12'6" of 5" pipe with coupling left in hole - hole filled with mud.	21					
UL				31					
	142			--					
	144								
	146								
	148								
			148'0"						
	150								
TYPE OF SAMPLE D. - DISTURBED U.L. - UNDIST. LINER S.T. - SHELBY TUBE S.S. - SPLIT SPOON R.C. - ROCK CORE ( ) - PENETROMETER			REMARKS:  Standard Penetration Test - Driving 2" O.D. Sampler 1' With 140# Hammer Falling 30"; Count Made At 6" Intervals	GROUND WATER OBSERVATIONS G.W. ENCOUNTERED AT 6 FT. 6 INS. G.W. ENCOUNTERED AT FT. INS. G.W. AFTER COMPLETION Wash Boring G.W. AFTER HRS. FT. INS. G.W. VOLUMES Medium					



McDOWELL & ASSOCIATES  
Geotechnical Engineers

LOG OF SOIL BORING NO. 2706 22-2  
PROJECT Installation of  
Observation Wells  
JOB NO. 81-134 LOCATION Dow Facilities  
SURFACE ELEV. 629.6 - 629.0 + 11-2, 3,  
DATE & 4-81 Midland, Michigan

Sample # Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Dry Den Wt. P.C.F.	Unc. Comp. Strength PSF	Str. %
	2		Compact moist fine oxidized brown sand						
	4								
	6		5'0" Compact moist to wet fine silty gray sand						
	8		7'9"						
	10								
	12								
	14								
	16								
	18		Very stiff moist silty blue clay, sand and pebbles						
	20								
	22								
	24								
	26								
	28								
	30								
	32								
	34		34'0"						
	36		Extremely stiff moist sandy blue clay						
	38								
	40		39'6"						
	42								
	44		Extremely stiff moist blue clay, hardpan, sand and pebbles, occasional stones						
	46								
	48								
	50		(Cont'd.)						
TYPE OF SAMPLE D. - DISTURBED U.L. - UNDIST. LINER S.T. - SHELBY TUBE S.S. - SPLIT SPOON R.C. - ROCK CORE ( ) - PENETROMETER			REMARKS:  Standard Penetration Test - Driving 2" DO Sampler 1' With 140 # Hammer Falling 30"; Count Made At 6" Intervals		GROUND WATER OBSERVATIONS G.W. ENCOUNTERED AT 5 FT. 0 INS. G.W. ENCOUNTERED AT FT. INS. G.W. AFTER COMPLETION FT. INS. G.W. AFTER HRS. FT. INS. G.W. VOLUMES Medium				





McDOWELL & ASSOCIATES  
Geotechnical Engineers

LOG OF SOIL BORING NO. 2706 (Cont'd.) 27-


PROJECT Installation of  
Observation Wells

JOB NO. 81-134

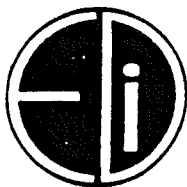
LOCATION Dow Facilities

SURFACE ELEV. 629.0 + 11-2, 3,  
DATE & 4-81

Midland, Michigan

Sample to Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Dry Den Wt. P.C.F.	Unc. Comp. Strength PSF	Str %	
	52		Extremely stiff moist blue clay, hardpan, sand and pebbles, occasional stones							
	54									
	56		56'0"	Extremely stiff moist gravelly blue clay, hardpan, streaks of sand						
	58									
	60		59'0"	Extremely stiff moist silty blue clay, hardpan, occasional stones						
	62									
	64									
	66									
	68									
	70									
	72	71'0"	Extremely stiff moist silty sandy blue clay, hardpan, occasional seams of sand							
	74									
A	76			30						
UL	76			38						
	78	77'0"	Extremely stiff moist silty blue clay, hardpan, occasional stones	46						
	80									
	90									
	100									
	110									
	120									
	130									
	140									
	150									
	160	160'0"								
	170									
	180									
TYPE OF SAMPLE			REMARKS:	GROUND WATER OBSERVATIONS						
D. - DISTURBED			Standard Penetration Test - Driving 2" OD Sampler 1' With 140# Hammer Falling 30"; Count Made At 6" Intervals	G.W. ENCOUNTERED AT	5	FT.	0	INS.		
U.L. - UNDIST. LINER				G.W. ENCOUNTERED AT		FT.		INS.		
S.T. - SHELBY TUBE				G.W. AFTER COMPLETION		FT.		INS.		
S.S. - SPLIT SPOON				G.W. AFTER	HRS.	FT.		INS.		
R.C. - ROCK CORE				G.W. VOLUMES	Medium					
( ) - PENETROMETER										

Standard Penetration Test - Driving 2" OD Sampler 1' With  
140# Hammer Falling 30"; Count Made At 6" Intervals



**EDI ENGINEERING & SCIENCE**  
 ENGINEERS / GEOLOGISTS / BIOLOGISTS / CHEMISTS  
 611 CASCADE W. PKWY. S.E.; GRAND RAPIDS, MI 49508; (616) 942-0970

PROJECT NO. 20245  
 OWNERS WELL NO. 3137  
 CLIENT DOW CHEMICAL  
 DATE 3-19-84

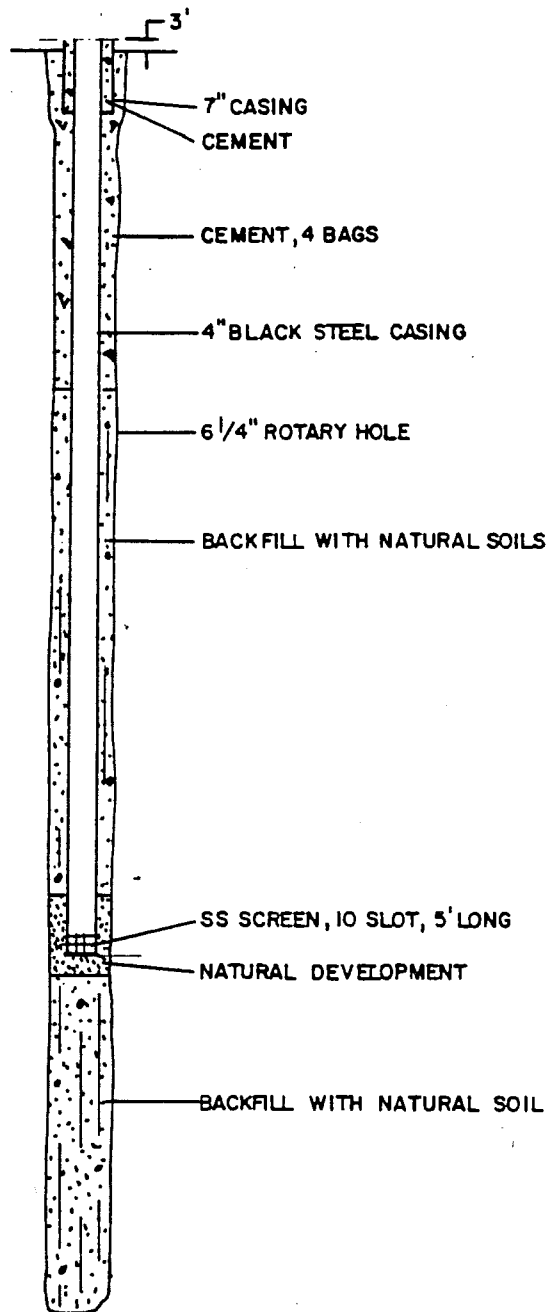
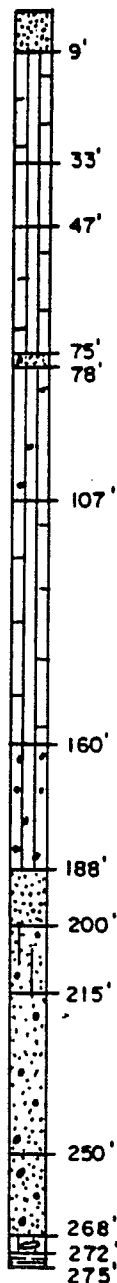
# BORING & WELL RECORD

CONTRACTOR: RAYMER

ELEVATIONS: LAND SURFACE ~ 628  
 TOP OF CASING 630.96

## LOCATION

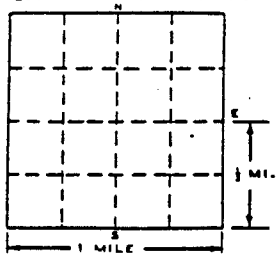
SAND  
 CLAY, HARD, BROWN  
 CLAY, SOFT, GRAY  
 CLAY, HARD  
 SAND & GRAVEL  
 CLAY, HARD BROWN, SOME STONES.  
 CLAY, HARD  
 CLAY, GRAVEL  
 SAND  
 SAND & GRAVEL, SANDY CLAY  
 SAND & FINE GRAVEL  
 GRAVEL & SAND  
 CLAY & SHALE  
 SHALE, BLACK



DRILLED BY MUD ROTARY

STATIC WATER LEVEL 8.5' BELOW TOP OF CASING

WATER WELL RECORD  
ACT 294 PA 1965MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH

<b>1 LOCATION OF WELL</b>			<b>22-</b>		
County <b>Midland</b>	Township Name <b>Midland</b>	Fraction %    %    %	Section Number <b>15</b>	Town Number <b>14</b> N/W	Range <b>2</b> E/W
Distance And Direction from Road Intersections  <b>East of parking area at 1803 Bldg Off of Washington</b>			3 OWNER OF WELL: <b>Dow Chemical U.S.A.</b> Address <b>Midland, Mi 48620</b>		
Street address & City of Well Location  Locate with "X" in section below 			4 WELL DEPTH: (completed) Date of Completion <b>310</b> ft.		
Sketch Map:			5 <input checked="" type="checkbox"/> Cable tool <input type="checkbox"/> Rotary <input type="checkbox"/> Driven <input type="checkbox"/> Dug <input type="checkbox"/> Hollow rod <input type="checkbox"/> Jetted <input type="checkbox"/> Bored <input type="checkbox"/>		
			6 USE: <input type="checkbox"/> Domestic <input type="checkbox"/> Public Supply <input checked="" type="checkbox"/> Industry <input type="checkbox"/> Irrigation <input type="checkbox"/> Air Conditioning <input type="checkbox"/> Commercial <input checked="" type="checkbox"/> Test Well <input type="checkbox"/>		
2 FORMATION			7 CASING: Threaded <input type="checkbox"/> Welded <input checked="" type="checkbox"/> Height: Above/Below Diam. _____ Surface <b>1</b> ft.		
			4 _____ in. to <b>285</b> ft. Depth Weight <b>11</b> lbs./ft. _____ in. to _____ ft. Depth Drive Shoe? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		
Sand			8 SCREEN:		
Clay			Type: _____ Dia.: _____ Slot/Gauze _____ Length _____ Set between _____ ft. and _____ ft. Fittings: _____		
Hardpan & clay			9 STATIC WATER LEVEL		
Watersand			<b>15</b> ft. below land surface		
Clay			10 PUMPING LEVEL below land surface		
Watersand			_____ ft. after _____ hrs. pumping _____ g.p.m. _____ ft. after _____ hrs. pumping _____ g.p.m.		
Sand rock			11 WATER QUALITY in Parts Per Million:		
			Iron (Fe) _____ Chlorides (Cl) _____ Hardness _____ Other _____		
			12 WELL HEAD COMPLETION: <input type="checkbox"/> In Approved Pit <input type="checkbox"/> Pitless Adapter <input type="checkbox"/> 12" Above Grade		
			13 Well Grouted? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Neat Cement <input type="checkbox"/> Bentonite <input type="checkbox"/> _____ Depth: From _____ ft. to _____ ft.		
Set screen at 209'			14 Nearest Source of possible contamination		
Static 10' --40GPM			_____ feet _____ Direction _____ Type _____ Well disinfected upon completion <input type="checkbox"/> Yes <input type="checkbox"/> No		
			15 PUMP: <input checked="" type="checkbox"/> Not installed		
Set screen at 257'			Manufacturer's Name _____		
Static 8' -- 100 GPM			Model Number _____ HP _____ Volts _____ Length of Drop Pipe _____ ft. capacity _____ G.P.M. Type: <input type="checkbox"/> Submersible <input type="checkbox"/> Jet <input type="checkbox"/> Reciprocating		
USE A 2ND SHEET IF NEEDED					
16 Remarks, elevation, source of data, etc.			17 WATER WELL CONTRACTOR'S CERTIFICATION:		
			This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief. <b>Nelson Well Drilling</b> <b>0241</b> REGISTERED BUSINESS NAME REGISTRATION NO. Address <b>245 Corning Farwell, Mi 4</b> Signed <i>[Signature]</i> <b>2-12-81</b> AUTHORIZED REPRESENTATIVE		

SUBJECT Location of well west of 1803 Bldg. SHEET NO. \_\_\_\_\_ OF 22  
DATE 7/30/91 BY J. Binkley 6-4200

N  
|

$\frac{S2442.25}{E2357.48}$  center of well

Washington

$\frac{N2019.34}{E1609.85}$   
HUSTIN

23-1  
106

## MICHIGAN DRILLING COMPANY

DATE 12-1-34

## LOG OF SOIL BORING

BORING NO. 1

SURFACE ELEV. 121.1

JOB NO. 68-310

PROJECT Soils Exploration

GROUND WATER TABLE 5'9"

LOCATION Waldo Road

G. W. VOLUME Heavy

Midland, Michigan

SAMPLE NUMBER	ELEV.	LEGEND	SOIL DESCRIPTION	BLOWS PER 12" PENETRATION	NATURAL WT. PER CU. FT.	MOISTURE %	RING SHEAR LB SQ FT.	UNCONF. INDEXED COMPRESSION
	2		0'5" Firm moist sandy brown top soil					
			2'2" Medium compact moist fine yellow sand					
673A	4		Compact moist fine yellow and brown sand	15	107.8	13.4		
	6		5'9" Slightly compact wet fine brown sand	2 1/2	112.1	18.8		
673B	8		8'6" Compact wet fine gray sand, streak of peat	12	121.9	20.0		
	10		12'0" Very stiff moist reddish-brown clay, sand and pebbles, lenses of silt	18		17.8	1320	4
673D	12		17'6" Very stiff moist reddish-brown clay, sand and pebbles	20	129.7	16.7	1340	5
	14		27'7" Stiff moist reddish-brown clay, sand and pebbles	18	128.3	14.7	1535	6
673E	16			15	125.2	16.5	740	2
673F	18			13	132.1	16.6	610	2
	20			14	130.4	17.9	540	2
673G	22		44'6" Very stiff moist blue clay, sand and pebbles, streak of sand	20	129.3	23.6	640	2
	24			25	131.9	16.1	890	3
673H	26		53'0" Extremely stiff moist blue clay, sand and pebbles	74	137.7	10.1	200	3
673I	28		58'0"	96	139.2	8.9	2110	17

# MICHIGAN DRILLING COMPANY

DATE 12-1-64

## LOG OF SOIL BORING

BORING NO. 674

SURFACE ELEV. 119.6

JOB NO. 64-940

PROJECT Soils Exploration

LOCATION Waldo Road

GROUND WATER TABLE 5'8"

Midland, Michigan

G. W. VOLUME Heavy

Offset approximately 30' North

SAMPLE NUMBER	ELEVATION	LEGEND	SOIL DESCRIPTION	BLOWS PER 12" PENETRATION	NATURAL WT. PER CU. FT.	MOISTURE %	RING SHEAR LB SQ. FT.	UNCONFINED COMPRESSION
674A	2		0'0" Firm moist sandy loamie brown top soil, roots					
	4		2'0" Medium compact moist fine brown sand and roots					
	6		Compact moist fine brown sand		101.7	7.5		
674B	8		5'8" Slightly compact wet fine gray sand	3	122.3	20.2		
	10		8'10" Very compact wet fine gray sand	19	116.3	17.4		
	12		12'9" Very stiff moist reddish-brown clay, sand and pebbles, lenses of silt	19	133.2	14.3	1125	43
674C	14							
	16							
	18							
674D	20		21'6" Very stiff moist reddish-brown clay, sand and pebbles	18	129.1	16.2	940	39
	22			18	128.3	16.1	920	29
674E	24			19	132.9	16.0	1050	40
	26		33'6" Very stiff moist blue clay, sand and pebbles	20	127.5	16.7	540	21
674F	28			18	130.2	16.6	595	20
	30			17	128.8	17.1	625	26
674G	32		49'6" Extremely stiff moist blue clay, sand and pebbles	30	127.5	19.0	670	26
	34			35	135.2	10.5	640	23
674H	36		57'6" Extremely stiff moist blue clay, sand and pebbles, streak of sand	79	136.7	8.9	2060	137
	38		64'0"	118	142.3	8.1	2190	189

# MICHIGAN DRILLING COMPANY

DATE 12-7-64

## LOG OF SOIL BORING

BORING NO. 1

JOB NO. 61-040

PROJECT Soils Exploration

SURFACE ELEV. 115

LOCATION Church Street

GROUND WATER TABLE 314

Midland, Michigan

G. W. VOLUME Hea

SAMPLE NUMBER	ELEVATION	LEGEND	SOIL DESCRIPTION	BLOWS PER 12" PENETRATION	NATURAL WT. PER CU. FT.	MOISTURE %	RING SHEAR LB SQ. FT.	UNCONFINED COMPRESSIVE STRENGTH LB SQ. IN.
	2		0'7" Soft moist sandy and loamy top-soil and roots					
	4		Medium compact moist fine brown sand and roots					
675A	4		3'4" Compact wet fine brown sand	9	121.1	22.1		
	6							
675B	8		6'9" Very compact wet fine brown sand	19	124.4	19.7		
	10							
675C	12		10'0" Stiff moist reddish brown clay, lenses of silt	14	123.9	24.8	560	2
	14		12'10"					
675D	16		Very stiff moist reddish brown clay, sand and pebbles	22	132.2	15.3	1225	4
	18							
675E	20			19	131.8	14.9	1055	7
675F	25			17	127.5	18.7	570	2
	30		29'6" Stiff moist reddish brown clay, sand and pebbles	16	130.8	18.2	585	2
675G	35			14	125.8	18.4	395	1
675H	40		39'6" Stiff moist silty blue clay, lenses of silt, rouge markings	13	130.3	15.5	370	1
675J	45		44'0" Very stiff moist blue clay, sand and pebbles, streaks of	25	133.1	15.4	450	1
675K	50		48'6" sand	37	139.1	10.5	2005	10
675L	55		Extremely stiff moist blue					
	55		54'0" clay, sand and pebbles	129	141.2	6.9	21	9

# MICHIGAN DRILLING COMPANY

DATE 12-4-54

## LOG OF SOIL BORING

BORING NO. 676

WOB NO. 64-940

PROJECT Soils Exploration

SURFACE ELEV. 117.9

LOCATION Church Street

GROUND WATER TABLE 3'6"

Midland, Michigan

G. W. VOLUME Heavy

SAMPLE NUMBER	ELEVATION	LEGEND	SOIL DESCRIPTION	BLOWS PER 12" PENETRATION	NATURAL WT. PER CU. FT.	MOISTURE %	RING SHEAR LB SQ FT.	UNCONF. LINED COMPRESSION
	2		0'6" Firm moist sandy and loamie brown top soil and roots					
	4		2'6" Medium compact moist fine brown sand and roots					
676A	6		Compact moist to wet fine brown sand	16	121.9	20.0		
676B	8		Slightly compact wet fine brown sand	4 1/2	120.2	20.3		
676C	10		9'10" Stiff moist reddish brown clay, sand and pebbles, lenses of silt	9	123.1	23.1	605	24
	12		12'9" Very stiff moist reddish-brown clay, sand and pebbles	17	127.8	18.1	590	22
676D	14							
	16							
676E	20							
	22		22'6" Stiff moist reddish-brown clay, sand and pebbles	18	128.8	15.2	1270	53
676F	25		26'7" Stiff moist reddish brown clay, sand and pebbles, streaks of wet sand	13	132.2	14.3	590	290
676G	30			12	135.8	11.0	560	215
676H	35			11	129.1	15.5	520	209
676I	40			11	124.7	13.9	200	77
676J	45		44'0" Stiff moist silty blue clay, sand and pebbles, lenses of silt, rouge markings	14	130.7	17.3	345	1580
676K	50		50'0" Extremely stiff moist blue clay, sand and pebbles	27	135.8	12.4	670	265
676L	55		53'9" Extremely stiff moist blue clay, sand and pebbles	110	141.3	9.0	2090	1898
676M	60		50'0"	132	142.8	8.5	2120	1972



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106

## MICHIGAN DRILLING COMPANY

DATE 12-8-64

## LOG OF SOIL BORING

BORING NO. 7

SURFACE ELEV. 111.6

JOB NO. 61-910

PROJECT Soils Exploration

GROUND WATER TABLE 212"

LOCATION Church Street

G. W. VOLUME Heavy

Midland, Michigan

SAMPLE NUMBER	ELEVATION	LEGEND	SOIL DESCRIPTION	BLOWS PER 12" PENETRATION	NATURAL WT. PER CU. FT.	MOISTURE %	RING SHEAR LB SQ. FT.	UNCONFINED COMPRESSION
	112.2		0'8" Soft moist sandy and loamy top-soil and roots					
677A	111.8		3'3" Medium compact moist fine brown sand and roots	10	116.6	24.5		
	111.5		Compact wet fine brown sand					
677E	110.8		5'10" Medium compact wet fine brown sand	7	116.1	22.6		
	110.5							
677C	110.2		9'6" Compact wet fine brown sand	8	128.3	16.8		
	109.8		11'2" Stiff moist reddish brown clay, sand and pebbles					
677D	109.5			13	122.8	24.5	690	25
	109.2							
677E	108.8		17'6" Very stiff moist reddish brown clay, sand and pebbles	20	132.2	16.8	740	30
677F	108.5			19	132.0	14.5	670	26
677G	108.2			17	133.3	12.7	440	16
677H	107.8		33'7" Stiff moist silty blue clay, lenses of silt	11	123.6	22.1	400	16
677I	107.5			9	119.4	19.5	465	19
677J	107.2		44'9" Extremely stiff moist blue clay, sand and pebbles	28	131.3	16.7	630	26
677K	106.8		47'0" Extremely stiff moist blue clay, sand and pebbles, streaks of	78	139.7	9.6	1325	51
677L	106.5		52'0" sand	107	140.9	8.2	2100	79

23-6

101

## MICHIGAN DRILLING COMPANY

DATE 12-3-64

## LOG OF SOIL BORING

BORING NO. 678

SURFACE ELEV. 112.3

GROUND WATER TABLE 3'0"

G. W. VOLUME Heavy

JOB NO. 64-940

PROJECT Soils Exploration

LOCATION Church Street

Midland, Michigan

SAMPLE NUMBER	ELEVATION	LEGEND	SOIL DESCRIPTION	BLOWS PER 12" PENETRATION	NATURAL WT. PER CU. FT.	MOISTURE %	RING SHEAR LB SQ. FT.	UNCONFINED COMPRESSION
	2		0'6" Soft moist loamie top soil, roots					
	4		Medium compact moist fine brown sand and roots					
678A	4		3'0" Compact wet fine brown sand, discolored streaks	16	113.1	19.6		
	6		5'10" Medium compact wet fine brown sand	7	112.0	13.8		
678B	8		8'0" Very stiff moist reddish-brown clay, sand and pebbles, lenses of silt	18	124.7	22.2	525	20
	10		11'9" Very stiff moist reddish-brown clay, sand and pebbles	19	127.3	17.5	770	30
	12							
	14							
678C	16							
	18							
678D	20		22'6" Stiff moist reddish-brown clay, sand and pebbles	18	127.8	14.6	730	29
	25			15	131.9	17.7	590	24
678E	30			14	132.2	16.4	580	24
678F	35			12	127.0	17.9	495	20
678G	40			13	124.4	20.1	450	18
678H	45		41'7" Stiff moist silty blue clay, lenses of silt	9	136.3	13.5		
678I	50		49'6" Extremely stiff moist blue clay, sand and pebbles, occasional stone	72	139.8	10.9	2045	118
678J	55			99	141.6	9.7	2180	169

## MICHIGAN DRILLING COMPANY

DATE 12-2-64

## LOG OF SOIL BORING

BORING NO. ( )

SURFACE ELEV. 100.0

JOB NO. 64-040

PROJECT Soils Exploration

GROUND WATER TABLE 3'6"

LOCATION Church Street

G. W. VOLUME Heavy

Midland, Michigan

SAMPLE NUMBER	ELEVATION	LEGEND	SOIL DESCRIPTION	BLOWS PER 12" PENETRATION	NATURAL WT. PER CU. FT.	MOISTURE %	RING SHEAR LB SQ. FT.	UNCONF. FIELD COMPRESSION
	0		0'6" Firm moist sandy brown top soil					
	2		2'0" Medium compact moist fine brown and yellow sand					
679A	4		Compact moist to wet fine brown sand	12	121.3	21.6		
679B	6							
	8		7'0" Very stiff moist reddish-brown clay, sand and pebbles, lenses of silt	17	121.1	25.3	575	23
679C	10		9'6" Very stiff moist reddish brown clay, sand and pebbles	21	132.1	19.0	600	26
	12							
	14							
679D	16			19	137.3	15.4	1005	40
	18							
679E	20			17	134.8	15.7	660	23
679F	25		23'0" Stiff moist reddish brown clay, sand and pebbles	16	136.3	15.0	660	26
679G	30		28'6" Very stiff moist reddish-brown clay, sand and pebbles	22	133.8	17.4	560	24
679H	35		32'0" Very stiff moist reddish-brown clay, sand and pebbles, layer of wet brown sand	20	129.6	11.1	560	22
	40		36'4" Very stiff moist silty blue clay, lenses of silt	17	129.9	21.4	600	26
679I	45		44'0" Extremely stiff moist blue clay, sand and pebbles	74	137.6	10.4	1835	140
679K	50		49'0"	107	144.3	3.4	1960	151
	55							



23-9 106

## MICHIGAN DRILLING COMPANY

DATE 12-3-64

## LOG OF SOIL BORING

BORING NO. 106

SURFACE ELEV. 100.0

HOLE NO. 64-940

PROJECT Soils Exploration

GROUND WATER TABLE None

LOCATION Church Street

G. W. VOLUME

Midland, Michigan

DEPTH NUMBER	ELEVATION	LEGEND	SOIL DESCRIPTION	BLOWS PER 12" PENETRATION	NATURAL WT. PER CU. FT.	MOISTURE %	RING SHEAR LB SQ. FT.	UNCONFIRMED COMPRESSION SHEAR
	2		0'6" Firm moist sandy brown top soil					
	1		Medium compact moist fine brown and yellow sand					
681A	1		3'6" Stiff moist reddish-brown clay, lenses of silt, oxidized streaks	9	114.3	29.3	410	160
	6							
681B	6		6'2" Very stiff moist reddish-brown clay, sand and pebbles, streaks of sand	18	129.6	17.7	663	335
	11							
681C	11		9'0" Very stiff moist reddish-brown clay, sand and pebbles	23	127.3	16.5	1400	537
	17							
	17		12'6"					
	17							
681D	17			15	130.7	17.9	660	207
	18							
	18		Stiff moist reddish-brown clay, sand and pebbles					
681E	20			16	129.9	13.0	430	202
	21							
681F	25			15	131.2	16.4	615	190
	26							
681G	30			14	130.7	26.9	570	222
	31							
681H	35		34'8" Stiff moist silty blue clay, lenses of silt	16	124.9	16.9	540	155
	36							
681I	40			15	123.8	17.6	745	160
	41							
681J	45		44'6" Extremely stiff moist blue clay, sand and pebbles	133	141.4	13.2	2010	1398
	46							
681K	50			151	142.1	11.9	2140	1974
	51							
	52							
	53							
	54							
	55							
	56							
	57							
	58							
	59							
	60							

64  
24-

WOLVERINE COAL COMPANY.

INCORPORATED.

COLL CO'S NO.

1003  
24

MICHIGAN PROSPECTING CO'S NO.

I HAVE THIS

DAY OF

April

1907

, FINISHED A TEST WELL ON THE

FOLLOWING DESCRIBED LAND OWNED BY  
AND REPORT THE TEST AS FOLLOWS:

John B. Rouders

LOCATION OF WELL

450 ft west of East line  
130 - South - North line

TOWNSHIP OF

Midland

COUNTY OF

Midland

STATE OF MICHIGAN

DESCRIPTION:

E 1/2 of SW 1/4 Sect 24  
14N - 2E

THICKNESS OF STRATA.

MATERIAL.

DEPTH.

65  
70  
10  
30  
3  
30  
2  
50  
3  
5  
11  
8  
17

Clay  
Hardpan  
Sand & Gravel  
Sand Clay  
Sand  
Clay  
Gravel  
Sandy Clay  
Sand & Gravel  
Clay  
Sand  
Dark Shale  
Gray "

65  
135  
145  
175  
178  
208  
210  
260  
263  
268  
279  
287  
304

REMARKS:

4365  
X

Signed

Fred. Tricoli

Driller.

#23 M Water Well (1)

Drilled April 1951

By A. B. Cogan

4-1/2"OD 8' Strainer 308

48' Static Water Level

Bail 100PM w/ 10' Drawdown

4" Used Black Pipe Well Csg  
0-89 Clay

89-125 Clay Hard Pan

125-152 Soft Clay

152-162 Tough Clay

162-252 Soft & Some Tough Clay

252-262 Clay Hard Pan

262-266 Soft Clay

266-278 Sandy Hard Pan

278-279 Fine Sand

279-299 Clay Hard Pan

299-308 Sand & Water

24-2

# HANDY BROS. MINING CO. & WOLVERINE COAL CO. 25-7

SAGINAW, MICH., Ne 8" 1905

COAL CO. NO. 621

DRILLER'S NO. \_\_\_\_\_

I HAVE THIS 6" DAY OF Ne 1905, FINISHED A TEST WELL ON THE FOLLOWING DESCRIBED LAND AND REPORT THE TEST AS FOLLOWS:

Myron Johnson DESCRIPTION. Midland  
NW 1/4 of SW 1/4 Sect 25  
14N-2E

Give Township and Sec. and Owner's name in country. In City give Street, Lot and Block No. and Addition.

THICKNESS OF STRATA.	MATERIAL.	DEPTH.
80	Sandy Clay	80
18	Sand	98
66	Gray Clay	164
7	Sand	171
29	Sandy Clay	200
65	Sand	265
<u>265</u>		

REMARKS:

600 ft South of North line  
50 - East of West line

Signed

Geo. Chickadee Driller.



# HANDY BROS. MINING CO. & WOLVERINE COAL CO.

25-2

SAGINAW, MICH.,

Oct 16 1906

COAL CO. No.

901 ✓

DRILLER'S No.

I HAVE THIS

13

DAY OF

Oct

1906

FINISHED A TEST WELL ON THE FOLLOWING DESCRIBED LAND AND REPORT THE TEST AS FOLLOWS:

M. Johnson

DESCRIPTION.

Midland

SW 1/4 Sect 25.

Give Township and Sec. and Owner's name in country. In City give Street, Lot and Block No. and Addition.

14N-2E

THICKNESS OF STRATA.	MATERIAL.	DEPTH.
15	Sand	15
3 1	Clay	46
4	Sand & Gravel	50
6 7	Clay	117
4 6	Hardpan	163
1 2	Red Clay	175
2	Dark Shale	177
40	Light	217
4 - 6	Chip slate	221 - 6
0 - 6	Fire Clay	222
5	Soft slate	227
2	Sandy shale	259
2	White Sand Rock	291
5	Gray shale	296
9	Slate	305
5	Gray shale	310

REMARKS:

100 ft S of N line 1 1/2  
125 - W of E

Signed

John Woodward Driller.

# HANDY BROS. MINING CO. & WOLVERINE COAL CO.

25:

SAGINAW, MICH.,

Oct 6 1906

COAL CO. No.

89, ✓

DRILLER'S No.

I HAVE THIS

2<sup>d</sup>

DAY OF

Oct

1906

FINISHED A TEST WELL ON THE FOLLOWING DESCRIBED LAND AND REPORT THE TEST AS FOLLOWS:

LOWING DESCRIBED LAND AND REPORT THE TEST AS FOLLOWS:

Rougald Curry

DESCRIPTION.

Midland

NW 1/4 of NW 1/4 Sect 25

Give Township and Sec. and Owner's name in country. In City give Street, Lot and Block No. and Addition.

14N-2E

THICKNESS OF STRATA.	MATERIAL.	DEPTH.
55	Clay	55
6	Sand	61
17	Hardpan	78
12	Sand	90
19	Hardpan	109
13	Clay	122
14	Hardpan	136
50	Clay	186
4	Sand	190
60	Clay	250
8	Sand	258
23	Sandy Clay	281
12	Sand	293

2565

REMARKS:

50 ft N of S line  
60 - W - E -

Signed

John Woodworth Driller.

## LOG OF BORING NO. 1

PROJECT OBSERVATION WELLS				SITE DOW CORNING CORP.-MIDLAND, MI			
BORING STARTED 8-6-81 COMPLETED				PROJECT NO. 81-210		SAMPLE TYPE S. S. _____ AUGER _____ SHELBY _____	
DEPTH IN FEET	LEGEND	SAMPLES	DESCRIPTION OF MATERIAL	SAMPLE NO.	STD. PENETRATION "N" BLOWS PER FOOT	UNIT NAT. WT. LB./CU. FT.	UNCONFINED COMPRESSIVE STRENGTH TONS/FT <sup>2</sup>
							1 2 3 4 5 PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT % X ———— X ———— Δ 10 20 30 40 50
			SURFACE ELEVATION _____				
			Topsoil-firm moist, sandy brown.				
			Clay-silty variegated				
			-stiff moist silty oxidized variegated				
5							
			-stiff moist, silty brown clay, oxidized streaks				
10							
15							
			-stiff moist silty blue clay				
20							
25			(Cont'd.)				
WATER LEVEL OBSERVATIONS						SAMTEST, INC. DRILLING & TESTING SERVICES	
W.L. _____							
W.L. _____							

## LOG OF BORING NO. 1 (Con't.)

PROJECT OBSERVATION WELLS				SITE DOW CORNING CORP.-MIDLAND, MI			
BORING STARTED 8-6-81 COMPLETED			PROJECT NO. 81-210		SAMPLE TYPE S.S. _____ AUGER _____ SHELBY _____		
DEPTH IN FEET	LEGEND	SAMPLES	DESCRIPTION OF MATERIAL	SAMPLE NO.	STD. PENETRATION "N" BLOWS PER FOOT	UNIT WAT. WT. LB./FT. <sup>3</sup>	UNCONFINED COMPRESSIVE STRENGTH TONS/FT <sup>2</sup>
							PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT %
			SURFACE ELEVATION _____	1 2 3 4 5 10 20 30 40 50			
			-stiff moist silty blue				
30			-extremely stiff moist silty blue clay, sand and pebbles, occasional stones				
35							
40			-extremely stiff moist silty blue clay, claypan, sand & pebbles, occasional stones, occasional 1" sand seams				
45							
50							
(Con't)							

WATER LEVEL OBSERVATIONS		S A M T E S T, I N C. DRILLING & TESTING SERVICES
W.L.		
W.L.		

# LOG OF BORING NO. 1 (Con't.)

PROJECT OBSERVATION WELLS				SITE DOW CORNING CORP.- MIDLAND, MI			
BORING STARTED 8-6-81 COMPLETED				PROJECT NO. 81-210		SAMPLE TYPE S.S. <u>X</u> AUGER <u>—</u> SHELBY <u>—</u>	
DEPTH IN FEET	LEGEND	SAMPLES	DESCRIPTION OF MATERIAL	SAMPLE NO.	STD. PENETRATION "N" BLOWS PER FOOT	UNIT NAT. WT. LB./CU. FT.	UNCONFINED COMPRESSIVE STRENGTH TONS/FT <sup>2</sup>
							<div> <div>1</div> <div>2</div> <div>3</div> <div>4</div> <div>5</div> </div> <div> <div>PLASTIC LIMIT %</div> <div>WATER CONTENT %</div> <div>LIQUID LIMIT %</div> </div> <div> <div>X</div> <div>X</div> <div>△</div> </div> <div> <div>10</div> <div>20</div> <div>30</div> <div>40</div> <div>50</div> </div>
SURFACE ELEVATION <u>                    </u>							
55			-extremely stiff moist silty blue clay, claypan, sand and pebbles, occasional stones, occasional 1" sand seams				
60							
65							
70							
75							
(Con't.)							
WATER LEVEL OBSERVATIONS						SAMTEST, INC. DRILLING & TESTING SERVICES	
W.L. <u>                    </u>							
W.L. <u>                    </u>							

## LOG OF BORING NO. 1 (Cont.)

PROJECT OBSERVATION WELLS				SITE DOW CORNING CORP.- MIDLAND, MI								
BORING STARTED 8-6-81 COMPLETED			PROJECT NO. 81-210	SAMPLE TYPE S.S. <u>X</u> AUGER <u>    </u> SHELBY <u>    </u>								
DEPTH IN FEET	LEGEND	SAMPLES	DESCRIPTION OF MATERIAL	SAMPLE NO.	STD. PENETRATION "N" BLOWS PER FOOT	UNIT NAT. WT. LB./CU. FT.	UNCONFINED COMPRESSIVE STRENGTH TONS/FT <sup>2</sup>					
							1	2	3	4	5	
			SURFACE ELEVATION <u>    </u>				PLASTIC LIMIT % <u>X</u> WATER CONTENT % <u>X</u> LIQUID LIMIT % <u>△</u> 10      20      30      40      50					
80			-extremely stiff moist silty blue clay, claypan, sand & pebbles, occasional stones, occasional 1" sand seams.	29 33 37								
				23 32 40								
				24 29 39								
85				18 32 36								
				21 66 --								
90				41 69 --								
				68 75 --								
95			-extremely stiff moist blue clay, hardpan, sand & pebbles, occasional stones, traces of shale	60/3" Stone								
				82/3" 75/3" --								
100			(Con't.)	100/5"								

WATER LEVEL OBSERVATIONS		S A M T E S T, I N C. DRILLING & TESTING SERVICES
W.L.		
W.L.		

## LOG OF BORING NO. 1 (Con't.)

PROJECT OBSERVATION WELLS					SITE DOW CORNING CORP.-MIDLAND, MI						
BORING STARTED 8-6-81 COMPLETED					PROJECT NO. 81-210		SAMPLE TYPE S.S. <u>X</u> AUGER <u>      </u> SHELBY <u>      </u>				
DEPTH IN FEET	LEGEND	SAMPLES	DESCRIPTION OF MATERIAL	SAMPLE NO.	STD. PENETRATION "N" BLOWS PER FOOT	UNIT NAT. WT. LB./CU. FT.	UNCONFINED COMPRESSIVE STRENGTH TONS/FT <sup>2</sup>				
							1	2	3	4	5
							PLASTIC LIMIT %	WATER CONTENT %	LIQUID LIMIT %		
			SURFACE ELEVATION <u>      </u>				10	20	30	40	50
105			-extremely stiff moist blue clay, hardpan, sand & pebbles, oc- casional stones, traces of shale.								
110			End of Boring @ 111'-0"								
			Bailed hole dry-no notice- able inflow.								
WATER LEVEL OBSERVATIONS							SAMTEST, INC. DRILLING & TESTING SERVICES				
W.L.	NONE										
W.L.											

Dow Corning-Midland  
September 20, 1979

26-2

Test Well  
LOG OF BORING NO. 3 (D.P. #3)

PROJECT Dow - Corning					SITE						
BORING STARTED					PROJECT NO.		SAMPLE TYPE S.S. _____ AUGER _____ SHELBY _____				
COMPLETED					UNCONFINED COMPRESSIVE STRENGTH TONS/FT <sup>2</sup>						
DEPTH IN FEET	LEGEND	SAMPLES	DESCRIPTION OF MATERIAL	SAMPLE NO.	STD. PENETRATION IN BLOWS PER FOOT	UNIT WGT. WT PCF					
							PLASTIC LIMIT %	WATER CONTENT %	LIQUID LIMIT %		
			SURFACE ELEVATION _____				10	20	30	40	50
			Surface Brown Sand-Some Fill								
			Clay - Soft, silty								
20			Lakebed Clay								
			Glacial Till								
			Clay - Hard, gravel packed								
40											
60											
80											
100											
End of boring 100ft.							As drilled by T. Krauss of Freeman & Krauss. Grouted with bentonite 0-100 ft., well non-productive				
WATER LEVEL OBSERVATIONS							EAM TEST, INC. DRILLING & TESTING SERVICES				
W.L.											
W.L.											



Dow Corning-Midland

September 20, 1979

Test Well  
LOG OF BORING NO. 2 (D.P.#2)

PROJECT Dow - Corning				SITE			
BORING STARTED			COMPLETED		PROJECT NO.	SAMPLE TYPE S.S. _____ AUGER _____ SHELBY _____	
DEPTH IN FEET	LEGEND	SAMPLES	DESCRIPTION OF MATERIAL	SAMPLE NO.	STD. PENETRATION "N" BLOWS PER FOOT	UNIT WGT. WT PCF	UNCONFINED COMPRESSIVE STRENGTH TONS/FT <sup>2</sup>
							PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT %
			SURFACE ELEVATION _____				1 2 3 4 5 10 20 30 40 50 X ⊗ △
			Sand-Surface, brown				
20			Clay - Soft, silty				
			Lakebed Clay				
40			Glacial Till Clay - Hard, gravel Packed				
60							
80							
100							
			End of Boring at 100ft				As drilled by T. Krauss of Freeman & Krauss Grouted with bentonite 0-100 ft. well non-productive
WATER LEVEL OBSERVATIONS							SAMTEST, INC. DRILLING & TESTING SERVICES
W.L.							
W.L.							

26-4  
DH-4

# LOG OF BORING NO. 5

PROJECT OBSERVATION WELLS				SITE DOW CORNING - MIDLAND, MI							
BORING		PROJECT NO.		SAMPLE TYPE							
STARTED 11-10-81 COMPLETED 11-11-81		81-210		S.S. _____ AUGER _____ SHELBY _____							
DEPTH IN FEET	LEGEND	SAMPLES	DESCRIPTION OF MATERIAL	SAMPLE NO.	STD. PENETRATION "N" BLOWS PER FOOT	UNIT NAT. WT. (lb./ft <sup>3</sup> )	UNCONFINED COMPRESSIVE STRENGTH TONS/FT <sup>2</sup>				
							1	2	3	4	5
							PLASTIC LIMIT % $\times$ WATER CONTENT % $\otimes$ LIQUID LIMIT % $\triangle$ 10      20      30      40      50				
			SURFACE ELEVATION _____								
			Fill-stiff, moist, silty brn clay								
			Sand-moist fine oxidized brown to discolored								
			Clay-stiff moist silty brn. blue clay								
10			-stiff moist silty blue clay								
20			-very stiff moist silty blue clay								
30			-extremely stiff moist silty blue clay <i>Labeled Clay</i> <i>Glacial Till</i>								
40			-extremely stiff moist gravelly blue clay, hardpan								
50			-extremely stiff moist silty blue claypan, sand & pebbles, occas. stones								

WATER LEVEL OBSERVATIONS (Cont'd.)		S A M T E S T, I N C. DRILLING & TESTING SERVICES
W.L.	Ground water encountered at 4 ft.	
W.L.	Medium flow upon completion	

LOG OF BORING NO. 5 (Cont'd.)

PROJECT					SITE						
OBSERVATION WELLS					DOW CORNING - MIDLAND, MI						
BORING			PROJECT NO.		SAMPLE TYPE						
STARTED 11-10-81 COMPLETED 11-11-81			81-210		S.S. _____ AUGER _____ SHELBY _____						
DEPTH IN FEET	LEGEND	SAMPLES	DESCRIPTION OF MATERIAL	SAMPLE NO.	STD. PENETRATION "N" BLOWS PER FOOT	UNIT NAT. WT. LB./FT <sup>3</sup>	UNCONFINED COMPRESSIVE STRENGTH TONS/FT <sup>2</sup>				
							1	2	3	4	5
							PLASTIC LIMIT %	WATER CONTENT %	LIQUID LIMIT %		
							X	X	△		
							10	20	30	40	50
60			-extremely stiff moist silty blue claypan, sand & pebbles, occasional stones								
70			-extremely stiff moist sandy blue clay, hardpan, occasional stones								
80											
90			Hole backfilled with mud. Bailed hole dry								
100			End of Boring at 100 ft.								

WATER LEVEL OBSERVATIONS	
W.L.	
W.L.	

**SAMTEST, INC.**  
DRILLING & TESTING SERVICES

DH-5

26-5

## LOG OF BORING NO. 6

PROJECT OBSERVATION WELLS				SITE DOW CORNING - MIDLAND, MI			
BORING STARTED 11-11-81 COMPLETED 11-12-81			PROJECT NO. 81-210		SAMPLE TYPE S.S. _____ AUGER _____ SHELBY _____		
DEPTH IN FEET	LEGEND	SAMPLES	DESCRIPTION OF MATERIAL	SAMPLE NO.	STD. PENETRATION "N" BLOWS PER FOOT	UNIT NAT. WT. LB./FT. <sup>3</sup>	UNCONFINED COMPRESSIVE STRENGTH TONS/FT <sup>2</sup>
							1 2 3 4 5 PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT % X --- X --- $\Delta$ 10 20 30 40 50
			SURFACE ELEVATION _____				
			Fill-moist fine clayey brown sand				
			Sand-moist to wet fine oxidized brown sand				
			Clay-stiff to very stiff moist silty blue clay				
10							
20			-extremely stiff moist silty blue clay				
30			-extremely stiff moist silty blue claypan				
40							
50			(Cont'd.)				

WATER LEVEL OBSERVATIONS		S A M T E S T, I N C. DRILLING & TESTING SERVICES
W.L.	Ground water encountered at 4 ft.	
W.L.	Medium flow upon completion	

# LOG OF BORING NO. 6 (Cont'd.)

PROJECT OBSERVATION WELLS					SITE DOW CORNING - MIDLAND, MI							
BORING STARTED 11-11-81 COMPLETED 11-12-81				PROJECT NO. 81-210		SAMPLE TYPE S.S. _____ AUGER _____ SHELBY _____						
DEPTH IN FEET	LEGEND	SAMPLES	DESCRIPTION OF MATERIAL	SAMPLE NO.	STD. PENETRATION "N" BLOWS PER FOOT	UNIT NAT. WT. LB./FT <sup>3</sup>	UNCONFINED COMPRESSIVE STRENGTH TONS/FT <sup>2</sup>					
							PLASTIC LIMIT %      WATER CONTENT %      LIQUID LIMIT % 10      20      30      40      50					
60			-extremely stiff moist silty blue claypan									
70												
80												
90												
100												
				(Cont'd.)								
WATER LEVEL OBSERVATIONS							SAMTEST, INC. DRILLING & TESTING SERVICES					
W.L.												
W.L.												

# LOG OF BORING NO. 6 (Cont'd.)

PROJECT OBSERVATION WELLS				SITE DOW CORNING - MIDLAND, MI			
BORING STARTED 11-11-81 COMPLETED 11-12-81			PROJECT NO. 81-210		SAMPLE TYPE S.S. _____ AUGER _____ SHELBY _____		
DEPTH IN FEET	LEGEND	SAMPLES	DESCRIPTION OF MATERIAL	SAMPLE NO.	STD. PENETRATION "N" BLOWS PER FOOT	UNIT NAT. WT (lb/ft <sup>3</sup> )	UNCONFINED COMPRESSIVE STRENGTH TONS/FT <sup>2</sup>
							1 2 3 4 5 PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT % X ———— ⊗ ———— △ 10 20 30 40 50
			SURFACE ELEVATION _____				
			-extremely stiff moist silty blue clay pan				
110			-extremely stiff moist sandy blue clay, hard-pan, occasional stones				
120			-extremely stiff moist silty blue clay, hard-pan				
130							
140			End of Boring at 140 ft.				
			Hole backfilled with mud. Bailed hole dry.				
WATER LEVEL OBSERVATIONS						SAMTEST, INC. DRILLING & TESTING SERVICES	
W.L. _____							
W.L. _____							



McDOWELL & ASSOCIATES  
Geotechnical Engineers

MW 1

LOG OF SOIL BORING NO. 26-6

PROJECT Observation Wells

JOB NO. 81-111

LOCATION Dow-Corning

SURFACE ELEV. DATE 8-10-81

Midland, Michigan

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Dry Den Wt. P.C.F.	Unc. Comp. Strength PSF.	St %
	1		Moist to wet fine brown sand						
	2								
	3								
	4								
	5								
	6		Wet fine silty gray sand, discolored seams						
	7								
	8								
	9								
	10								
	11		Very stiff to extremely stiff moist silty blue clay						
	12								
	13								
	14								
	15								
	16								
	17								
	18								
	19								
	20								
	21								
	22								
	23								
	24								
	25								
(Cont'd.)									
TYPE OF SAMPLE D. - DISTURBED U.L. - UNDIST. LINER S.T. - SHELBY TUBE S.S. - SPLIT SPOON R.C. - ROCK CORE ( ) - PENETROMETER				REMARKS:  Standard Penetration Test - Driving 2" OD Sampler 1' With 140 # Hammer Falling 30"; Count Made At 6" Intervals		GROUND WATER OBSERVATIONS G.W. ENCOUNTERED AT 4 FT. 0 INS. G.W. ENCOUNTERED AT 49 FT. 0 INS. G.W. AFTER COMPLETION 57 FT. 0 INS. G.W. AFTER HRS FT. INS. G.W. VOLUMES Heavy - Medium			



McDOWELL & ASSOCIATES  
Geotechnical Engineers

PROJECT Observation Wells

JOB NO. 81-111

LOCATION Dow-Corning

SURFACE ELEV. \_\_\_\_\_ DATE 8-10-81 Midland, Michigan

Sample or Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Dry Den Wt. P.C.F.	Unc. Comp. Strength PSF	Str. %
	26								
	27								
	28								
	29								
	30								
	31								
	32								
	33								
	34								
	35								
	36								
	37								
	38								
	39								
	40		39'6" <i>Lake bed Clay</i>						
	41		<i>Glacial Till</i>						
	42		Extremely stiff moist gravelly blue clay, hardpan, sand and pebbles						
	43								
	44		43'6"						
	45								
	46		Extremely stiff moist silty blue clay, hardpan, layers of sand						
	47								
	48								
	49		49'0"						
	50		Extremely compact wet fine brown and gray sand (3.5')						

**TYPE OF SAMPLE**

D. - DISTURBED

U.L. - UNDIST. LINER

S.T. - SHELBY TUBE

S.S. - SPLIT SPOON

R.C. - ROCK CORE

( ) - PENETROMETER

**REMARKS:**

(Cont'd.)

Standard Penetration Test - Driving 2" OD Sampler 1' With  
140# Hammer Falling 30"; Count Made At 6" Intervals

**GROUND WATER OBSERVATIONS**

G.W. ENCOUNTERED AT	4	FT.	0	INS
G.W. ENCOUNTERED AT	49	FT.	0	INS
G.W. AFTER COMPLETION	57	FT.	0	INS
G.W. AFTER	HRS.	FT.		INS
G.W. VOLUMES Heavy - Medium				





McDOWELL & ASSOCIATES  
Geotechnical Engineers

LOG OF SOIL BORING NO. 2 (CONT. D.)





PROJECT Observation Wells

JOB NO. 81-111

LOCATION Dow-Corning

SURFACE ELEV. DATE 8-10-81

Midland, Michigan

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Dry Den Wt. P.C.F.	Unc. Comp. Strength PSF.	Str. %
	53		52'6" Extremely compact wet fine brown and gray sand						
	54								
	55								
	56								
	57		57'0" Extremely stiff moist blue clay, hardpan, slight seams of sand						
	58								
	59								
	60								
SS	61		61'3" Extremely compact wet fine gray sand (4.3')	23					
	62			51					
	63			55					
	64								
SS	65								
	66								
	67								
	68								
	69								
SS	70		69'9" Extremely compact wet gray silt, lenses of clay	27					
	71			34					
	72			39					
	73								
	74								
	75								
SS	76								
	77								
			76'0" Extremely stiff moist sandy blue clay, hardpan, occasional stones (Cont'd.)						
TYPE OF SAMPLE			REMARKS:	GROUND WATER OBSERVATIONS					
D. - DISTURBED				G.W. ENCOUNTERED AT		4	FT.	0	INS.
U.L. - UNDIST. LINER				G.W. ENCOUNTERED AT		49	FT.	0	INS.
S.T. - SHELBY TUBE				G.W. AFTER COMPLETION		57	FT.	0	INS.
S.S. - SPLIT SPOON				G.W. AFTER		HRS.	FT.		INS.
R.C. - ROCK CORE				G.W. VOLUMES		Heavy - Medium			
( ) - PENETROMETER									
Standard Penetration Test - Driving 2" OD Sampler 1' With 140# Hammer Falling 30"; Count Made At 6" Intervals									

LOG OF SOIL BORING NO. \_\_\_\_\_



**McDOWELL & ASSOCIATES**  
Geotechnical Engineers

PROJECT Observation WellsJOB NO. 81-111LOCATION Dow-CorningSURFACE ELEV. \_\_\_\_\_ DATE 8-10-81Midland, Michigan

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Dry Den Wt. P.C.F.	Unc. Comp Strength PSF	St. %
	78								
	79			44					
SS	80			72					
	81			--					
	82								
	83								
	84			38					
SS	85		Extremely stiff moist sandy blue clay, hardpan, occasional stones	64					
	86			--					
	87								
	88								
	89			37					
SS	90			71					
	91			--					
	92		Set bottom of 5' screen at 62' with 60' riser.						
	93		Backfilled with 2NS sand up to 55' - Bentonite slurry from 55' to surface.						
	94								
SS	95			35					
	96		Blew hole for 30 minutes at 3 gallons per minute.	82					
	97			--					
	98								
	99								
SS	100		100' 0"	32					
	101			66					
	102			--					

TYPE OF SAMPLE	REMARKS:	GROUND WATER OBSERVATIONS				
D. - DISTURBED		G.W. ENCOUNTERED AT	4	FT.	0	INS.
U.L. - UNDIST. LINER		G.W. ENCOUNTERED AT	49	FT.	0	INS.
S.T. - SHELBY TUBE		G.W. AFTER COMPLETION	57	FT.	0	INS.
S.S. - SPLIT SPOON		G.W. AFTER	HRS.	FT.		INS.
R.C. - ROCK CORE		G.W. VOLUMES	Heavy - Medium			
( ) - PENETROMETER	Standard Penetration Test - Driving 2" OD Sampler 1' With 140 # Hammer Falling 30"; Count Made At 6" Intervals					



McDOWELL & ASSOCIATES  
Geotechnical Engineers

JOB NO.

MW 2

81-111

PROJECT

Observation Wells

LOCATION

Dow-Corning

SURFACE ELEV.

DATE 8-17 & 18-81

Midland, Michigan

LOG OF SOIL BORING NO.

26-7

Sample # & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Dry Den Wt. P.C.F.	Unc. Comp. Strength PSF.	Str. %
	1		0'6" Firm moist clayey black topsoil						
	2								
	3								
	4		Stiff moist silty oxidized variegated clay						
	5								
	6								
	7								
	8		8'0"						
	9								
	10								
	11		Stiff to very stiff moist silty brown clay						
	12								
	13								
	14								
	15								
	16		16'0"						
	17		Stiff moist silty blue clay, sand and pebbles						
	18		17'6"						
	19		Very stiff moist silty blue clay, sand and pebbles						
	20								
	21		21'0" <i>Lake bed Clay</i> <i>Glacial Till</i>						
	22		Extremely stiff moist silty blue clay, claypan, sand and pebbles						
	23								
	24								
	25								
			(Cont'd.)						

TYPE OF SAMPLE

- D. - DISTURBED
- U.L. - UNDIST. LINER
- S.T. - SHELBY TUBE
- S.S. - SPLIT SPOON
- R.C. - ROCK CORE
- ( ) - PENETROMETER

REMARKS:

Standard Penetration Test - Driving 2" OD Sampler 1' With  
140# Hammer Falling 30"; Count Made At 6" Intervals

GROUND WATER OBSERVATIONS

G.W. ENCOUNTERED AT 7 FT. 10 INS.  
G.W. ENCOUNTERED AT 71 FT. 0 INS.  
G.W. AFTER COMPLETION FT. INS.  
G.W. AFTER HRS FT. INS.  
G.W. VOLUMES Light Seepage

LOG OF SOIL BORING NO. \_\_\_\_\_



**McDOWELL & ASSOCIATES**  
Geotechnical Engineers

PROJECT Observation Wells

JOB NO. 81-111

LOCATION Dow-Corning

SURFACE ELEV. \_\_\_\_\_ DATE 8-17 & 18-81 Midland, Michigan

Sample 6 Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Dry Den Wt. P.C.F.	Unc. Comp. Strength PSF	Str. %
	26								
	27								
	28								
	29								
	30								
	31		Extremely stiff moist silty blue clay,						
	32		claypan, sand and						
	33		pebbles						
	34								
	35								
	36								
	37								
	38								
	39								
	40								
	41								
	42								
	43								
	44								
	45		Extremely stiff moist sandy blue clay,						
	46		hardpan, medium						
	47		pebble content						
	48								
	49								
	50								

42'0"

(Cont'd.)

**TYPE OF SAMPLE**

- D. - DISTURBED
- U.L. - UNDIST. LINER
- S.T. - SHELBY TUBE
- S.S. - SPLIT SPOON
- R.C. - ROCK CORE
- ( ) - PENETROMETER

**REMARKS:**

Standard Penetration Test - Driving 2" O.D. Sampler 1' With  
140# Hammer Falling 30"; Count Made At 6" Intervals

**GROUND WATER OBSERVATIONS**

G.W. ENCOUNTERED AT	7	FT. 10	INS.
G.W. ENCOUNTERED AT	71	FT. 0	INS.
G.W. AFTER COMPLETION		FT.	INS.
G.W. AFTER	HRS	FT.	INS.
G.W. VOLUMES	Light Seepage		

LOG OF SOIL BORING NO. \_\_\_\_\_



**McDOWELL & ASSOCIATES**  
Geotechnical Engineers

PROJECT Observation WellsJOB NO. 81-111LOCATION Dow-CorningSURFACE ELEV. \_\_\_\_\_ DATE 8-17 & 18-81 Midland, Michigan

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Dry Den Wt. P.C.F.	Unc. Comp. Strength PSF.	Str. %
	51								
	52								
	53								
	54								
SS	55			17					
				31					
	56			35					
	57								
	58								
	59								
SS	60			21					
				32					
	61			37					
	62								
	63								
	64								
SS	65			21					
				39					
	66			43					
	67								
	68								
	69								
SS	70			16					
				28					
	71			33					
	72								
SS	73			17					
				26					
	74			29					
SS	75			19					
				28					
				30					

Extremely stiff moist  
sandy blue clay,  
hardpan, medium  
pebble content

Extremely stiff moist  
silty blue clay, sand  
and pebbles

Extremely compact wet  
fine to medium gray  
sand

Extremely stiff moist  
silty blue clay, sand  
and pebbles  
(Cont'd.)

## REMARKS:

Standard Penetration Test - Driving 2" OD Sampler 1' With  
140# Hammer Falling 30"; Count Made At 6" Intervals

## GROUND WATER OBSERVATIONS

G.W. ENCOUNTERED AT 7 FT. 10 INS.  
G.W. ENCOUNTERED AT 71 FT. 0 INS.  
G.W. AFTER COMPLETION FT. INS.  
G.W. AFTER HRS. FT. INS.  
G.W. VOLUMES Light Seepage

## TYPE OF SAMPLE

D. - DISTURBED  
U.L. - UNDIST. LINER  
S.T. - SHELBY TUBE  
S.S. - SPLIT SPOON  
R.C. - ROCK CORE  
( ) - PENETROMETER



McDOWELL & ASSOCIATES  
Geotechnical Engineers

LOG OF SOIL BORING NO. \_\_\_\_\_

PROJECT Observation Wells

JOB NO. 81-111

LOCATION Dow-Corning

SURFACE ELEV. \_\_\_\_\_ DATE 8-17 & 18-81 Midland, Michigan

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural WL P.C.F.	Dry Den WL P.C.F.	Unc. Comp. Strength PSF	Str. %
	76		Extremely stiff moist silty blue clay, sand and pebbles						
	77			18					
SS				29					
	78			32					
	79								
	80			21					
SS				33					
	81			33					
	82								
	83								
	84		Extremely stiff moist silty sandy blue clay, sand and pebbles						
	85			14					
SS				20					
	86			26					
	87								
	88								
	89								
	90			21					
SS				29					
	91			33					
	92		Set bottom of 5' No. 10 slot screen at 73' with 70' riser - Backfilled with 2NS sand to 60' - Bentonite slurry from 60' to surface.						
	93								
	94								
	95			19					
SS				27					
	96			34					
	97								
	98								
	99								
	100			16					
S				31					
				33					

82'0"

100'0"

TYPE OF SAMPLE  
D. - DISTURBED  
U.L. - UNDIST. LINER  
S.T. - SHELBY TUBE  
S.S. - SPLIT SPOON  
R.C. - ROCK CORE  
( ) - PENETROMETER

REMARKS:

Standard Penetration Test - Driving 2" O.D. Sampler 1' With  
140# Hammer Falling 30"; Count Made At 6" Intervals

GROUND WATER OBSERVATIONS

G.W. ENCOUNTERED AT	7	FT.	10	INS
G.W. ENCOUNTERED AT	71	FT.	0	INS
G.W. AFTER COMPLETION		FT.		INS
G.W. AFTER	HRS	FT.		INS
G.W. VOLUMES	Light Seepage			



McDOWELL & ASSOCIATES  
Geotechnical Engineers

LOG OF SOIL BORING NO. 4 26-8

PROJECT Observation Wells

JOB NO. MW3 81-111

LOCATION Dow-Corning

SURFACE ELEV. DATE 11-9-10-81 Midland, Michigan

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Dry Den Wt. P.C.F.	Unc. Comp. Strength PSF.	Str. %
	2	FILL	1'0" Firm moist brown clay, fill						
	4		2'9" Moist fine oxidized brown sand						
	6		Very stiff moist silty brown clay						
	8		6'6" Moist clayey brown silt, oxidized streaks						
	10		8'0" Very stiff moist silty brown clay						
	12								
	14		12'6" Extremely stiff moist silty gravelly brown						
	16		15'0" clay, layers of sand						
	18								
	20								
	22								
	24		Extremely stiff moist silty blue clay, occasional stones						
	26								
	28								
	30								
	32								
	34		33'0" <u>Labelled Clay</u> <u>Clayey Fill</u> Extremely stiff moist						
	36		sandy gravelly blue clay, hardpan, streaks						
	38		37'0" of sand						
	40								
	42		Extremely stiff moist						
	44		sandy gravelly blue clay, hardpan						
	46								
	48								
	50								
			(Cont'd.)						
TYPE OF SAMPLE			REMARKS:  Standard Penetration Test - Driving 2" 00 Sampler 1' With 140 # Hammer Falling 30": Count Made At 6" Intervals	GROUND WATER OBSERVATIONS					
D. - DISTURBED				G.W. ENCOUNTERED AT 13. FT 0 INS					
U.L. - UNDIST. LINER				G.W. ENCOUNTERED AT FT INS					
S.T. - SHELBY TUBE				G.W. AFTER COMPLETION Washed FT INS					
S.S. - SPLIT SPOON				G.W. AFTER HRS. FT. INS					
R.C. - ROCK CORE				G.W. VOLUMES Medium					
P. - PENETROMETER									

LOG OF SOIL BORING NO. 4 (CONT. D.)



**McDOWELL & ASSOCIATES**  
Geotechnical Engineers

PROJECT Observation WellsJOB NO. 81-111LOCATION Dow-Corning

SURFACE ELEV. \_\_\_\_\_

DATE 11-9-10-81Midland, Michigan

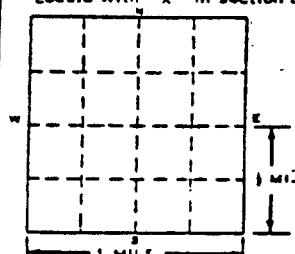
Sample # & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural WL P.C.F.	Dry Den WL P.C.F.	Unc. Comp. Strength PSF.	St. %
52	52'0"		Extremely stiff moist sandy gravelly blue clay, hardpan						
54									
56									
58									
60			Extremely stiff moist silty blue claypan, occasional stones						
62									
64									
66									
68									
70									
72	71'6"		Extremely compact wet fine to medium sand (5.5')						
74									
76									
78	77'0"								
80			Extremely stiff moist blue clay, hardpan, occasional stones						
82									
84									
86	85'0"		Set 5' of 2" No. 10 slot screen from 73'0" to 78'0". Riser pipe from 73'0" to 3' above ground elevation. Backfilled with sand up to 62'0". Bentonite from 62'0" to surface. Blew for 40 minutes at 1 gallon per minute.						
88									
90									
92									
94									
96									
98									
100									

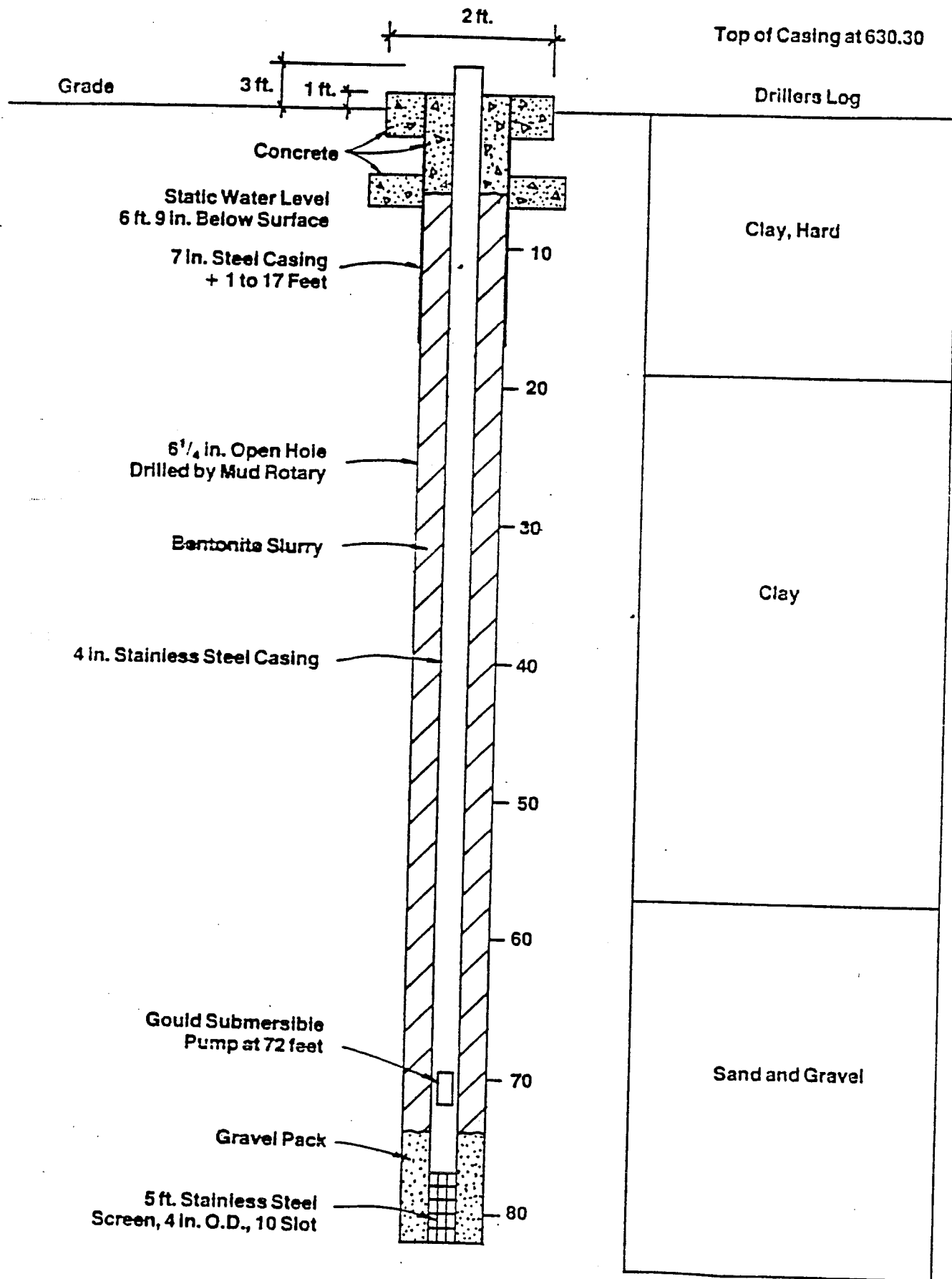
  

TYPE OF SAMPLE	REMARKS:	GROUND WATER OBSERVATIONS
D. - DISTURBED		G.W. ENCOUNTERED AT 13 FT. 0 INS
U.L. - UNDIST. LINER		G.W. ENCOUNTERED AT FT. INS
S.T. - SHELBY TUBE		G.W. AFTER COMPLETION Washed FT. INS
S.S. - SPLIT SPOON		G.W. AFTER HRS. FT. INS
R.C. - ROCK CORE		G.W. VOLUMES Medium
DESTRUCTIVE	Standard Penetration Test - Driving 2" OD Sampler 1' With 140# Hammer Falling 30": Count Made At 6" Intervals	



WATER WELL RECORD  
ACT 294 PA 1985MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH

1 LOCATION OF WELL		County		Township Name		Fraction		Section Number		Town Number		Range Number	
Midland										N/S.		E/W.	
Distance And Direction from Road Intersections <b>NORTH WELL (MW-4A)</b>						3 OWNER OF WELL: <b>Dow Corning</b> Address <b>Midland, Michigan</b>							
Street address & City of Well Location Locate with "X" in section below						4 WELL DEPTH: (completed) Date of Completion <b>82 ft. May 8, 1984</b>							
Sketch Map: 						5 <input type="checkbox"/> Cable tool <input checked="" type="checkbox"/> Rotary <input type="checkbox"/> Driven <input type="checkbox"/> Dug <input type="checkbox"/> Hollow rod <input type="checkbox"/> Jetted <input type="checkbox"/> Bored <input type="checkbox"/>							
						6 USE: <input type="checkbox"/> Domestic <input type="checkbox"/> Public Supply <input type="checkbox"/> Industry <input type="checkbox"/> Irrigation <input type="checkbox"/> Air Conditioning <input type="checkbox"/> Commercial <input type="checkbox"/> Test Well <input checked="" type="checkbox"/> <b>Monitoring</b>							
						7 CASING: Threaded <input checked="" type="checkbox"/> Welded <input type="checkbox"/> Diam. <b>4 in.</b> to <b>4 ft.</b> Depth <b>11 lbs./ft.</b> Height: Above/Below Surface <b>1 ft.</b> Drive Shoe? Yes <input type="checkbox"/> No <input type="checkbox"/>							
2 FORMATION						THICKNESS OF STRATUM		DEPTH TO BOTTOM OF STRATUM		8 SCREEN:			
Clay, hard						19		19		Type: <b>Stainless St.</b> Dia.: <b>4"</b> Slot/Gauze <b>10</b> Length <b>5'</b> Set between <b>77 ft.</b> and <b>82 ft.</b> Fittings:			
Clay						38		57					
Sand & Gravel						25		82		9 STATIC WATER LEVEL <b>6' 9"</b> ft. below land surface			
										10 PUMPING LEVEL below land surface ft. after <b>4</b> hrs. pumping <b>50 to 60 g.p.m.</b> ft. after ___ hrs. pumping ___ g.p.m.			
										11 WATER QUALITY in Parts Per Million: Iron (Fe) <b>0.6</b> P.P.M. Chlorides (Cl) ___ Hardness <b>15</b> P.P.M. Other ___			
										12 WELL HEAD COMPLETION: <input type="checkbox"/> In Approved Pit <input type="checkbox"/> Pitless Adapter <input checked="" type="checkbox"/> 12" Above Grade			
										13 Well Grouted? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Neat Cement <input checked="" type="checkbox"/> Bentonite <input type="checkbox"/> Depth: From <b>0</b> ft. to <b>77</b> ft.			
										14 Nearest Source of possible contamination ___ feet ___ Direction ___ Type ___ Well disinfected upon completion <input type="checkbox"/> Yes <input type="checkbox"/> No			
										15 PUMP: <input checked="" type="checkbox"/> Not installed Manufacturer's Name ___ Model Number ___ HP ___ Volts ___ Length of Drop Pipe ___ ft. capacity ___ G.P.M. Type: <input type="checkbox"/> Submersible <input type="checkbox"/> Jet <input type="checkbox"/> Reciprocating			
16 Remarks, elevation, source of data, etc.						17 WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief. <b>Raymer Co., Inc.</b> 0384 REGISTERED BUSINESS NAME REGISTRATION NO. Address <b>3311 Three Mile Rd., N.W., Grand Rapids, MI</b> Signed <b>D. J. Neuberger</b> Date <b>May 23, 1984</b> AUTHORIZED REPRESENTATIVE							





McDOWELL & ASSOCIATES  
Geotechnical Engineers

LOG OF SOIL BORING NO. 2.6-10

PROJECT Observation Wells

JOB NO. MW 5 81-111

LOCATION Dow-Corning

SURFACE ELEV. \_\_\_\_\_ DATE 11-16-17-81 Midland, Michigan

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows for 6"	Moisture %	Natural Wt. P.C.F.	Dry Den Wt. P.C.F.	Unc. Comp. Strength PSF	Str. %
	2	FILL	1'6" Moist fine brown sand, fill						
	4		Moist fine oxidized brown sand						
	6		Moist to wet fine brown and discolored sand						
	8		8'6" <u>Surface Sand</u>						
	10		<u>Lake bed clay</u>						
	12								
	14		Stiff moist silty blue clay						
	16								
	18								
	20								
	22								
	24		23'0" Extremely stiff moist gravelly blue clay						
	26								
	28		<u>Lake bed Clay</u>						
	30		29'6" <u>Glacial Till</u>						
	32		Extremely stiff moist sandy blue claypan						
	34								
	36								
	38								
	40		39'6" Extremely compact wet medium brown sand (S.S')						
	42								
A	44			32					
UL	46		45'0" Extremely stiff moist gravelly blue clay, occasional stones	60					
	48								
	50		(Cont'd.)						

TYPE OF SAMPLE  
D. - DISTURBED  
U.L. - UNDIST. LINER  
S.T. - SHELBY TUBE  
S.S. - SPLIT SPOON  
R.C. - ROCK CORE  
P.C. - PHOTOGRAPHIC

REMARKS:

Standard Penetration Test - Driving 2" OD Sampler 1' With  
140# Hammer Falling 30". Count Made At 6" Intervals

GROUND WATER OBSERVATIONS

G.W. ENCOUNTERED AT	5	FT.	6	INS.
G.W. ENCOUNTERED AT	59	FT.	0	INS.
G.W. AFTER COMPLETION		FT.		INS.
G.W. AFTER	HRS	FT.		INS.
G.W. VOLUMES	Washed			



McDOWELL & ASSOCIATES  
Geotechnical Engineers

PROJECT Observation Wells

JOB NO. 81-111

LOCATION Dow-Corning

SURFACE ELEV. \_\_\_\_\_ DATE 11-16-17-81 Midland, Michigan

Sample # Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Dry Den Wt. P.C.F.	Unc. Comp. Strength PSF	Str. %
	52		Extremely stiff moist gravelly blue clay, occasional stones						
	54								
	56								
	58								
	60		Extremely compact wet medium to coarse gray sand (9')	60					
B	62			60/3"					
UL	64								
	66								
	68		Extremely stiff moist silty blue clay, hardpan, layers of sand and gravel						
	70								
	72								
	74								
	76		2½' Stick-Up. Bottom of screen 68'0". 10' - .010 screen. Blew for 30 minutes at 10 gallons per minute ±						
	78								
	80								
	82								
	84								
	86								
	88								
	90								
	92								
	94								
	96								
	98								
	100								

- TYPE OF SAMPLE  
D. - DISTURBED  
U.L. - UNDIST. LINER  
S.T. - SHELBY TUBE  
S.S. - SPLIT SPOON  
R.C. - ROCK CORE  
P.F. - PFENOMETER

REMARKS:

Standard Penetration Test - Driving 2" OD Sampler 1' With  
140 # Hammer Falling 30"; Count Made At 6" Intervals

GROUND WATER OBSERVATIONS

G.W. ENCOUNTERED AT	5	FT.	6	INS
G.W. ENCOUNTERED AT	59	FT.	0	INS
G.W. AFTER COMPLETION		FT.		INS
G.W. AFTER	HRS.	FT.		INS
G.W. VOLUMES	Washed			

26-11

GEOLOGICAL SURVEY SAMPLE NO. 

# **WATER WELL RECORD** ACT 294 PA 1985

MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH

1 LOCATION OF WELL			3 OWNER OF WELL:		
County <b>Midland</b>	Township Name	Fraction <div style="display: flex; justify-content: space-around;"><div>1/4</div><div>1/4</div><div>1/4</div></div>	Section Number	Town Number N/S.	Range Number E/W.
Distance And Direction from Road Intersections <b>SOUTH WELL MW-6A</b>			Address <b>Midland, Michigan</b>		
Street address & City of Well Location			3 WELL DEPTH: (completed) Date of Completion <b>75 ft. May 8, 1984</b>		
Locate with "X" in section below <div style="border: 1px solid black; width: 100px; height: 100px; position: relative; margin: 10px 0;"><div style="position: absolute; top: 0; left: 0; width: 100%; height: 100%; border: 1px dashed black;"></div><div style="position: absolute; bottom: 0; right: 0; width: 20px; height: 20px; border: 1px solid black;"></div><div style="position: absolute; bottom: 0; right: 0; width: 20px; height: 20px; border: 1px solid black;"></div></div>			5 <input type="checkbox"/> Cable tool <input checked="" type="checkbox"/> Rotary <input type="checkbox"/> Driven <input type="checkbox"/> Dug <input type="checkbox"/> Hollow rod <input type="checkbox"/> Jetted <input type="checkbox"/> Bored <input type="checkbox"/>		
Sketch Map:			6 USE: <input type="checkbox"/> Domestic <input type="checkbox"/> Public Supply <input type="checkbox"/> Industry <input type="checkbox"/> Irrigation <input type="checkbox"/> Air Conditioning <input type="checkbox"/> Commercial <input type="checkbox"/> Test Well <input checked="" type="checkbox"/> <b>Monitoring</b>		
2 FORMATION			7 CASING: Threaded <input checked="" type="checkbox"/> Welded <input type="checkbox"/> Height: Above/Below Diam. Surface <b>1</b> ft.		
			4 in. to <b>70</b> ft. Depth Weight <b>11</b> lbs./ft. in. to ft. Depth Drive Shoe? Yes <input type="checkbox"/> No <input type="checkbox"/>		
Clay, hard			8 SCREEN:		
Sandy Clay			Type: <b>Stainless St.</b> Dia.: <b>4"</b>		
Sand, fine			Slot/Gauze <b>10</b> Length <b>5'</b>		
Sandy Clay & Gravel			Set between <b>70</b> ft. and <b>75</b> ft.		
Sand & Gravel			Fittings:		
			9 STATIC WATER LEVEL		
			<b>7'7"</b> ft. below land surface		
			10 PUMPING LEVEL below land surface		
			ft. after <b>4</b> hrs. pumping <b>3</b> g.p.m.		
			ft. after hrs. pumping g.p.m.		
			11 WATER QUALITY in Parts Per Million:		
			Iron (Fe) <b>0.6</b> Chlorides (Cl) <b>175 parts</b>		
			Hardness <b>11 gts.</b> Other		
			12 WELL HEAD COMPLETION: <input type="checkbox"/> In Approved Pit		
			<input type="checkbox"/> Pitless Adapter <input checked="" type="checkbox"/> <b>12" Above Grade</b>		
			13 Well Grouted <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
			<input type="checkbox"/> Neat Cement <input checked="" type="checkbox"/> Bentonite <input type="checkbox"/>		
			Depth: From <b>0</b> ft. to <b>70</b> ft.		
			14 Nearest Source of possible contamination		
			feet Direction Type		
			Well disinfected upon completion <input type="checkbox"/> Yes <input type="checkbox"/> No		
			15 PUMP: <input checked="" type="checkbox"/> Not installed		
			Manufacturer's Name		
			Model Number HP Volts		
			Length of Drop Pipe ft. capacity G.P.M.		
			Type: <input type="checkbox"/> Submersible		
			<input type="checkbox"/> Jet <input type="checkbox"/> Reciprocating		
16 Remarks, elevation, source of data, etc.			17 WATER WELL CONTRACTOR'S CERTIFICATION:		
			This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.		
			Raymer Company, Inc. 0384 REGISTERED BUSINESS NAME REGISTRATION NO.		
			Address <b>3311 Three Mile Rd N.W., Grand Rapids</b>		
			Signed <b>D. F. Newberry, Jr.</b> May 23, 1984 AUTHORIZED REPRESENTATIVE		

USE A 2ND SHEET IF NEEDED

D67d

100M (Rev. 12-68)

**IMPORTANT: File with deed.**

**WELL OWNER COPY**

MIDLAND<sup>sup</sup> — 26

26-12

DOW CORNING  
MW #9

Drilling

#7 M

Cleaning Out

## HUGH NELSON

~~Oil and Gas~~ Water Well Service

PHONE: ~~---~~ Ludlow 3-4571

FARWELL, MICHIGAN

2/11/56  
Order #81271  
A-BA

4 Inch casing		Formation	
		From	To
1--	22 ft.	0	9 ft. Sand
2--	21 ' plus 6 inches.	9 ft.	26 ' Clay
3--	18 ' 6 "	26 ' 140 ' clay and hard pan	
4--	13 ' 9 "	140 ' 145 ' Fine sand good show of water	
5--	18 ' 3 "		to much silt, would not develop
6--	19 ' 2 "		out.
7--	19 ' 6 "	145 ' 163 ' Clay	
8--	19 ' 1 "	163 ' 177 ' Fine sand. Lot of silt in sand	
9--	10 ' 2 "		from 163 ft. to 172.
10--	10 ' 5 "		
Total 177 ft. plus 2 inches			

### Description of Well

7 ft. #10 Slot Johnson wire wound screen with lead packer, set at 177 ft in fine sand. 171 ft. 4 inch pipe in well.

Static water head . ft. from surface.

Well pumped 20 gal. per minute. No draw down.

26-13

Don Corning  
MW #8

Drilling In

midland-26

HUGH NELSON

Oil, Gas and Water Well Service

PHONE Lu-8-4571

FARWELL, MICHIGAN

Cleaning Out

near well house

Order No. 39050  
Monroe well No. 8  
8/11/56

4 Inch casing			
1	--	22	ft. plus 8 inches
2	--	22	" 4 "
3	--	22	" 6 "
4	--	22	" 4 "
5	--	22	" 8 "
6	--	22	" 2 "
7	--	11	" 4 "
8	--	10	" 8 "
9	--	20	" 4 "
10	--	10	" 8 "
11	--	11	" 4 "
Total 199 ft.			

Formation			
From	0 ft.	to	110 ft.
	0	10	25
	10	35	105
	35	105	112
	112	165	165
	165	192	192
	192	207	207

sand.  
clay.  
hard pan and clay.  
muddy sand, little  
show of water.  
Clay.  
Muddy sand.  
Fine sand, good we-  
pay.

Description of well

Well bailed 25 gal. per minute. No draw down.  
Static water head 8 ft. from surface.

= 10 slot 10 ft. lead top screen.

old one midland-26

Drilling In

Cleaning Out

# HUGH NELSON

~~Oil, Gas and Water Well Service~~  
PHONE ~~637~~ 4-8-4371  
FARWELL, MICHIGAN

on fill -

Monroe well No. 8  
Order No. 93-42218  
3-24-56

4 inch casing  
1-- 21 ft. plus 6 inches.  
2-- 20 " 3 "  
3-- 21 " 10 "  
4-- 19 " 8 "  
5-- 19 " 8 "  
6-- 19 " 8 "  
7-- 21 " 8 "  
8-- 7 " 8 "  
149 ft. plus 3 inches

From	0 to	Formation
0	8 ft.	Sand
8	35	Clay
35	90	Hard pan
90	155	Clay and hard pan
135	147	Fine sand. Lot of si
		in sand.
147	155	Gravel, very coarse.

7 ft.- 10 slot Johnson screen set at 155 ft. Screen set in gravel.  
Well bailed 20 gal. per minute with 20 ft. draw down.  
Static water level 12 ft. from surface.



## THE DOW CHEMICAL COMPANY

Test Water Well - Bedrock Valley Test No. 1

Approximate Location:

E $\frac{1}{2}$  SE NE Section 26  
T14N - R2E  
Midland Twp., Midland Co., Michigan

Survey -

1900.5' south of the north line of Section 26  
321.27' west of the east line of Section 26

Elevation -

Top of 6" coupling (6-26-67)  
640.02' (Weather Bureau)  
638.68' (U.S.G.S.)  
Use 640' above mean sea level

Surface to 335' drilled by cable tool, water well rig, driving 4" csg as hole was made. Casing could not be driven easily and rig moved off July 20, 1967. Driller: Hugh Nelson

335' to 417' was drilled with rotary rig the week of August 20, 1967. Driller:

Water samples recovered at: 203-218, 240-250, 270, 305, 320, and 336

Sample log by R. D. Matthews, September 6, 1967

Cable tool samples begin at 45'.

- 45 - 50 Sand, fine grained (~ 0.5 mm), well sorted, sub-rounded; colorless quartz 90%, pink feldspar and tan limestone about 10% with traces of black mineral grains in the sand mixture. Occasional pea gravel pieces of igneous and sedimentary origin. The sediment gravel is fine grained gray siltstone.
- 50 - 55 Sand, f.g. to v.f.g., rounded to sub-angular composition; quartz 95%, feldspar, blk mineral and limestone, 5%.
- 55 - 60 Sand, v.f.g., quartz as above.
- 60 - 68 Sand, v.f.g., quartz, well sorted, clean, trace of limestone component in sand.

- 68 - 80 Clay, brown, plastic, limy (good acid reaction), a few quartz grains, colorless, sub-rounded, are present.
- 80 - 90 Clay, brown, plastic, slightly limy; sand, medium grained to fine grained, sub-rounded quartz; minor pea gravel of sandstone, siltstone, chert and igneous granules.
- 90 - 105 Clay, sand, and gravel.
- 105 - 110 Clay, brown, limy, subordinate sand.
- 110 - 115 Clay and sand
- 115 - 150 Clay, brown, plastic, limy, minor sand.
- 150 - 160 Clay, brown, plastic, limy, trace sand.
- 160 - 170 Clay, brown, plastic, limy, minor sand and gravel, igneous up to 10 mm in size.
- 170 - 203 Clay, as above; minor sand.
- 203 - 210 Gravel, pea gravel (< 15mm), igneous, and sedimentary granules, including granite, peridotite, quartzite, chert, sandstone, siltstone, dolomite and limestone. Minor sand and brown clay. Most of the limestone granules are fossiliferous. 1/5th dolomite; cream colored, tan and light gray, no visible grains to medium grains, sub-rounded to angular. < 9 mm; 1/5th limestone; brown and tan, some vergiated and fossiliferous, some bedded with carbonaceous banding, very fine grained to granular, calcite crystal and fossil replacement common. < 12 mm; 1/5th sandstone and siltstone; wide range of color, colorless, white, pink, gray, yellow, cream, grey-green, mottled red and white, and black and gray, wide range of grain size and rounding, largest sandstone granule 13mm; 2/5th Chert, clay, and loose sand grains mostly quartz, and igneous and metamorphic granules or fragments, such as feldspar or hornblende.
- 210-212 Sand, largely quartz, colorless, clean, sub-rounded, well sorted. fine grained minor feldspar, jasper and black mineral (carbonaceous), traces of red sandstone and siltstone. Trace of limestone (very slight acid reaction on total sample.)
- 212 - 215 Sand, coarse grained (< 3 mm) to fine, igneous metamorphic and sedimentary. About 1/2 of grains are limestone. A trace of brown clay, and pieces of sandstone.
- 215 - 218 Sand, as above - smaller grain sizes more prominent.

- 218 - 225 Gravel, fine, or coarse grained sand, well sorted, sub-angular, igneous metamorphic and sedimentary. Minor brown limy clay. About 1/3d sample is limestone.
- 225 - 230 Sand, fine grained, quartz and limestone, sub-angular, subordinate pea gravel and brown limy clay.
- 230 - 236 Sand, fine to medium grain, quartz and limestone, sub-rounded; subordinate pea gravel and brown limy clays.
- 236 - 240 Sand, v.f.g. to f.g., quartz, feldspar and minor dark mineral angular to sub-angular, clean. well sorted. Only a slight acid reaction.
- 240 - 245 Sand, v.f.g. to f.g., quartz, feldspar and dark mineral, sub-angular to sub-round, traces of clay, good sorting. Some limestone present.
- 245 - 250 Sand, as above; very little limestone.
- 250 - 255 Gravel, fine to pea size, igneous metamorphic and sedimentary about 1/4 limestone or dolomite, well sorted, clean.
- 255 - 260 Sand, v.f.g. to f.g., well sorted, quartz, sub-rounded. trace of limestone. A few fine gravel pieces as above.
- 260 - 265 Sample missing.
- 265 - 270 Sand, f.g. to med. gr., quartz, chert, and feldspar, well sorted, clean.
- 270 - 275 Sand, v.f.g. to coarse, minor small gravel. The sand is quartz, igneous and a trace of limestone, poorly sorted, clean. Many of the larger particles are dark gray to black, igneous granules giving the overall sample a darker tone.
- 275 - 280 Sand, v.f.g. to f.g., a few larger grains, generally the sample is well sorted and clean. A slight increase in acid reaction but only minor amounts of limestone in the sand which is largely quartz.
- 280 - 290 Sand, v.f.g., quartz, clean, well sorted, sub-rounded. Trace of limestone in sand.
- 290 - 295 Sand, f.g., quartz, some clay contamination, good sorting, trace of limestone in the sand. Overall sample is darker than sand above.
- 295 - 300 Sand, as above. Decrease to trace of limestone, increase in dark colored grains and a considerable amount of orange-brown iron stain on small particles widely distributed through the sample.

- 300 - 310 Sand, v.f.g. to med. g.. quartz and igneous, trace of limestone, smaller grains are sub-round, medium grains are sub-angular, trace of clay.
- 310 - 315 Sand, v.f.g. to f.g., quartz, sub-angular. trace of clay and limestone.
- 315 - 320 Sand, v.f.g., well sorted, clean, quartz, sub-angular to angular. Minor limestone.
- 320 - 325 Sand, f.g., well sorted, clean, quartz, sub-angular, trace limestone.
- 325 - 330 Sand, f.g. to medium grains, quartz and igneous, increase in dark minerals, good sorting, trace of clay and limestone.
- 330 - 335 Sand, v.f.g. to f.g., quartz and igneous, good sorting, trace of clay and limestone.

## Rotary samples 335 - 417

- 335 - 340 Gravel, 5. to 1. mm, igneous metamorphic and sedimentary, round to sub-round on unbroken surfaces; sand grains, quartz and traces of limestone, some lime is fossiliferous.
- 340 - 355 Gravel, 15. mm, igneous metamorphic and sedimentary, round to sub-round on unbroken surfaces. most pieces are freshly broken (by bit) and are very angular. Trace of coal, burns easily, at 340-45. A major part of the broken granules are composed of limestone. Other fragments of granite, quartzite, chert, sandstone, siltstone are present and most show rounding on old surfaces.
- 355 - 360 Gravel, 10. mm, igneous and sedimentary including limestone granules. This sample is about 1/4 coal, burns easily, soft coal odor - it is believed to be a local deposit of loose coal derived from nearby bedrock hill sides.
- 360 - 365 Gravel and sand, some large (10.+ mm granules) but most of sample is < 5. mm. The gravels are as above, sub-rounded igneous and sedimentary types with very angular surfaces where fresh. Some coal present. Some limestone in the gravel size range.
- 365 - 375 Sand, coarse, some large granules as above, sub-round on old surfaces. General tone of sample presents a angular shape because of smaller size of grains and additional broken surfaces. Some coal and limestone as above.
- 375 - 380 Gravel and sand, sample contaminated with newspaper. The lime and other granules still show rounding on old surfaces. Wide variation in particle size (> 20. mm to < 1.mm). Traces of coal.

## Bedrock Valley Test No. 1 - 5 -

380 - 385 Gravel and sand as above. Sample is largely paper pulp.

385 - 395 Gravel and sand, < 15. mm, igneous metamorphic and sedimentary, broken granules with sub-rounded old surfaces, many of the gravel granules are composed of limestone. Sample contaminated with printed paper (newspaper?). Traces of coal.

395 - 405 Gravel and sand as above. The sample contains a few (~ 1%) particles of siltstone or fine grained sandstone, about 1/4 of them show old sub-rounded surfaces indicating that they are true gravels and not bedded sandstone. This siltstone is typical of Saginaw Series through which the valley was cut, it is apparent that some of the valley fill will be composed of material from local hill sides, as in the case of coal described in the samples.

405 - 410 Sand and gravel, < 6. mm, igneous metamorphic and sedimentary granules and grains. Some black shale and coal are included. a few of the shale pieces show rounding and could be drift material. About 10% of the sample is siltstone or sandstone and may represent bedrock, although a few pieces show old rounded surfaces and are glacial drift. If the base of the drift is 405 (driller's pick) then this sample is 90% drift contamination.

410 - 415 Sand and gravel, as above. About 10% of sample is fine grained sandstone or siltstone with calcareous cement and black shale and traces of coal. Remainder of sample (90%) is granules of igneous, metamorphic and sedimentary rock having weathered surfaces. Paper contamination continues.

415 - 417 Sand and gravel, as above. Increase in fine grained sandstone to about 20%, remainder is clearly glacial drift.

Circulating sample at 417 T.D.

Gravel, about 15 large stones, 25. mm to 10. mm and smaller chips or cuttings down to sand size. This is a small volume sample and the few large pieces dominate. The pieces showing rounded surfaces, weathering and evidence of stream erosion are:

1. granite, quartz, white feldspar and a black slaty mineral with a greenish cast, black mineral shows iron stain on old surface.
2. Limestone, cream colored to buff, slightly iron stained, fossiliferous, finely crystalline. The sample has one surface which is well weathered smooth and shows evidence of rounding on one corner. 23. mm long x 14. mm wide x 8. mm deep.

3. Sandstone, gray, fine grained quartz. occasional black grain, tightly cemented with a white dolomitic cement, very slow acid reaction. This is a large flake with one surface freshly broken and one surface rounded, grains range from <0.1 to ~0.4 mm, sub-angular to sub-round, 70% of grains are colorless, ~20% are white and <10% are black.
4. Chert(?) dolomitic, cream colored, very hard, very fine matrix with occasional (~10%) fine grained, colorless crystals in the matrix. Very slight slow acid reaction. This is a chip, one surface fresh and one well rounded and smooth.
5. & 6. Sandstone, light gray, very fine grained under 45x magnification, uniform grain size, well sorted, sub-rounded clear quartz grains. Calcareous cement, sample shows slight acid reaction. There are two such pieces, both are thin slabs with rounded edges and bedding surfaces well worn. The tablets are 1.5 mm thick and about 10. mm in length and width.
7. Quartzite, pink, rose quartz, clear quartz and minor dark mineral, trace of red feldspar. One area on this piece appears to be worn and weathered.
8. Chert(?) white, with minor dark to black inclusions, very hard, very minor acid reaction (trace of dolomite in chert?)
9. Quartz grain, sub-rounded, colorless, 9. mm in diameter.
10. Dolomite, light tan, very finely crystalline, a few needle shaped crystals of dark calcite. One side is well rounded and smooth.
11. Dolomite, light tan to buff, very fine grained, water worn, smoothed surfaces, sub-rounded. ~7. mm in largest dimension.
12. Dolomite, as above. Better rounding.
13. Chert, white, some iron stain, amorphous, hard.
14. Siltstone, dolomitic, cream to buff, well rounded and weathered surface. About 8. mm in largest dimension.
15. Sandstone, white, v.f.g., sub-angular, quartz with white cement or matrix, slightly dolomitic. One side of the chips is clearly rounded and weathered smooth.

16. Sandstone, gray, f.g., sub-rounded, quartz and possibly some calcite; the chip shows a slight acid reaction which may be due to calcitic or dolomitic cement although the sample is very dense and cement is not apparent. A few grains of black mineral and one larger opaque quartz grain. One surface is clearly water worn and smooth. 5. mm in longest dimension.

4" casing driven to ~ 334'.

Present Total Depth 417' August, 1967

The base of the drift at 405' as picked by the rotary driller is not clearly confirmed by samples. There are cuttings typical of Saginaw Series (up to 20%) in the samples; sandstone, siltstone, black shale, tan to buff crystalline limestone and coal are all present and increasing slightly in the lower footages. However, limestone is clearly present in the glacial drift as rounded pebbles and granules, some of the cable tool "sand" samples give a decided acid reaction. Many of the sandstone particles show rounded surfaces indicating that they are from glacial valley fill and not bedrock cuttings. The coal and black shale can be common to valley fill where coal and black shale are known to exist in the bedrock hills forming the walls of the valley.

The valley fill could easily be composed of rock types derived from the Saginaw Series. If the hole is in bedrock, then about 80% of the deepest samples is drift contamination from a caving hole below the casing at 336'.

*Hugh Nelson*

Formation:

<u>From</u>	<u>To</u>	
0	10	Sand
10	25	Clay
25	45	Clay Hard pan
45	68	Water Sand
68	81	Clay
81	90	Hard pan
90	100	Hard pan
100	110	Clay and gravel
110	120	Hard pan
120	135	Clay Hard pan
135	203	Clay
203	218	Water sand
218	236	Hard pan
236	250	gravel water bearing
250	270	gravel
270	282	gravel
282	310	gravel
310	330	gravel
330	340	gravel
340	355	gravel
355	370	gravel
370	375	gravel and coal
375	385	gravel
385	395	hard gravel some shale breaks
395	405	Hard gravel, some show sand rock
405	417	Sand rock, gravel and shale

Base of drift 405

Very good water bearing gravel from 320 ft. to 370 ft.

"45' top of water sand .

Top of water sand and gravel at 203

236 to 250 Hard pan & sand - some water

Good show water from 270 to 310

Base of drift 405

Drilling time from 395 to 417 6 to 10 min per foot"

about 1000 ft. of water

our screens were  
set to test 335-37:

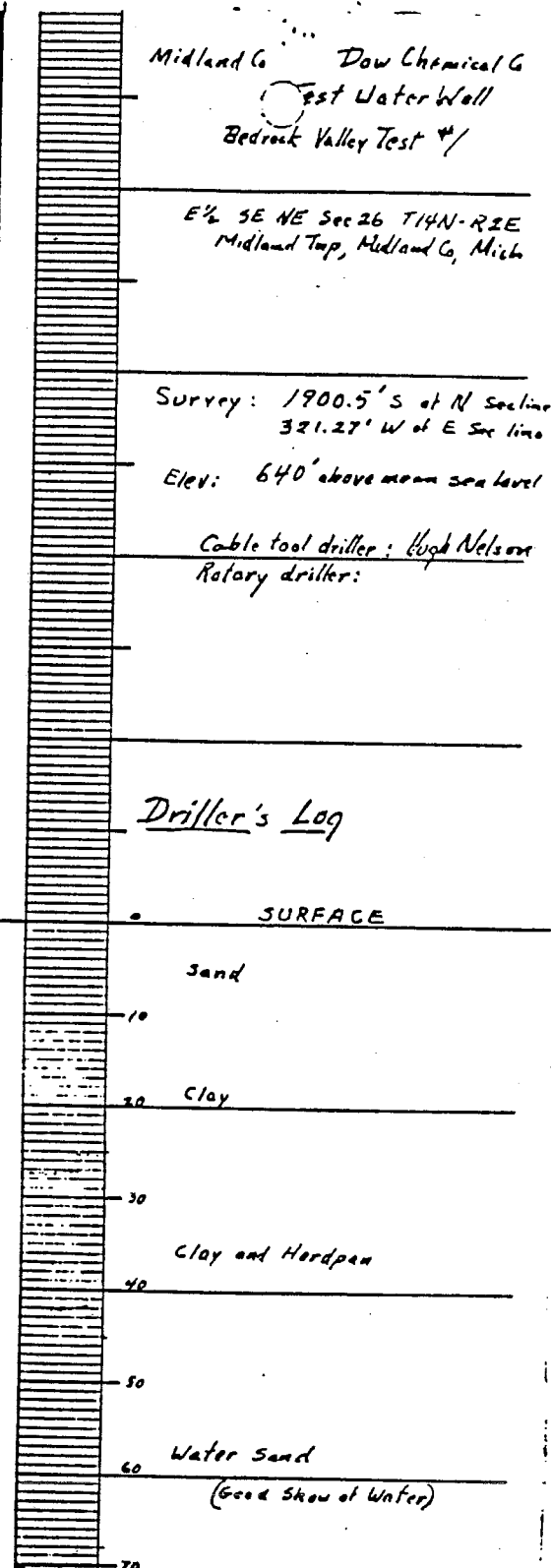
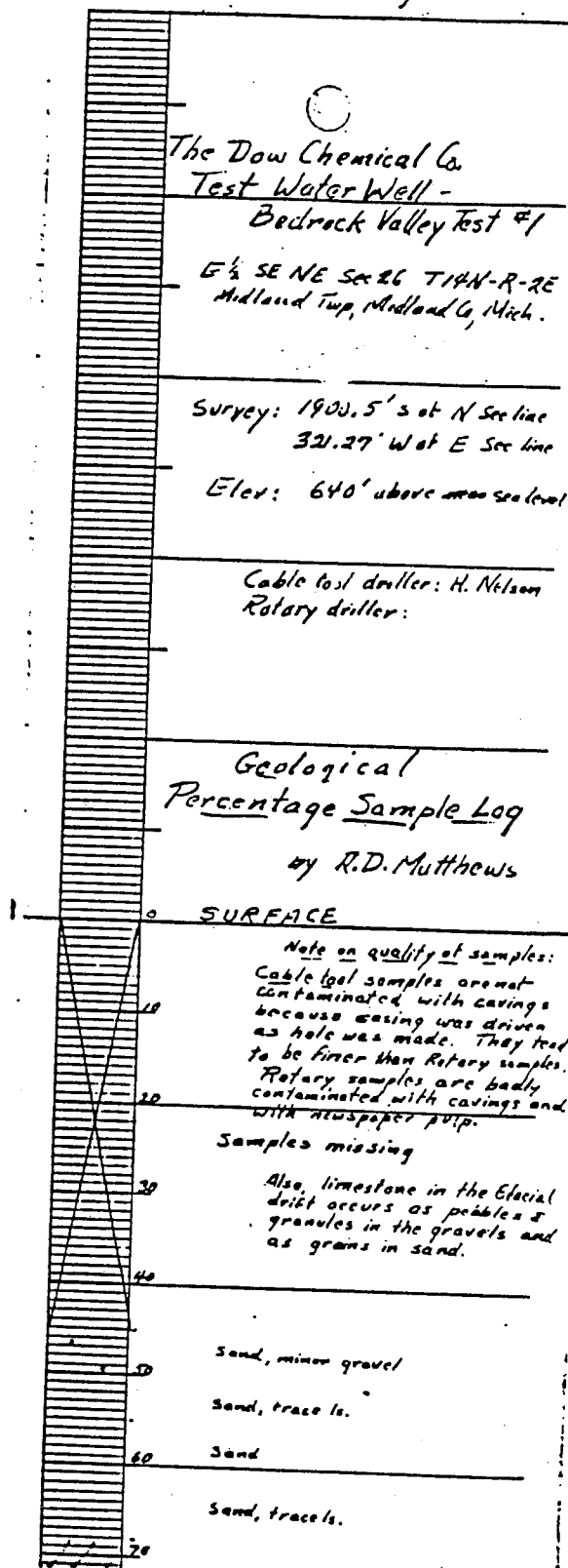


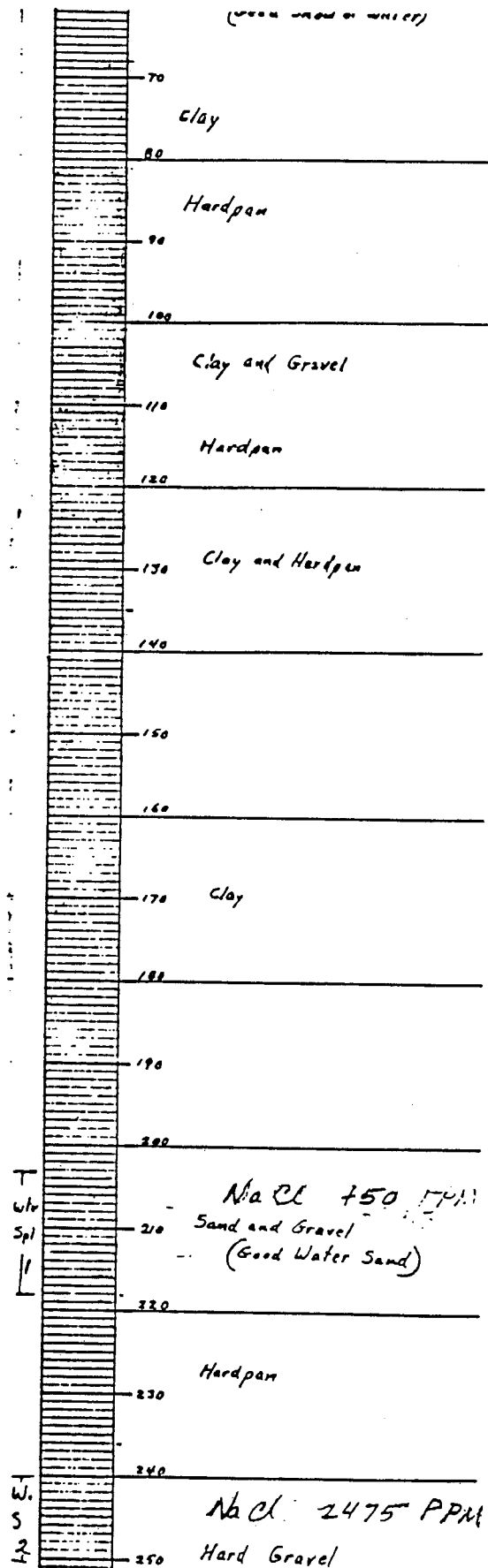
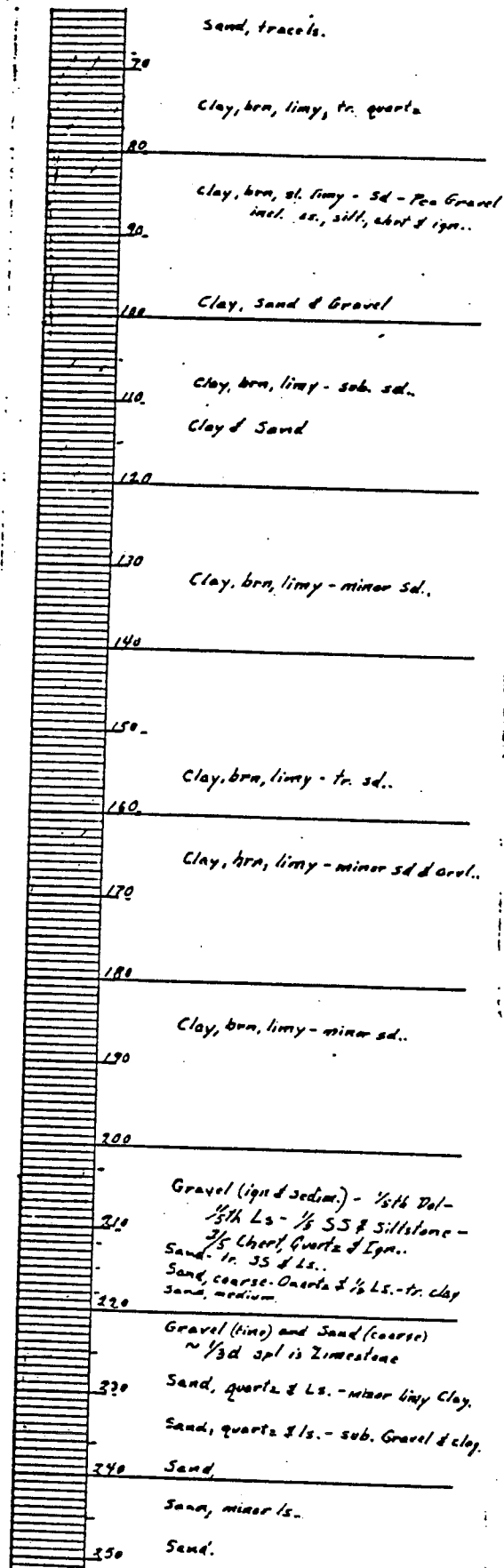
## Dow Bedrock Valley Test #1

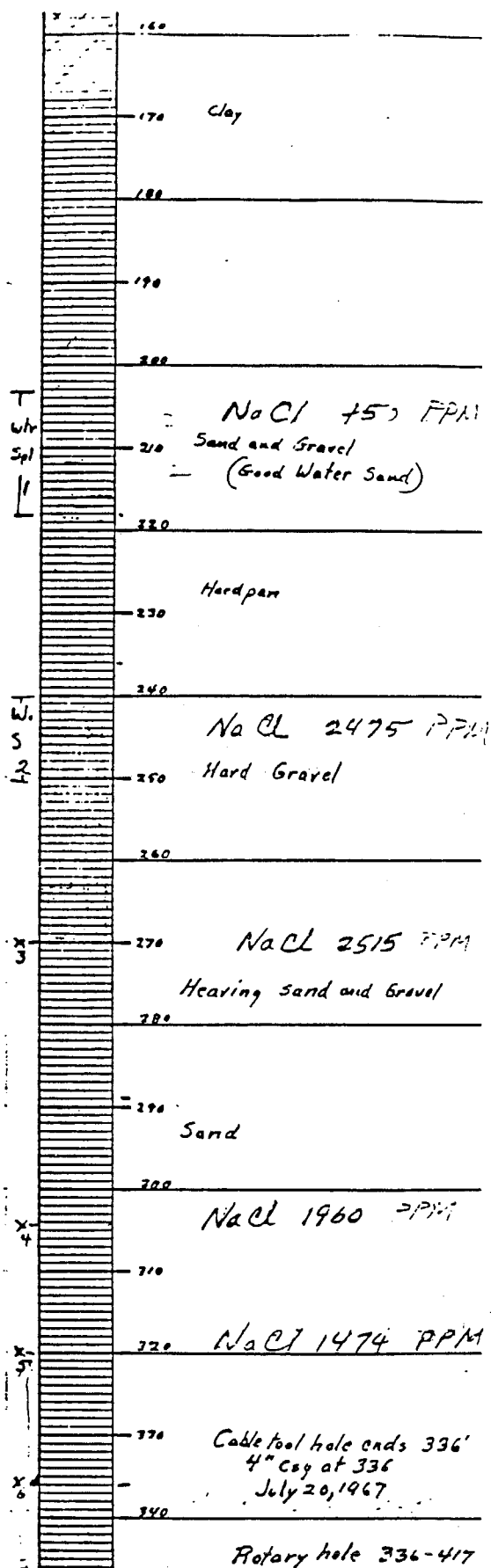
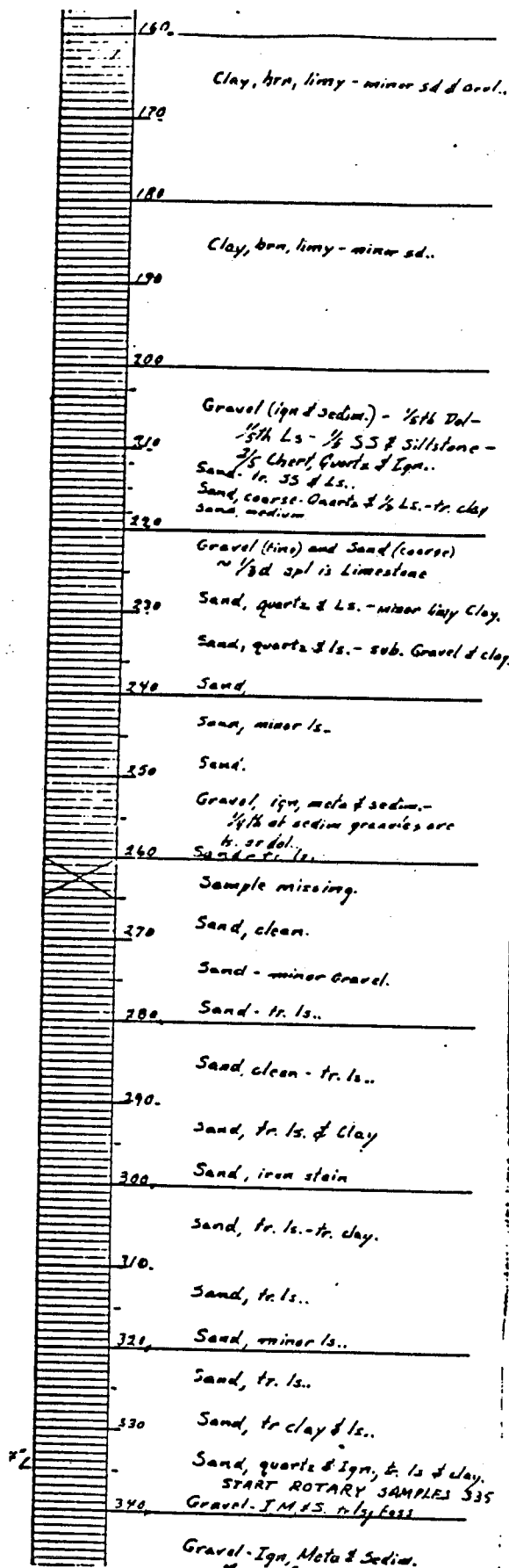
Sec 26

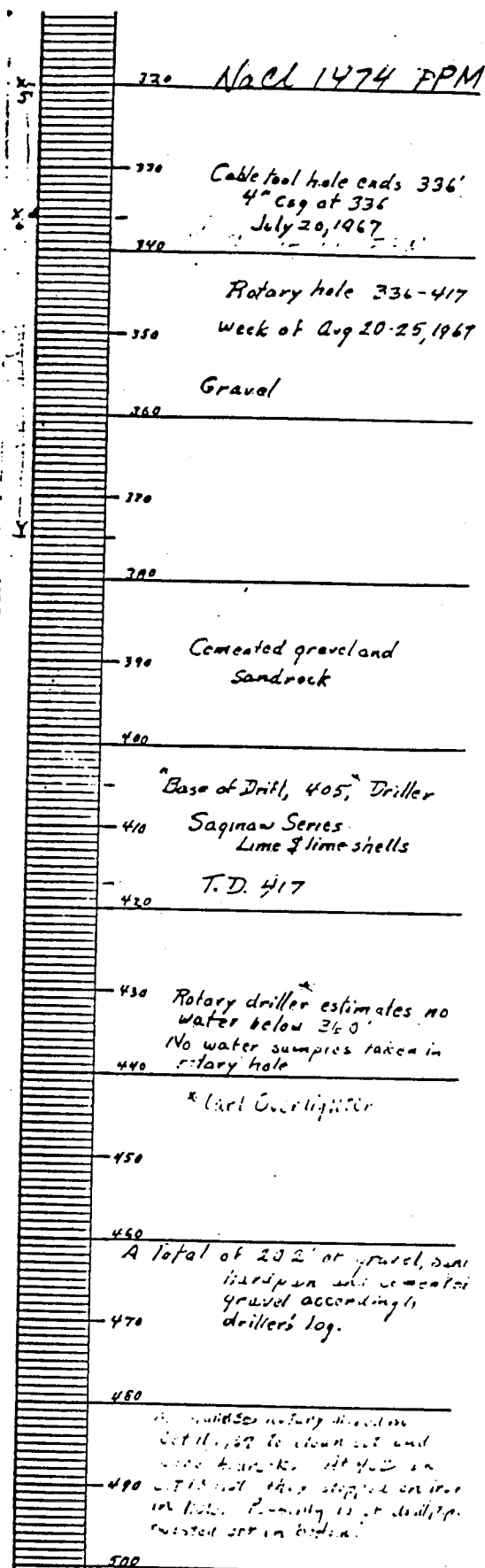
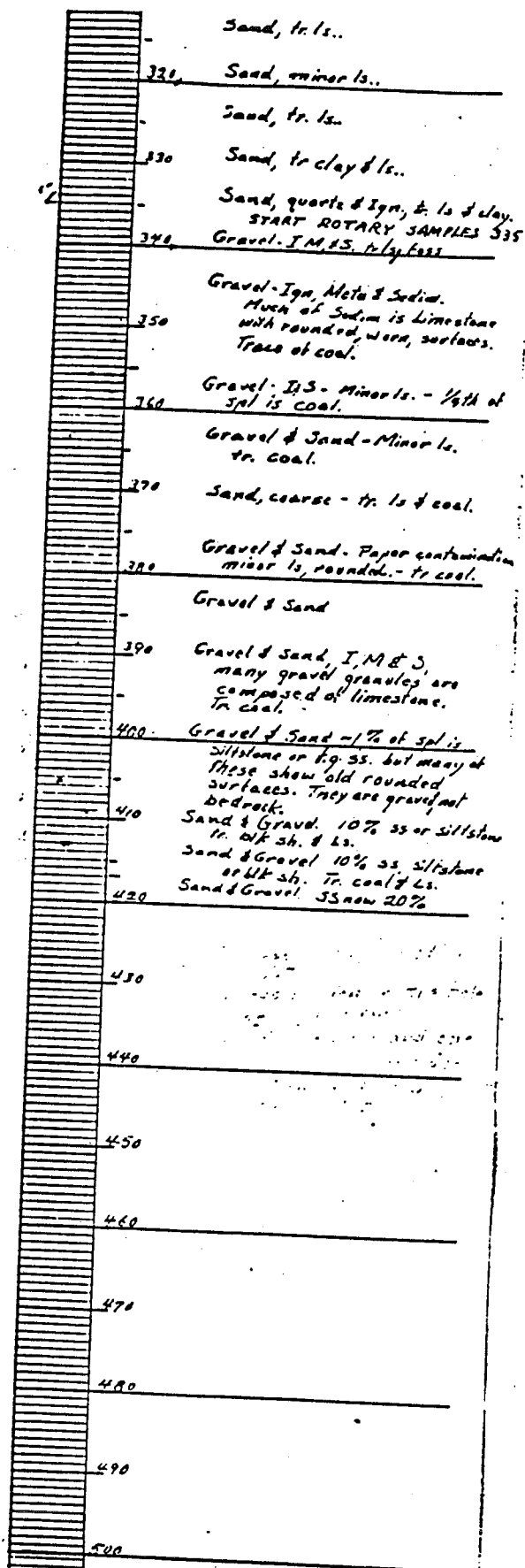
## Drillers Log

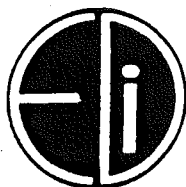
## Sample Log











# EDI ENGINEERING & SCIENCE

ENGINEERS / GEOLOGISTS / BIOLOGISTS / CHEMISTS  
611 CASCADE W. PKWY., S.E., GRAND RAPIDS, MI 49508; (616) 942-0870

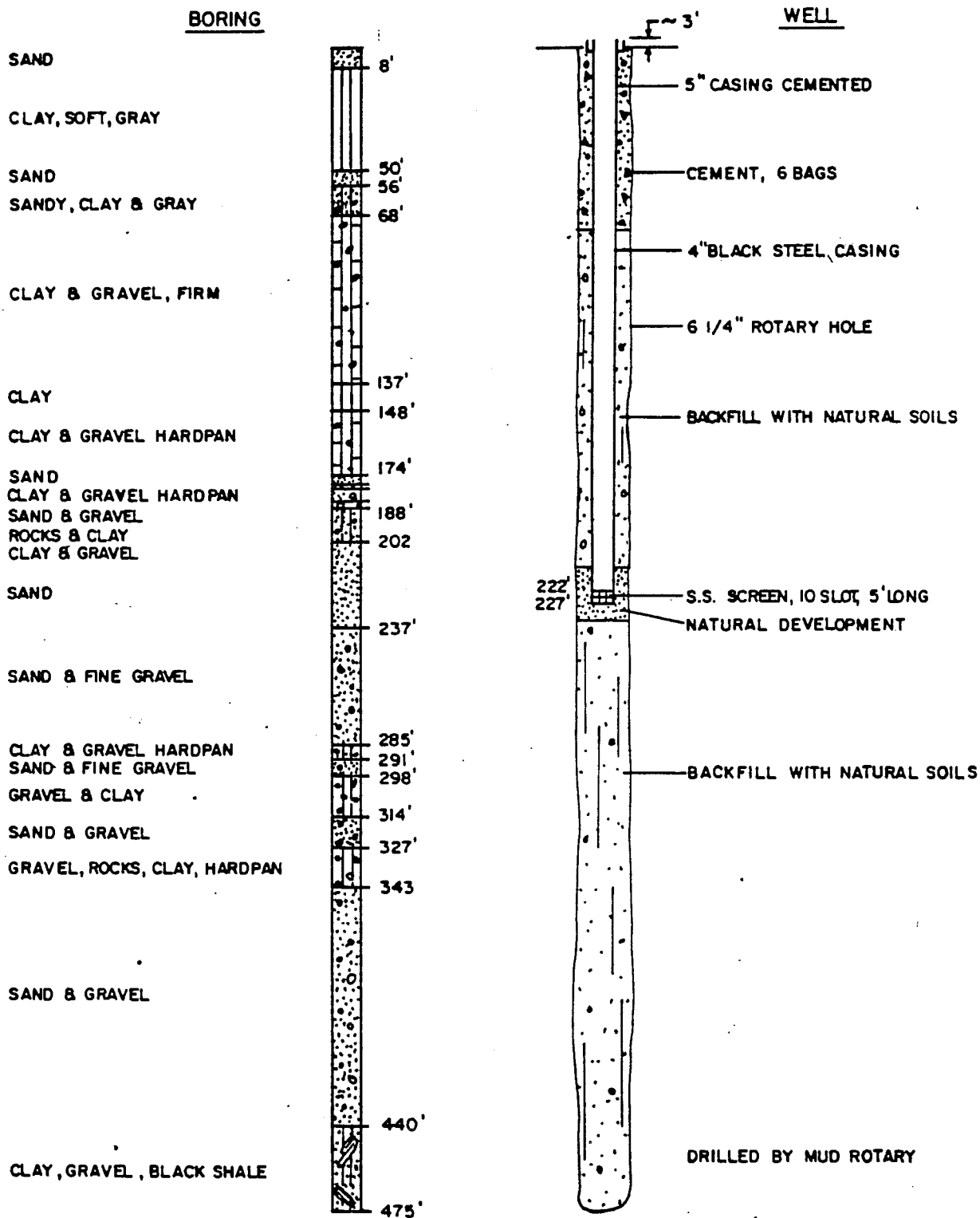
PROJECT NO. 20245  
OWNERS WELL NO. 3138  
CLIENT DOW CHEMICAL  
DATE 3-30-84

## BORING & WELL RECORD

CONTRACTOR: RAYMER

ELEVATIONS: LAND SURFACE ~ 639  
TOP OF CASING 641.92

### LOCATION



DRILLED BY MUD ROTARY

STATIC WATER LEVEL 19' BELOW TOP OF CASING

OK-1 (26-17)

GEOPHYSICAL LOG ONLY

SEE APPENDIX 3

County	MIDLAND	Township	MIDLAND	Fraction	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	Section	26	T	14N	R	2E
--------	---------	----------	---------	----------	---------------	---------------	---------------	---------	----	---	-----	---	----

[illegible][illegible]

# EDI Engineering & Science

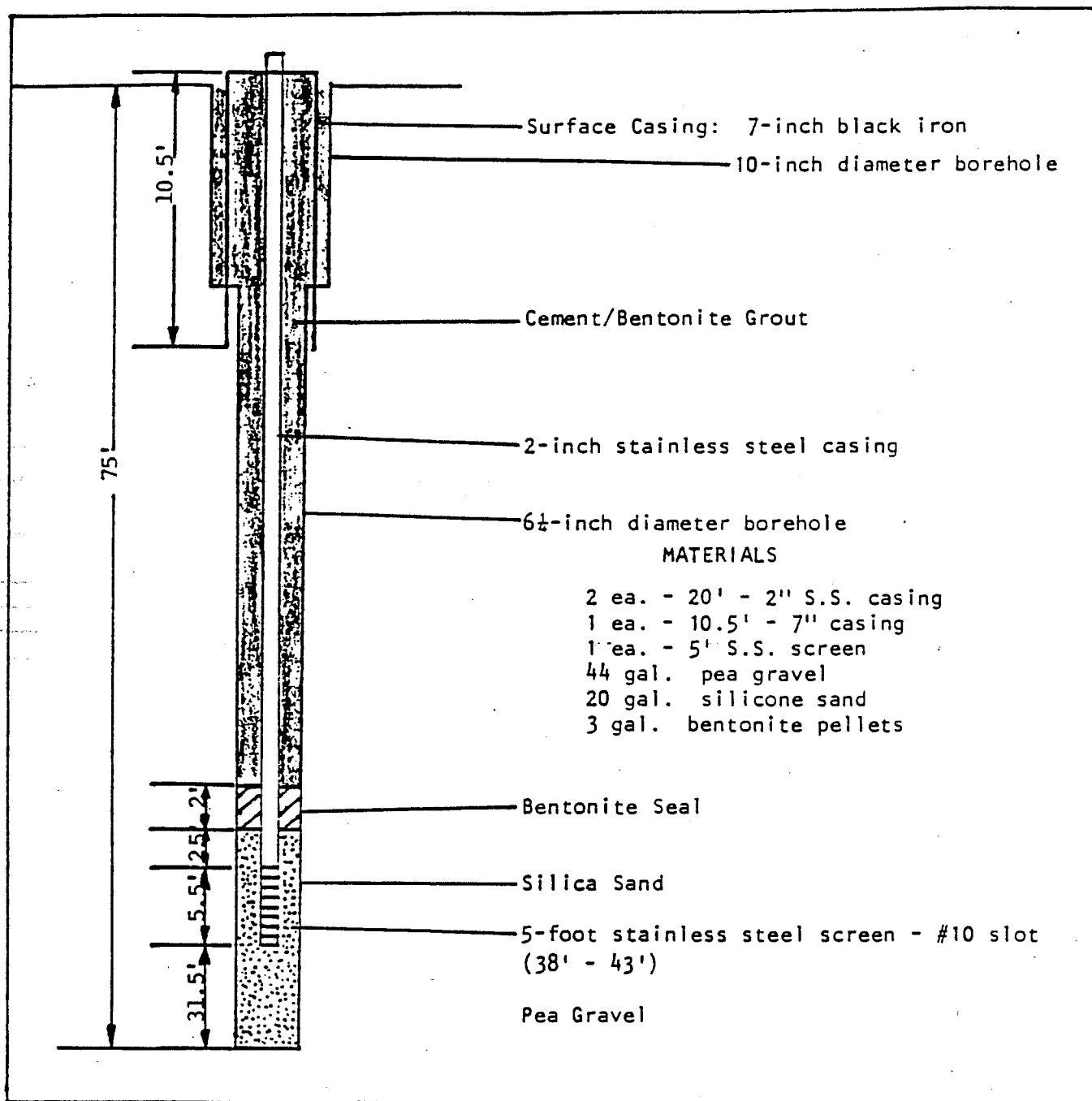
Environmental Engineering  
Geology, Biology and Chemistry

26-19

WELL IDENTIFICATION: DMV - 7

PLANT COORDINATES: 7935.54 N 3811.25 E

DATE COMPLETED: 9/10/86





# Well / Boring Log Sheet

County	MIDLAND	Township	MIDLAND	Fraction	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	Section	26	T	14N	R	2E
--------	---------	----------	---------	----------	---------------	---------------	---------------	---------	----	---	-----	---	----

Contractor: Raymer  
Address: Grand Rapids, MI  
Equipment: Falling Rig #10  
Supervisor: D. Pierce  
Drilling Method(s) Rotary Depth

Screen: \_\_\_\_\_  
 Manufacturer: Johnson  
 Material: stainless steel  
 Model: 960  
 Slot/Gauze: 10 slot Dia: 2"  
 Length: 5'  
 Death Set: 74.9' To: 79.9'

<b>Casing</b>			
Dia.	Type	Depth	Set
2"	S.S.	+ 2.1	To 74.9'
<hr/> 7"	<hr/> Blk.	+ 0.5	To 12.8'

Elevation  
Casing: 634.94'  
Ground: 632.8'  
Ref. Pt:

Remarks: (include here, other data available)

Filter pack from 72' to 82' #7 grade.

Pea gravel from 82' to 244'.

### Location Sketch

9283.78 N  
3821.24 E

[illegible]

Grouting/Seal		
Depth	To	Material
70	72'	Bentonite Pellet
0	70'	Bentonite/Cement

Development: Water Jet w/  
Deionized Water

Water Level: \_\_\_\_\_ Ft. Below: \_\_\_\_\_  
Measured On: \_\_\_\_\_

[illegible]

# EDI Engineering & Science

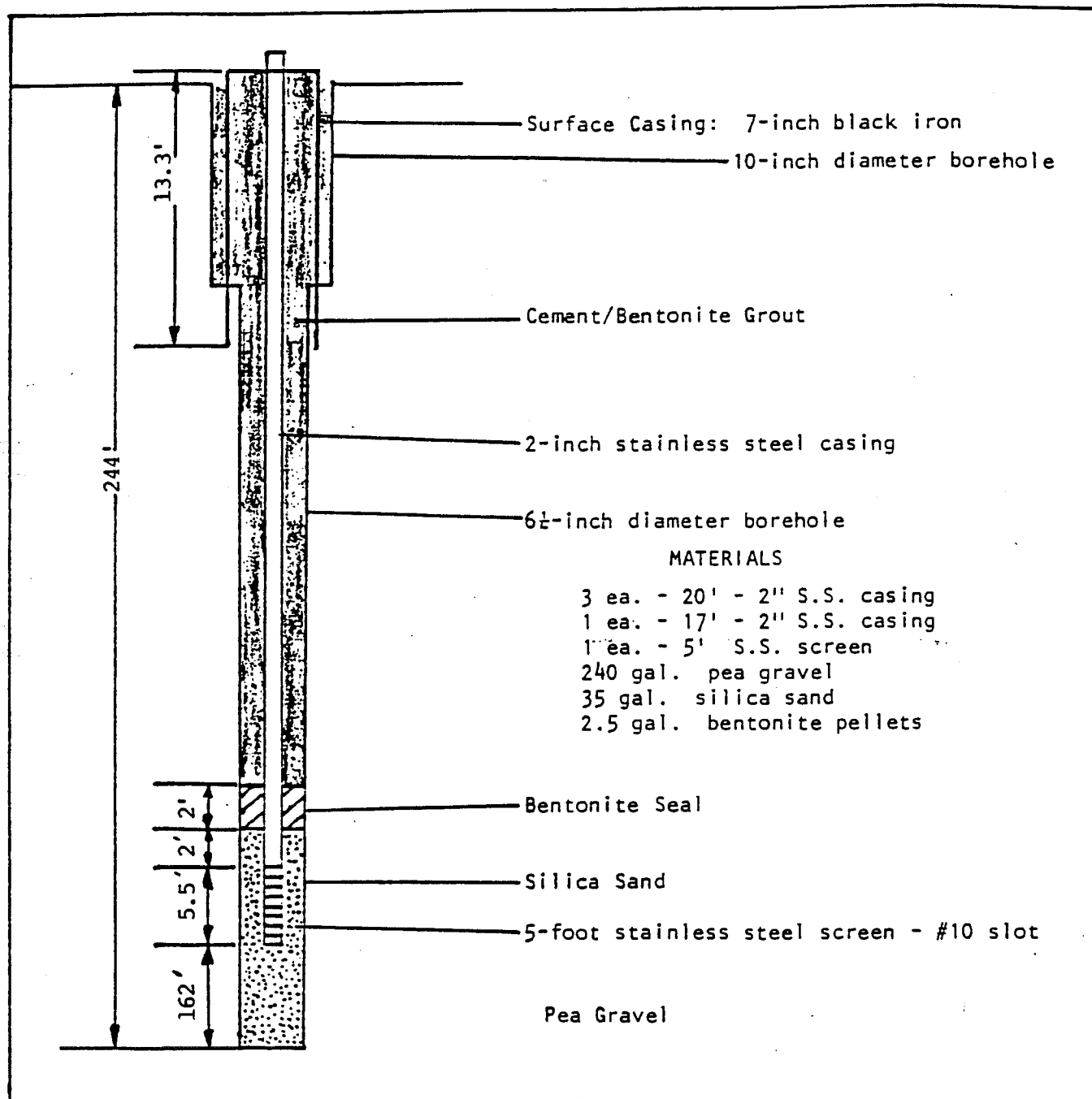
Environmental Engineering  
Geology, Biology and Chemistry

26-19

WELL IDENTIFICATION: DMV - 8

PLANT COORDINATES: 9283.78 N 3821.24 E

DATE COMPLETED: 10/1/86



(FEET) Thick- ness	(FEET) Depth To Base	Description	Remarks
1.0	1.0	TOPSOIL	
7.0	8.0	CLAY - brown	
5.0	13.0	CLAY - very hard, brown	
26.0	39.0	CLAY - very hard, some pebbles, gray	
5.0	44.0	SAND - fine to medium	
28.0	72.0	CLAY - sandy, w/gravel	
6.0	78.0	GRAVEL - sandy	
80.0	158.0	CLAY - very hard, gray	
56.0	214.0	CLAY - soft, gray	
10.0	224.0	SAND - fine to medium	
2.0	226.0	CLAY - gray	
12.0	238.0	GRAVEL - sandy	
7.0	245.0	CLAY - gravelly	

# EDI Engineering & Science

Environmental Engineering  
Geology, Biology and Chemistry

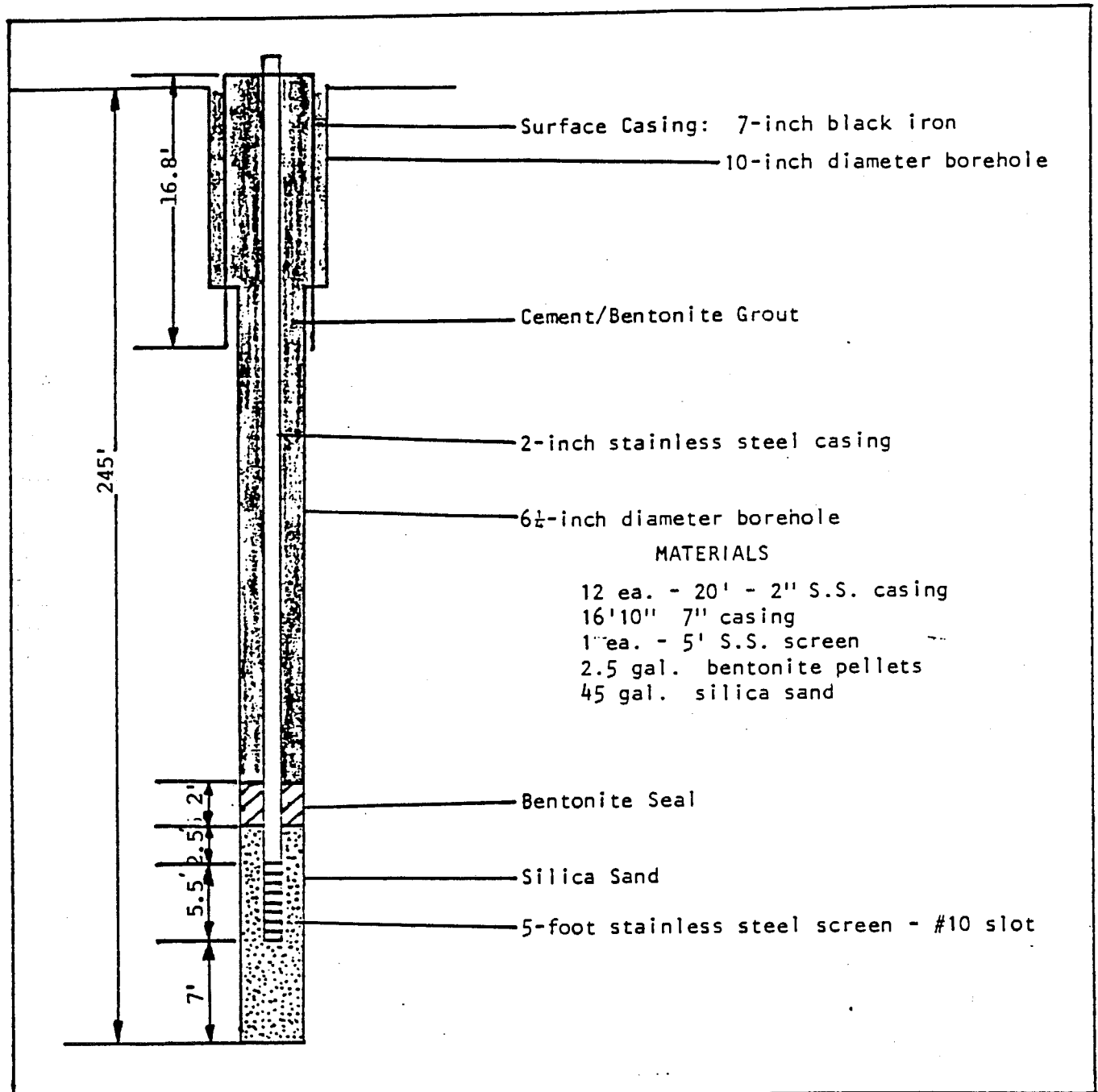


26-20

WELL IDENTIFICATION: DMW - 9

PLANT COORDINATES: 5892.29 N 1249.09 E

DATE COMPLETED: 10/10/86



Pea gravel from 165' to 66'.

[illegible]

# EDI Engineering & Science

Environmental Engineering  
Geology, Biology and Chemistry

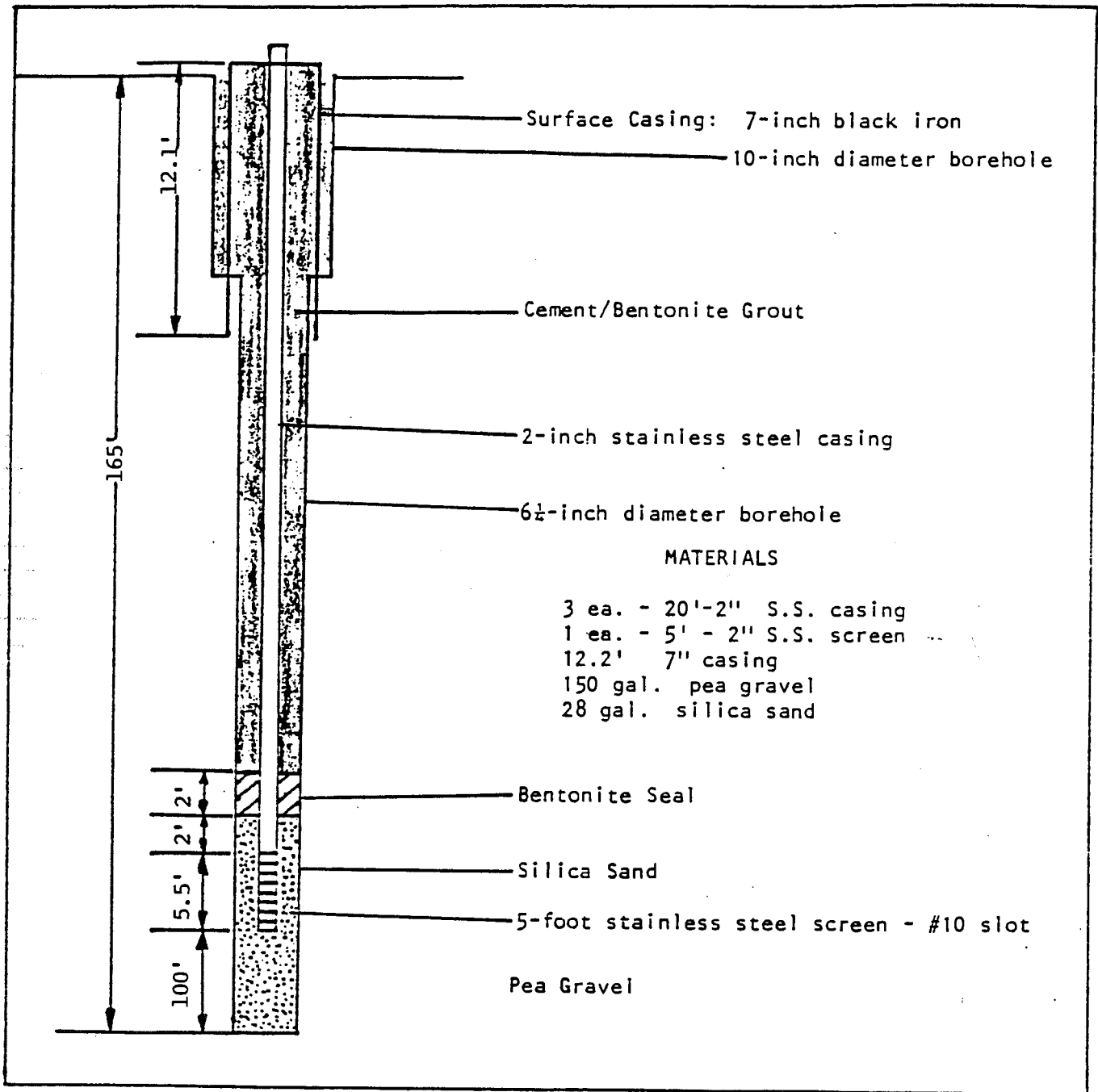


26-21

WELL IDENTIFICATION: DW - 10

PLANT COORDINATES: 9217.91 N 1435.29 E

DATE COMPLETED: 10/16/86



[illegible]

# EDI Engineering & Science

Environmental Engineering  
Geology, Biology and Chemistry

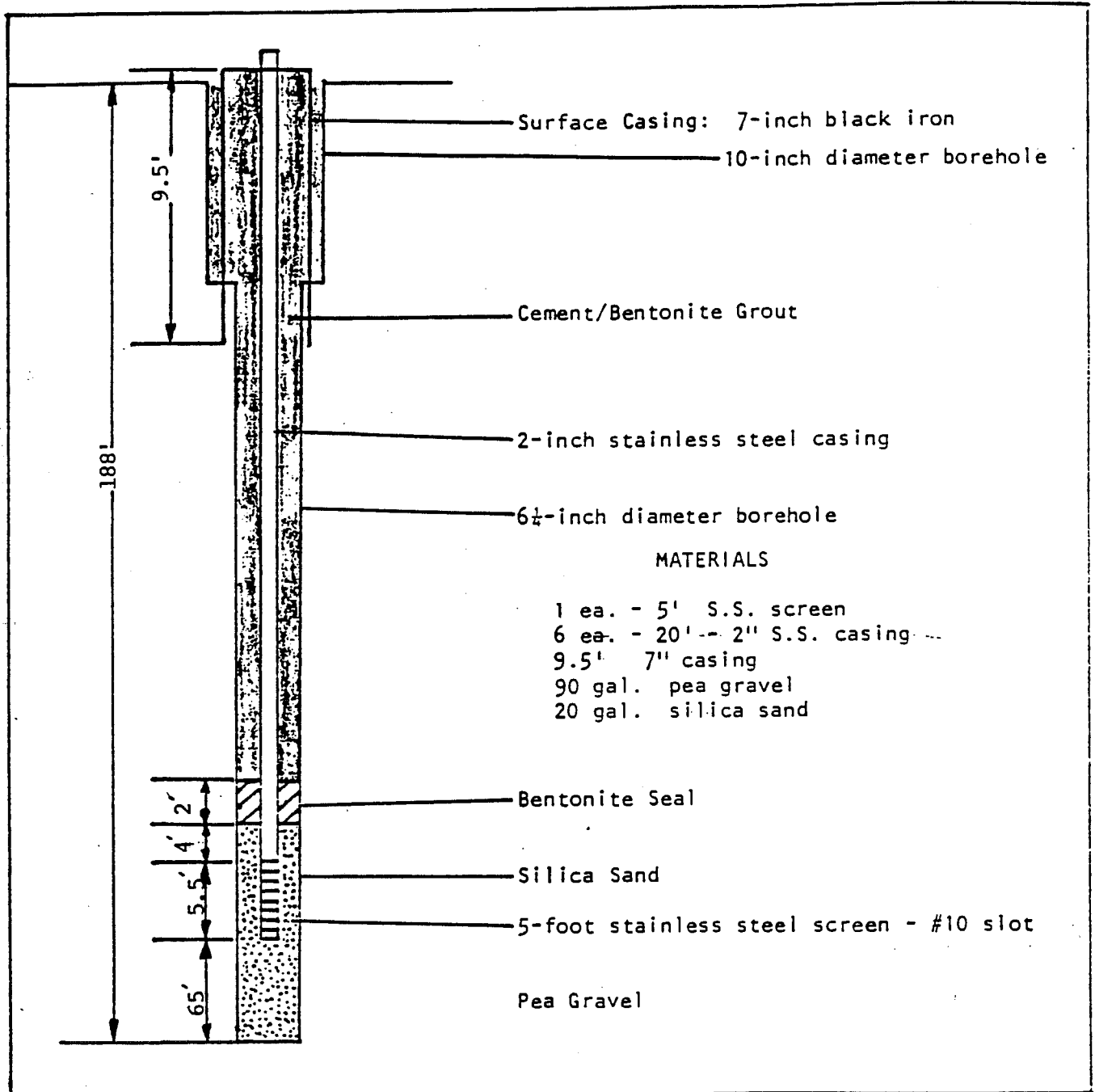


26-22

WELL IDENTIFICATION: DMW - 11

PLANT COORDINATES: 7919.83 N 3338.72 E

DATE COMPLETED: 10/27/86





[illegible]

# EDI Engineering & Science

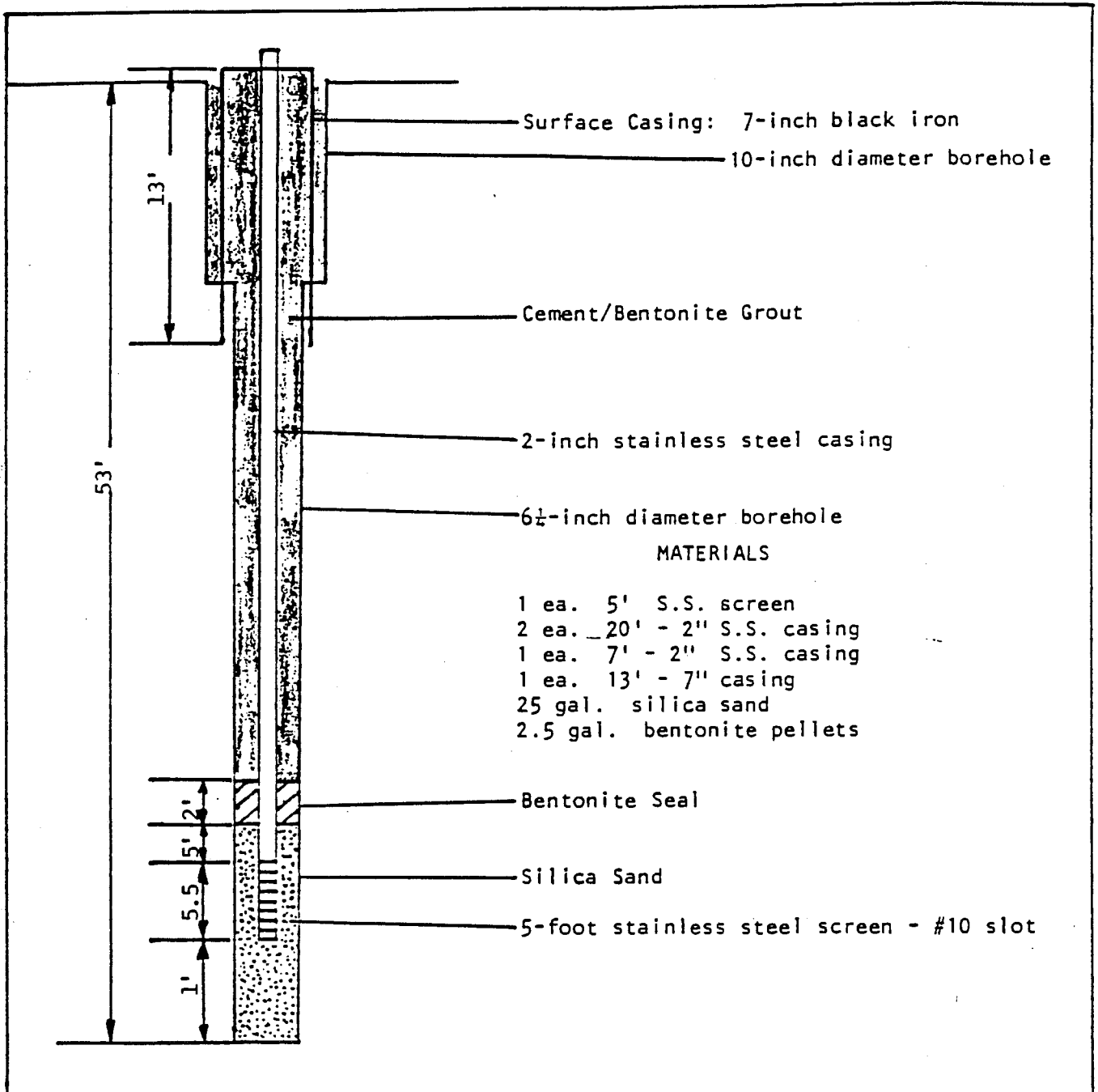
Environmental Engineering  
Geology, Biology and Chemistry

26-23

WELL IDENTIFICATION: DMW -12

PLANT COORDINATES: 9283 N 3833 E

DATE COMPLETED: 10/30/86



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## Well / Boring Log Sheet

County	MIDLAND	Township	MIDLAND	Fraction	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	Section	26	T	14N	R	2E
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Contractor: Raymer  
Address: Grand Rapids, MI  
Equipment: Failing Rig #10  
Supervisor: D. Pierce  
Drilling Method(s) Rotary Depth           

Grouting/Seal		Material
Depth	To	

Development: \_\_\_\_\_  
\_\_\_\_\_

Water Level: \_\_\_\_\_ Ft. Below: \_\_\_\_\_  
Measured On: \_\_\_\_\_

Screen: \_\_\_\_\_  
 Manufacturer: \_\_\_\_\_  
 Material: \_\_\_\_\_  
 Model: \_\_\_\_\_  
 Slot/Gauze: \_\_\_\_\_ Dia.: \_\_\_\_\_  
 Length: \_\_\_\_\_  
 Depth Set: \_\_\_\_\_ To: \_\_\_\_\_

**Casing**

Dia.	Type	Depth Set
_____	_____	_____ To _____
_____	_____	_____ To _____

**Elevation**  
Casing: \_\_\_\_\_  
Ground: \_\_\_\_\_  
Ref. Pt.: \_\_\_\_\_

Remarks (include here, other data available)

### Location Sketch

[illegible][illegible]

County	MIDLAND	Township	MIDLAND	Fraction	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	Section	26	T	14N	R	2E
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27-1

DATE: 11-1-54

File No. 100-443888

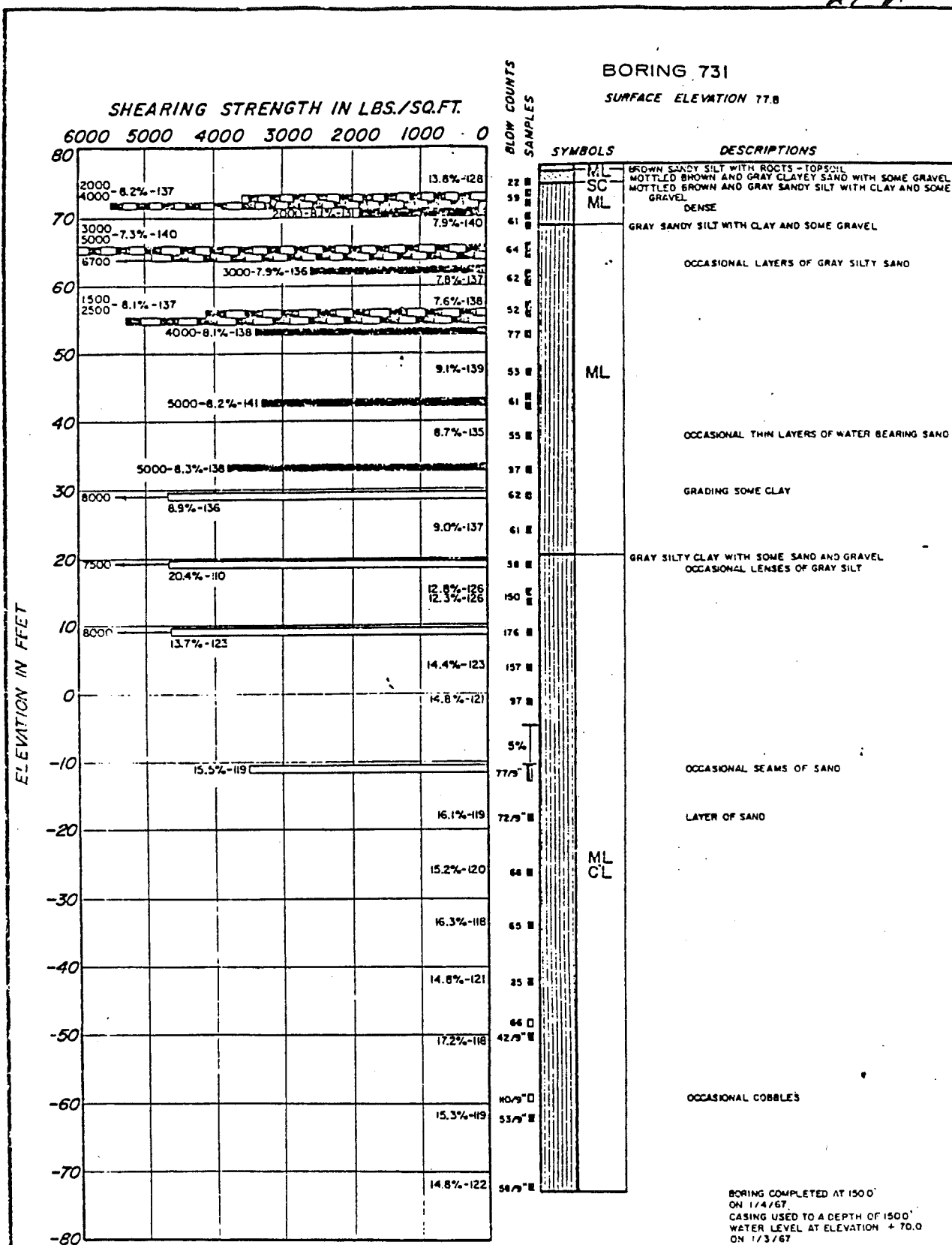
SUBJECT: 78

LOCATION Site "1" (1st road section)

GROUND WATER TA

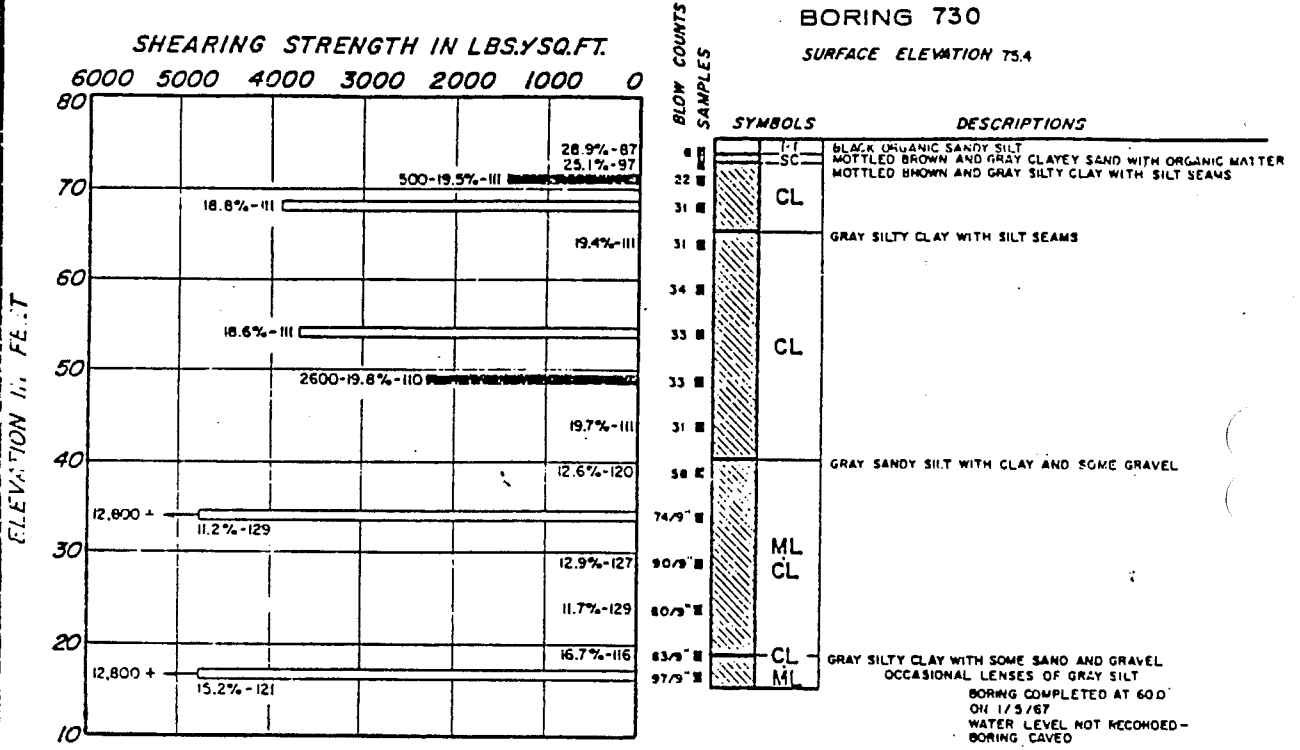
G. V. VOLUME He

SAMPLE NUMBER	DEPTH	LEGEND	SOIL DESCRIPTION	FOREIGN GRAVEL	C. SAND	M. SAND	F. SAND	SILT	CLAY	BLOWS PER 12 PENETRATION	CONSISTENCY	MOISTURE	HORIZONTAL SHEAR LB SQ FT
	-		6" Firm moist topsoil, heavy vegetation										
	2		Compact moist fine reddish brown sand streaks of clay										
329	4									18		14	
	6		Very compact moist fine reddish brown sand										
329	8		Compact moist fine brown sand, streaks of clay							9 1/2		14	
329	10		Compact moist fine light brown sand, streaks of clay							16		15	
	12												
	14		Compact wet fine grey sand										
329	16		Extremely compact wet fine to medium grey sand, streaks of clay							30	.90	11	
	18		Extremely stiff moist smooth blue clay streaks of sand and silt										
329	20		Extremely compact wet fine grey sand							65		10	
	22												
329	24		Extremely compact wet fine grey sand							40		12	
	26												
	28												
329	30		Extremely compact wet fine grey sand							40		10	
329	35									30		10	
	40		Extremely compact wet fine grey sand, streaks of coarse wet grey sand							80		12	
329	45									35		14	
329	50		Extremely compact wet fine grey sand, streaks of coarse wet grey sand							46		14	
329	55									40		14	



## LOG OF BORINGS





## LOG OF BORINGS

NOTE:  
ELEVATIONS REFER TO PLANT DATUM

THIS BORING WAS MADE BY THE  
U.S. ARMY CORPS OF ENGINEERS  
AT THE  
FORT MONROE, VIRGINIA  
ON 1/3/67  
BY  
S. J. MOORE

#3 MONROE WATER WELL

- 4" Casing
- 265' to Top of Screen

NO WELL LOG AVAILABLE



**MICHIGAN DRILLING**  
DIVISION OF MICHIGAN TESTING ENGINEERS, INC.  
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS  
14715 WYOMING AVENUE • DETROIT, MICHIGAN 48236

JOB NO. 74-585 LOG OF SOIL BORING NO. 158

PROJECT PROPOSED OFFICE AND PERSONNEL BL

LOCATION DOW CHEMICAL COMPANY

DATE 8-19-74 SURFACE ELEV. 103.5' MIDLAND, MICHIGAN 2

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"			Moisture %	Natural Wt. P.C.F.	Unc. Comp. Strength PSF.
A	2		0'3" FIRM MOIST SANDY TOPSOIL	6	7	10	14.8	117.2	
UL	4		2'0" WITH LIGHT VEGETATION						
B	6		3'2" COMPACT MOIST MEDIUM BROWN						
UL	8		SAND WITH LIGHT ORGANIC	7	10	10	19.5		
C	10		STREAKS, FILL						
UL	12		7'0" VERY COMPACT MOIST MEDIUM	1	1	2	47.9		
D	14		7'10" BROWN SAND WITH LIGHT						
UL	16		8'5" ORGANIC STREAKS, FILL						
	18		VERY COMPACT MOIST MEDIUM	2	2	3	30.0	120.0	2011
	20		HIGHLY ORGANIC STREAKS,						
	22		SAND, FILL						
E	24		12'6" SOFT MOIST HIGH ORGANIC	8	9	13	23.9	111.8	6704
UL	26		15'6" CLAY MIXED WITH PEAT						
	28		17'6" SOFT MOIST VARIEGATED						
F	30		SWAMP BOTTOM CLAY WITH						
UL	32		MEDIUM VEGETATION						
	34		FIRM MOIST VERY SANDY	5	7	9	19.3	131.3	415
	36		SILTY VARIEGATED CLAY WITH						
G	38		OXIDIZED STREAKS AND						
UL	40		TRACES OF VEGETATION						
	42		VERY STIFF MOIST SILTY	6	6	8	20.3	130.6	560
	44		OXIDIZED BROWN CLAY,						
H	46		29'0" HEAVY ROUGE COLOR						
UL	48		VERY STIFF MOIST SILTY	5	7	8	23.0	122.4	
	50		BLUE CLAY						
	52		32'6" STIFF MOIST SILTY BLUE						
	54		CLAY WITH LIGHT SAND						
	56		AND PEBBLES						
I	58		32'6" COMPACT MOIST FINE GRAY	6	8	8	18.9	133.6	2230
UL	60		SAND AND SILT WITH MEDIUM						
	62		CLAY CONTENT						
	64		STIFF MOIST SILTY BLUE	18	28	100	312.0	143.1	4492
	66		40'0" CLAY WITH LIGHT SAND AND						
	68		41'0" PEBBLES						
	70		42'0" HARDPAN						
J	72		BOULDERS, 41' TO 42'	39	83		8.8	145.9	28663
UL	74		46'0" HARDPAN, SEAMS OF SAND						
	76		SANDY HARDPAN WITH						
	78		OCCASIONAL LAYERS OF SAND						
K	80		50'0"	29	46	84	11.6		17408
UL	82								
	84								
	86								
	88								
	90								
	92								
	94								
	96								
	98								
	100								

**TYPE OF SAMPLE**

1. TOP SOIL  
2. BOTTOM SOIL  
3. INTERMEDIATE SOIL  
4. SOIL FROM LOG  
5. SOIL FROM LOG  
6. SOIL FROM LOG  
7. SOIL FROM LOG  
8. SOIL FROM LOG  
9. SOIL FROM LOG  
10. SOIL FROM LOG

**REMARKS**

SOLE SEALED WITH CEMENT GROUT BETWEEN  
DEPTHS OF 50'0" AND SURFACE.

Standard Penetration Test - Driving 2" O.C. Sampler 1" With  
120# Hammer Following 29" Count Made at 6" Intervals

**GROUND WATER OBSERVATIONS**

G.W. ENCOUNTERED AT 6 FT. 0 IN.  
G.W. ENCOUNTERED AT 6 FT. 4 IN.  
G.W. AFTER COMPLETION 6 FT. 4 IN.  
G.W. AFTER 100% 6 FT. 4 IN.  
G.W. VOLUMES HEAVY



**MICHIGAN DRILLING**  
DIVISION OF MICHIGAN TESTING ENGINEERS, INC.  
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS  
14155 WYOMING AVENUE • DETROIT, MICHIGAN 48236

JOB NO. 74-535 LOG OF SOIL BORING NO. 19

PROJECT PROPOSED SILO

LOCATION MIDLAND, MICHIGAN

DOW CHEMICAL COMPANY

27-6

DATE 8-20-74

SURFACE ELEV. 105.9'

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Unc. Comp. Strength PSF		
A	2		0'2" SLIGHT COMPACT MOIST	5	8	9	12.1	108.7	
UL	4		2'0" SANDY TOPSOIL, HEAVY						
B	4		VEGETATION						
UL	6		4'0" COMPACT MOIST FINE BROWN	2	2	3	20.9	116.6	
C	6		5'6" SAND, LIGHT VEGETATION,						
UL	8		7'0" FILL	2	2	4	25.3	120.8	2138
D	10		9'0" VERY COMPACT MOIST MEDIUM						
UL	10		BROWN SAND FILL	5	8	9	21.6	129.8	5044
	12		11'6" MEDIUM COMPACT WET MEDIUM						
	14		BROWN HIGHLY ORGANIC						
E	16		15'6" STREAKS, SAND FILL, LIGHT						
UL	16		VEGETATION	6	8	8	26.2	119.8	5299
	18		MEDIUM COMPACT WET MEDIUM						
	20		HIGHLY ORGANIC SAND FILL						
F	20		FIRM MOIST SANDY SILTY						
UL	22		27'0" VARIEGATED CLAY, LIGHT	5	6	9	25.5	126.2	3415
	24		VEGETATION						
G	26		29'0" VERY STIFF MOIST VARIE-	5	7	9	21.8	127.7	5778
L	28		GATED CLAY, OXIDIZED STREAK						
	30		AND VERY HIGH SAND AND SILT						
H	30		29'0" CONTENT	3	4	4	25.3	123.4	3320
	32		STIFF MOIST SILTY BLUE						
	34		CLAY						
I	36		37'0" STIFF MOIST BLUE CLAY WITH	4	5	8	23.1	125.9	2011
UL	38		OCCASIONAL LAYERS OF FINE						
	40		GRAY SAND AND SILT						
J	40		39'0" STIFF MOIST SILTY BLUE	18	23	30	12.3		
UL	42		CLAY WITH LIGHT SAND AND						
	44		PEBBLES						
K	46		40'6" EXTREMELY STIFF MOIST	36	79		7.9	147.2	957
UL	48		SILTY BLUE CLAY WITH SAND						
	50		AND PEBBLES						
	52		EXTREMELY COMPACT MOIST						
	54		FINE GRAY SAND AND SILT						
L	56		47'0" WITH STREAKS OF CLAY	40	87		14.7	136.1	
UL	58		HARDPAN WITH SEAMS OF						
	60		FINE GRAY SAND AND SILT						
	62		50'0" EXTREMELY COMPACT MOIST						
	64		FINE GRAY SAND AND SILT						
	66								
	68								
	70								

TYPE OF SAMPLE  
D. - DISTENDED  
UL - UNDISTURBED  
S. - SPLIT  
P. - PNEUMATIC  
M. - MANUAL  
G. - GRAVITY  
C. - CROWDER  
H. - HANDED  
O. - OTHER

REMARKS:

HOLE SEALED WITH CEMENT GROUT BETWEEN  
DEPTHS OF 10'0" AND SURFACE.

Standard Penetration Test - Driving 2" G.S. Sampler 1" With  
140# Hammer Falling 30"; Count Made At 5" Intervals

GROUND WATER OBSERVATIONS

G.W. ENCOUNTERED AT 4 FT. 0 IN.  
G.W. ENCOUNTERED AT 11 FT. 0 IN.  
G.W. AFTER COMPLETION 6 FT. 0 IN.  
G.W. AFTER 11 FT. 0 IN.  
G.W. VOLUMES HEAVY



MICHIGAN DRILLING  
DIVISION OF MICHIGAN TESTING ENGINEERS, INC.  
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS  
14933 WYOMING AVENUE • DETROIT, MICHIGAN 48238

JOB NO. 74-585 LOG OF SOIL BORING NO. 15  
PROJECT PROPOSED 5 STOREY BUILDING  
LOCATION DOW CHEMICAL COMPANY

DATE 8-20-74 SURFACE ELEV. 103.4'

MIDLAND, MICHIGAN

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"			Moisture %	Natural Wt. P.C.F.	Unc. Comp. Strength PSF.
A	2		0'2" SLIGHTLY COMPACT MOIST SANDY TOPSOIL, HEAVY	10	12	18	12.5	113.5	
UL	4		3'0" VEGETATION						
B									
UL	6		EXTREMELY COMPACT MOIST MEDIUM BROWN SAND, LIGHT	2	2	3	23.8		
C			ORGANIC STREAKS, FILL						
UL	8		6'6" MEDIUM COMPACT MOIST	2	2	4	36.6		
D			7'8" MEDIUM HIGHLY ORGANIC						
UL	10		9'0" SAND WITH MEDIUM TO LIGHT CLAY CONTENT, FILL	2	1	2	27.5	123.6	606
	12		12'0" SOFT MOIST HIGHLY ORGANIC SWAMP BOTTOM CLAY WITH PEAT CONTENT						
E			14'6" FIRM MOIST SANDY SILTY VARIEGATED SWAMP BOTTOM CLAY, LIGHT VEGETATION	7	9	10	26.2	126.2	7661
UL	16		16'2" SOFT MOIST EXTREMELY SANDY SILTY VARIEGATED CLAY, OXIDIZED STREAKS	4	5	7	24.3	127.5	4916
	18								
F									
UL	20		29'0" STIFF MOIST SILTY BROWN CLAY WITH ROUGE MARKINGS	4	6	7	24.0	125.9	
	22		31'0" STIFF MOIST SILTY BLUE CLAY WITH LIGHT SAND AND PEBBLES						
	24								
UL	26		36'0" STIFF MOIST VERY SANDY SILTY BLUE CLAY	4	6	7	23.1	121.2	
	28								
J			40'0" COMPACT WET FINE GRAY SAND AND SILT, LIGHT TO MEDIUM CLAY CONTENT	18	30	72			
UL	42		EXTREMELY STIFF MOIST SILTY BLUE CLAY WITH SAND AND PEBBLES, OCCASIONAL SEAMS OF SAND AND SILT						
	44								
K			46'0" SANDY HARDPAN	100	73		11.1		
UL	48								
	50		50'0" EXTREMELY COMPACT MOIST FINE GRAY SAND AND SILT	24	69		18.5	127.5	
L									
UL	52								
	54								
	56								
	58								
	60								

TYPE OF SAMPLE  
D. - INSTALLED  
UL - UNDISTURBED  
S. - SOIL BY TUBE  
S. - SOIL BY SPOON  
C. - SOIL CORE  
O. - OTHER

REMARKS:

BOLE SEALED WITH CEMENT GROUT BETWEEN  
DEPTH OF 10'0" AND SURFACE.

Standard Penetration Test - Driving 2" C.D. Sampler 1' With  
149# Hammer Falling 30". Count Made At 6" Intervals

GROUND WATER OBSERVATIONS

G.W. ENCOUNTERED AT 5 FT. 0 IN.  
G.W. ENCOUNTERED AT FT. IN.  
G.W. AFTER COMPLETION 5 FT. 5 IN.  
G.W. AFTER IN. FT. IN.  
G.W. VOLUMES HEAVY



**MICHIGAN DRILLING**  
DIVISION OF MICHIGAN TESTING UNIT, INC.  
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS  
14915 WYOMING AVENUE • DETROIT, MICHIGAN 48230

JOB NO. 74-535 LOG OF SOIL BORING NO. 1

PROJECT PROPOSED OPEN PROCESS BUILDING

LOCATION DOW CHEMICAL COMPANY

DATE 8-20-74

SURFACE ELEV. 103.3'

MIDLAND, MICHIGAN

27-8

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"			Moisture %	Natural Wt. P.C.F.	Unc. Comp. Strength PSF.
A	2		0'2" SLIGHTLY COMPACT MOIST						
UL	3		2'0" SANDY TOPSOIL, HEAVY	6	13	18	13.7	116.6	
B	4		3'0" VEGETATION						
UL	5		4'2" COMPACT MOIST MEDIUM BROWN	5	6	6	17.3		
C	6		AND ORGANIC SAND FILL						
UL	7		7'0" EXTREMELY COMPACT MOIST	2	3	4	30.9	117.5	1915
D	8		8'0" MEDIUM BROWN SAND, SLIGHT						
UL	9		9'0" ORGANIC STREAKS, FILL	1	1 1/2	2	28.3	124.4	1895
	10		COMPACT MOIST MEDIUM						
	11		HIGHLY ORGANIC SAND, FILL						
	12		13'0" COMPACT MOIST MEDIUM BROWN						
E	13		SAND, SLIGHT ORGANIC STREAK						
UL	14		FILL	6	7	11	23.9	119.5	4852
	15		18'0" FIRM MOIST SANDY SILTY						
	16		VARIEGATED CLAY, LIGHT						
F	17		VEGETATION						
UL	18		FIRM MOIST SANDY SILTY	4	6	8	26.7	124.1	
	19		VARIEGATED CLAY						
	20		SOFT MOIST EXTREMELY SANDY						
	21		SILTY VARIEGATED CLAY						
	22		VERY STIFF MOIST SILTY	6	7	9	19.8	130.3	
	23		BROWN CLAY, OXIDIZED STREAK						
	24		AND ROUGE MARKINGS						
	25		28'0" STIFF MOIST SILTY BLUE						
	26		CLAY WITH SAND AND PEBBLES	4	6	7	23.6		
UL	27		31'0" COMPACT WET FINE GRAY SAND						
	28		AND SILT, MEDIUM TO HIGH						
	29		CLAY CONTENT						
	30		STIFF MOIST SILTY BLUE	5	5	6			
	31		CLAY WITH OCCASIONAL STREAK						
	32		OF SAND AND SILT, LIGHT						
	33		38'0" SAND AND PEBBLES						
J	34		39'6" EXTREMELY STIFF MOIST	18	62	130	12.7	142.6	25621
UL	35		BLUE CLAY WITH SAND AND						
	36		PEBBLES						
	37		HARDPAN						
K	38			40	91		10.7	146.5	
UL	39								
	40		48'0" EXTREMELY COMPACT MOIST						
	41		FINE GRAY SAND AND SILT						
L	42		50'0"	39	83		16.5	123.4	
UL	43								
	44								
	45								
	46								
	47								
	48								
	49								
	50								
	51								
	52								
	53								
	54								
	55								
	56								
	57								
	58								
	59								
	60								

TYPE OF SAMPLE  
IN - FORTIFIED  
UL - UNDISTURBED  
UL - UNDISTURBED  
UL - UNDISTURBED

REMARKS:  
HOLE SEALED WITH BENTONITE GROUT  
BETWEEN DEPTHS OF 50'0" AND SURFACE.  
Standard Penetration Test - Driving 2" x 1/2" Sampler 1' With  
140# Blow on Falling 30", Count Made 2' 6" Interval

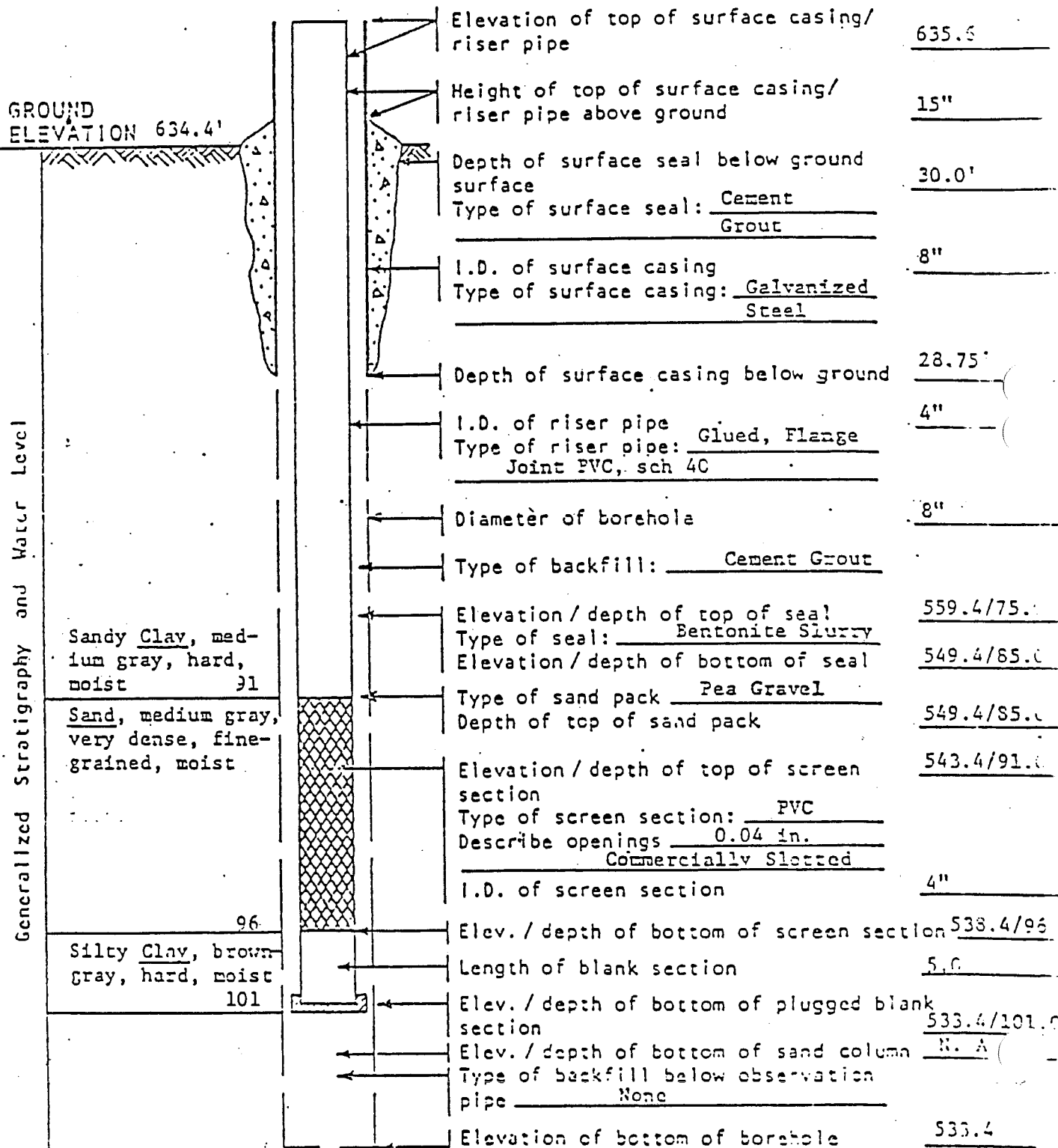
GROUND WATER OBSERVATIONS  
G.W. ENCOUNTERED AT 0 FT. 0 IN.  
G.W. ENCOUNTERED AT 0 FT. 0 IN.  
G.W. AFTER COMPLETION 0 FT. 0 IN.  
G.W. AFTER 0 HRS. 0 FT. 0 IN.  
G.W. AFTER 0 HRS. 0 FT. 0 IN.

# GROUND WATER OBSERVATION WELL RECORD

27-9

PROJECT Midland Power Plant  
 LOCATION S 4811 E 1255  
 DATE COMPLETED 9 December 1978  
 INSPECTED BY W. R. Kinzer DATE 12/9/77  
 CHECKED BY G. T. LeFevre DATE 2/14/79

PAGE 1 OF 1  
 WELL NO. W-2  
 AQUIFER Sand  
 THICKNESS 5.0'

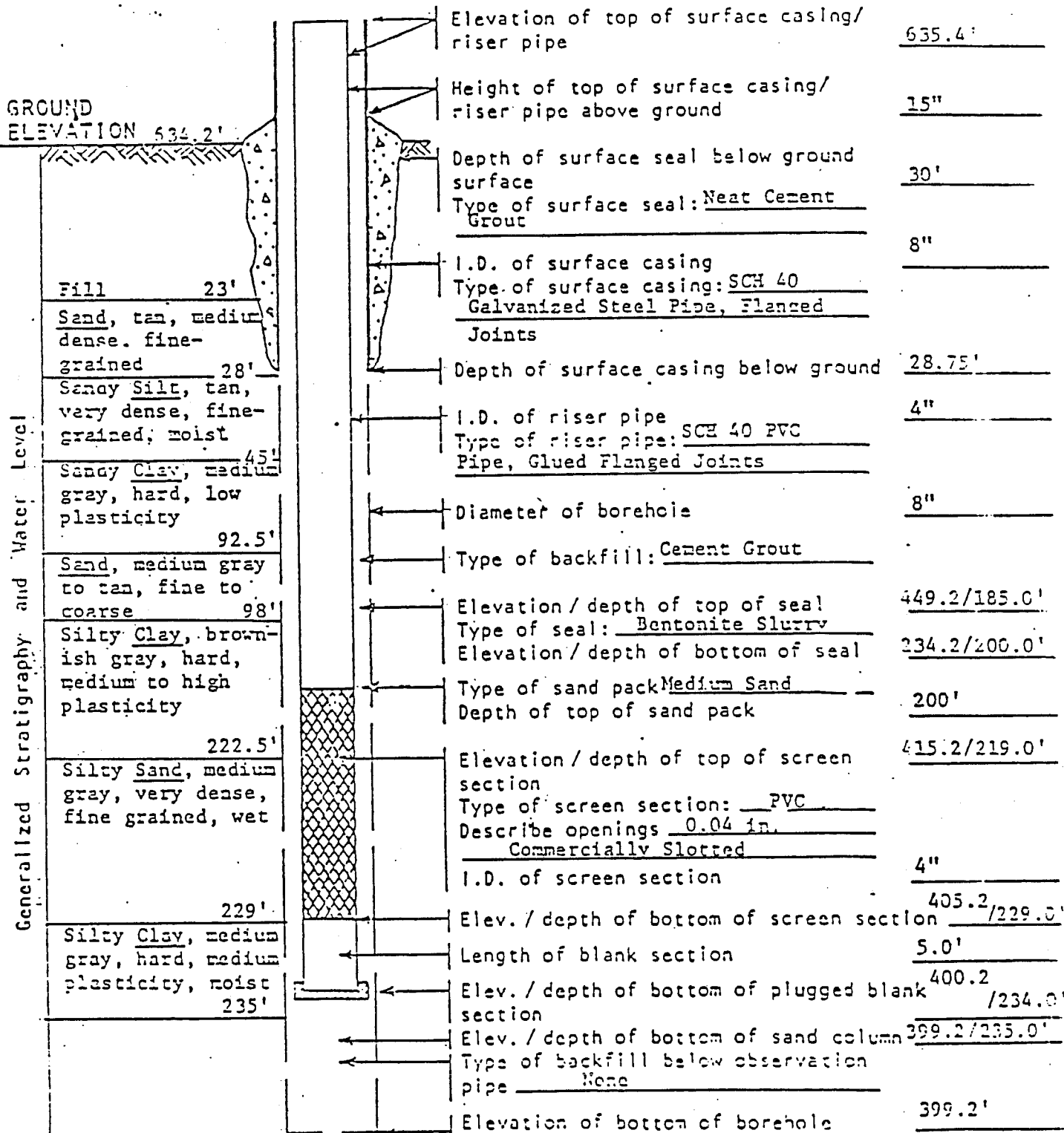


# GROUND WATER OBSERVATION WELL RECORD

27-10

PROJECT Midland Power Plant  
 LOCATION S 4814 E 1259  
 DATE COMPLETED 5 December 1977  
 INSPECTED BY W. R. Kinzer DATE 12/5/77  
 CHECKED BY G. T. LeFevre DATE 2/14/79

PAGE 1 OF 1  
 WELL NO. W3  
 AQUIFER Silty Sand  
 THICKNESS 6.5'





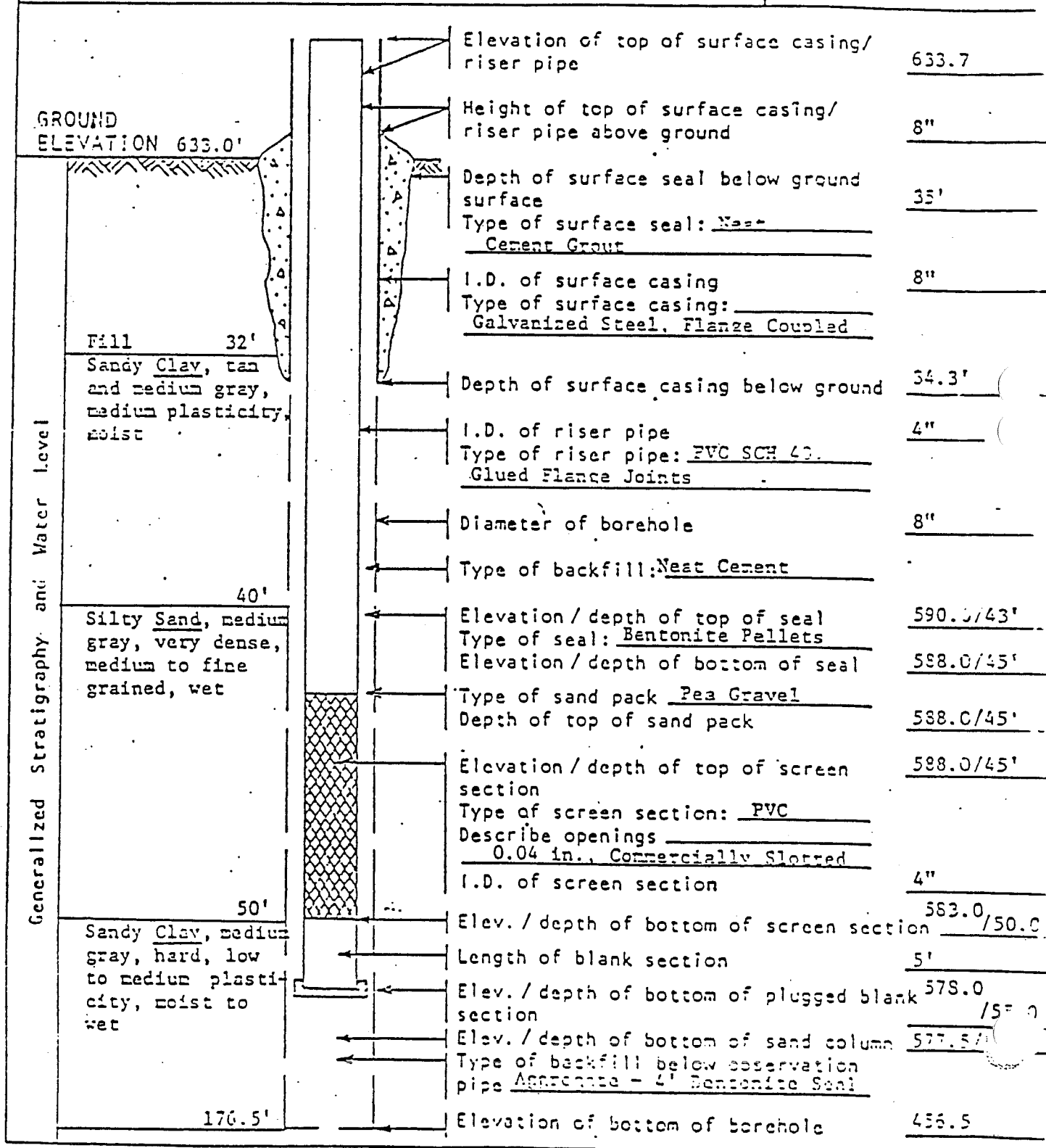


# GROUND WATER OBSERVATION WELL RECORD

27-11

PROJECT Midland Power Plant  
LOCATION S 5627 E 2500  
DATE COMPLETED 27 October 1977  
INSPECTED BY W. R. Kinzer DATE 10/27/77  
CHECKED BY G. T. LeFevre DATE 2/14/78

PAGE 1 OF 1  
WELL NO. W-4  
AQUIFER Silty Sand  
THICKNESS 10'



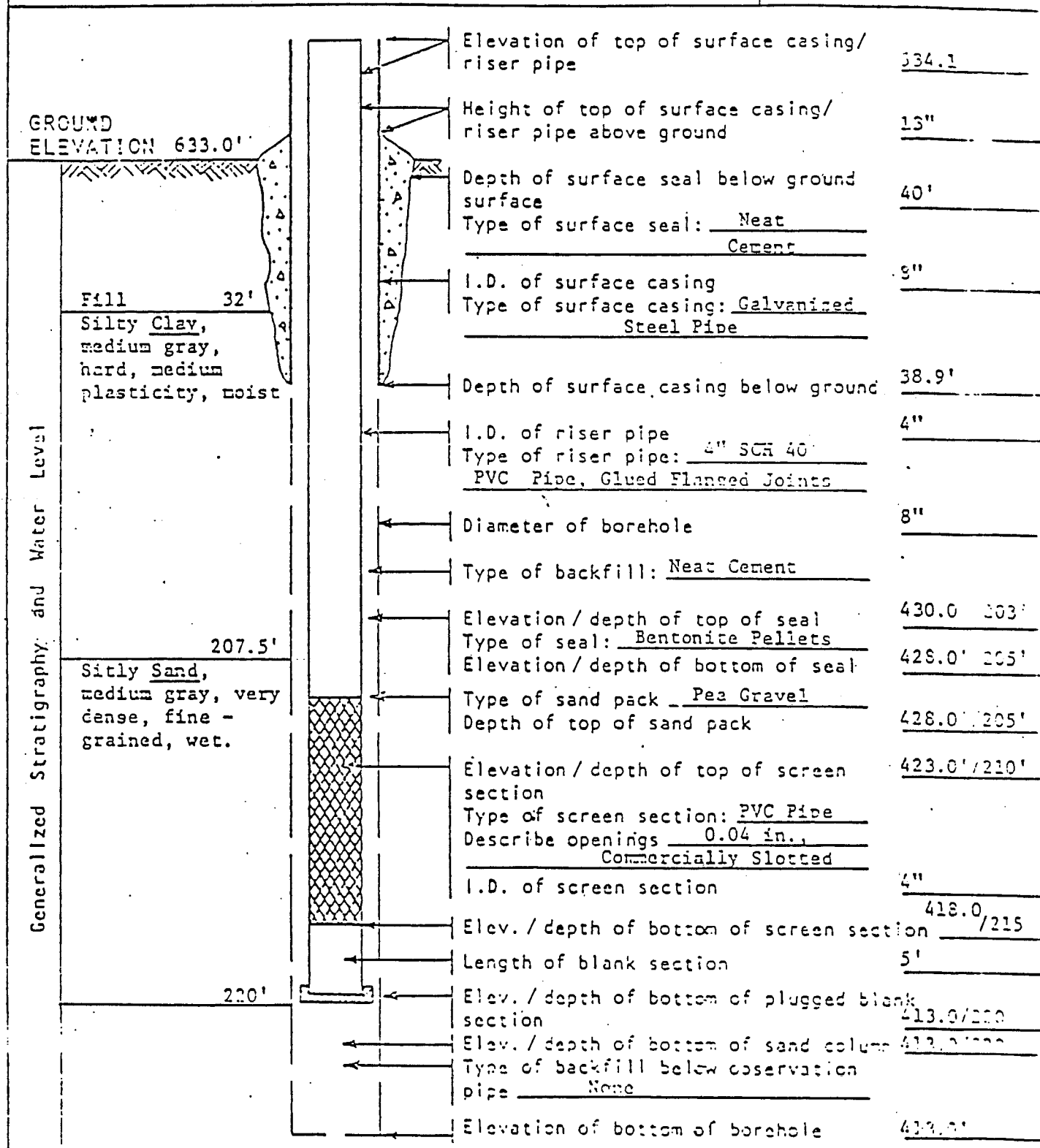


# GROUND WATER OBSERVATION WELL RECORD

27-12

PROJECT Midland Power Plant  
LOCATION S 5629 E 2504  
DATE COMPLETED 4 November 1977  
INSPECTED BY W. R. Kinzer DATE 11/4/77  
CHECKED BY G. T. LaFevre DATE 2/14/79

PAGE 1 OF 1  
WELL NO. W-5  
AQUIFER Silty Sand  
THICKNESS 12.5





McDOWELL & ASSOCIATES  
Geotechnical Engineers

LOG OF SOIL BORING NO. 2705

27-13

PROJECT Installation of  
Observation Wells

JOB NO. 81-134

LOCATION Dow Facilities

SURFACE ELEV. 625.0 - 626.0 +  
DATE 10-30, 11-2-81

Midland, Michigan

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Dry Den Wt. P.C.F.	Unc. Comp. Strength PSF.	Str. %
	2	17 FILL	1'0" Moist gravelly brown sand, fill						
	4		Moist fine oxidized brown sand						
	6		4'0" Moist to wet fine discolored sand						
	8		7'4"						
	10								
	12		Stiff to very stiff moist silty blue clay, seams of silt						
	14								
	16								
	18								
	20								
	22								
	24								
	26		25'0"						
	28		Extremely stiff moist silty blue clay						
	30								
	32		30'0"						
	34		Extremely stiff moist gravelly blue clay, hardpan, streaks of sand						
	36								
	38								
	40								
	42		41'0"						
	44		Extremely stiff moist silty blue clay, hardpan, occasional stones						
	46								
	48								
	50		(Cont'd.)						
TYPE OF SAMPLE D. - DISTURBED U.L. - UNDIST. LINER S.T. - SHELBY TUBE S.S. - SPLIT SPOON R.C. - ROCK CORE ( ) - PENETROMETER			REMARKS:  Standard Penetration Test - Driving 2" OD Sampler 1' With 140# Hammer Falling 30"; Count Made At 6" Intervals		GROUND WATER OBSERVATIONS G.W. ENCOUNTERED AT 4 FT. 6 INS. G.W. ENCOUNTERED AT 32 FT. 0 INS. G.W. AFTER COMPLETION FT. INS. G.W. AFTER HRS. FT. INS. G.W. VOLUMES Medium				



McDOWELL & ASSOCIATES  
Geotechnical Engineers

LOG OF SOIL BORING NO. 2705 (Cont'd.) 27-









PROJECT Installation of  
Observation Wells

JOB NO. 81-134

LOCATION Dow Facilities

SURFACE ELEV. 626.0 <sup>+</sup>  
DATE 10-30,  
11-2-81

Midland, Michigan

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Dry Den Wt. P.C.F.	Unc. Comp. Strength PSF	Str. %	
	52		Extremely stiff moist silty blue clay, hardpan, occasional stones							
	54									
	56									
	58									
	60									
	62									
	64									
	66									
	68									
	70									
	72									
	74									
	76									
	78									
	80									
	82									
	84									
	86									
	88									
	90									
	92									
	94									
	96									
	98		96'0" Moist gravelly blue clay, hardpan							
	100		99'6" Moist silty blue clay, hardpan							
TYPE OF SAMPLE			REMARKS: (Cont'd.)  Standard Penetration Test - Driving 2" OD Sampler 1' With 140# Hammer Falling 30"; Count Made At 6" Intervals	GROUND WATER OBSERVATIONS						
D. - DISTURBED				G.W. ENCOUNTERED AT	4	FT.	6	INS.		
U.L. - UNDIST. LINER				G.W. ENCOUNTERED AT	32	FT.	0	INS.		
S.T. - SHELBY TUBE				G.W. AFTER COMPLETION		FT.		INS.		
S.S. - SPLIT SPOON				G.W. AFTER	HRS.	FT.		INS.		
R.C. - ROCK CORE			G.W. VOLUMES	Medium						
( ) - PENETROMETER										



McDOWELL & ASSOCIATES  
Geotechnical Engineers

LOG OF SOIL BORING NO. 2705 (Cont'd.)

PROJECT Installation of  
Observation Wells

JOB NO. 81-134

LOCATION Dow Facilities

SURFACE ELEV. 626.0 +

10-30,  
DATE 11-2-81

Midland, Michigan

Sample # Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Dry Den Wt. P.C.F.	Unc. Comp. Strength PSF.	Str. %	
	102		Moist silty blue clay, hardpan							
	104									
	106									
	108									
	110									
	112									
	114									
	116									
	118									
A	120					22				
UL	122					37				
	124					41				
	126									
	128									
	130									
	132									
	134									
	136									
	138									
	140									
	145									
	150									
	155									
	160		160'0"							
	165									
TYPE OF SAMPLE			REMARKS:	GROUND WATER OBSERVATIONS						
D. - DISTURBED			Standard Penetration Test - Driving 2" OD Sampler 1' With 140# Hammer Falling 30"; Count Made At 6" Intervals	G.W. ENCOUNTERED AT	4	FT.	6	INS.		
U.L. - UNDIST. LINER				G.W. ENCOUNTERED AT	32	FT.	0	INS.		
S.T. - SHELBY TUBE				G.W. AFTER COMPLETION		FT.		INS.		
S.S. - SPLIT SPOON				G.W. AFTER	HRS.	FT.		INS.		
R.C. - ROCK CORE				G.W. VOLUMES	Medium					
( ) - PENETROMETER										

McDOWELL & ASSOCIATES  
10659 Galaxie  
Ferndale, Michigan 48220  
Phone: 313-399-2066

27-14

DATE 1-7, 8, 12, 13-82

LOG OF SOIL BORING

JOE NO. 81-134

BORING NO. 2746

ELEVATION 600.5

PROJECT MCN. WELL

LOCATION \_\_\_\_\_

GROUND WATER OBSERVATIONS  
G.W. ENCOUNTERED AT 7 FT. 6 IN.  
G.W. ENCOUNTERED AT \_\_\_\_\_ FT. \_\_\_\_\_ IN.  
G.W. AFTER COMPLETION WASH IN.  
G.W. AFTER \_\_\_\_\_ HRS. \_\_\_\_\_ FT. \_\_\_\_\_ IN.  
G.W. VOLUMES MED.

CREW CHIEF JOE HELPER JOHN

Sample Elev.	Depth	Legend	Depth of Change	Soil Description (Density, Moisture, Color, Texture, etc.) Blows / 6" OR FORCE LBS.	Penetration
	0	TIME			
	1			FIRM MOIST CLAYEY SILT FILL	
	2			W/ LAYERS OF CLAY.	
	3				
	4		3'0"	FIRM MOIST BROWN CLAYEY SILT.	
	5				
	6				
	7				
	8		7'6"	WET FINE CLAYEY SILTY BROWN SAND.	
	9				
	10				
	11				
	12				
	13				
	14		13'6"	EXT. STIFF MOIST SILTY BLUE CLAY, SEAMS OF SILT.	
	15				
	16				
	17				
	18				
	19		18'6"	EXT. STIFF MOIST SILTY BLUE CLAY (CLAY PAN) OCC. SEAMS OF SILT.	
	20				
	21				
	22				
	23				
	24				
	25				

(OVER)

TYPE OF SAMPLE: D.-DISTURBED U.L.-UNDIST. LINER S.T. - SHELBY TUBE S.S.-SPLIT SPOON R.C.-ROCK CORE

Start taking routine penetration test one foot above nominal depth & drive 18".





McDOWELL & ASSOCIATES  
Geotechnical Engineers

LOG OF SOIL BORING NO. 2702 27-15  
PROJECT Installation of  
Observation Wells  
JOB NO. 81-134 LOCATION Dow Facilities  
SURFACE ELEV. 620.84 + 622.5 - DATE 9-23, 24,  
& 28-81 Midland, Michigan

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Dry Den Wt. P.C.F.	Unc. Comp. Strength PSF	Str. %
	2		1'6" Medium compact moist fine oxidized brown sand						
	4								
A	6		Stiff to very stiff moist silty oxidized variegated clay, layers of silt	5					
UL	8			7					
	10			10					
B	12								
UL	14		12'0" Stiff moist silty oxidized brown clay, seams of silt	7					
	16			9					
	18			11					
C	20		17'6" Very stiff moist silty blue clay, layers of silt						
UL	22			5					
	24			5					
	26		20'4" Extremely stiff moist blue clay, sand and pebbles	7					
E	28								
UL	30		26'6" Extremely stiff moist blue clay, hardpan, sand and pebbles	8					
	32			10					
	34			16					
G	36		33'0"						
UL	38			20					
	40			23					
H	42		Extremely stiff moist sandy blue clay, hardpan, occasional stones, occasional slight sand seams	27					
UL	44								
	46			73					
	48			--					
	50			--					
J			(Cont'd.)						
UL				26					
				34					
				37					
				68					
				--					
				--					
				52					
				32/3"					
				46					
				30/3"					
TYPE OF SAMPLE				GROUND WATER OBSERVATIONS					
D. - DISTURBED				G.W. ENCOUNTERED AT 3 FT. 0 INS.					
U.L. - UNDIST. LINER				G.W. ENCOUNTERED AT FT. INS.					
S.T. - SHELBY TUBE				G.W. AFTER COMPLETION Wash Boring					
S.S. - SPLIT SPOON				G.W. AFTER HRS. FT. INS					
R.C. - ROCK CORE				G.W. VOLUMES Medium					
( ) - PENETROMETER									
REMARKS:									
Standard Penetration Test - Driving 2" OD Sampler 1' With 140# Hammer Falling 30"; Count Made At 6" Intervals									





**McDOWELL & ASSOCIATES**  
Geotechnical Engineers

PROJECT Installation of Observation Wells

JOB NO. 81-134

LOCATION Dow Facilities

SURFACE ELEV. 622.5  $\pm$

DATE 9-23, 24,  
& 28-81

Midland, Michigan

SURFACE ELEV.			SOIL DESCRIPTION		Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Dry Den Wt. P.C.F.	Unc. Comp. Strength PSF.	Str. %
Sample # & Type	Depth	Legend								
	52		Extremely stiff moist sandy blue clay, hardpan, occasional stones, occasional slight sand seams							
	54									
K					39					
UL	56				55/3"					
	58									
L	60				52					
UL					35/3"					
	62									
	64									
M					51					
UL	66	30/3"								
	68									
N	70				68					
UL					--					
	72				--					
	74									
O					66					
UL	76				--					
	78				--					
P	80				71					
UL					--					
	82		81'6"		--					
	84									
Q					38					
UL	86				82					
	88				--					
			Extremely stiff moist silty blue claypan							
R	90				34					
UL					38					
	92				--					
	94									
S					37					
UL	96				41					
	98				--					
T	100				42					
UL			(Cont'd.)		48					
TYPE OF SAMPLE					GROUND WATER OBSERVATIONS					
D. - DISTURBED					G.W. ENCOUNTERED AT 3 FT. 0 INS.					
U.L. - UNDIST. LINER					G.W. ENCOUNTERED AT FT. INS.					
S.T. - SHELBY TUBE					G.W. AFTER COMPLETION Wash Boring					
S.S. - SPLIT SPOON					G.W. AFTER HRS. FT. INS.					
R.C. - ROCK CORE					G.W. VOLUMES Medium					
( ) - PENETROMETER										
REMARKS:										
Standard Penetration Test - Driving 2" OD Sampler 1' With 140 # Hammer Falling 30": Count Made At 6" Intervals										



McDOWELL & ASSOCIATES  
Geotechnical Engineers

LOG OF SOIL BORING NO. 2702 (Cont'd.) 27

PROJECT Installation of  
Observation Wells

JOB NO. 81-134 LOCATION Dow Facilities

SURFACE ELEV. 622.5 ± DATE 9-23, 24, & 28-81 Midland, Michigan

Sample # Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Dry Den Wt. P.C.F.	Unc. Comp. Strength PSF.	Str. %
	102								
	104								
U				37					
UL	106			45					
				--					
	108		Extremely stiff moist silty blue claypan						
V	110			26					
UL				31					
	112			40					
	114								
W				32					
UL	116			42					
				--					
	118								
X	120			30					
UL				45/1"					
	122		122'0"						
	124		Extremely compact moist clayey gray silt						
Y				52					
UL	126		126'0"	50/4"					
	128								
Z	130		Extremely stiff moist silty blue clay, seams of silt	22					
UL				38					
	132			--					
	134								
ZA				26					
UL	136			36					
				--					
	138		138'0"						
	140								
	142		10' of 5" casing with coupling left in hole - hole filled with mud.						
	144								
	146								
	148								
	150								
TYPE OF SAMPLE D. - DISTURBED U.L. - UNDIST. LINER S.T. - SHELBY TUBE S.S. - SPLIT SPOON R.C. - ROCK CORE ( ) - PENETROMETER			REMARKS:  Standard Penetration Test - Driving 2" OD Sampler 1' With 140# Hammer Falling 30"; Count Made At 6" Intervals	GROUND WATER OBSERVATIONS G.W. ENCOUNTERED AT 3 FT. 0 INS. G.W. ENCOUNTERED AT FT. INS. G.W. AFTER COMPLETION Wash Boring G.W. AFTER HRS. FT. INS. G.W. VOLUMES Medium					

Exploratory 27-16  
TD=5195 in Bois Blanc  
Dry

27-14N-2E  
Midland (Midland Co.)

Dow Chemical Company

Fee M-2

Permit No. 3064

Drilling Contractor: --

Location: NE  $\frac{1}{4}$  SW  $\frac{1}{4}$  NW  $\frac{1}{4}$  section 27. T. 14N., R. 2E.  
790 Feet from South and 860 feet from West line of quarter section.  
(Lost hole on M-1. Skidded rig and drilled M-2.)

Elevation: 616 feet above sea level.

Record by: L. Hale from samples 310-5192

Thickness (feet)	Depth (feet)
---------------------	-----------------

PLEISTOCENE:

Drift: (possibly some Saginaw in lower part):

No record

310	310
-----	-----

PENNSYLVANIAN:

Saginaw:

Shale, gray, flaky, micaceous	5	315
-------------------------------	---	-----

Shale, black and brown; a little gray shale	20	335
---	----	-----

Shale, black and light gray well cemented micaceous sandstone	5	340
---	---	-----

Shale, gray, muddy; some brown and black shale	70	410
--	----	-----

Sandstone, gray, both friable and cemented, medium grained, angular and black shale	10	420
---	----	-----

Sandstone, light gray, medium grained angular a little mica	15	435
---	----	-----

No samples	60	495
------------	----	-----

Sandstone, light brown, well cemented with dolomite; some shale; some dolomite; and friable sandstone	5	500
---	---	-----

Shale, gray, muddy	32	532
--------------------	----	-----

Sandstone, light gray, both friable and cemented with dolomite	15	547
--	----	-----

Shale, gray, muddy; flaky; shaly; a little hard brown shale	53	600
---	----	-----

Dolomite, light gray, with some crystals of dolomite	6	606
--	---	-----

Shale, gray, muddy; some flaky shale	109	715
--------------------------------------	-----	-----

(405)

Parma (?):

Sandstone, gray, fine to coarse grained; a little shale a little pyrite	20	735
---	----	-----

MISSISSIPPIAN:

Bayport:

Limestone, light brown and buff, dense with pyrite; some white, frosted grains of sandstone; a little gray shale; a little green shale	6	741
--	---	-----

Sandstone, white, fine to medium grained, sub-angular, frosted; a little black shale	34	775
--	----	-----

Sandstone, white, fine to coarse grained, frosted, sub-angular; some buff limestone; pyrite	20	795
---	----	-----

Limestone, gray-brown, dense	8	803
------------------------------	---	-----

Sandstone, gray, fine to medium grained, frosted, sub-angular; some buff limestone	17	820
--	----	-----

Limestone, brown, dolomitic; some sandstone	16	836
---	----	-----

Dolomite, brown, sandy, somewhat porous	14	850
---	----	-----

Sandstone, gray, fine to medium grained, angular, some dolomitic limestone	12	862
--	----	-----

# HANDY BROS. MINING CO. & WOLVERINE COAL CO.

SAGINAW, MICH.,

COAL CO. NO.

DRILLER'S NO.

I HAVE THIS

DAY OF

19

FINISHED A TEST WELL ON THE FOLLOWING DESCRIBED LAND AND REPORT THE TEST AS FOLLOWS:

LOWING DESCRIBED LAND AND REPORT THE TEST AS FOLLOWS:

DESCRIPTION.

Give Township and Sec. and Owner's name in country.

In City give Street, Lot and Block No. and Addition.

THICKNESS OF STRATA.

MATERIAL.

DEPTH.

50  
55  
133  
16  
15  
6  
275

Sandy Clay  
Blue "  
Gray "  
Hardpan  
Sand  
Hardpan

50  
105  
238  
254  
269  
275

REMARKS:

554 ft north of south line  
east of west line  
859

Signed

Theo Archambault Driller.

WATER WELL RECORD  
ACT 294 PA 1965MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH

1 LOCATION OF WELL			Fraction		Section Number	Town Number	Range Number	
County	Township Name		$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$		N/S.	E/W.
Distance And Direction from Road Intersections			3 OWNER OF WELL: <u>Dow Chemical Co</u> Address					
			4 WELL DEPTH: (completed) Date of Completion <u>234</u> ft. <u>3/9/71</u>					
Street address & City of Well Location Locate with "X" in section below <div style="display: flex; align-items: center;"><div style="border: 1px dashed black; width: 100px; height: 100px; position: relative; margin-right: 10px;"><div style="position: absolute; top: 50%; left: 50%; transform: translate(-50%, -50%); font-size: 20px;">X</div></div><div>Sketch Map:</div></div>			5 <input checked="" type="checkbox"/> Cable tool <input type="checkbox"/> Rotary <input type="checkbox"/> Driven <input type="checkbox"/> Dug <input type="checkbox"/> Hollow rod <input type="checkbox"/> Jetted <input type="checkbox"/> Bored <input type="checkbox"/>					
			6 USE: <input type="checkbox"/> Domestic <input type="checkbox"/> Public Supply <input checked="" type="checkbox"/> Industry <input type="checkbox"/> Irrigation <input type="checkbox"/> Air Conditioning <input type="checkbox"/> Commercial <input type="checkbox"/> Test Well <input type="checkbox"/>					
<div style="display: flex; align-items: center;"><div style="border: 1px dashed black; width: 100px; height: 100px; position: relative; margin-right: 10px;"><div style="position: absolute; top: 50%; left: 50%; transform: translate(-50%, -50%); font-size: 20px;">X</div></div><div>Sketch Map:</div></div>			7 CASING: Threaded <input checked="" type="checkbox"/> Welded <input type="checkbox"/> Height: Above/Below Diam. Surface <u>1</u> ft. <u>4</u> in. to <u>524</u> ft. Depth Weight <u>11</u> lbs./ft. <u>  </u> in. to <u>  </u> ft. Depth Drive Shoe? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>					
			8 SCREEN: Type: <u>WIRE MOUND</u> Dia.: <u>3 3/4</u> Slot/Gauze <u>7</u> Length <u>10</u> Set between <u>234</u> ft. and <u>234</u> ft. Fittings: <u>7' H Packer</u>					
2 FORMATION			THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM		9 STATIC WATER LEVEL		
<u>SAND</u>			<u>0</u>	<u>12</u>		<u>Flow</u> ft. below land surface		
<u>CLAY</u>			<u>12</u>	<u>42</u>		10 PUMPING LEVEL below land surface		
<u>Hard PAN</u>			<u>42</u>	<u>120</u>		<u>  </u> ft. after <u>  </u> hrs. pumping <u>  </u> g.p.m.		
<u>Hard PAN &amp; CLAY</u>			<u>120</u>	<u>202</u>		<u>  </u> ft. after <u>  </u> hrs. pumping <u>  </u> g.p.m.		
<u>SILT</u>			<u>202</u>	<u>208</u>		11 WATER QUALITY in Parts Per Million:		
<u>Water SAND</u>			<u>208</u>	<u>234</u>		Iron (Fe) <u>  </u> Chlorides (Cl) <u>  </u>		
						Hardness <u>  </u> Other <u>  </u>		
						12 WELL HEAD COMPLETION: <input type="checkbox"/> In Approved Pit		
						<input type="checkbox"/> Pitless Adapter <input checked="" type="checkbox"/> 12" Above Grade		
						13 Well Grouted? <input type="checkbox"/> Yes <input type="checkbox"/> No		
						<input type="checkbox"/> Neat Cement <input type="checkbox"/> Bentonite <input type="checkbox"/>		
						Depth: From <u>  </u> ft. to <u>  </u> ft.		
						14 Nearest Source of possible contamination		
						<u>  </u> feet <u>  </u> Direction <u>  </u> Type <u>  </u>		
						Well disinfected upon completion <input type="checkbox"/> Yes <input type="checkbox"/> No		
						15 PUMP: <input checked="" type="checkbox"/> Not installed		
						Manufacturer's Name <u>  </u>		
						Model Number <u>  </u> HP <u>  </u> Volts <u>  </u>		
						Length of Drop Pipe <u>  </u> ft. capacity <u>  </u> G.P.M.		
						Type: <input type="checkbox"/> Submersible		
						<input type="checkbox"/> Jet <input type="checkbox"/> Reciprocating		
6 Remarks, elevation, source of data, etc.			17 WATER WELL CONTRACTOR'S CERTIFICATION:					
<u>ELEVATION - 620</u>			This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.					
			<u>NELSON WELL DRILLING CO. 241</u> REGISTERED BUSINESS NAME REGISTRATION NO.					
			Address <u>245 CANNING ST Ferwell Mich</u>					
			Signed <u>H. Nelson</u> Date <u>3/11/71</u>					
			AUTHORIZED REPRESENTATIVE					

USE A 2ND SHEET IF NEEDED

6 Remarks, elevation, source of data, etc.

ELEVATION - 620

## 17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NELSON WELL DRILLING CO. 241  
REGISTERED BUSINESS NAME REGISTRATION NO.Address 245 CANNING ST Ferwell MichSigned H. Nelson Date 3/11/71  
AUTHORIZED REPRESENTATIVE

IMPORTANT: File with deed.

WELL OWNER COPY

27-19

CO. N 51/4 SW SW Sec. 27

T 14 N R 2 E

WATER WELL

F 14 U 8 06

ARPA PROJECT

655 BLOG.

WELL DRILLED BY H. NELSON

CONT. MT. PLEASANT, MICH.

LOG:

SURFACE TO 11 feet ---- Fill sand and clay

12' To 165 ---- Clay

165 to 175 TO ---- Sandy Clay

TOTAL DEPTH 175 FEET.

SET 170 FEET 4 1/2" OD GALVANIZED CASING

7 FOOT #10 SLOT JOHNSON SCREEN  
WITH 5 FEET EXPOSED.

3' OF 3" GALVANIZED PIPE ON TOP OF  
SCREEN WITH LEAD PACKER.

WELL FLOWED 8 GPM AT SURFACE.

WILL PRODUCE 15 GPM WITH 5 FEET DRAIN DOWN

WILL SET PUMP ABOUT 40 FEET DOWN HOLE.

# ANALYTICAL LABORATORY REPORT SHEET

DATE March 9, 1959

CHARGE 8237-26

AL-10, 11-03

VA/25

Oil Water 6.5 Blue

Wm Hardness as  $\text{CaCO}_3$  ..... 70

Wm Ca ..... 4

Wm Mg ..... 15

Wm Alkalinity as  $\text{CaCO}_3$  ..... 188

Wm Cl as  $\text{NaCl}$  ..... 38

Wm  $\text{SO}_4$  ..... 8

pH ..... 6.2

2 hrs

7 dots

*Very good!  
CWA*

10:17x

143 Bldg., Phone 6-7

G. K. Stobby

*SW*

## INVOICE

Drilling In

Cleaning Out

## HUGH NELSON

~~Oil, Gas and~~ Water Well Service

FARWELL, MICHIGAN

Dow Chemical Co.

Midland, Mich.

Order No. 83776-X-E  
Well located at the  
ARPA project.

Telephone Lu-8-4571

DATE	DESCRIPTION	@	TOTAL
3-59	<p>Description of Well</p> <p>Formation</p> <p>From To</p> <p>10 ft. 11 ft. Fill sand and Clay.</p> <p>11 165 Clay.</p> <p>Well flowed 8 gal. per minute.</p> <p>Will produce 15 gal. per minute with 5 ft. draw down.</p>		



APR 7 1983

## WATER WELL AND PUMP RECORD

PART 127 ACT 368, P.A. 1978

PERMIT NUMBER

27-26

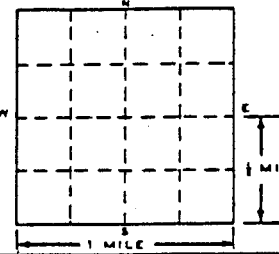
1 LOCATION OF WELL			3 OWNER OF WELL		
County <b>Midland</b>	Township Name <b>Midland</b>	Range <b>SW 1/4 NE 1/4 NE 1/4</b>	Section Number <b>34</b>	Town Number <b>T14 N/S</b>	Range Number <b>R2</b>
Distance And Direction From Road Intersection  <b>1-3/4 miles E. of Poseyville Road 3/4 miles No. of Gordonville Road</b>			Address <b>Consumers Power Co Midland Generating Station Midland, Michigan</b>		
Street Address & City of Well Location  Locate with "X" in Section Below			Address Same As Well Location? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
Sketch Map  Coordinates: <b>S4963 E762</b>			4 WELL DEPTH: (completed) <b>74</b> ft. Date of Completion <b>10-21-81</b>		
			5 <input checked="" type="checkbox"/> Cable tool <input type="checkbox"/> Rotary <input type="checkbox"/> Driven <input type="checkbox"/> Dug <input type="checkbox"/> Hollow rod <input type="checkbox"/> Auger <input type="checkbox"/> Jetted <input type="checkbox"/>		
			6 USE: <input type="checkbox"/> Domestic <input type="checkbox"/> Type I Public <input type="checkbox"/> Type III Public <input type="checkbox"/> Irrigation <input type="checkbox"/> Type IIa Public <input type="checkbox"/> Heat pump <input type="checkbox"/> Test Well <input type="checkbox"/> Type IIb Public <input checked="" type="checkbox"/> Dewater		
			7 CASING Diameter <input type="checkbox"/> Steel <input type="checkbox"/> Threaded <input checked="" type="checkbox"/> Plastic <input checked="" type="checkbox"/> Welded Height Above/Below Surface <b>.5</b> ft Weight <b>3.56</b> lbs./ft Drive Shoe <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
			8 SCREEN <b>Johnson</b> <input type="checkbox"/> Not installed Type <b>PVC Wire Wound</b> meter <b>6"</b> Slot/Gauze <b>.018"</b> Length <b>19.2'</b> Set between <b>49.9</b> ft and <b>69.1</b> ft FITTINGS <input type="checkbox"/> K-Packer <input type="checkbox"/> Lead Packer <input type="checkbox"/> Bremer Check <input type="checkbox"/> Blank above screen <b>ft</b> Other <b>PVC cplg</b>		
			9 STATIC WATER LEVEL <b>32.15</b> ft below land surface <input type="checkbox"/> Flow		
2 F-1 FORMATION DESCRIPTION <b>634.3'</b>			10 PUMPING LEVEL below land surface		
THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM		_____ ft after _____ hrs pumping at _____ GPM		
<b>Road Gravel</b>	<b>1</b>	<b>1</b>	_____ ft after _____ hrs pumping at _____ GPM		
<b>Grey clay with rocks</b>	<b>8</b>	<b>9</b>	11 WELL HEAD COMPLETION <input type="checkbox"/> Fitless adapter <input type="checkbox"/> 12" above grade <input type="checkbox"/> Basement offset <input type="checkbox"/> Approved pit		
<b>Sand and gravel</b>	<b>2</b>	<b>11</b>	12 WELL GROUTED? <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes From <b>5.0</b> to <b>24.1</b> ft		
<b>Brown clay</b>	<b>9</b>	<b>20</b>	<input checked="" type="checkbox"/> Neat cement <input type="checkbox"/> Bentonite <input type="checkbox"/> Other _____		
<b>Sand and gravel</b>	<b>2</b>	<b>22</b>	No. of bags of cement <b>29</b> Additives _____		
<b>Grey clay</b>	<b>33</b>	<b>55</b>	13 Nearest source of possible contamination		
<b>Fine sand</b>	<b>19</b>	<b>74</b>	Type <b>Storm Drain</b> Distance <b>15</b> ft Direction <b>E</b>		
			Well disinfected upon completion? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
			14 PUMP <input checked="" type="checkbox"/> Not installed <input type="checkbox"/> Pump installation Only		
			Manufacturer's name _____		
			Model number _____ HP _____ Volts _____		
			Length of Drop Pipe _____ ft capacity _____ GPM		
			TYPE <input type="checkbox"/> Submersible <input type="checkbox"/> Jet _____		
			PRESSURE TANK		
			Manufacturer's name _____		
			Model number _____ Capacity _____ Gallons		
15 Remarks, elevation, source of data, etc.  <b>Dewatering well F-1 at Service water pump structure 17" x 6" Gravel Wall Well Surface elevation 634.3</b>			16 WATER WELL CONTRACTOR'S CERTIFICATION This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief  <b>Layne Northern Co</b> REGISTERED BUSINESS NAME Address <b>P.O. Box 468, Mishawaka, IN 46544</b> Signed <b>Erwin H. G. Stahl</b> Date <b>1-27-82</b> AUTHORIZED REPRESENTATIVE		

## WATER WELL AND PUMP RECORD

PART 127 ACT 368, P.A. 1978

PERMIT NUMBER

27-6

1 LOCATION OF WELL			Section Number		Town Number		Range Number	
County <b>Midland</b>	Township Name <b>Midland</b>	Range <b>SW 1/4 SE 1/4 SW 1/4</b>	<b>34</b>		<b>T14 N/S</b>		<b>R2 E/W</b>	
Distance And Direction From Road Intersection <b>1-3/4 miles E. of Poseyville Road</b> <b>3/4 miles N. of Gordonville Road</b>			3 OWNER OF WELL <b>Consumers Power Company</b> <b>Midland Generating Station</b> <b>Midland, Michigan</b>					
Street Address & City of Well Location			Address Same As Well Location? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No					
Locate with "X" in Section Below 			4 WELL DEPTH: (completed) <b>61.3</b> ft Date of Completion <b>9-18-81</b>					
2 G-1 FORMATION DESCRIPTION <b>634.0</b>			5 <input checked="" type="checkbox"/> Cable tool <input type="checkbox"/> Rotary <input type="checkbox"/> Driven <input type="checkbox"/> Dug					
			<input type="checkbox"/> Hollow rod <input type="checkbox"/> Auger <input type="checkbox"/> Jetted <input type="checkbox"/>					
			6 USE: <input type="checkbox"/> Domestic <input type="checkbox"/> Type I Public <input type="checkbox"/> Type III Public					
			<input type="checkbox"/> Irrigation <input type="checkbox"/> Type IIa Public <input type="checkbox"/> Heat pump					
			<input type="checkbox"/> Test Well <input type="checkbox"/> Type IIb Public <input checked="" type="checkbox"/> Dewater					
			7 CASING Diameter <input type="checkbox"/> Steel <input type="checkbox"/> Threaded <input checked="" type="checkbox"/> Plastic <input checked="" type="checkbox"/> Welded					
			Height Above Surface <b>5</b> ft					
			Surface <b>5</b> ft					
			Weight <b>3.56</b> lbs./ft					
			Drive Shoe <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No					
Road gravel			8 SCREEN: <b>Johnson</b> <input type="checkbox"/> Not installed					
Grey gravelly clay			Type <b>PVC Wire Wound</b> Diameter <b>6"</b>					
Grey clay			Slot/Gauze <b>.018"</b> Length <b>22.1</b>					
Coarse gravel with rocks			Set between <b>33.8</b> ft and <b>55.9</b> ft					
Fine sand			FITTINGS <input type="checkbox"/> K-Packer <input type="checkbox"/> Lead Packer <input type="checkbox"/> Bremer Check					
Grey clay			<input type="checkbox"/> Blank above screen <input type="checkbox"/> Other <b>PVC cap</b>					
			9 STATIC WATER LEVEL <b>14.04</b> ft below land surface <input type="checkbox"/> Flow					
			10 PUMPING LEVEL below land surface					
			ft after hrs pumping at GPM					
			ft after hrs pumping at GPM					
			11 WELL HEAD COMPLETION <input type="checkbox"/> Pitless adapter <input type="checkbox"/> 12" above grade					
			<input type="checkbox"/> Basement offset <input type="checkbox"/> Approved pit					
			12 WELL GROUTED? <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes From <b>4.4</b> to <b>22.5</b> ft					
			<input checked="" type="checkbox"/> Neat cement <input type="checkbox"/> Bentonite <input type="checkbox"/> Other					
			No. of bags of cement <b>24</b> Additives					
			13 Nearest source of possible contamination					
			Type <b>Storm Drain</b> Distance <b>55</b> ft Direction <b>W</b>					
			Well disinfected upon completion? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No					
			14 PUMP <input checked="" type="checkbox"/> Not installed <input type="checkbox"/> Pump installation Only					
			Manufacturer's name					
			Model number HP Volts					
			Length of Drop Pipe ft capacity GPM					
			TYPE <input type="checkbox"/> Submersible <input type="checkbox"/> Jet					
			PRESSURE TANK					
			Manufacturer's name					
			Model number Capacity Gallons					
15 Remarks, elevation, source of data, etc <b>Dewatering well G-1 @ Circulating Water Intake Structure</b> <b>17" x 6" Gravel Wall Well</b> <b>Surface elevation 634.0</b>			16 WATER WELL CONTRACTOR'S CERTIFICATION This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief <b>Layne-Northern Company</b> <b>0550</b> REGISTERED BUSINESS NAME REGISTRATION NO Address <b>P.O. Box 468, Michawaka, IN 46544</b> Signed <b>Brown H. H. Stahl</b> Date <b>1-27-82</b> AUTHORIZED REPRESENTATIVE					

# Environmental Data Inc.

a subsidiary of WILLIAMS & WORRIS

ENVIRONMENTAL SCIENTISTS/ENGINEERS/GEOLOGISTS/CHEMISTS  
671 CASCADE WEST PARKWAY, S.E. P.O. BOX 671, GRAND RAPIDS, MICHIGAN 49508



PROJECT NO. 20245 27-22

OWNERS WELL NO. 3065

CLIENT DOW CHEMICAL

DATE 11-2-83

CONTRACTOR: RAYMER

ELEVATIONS: LAND SURFACE 599.00

TOP OF CASING 601.64

## BORING & WELL RECORD

LOCATION:

### BORING

CLAY, BROWN, SOFT, SILTY  
CLAY, GRAY-BROWN, SOFT,  
LOT OF PLANT, WOOD & SHELL  
DEBRIS, SOME SILT.

CLAY, GRAY, PLASTIC, FIRM

SAND-COARSE & SANDY CLAY

CLAY, GRAY

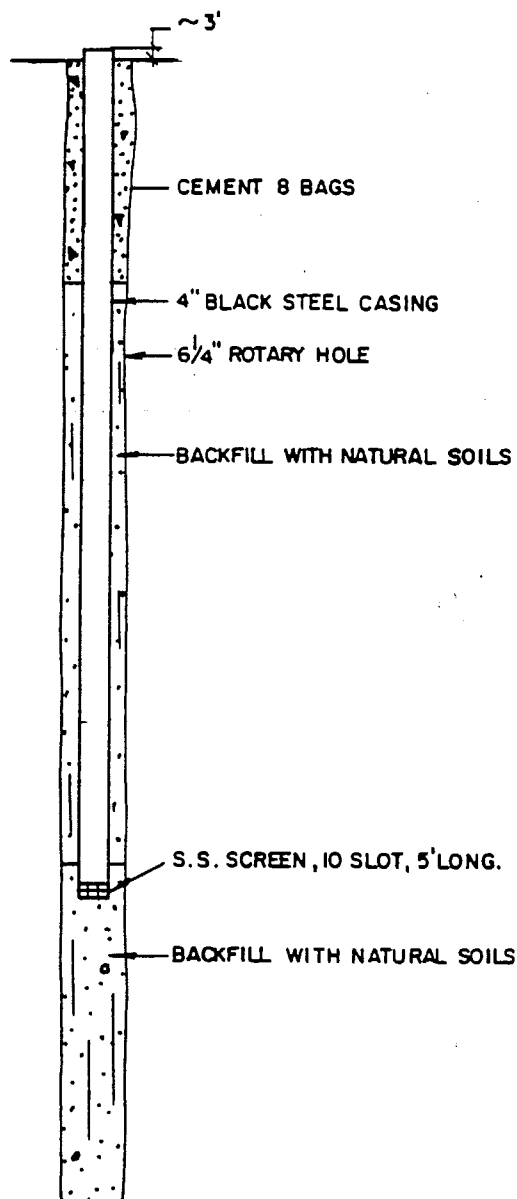
SAND

GRAVEL & SAND  
CLAY & GRAVEL

SAND

CLAY, SANDY, GRAVEL  
CLAY, SANDY  
CLAY, GRAVEL  
SHALE, LIMESTONE &  
GYPSUM

### WELL



STATIC WATER LEVEL FLOWING OVER TOP OF CASING



McDOWELL & ASSOCIATES  
Geotechnical Engineers

LOG OF SOIL BORING NO. 2707 28-1

PROJECT Installation of  
Observation Wells

JOB NO. 81-134 LOCATION Dow Facilities  
619.24 11-4, 5,  
SURFACE ELEV. 616.0 + DATE 6 & 9-81 Midland, Michigan

Sample 6 Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Dry Den Wt. P.C.F.	Unc. Comp. Strength PSF	Str %
	2		Stiff moist mixed sandy						
	4		blue clay and clayey						
	6		sand, fill						
	8	FILL	6'6"						
	10		Moist mixed brown and						
	12	FILL	11'0"						
	14		discolored sand, fill						
	16		Wet fine brown and						
	18		discolored sand						
	20		18'6"						
	22		Stiff moist silty blue						
	24		clay, seams of silt						
	26		and sand						
	28		24'0"						
	30		Extremely compact wet						
	32		fine to medium gray sand						
	34		26'6"						
	36		Extremely stiff moist						
	38		silty blue clay						
	40		35'0"						
	42								
	44		Extremely stiff moist						
	46		silty blue claypan						
	48								
	50		(Cont'd.)						
TYPE OF SAMPLE			REMARKS:		GROUND WATER OBSERVATIONS				
D. - DISTURBED					G.W. ENCOUNTERED AT 11 FT. 0 INS.				
U.L. - UNDIST. LINER					G.W. ENCOUNTERED AT 24 FT. 0 INS.				
S.T. - SHELBY TUBE					G.W. AFTER COMPLETION Wash Boring				
S.S. - SPLIT SPOON					G.W. AFTER HRS. FT. INS.				
R.C. - ROCK CORE					G.W. VOLUMES Medium - Heavy				
( ) - PENETROMETER									



McDOWELL & ASSOCIATES  
Geotechnical Engineers

LOG OF SOIL BORING NO. 2707 (Cont'd.) 28-

PROJECT Installation of  
Observation Wells

JOB NO. 81-134

LOCATION Dow Facilities

SURFACE ELEV. 616.0 +  
DATE 11-4, 5,  
6 & 9-81

Midland, Michigan

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Dry Den Wt. P.C.F.	Unc. Comp. Strength PSF.	Sir %
	55		Extremely stiff moist silty blue claypan						
	60								
	65								
	70								
	75								
	80								
	85								
	90								
	95								
	100								
	105		130'0" Extremely stiff moist silty blue claypan, 135'0" seams of silt						
	110								
	115		Extremely stiff moist silty blue claypan						
	120								
	125		148'6"						
	130								
	135		32'6" of 4" casing left in hole - hole filled with mud.						
	140								
	145								
	150								
	155								
	160								
	165								
	170								
	175								
TYPE OF SAMPLE D. - DISTURBED U.L. - UNDIST. LINER S.T. - SHELBY TUBE S.S. - SPLIT SPOON R.C. - ROCK CORE ( ) - PENETROMETER			REMARKS:  Standard Penetration Test - Driving 2" OD Sampler 1' With 140# Hammer Falling 30"; Count Made At 6" Intervals		GROUND WATER OBSERVATIONS G.W. ENCOUNTERED AT 11 FT. 0 INS. G.W. ENCOUNTERED AT 24 FT. 0 INS. G.W. AFTER COMPLETION Wash Boring G.W. AFTER HRS. FT. INS. G.W. VOLUMES Medium - Heavy				

**Phone: 313 - 399-2066**

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28-2

JOB NO. 51-134

BORING NO. 2745

ELEVATION 603.8

DATE 12-16

## LOG OF SOIL BORING

PROJECT MCM, WFLC

LOCATION MIDLAND - Down

## GROUND WATER OBSERVATIONS

G.W. ENCOUNTERED AT 6 FT. 6 INS.

G.W. ENCOUNTERED AT 61 FT. INS.

G.W. AFTER COMPLETION            FT.            INS.

G.W. AFTER	HRS.	FT.	INS.
------------	------	-----	------

G.W. VOLUMES 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800 801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021 1022 1023 1024 1025 1026 1027 1028 1029 1030 1031 1032 1033 1034 1035 1036 1037 1038 1039 1040 1041 1042 1043 1044 1045 1046 1047 1048 1049 1050 1051 1052 1053 1054 1055 1056 1057 1058 1059 1060 1061 1

**CREW CHIEF**

TOE

## HELPER

Torin

Sample Elev.	Depth	Legend	Soil Description	Penetration
	0	TIME	( Density, Moisture, Color, Texture, etc. ) Elev. 1/8" OR FORCE LBS.	
	1		MOIST MIXED BROWN SAND	
	2		& CLAY FILL.	
	3			
	4		3'0" MOIST FINE GR. BROWN	
	5		SILTY SAND.	
	6			
	7		6'6" WET FINE TO MED. BROWN	
	8		SAND.	
	9		8'0" EXT. STIFF MOIST SILTY BLUE	
	10		CLAY, S.S.	
	11		10'6" EXT. STIFF MOIST SILTY BLUE	
	12		CLAY, CLAY PAN.	
	13			
	14			
	5'5			
	16			
	17			
	18			
	19			
	20			
	21			
	22			
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	95			
	96			
	97			
	98			
	99			
	100			

Start taking routine penetration test one foot above nomin. depth & drive 18".

TYPE OF SAMPLE: D.-DISTURBED U.L.-UNDIST. LINER S.T. - SHELBY TUBE S.S.-SPLIT SPOON R.C.-ROCK CORE

A	69'			56
			70'3" DWS	
	35		EXT. STIFF MOIST BLUE CLAY, HARD PAID, SEP.	
	40			
	45			
	100'			
	55		108'0" EXT. COMP. WET <sup>SILTY</sup> FINE BROWN SAND.	
B	140'			57
				94
	65			
	70		114'0" EXT. STIFF MOIST SILTY BLUE CLAY W/ LAYERS OF SAND, W/ LAYERS OF SAND.	
	75		118'0" EXT. COMP. WET FINE BROWN SAND. (ARTIFICIAL)	
	80		135'0" EXT. STIFF MOIST SILTY BLUE CLAY LAYERS OF SILT.	

<b>PLUGGING PROCEDURES</b> Hole filled with <input type="checkbox"/> Natural Soils <input type="checkbox"/> Bags Cement <input type="checkbox"/> Bags Bentonite Time Taken to plug or grout _____ hrs. <b>DRILLING METHOD</b> Auger size _____ Wash Boring _____ Hollow Auger size _____ Profile _____ Casing size _____ Depth _____ Rotary size _____ Drill Mud _____ Diamond Core size _____ Hand Auger Boring _____ Swamp Buggy <u>or drill used</u> Dozer Rental _____ Hours _____ Remarks: _____ _____ _____ _____		CONSISTENCY: PENETRATION Less than 1 1 - 1% 2 - 4% 5 - 7% 8 - 16% 17 - 25 Over 25 CLAY Extremely Soft Very Soft Soft Firm Stiff Very Stiff Extremely Stiff
<b>GENERAL INFORMATION</b> Boring Offset to _____ Is this hourly job _____ hours this hole _____ Was boring abandoned _____ Why _____ Was gas observed _____ where _____ Note any unusual conditions: _____ _____ _____		

81-134

O.B. WELL # 2745

21' OF 4" CASING SET @ 20'

120' OF 2" GALVANIZED RISER PIPE  
W/ 36" STAINLESS #10 SLOT  
WELL SCREEN.

PRESSURE CEMENT GROUT FROM  
115' TO SURFACE

3 1/2 BAGS QUICK GELL

3 BAGS CEMENT

2 BAGS ALUMINUM POWD.





McDOWELL & ASSOCIATES  
Geotechnical Engineers

LOG OF SOIL BORING NO. 2803

PROJECT Tertiary Pond

JOB NO. 82-99

LOCATION Dow Facilities

SURFACE ELEV. DATE 6-22-82

Midland, Michigan

Sample 6 Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Dry Den Wt. P.C.F.	Unc. Comp Strength PSF	Str
			0'4"						
	1		Compact moist discolored sand, gravel						
	2								
	3		Compact moist fine brown sand, oxidized streaks						
	4		4'0"						
A	5		Compact wet fine brown sand	4					
UL	6			5					
	7			5					
	8		7'0"						
	9		Very stiff moist blue clay, sand and pebbles, lenses of silt						
B	10		9'0"	6					
UL	11			10					
	12			14					
	13								
	14		Extremely stiff moist blue clay, sand and pebbles						
C	15			9					
UL	16			17					
	17			20					
	18								
	19		19'0"						
D	20		Extremely stiff moist blue clay, sand and pebbles, lenses of silt, occasional stone	10					
UL	21			15					
	22			18					
	23								
	24								
E	25			10					
UL				17					
			(cont'd)	23					
TYPE OF SAMPLE			REMARKS:			GROUND WATER OBSERVATIONS			
D - DISTURBED						G.W. ENCOUNTERED AT	4	FT	0 INS
UL - UNDIST. LINER						G.W. ENCOUNTERED AT		FT	INS
ST - SHELBY TUBE						G.W. AFTER COMPLETION	9	FT	0 INS
SS - SPLIT SPOON						G.W. AFTER	HRS	FT	INS
RC - ROCK CORE						G.W. VOLUMES	Heavy		
( ) - PENETROMETER									



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LOG OF SOIL BORING NO. 2803 (cont'd) 28

PROJECT Tertiary Pond

JOB NO. 82-99 LOCATION Dow Facilities

SURFACE ELEV. DATE 6-22-82 Midland, Michigan

Sample # & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Dry Den Wt. P.C.F.	Unc. Comp Strength PSF	Str :
	26		Extremely stiff moist blue clay, sand and pebbles, lenses of silt, occasional stone						
	27								
	28								
	29								
F UL	30		Extremely stiff moist blue clay, sand and pebbles, lenses of silt	15 38 47					
	31								
	32								
	33								
	34		Extremely stiff moist blue clay, lenses of silt	9 15 19					
G UL	35								
	36								
	37								
	38		Extremely stiff moist blue clay, light sand and pebbles, lenses of silt	10 17 24					
H UL	39								
	40								
	41								
	42		Extremely stiff moist blue clay, light sand and pebbles, lenses of silt	13 23 32					
	43								
	44								
I UL	45								
	46		Extremely stiff moist blue clay, light sand and pebbles, lenses of silt						
	47								
	48								
	49								
J UL	50		(cont'd)	24 27 43					
TYPE OF SAMPLE D - DISTURBED UL - UNOIST LINER S.T. - SHELBY TUBE S.S. - SPLIT SPOON R.C. - ROCK CORE ( ) - PENETROMETER				REMARKS:  Standard Penetration Test - Driving 2" OD Sampler 1' With 140# Hammer Faling 30"; Count Made At 6" Intervals					
				GROUND WATER OBSERVATIONS G.W. ENCOUNTERED AT 4 FT 0 INS G.W. ENCOUNTERED AT 9 FT 0 INS G.W. AFTER COMPLETION 9 HRS. FT INS G.W. AFTER 27 HRS. FT INS G.W. VOLUMES Heavy					

LOG OF SOIL BORING NO. 2803 (cont'd)



McDOWELL & ASSOCIATES  
Geotechnical Engineers

PROJECT Tertiary Pond

JOB NO. 82-99 LOCATION Dow Facilities

SURFACE ELEV. DATE 6-22-82 Midland, Michigan

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Dry Den Wt. P.C.F.	Unc. Comp Strength PSF	St.
	51		Extremely stiff moist blue clay, light sand and pebbles, lenses of silt						
	52								
	53								
	54								
K UL	55			23 71 --					
	56								
	57								
	58								
	59								
L UL	60		Extremely stiff moist blue clay, lenses of silt, occasional pebbles	27 69 --					
	61								
	62								
	63								
	64								
M UL	65			24 59 --					
	66								
	67								
	68								
	69								
N UL	70			30 57 --					
	71								
	72								
	73								
	74								
	75								
TYPE OF SAMPLE D - DISTURBED UL - UNDISTURBED ST - SHELBY TUBE SS - SPLIT SPOON RC - ROCK CORE ( ) - PENETROMETER			REMARKS:  Standard Penetration Test - Driving 2" OD Sampler 1' With 140# Hammer Falling 30". Count Made At 6" Intervals		GROUND WATER OBSERVATIONS GW ENCOUNTERED AT 4 FT 0 INS GW ENCOUNTERED AT FT INS GW AFTER COMPLETION 9 FT 0 INS GW AFTER HRS FT INS GW VOLUMES Heavy				

28-2



**McDOWELL & ASSOCIATES**  
Geotechnical Engineers

LOG OF SOIL BORING NO. 2804

PROJECT Tertiary Pond

JOB NO. 82-99 LOCATION Dow Facilities

SURFACE ELEV. \_\_\_\_\_ DATE 6-23-82 Midland, Michigan

Sample # Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Dry Den Wt. P.C.F.	Unc Comp Strength PSF	Sir
			0'4"						
	1		Firm moist sandy topsoil						
	2		Medium compact moist						
	3		fine brown sand,						
	4		oxidized streaks						
	5		3'6"						
A	6		Compact wet fine brown	3					
UL	7		sand	5					
	8			6					
	9		7'0"						
	10								
B	11		Stiff moist blue clay,	3					
UL	12		lenses of silt, rouge	4					
	13		markings	4					
	14								
	15		14'0"						
C	16		Extremely stiff moist	6					
UL	17		blue clay, sand and	9					
	18		pebbles, lenses of silt	18					
	19								
	20		19'0"						
D	21		Extremely stiff moist	20					
UL	22		silty blue clay, lenses	27					
	23		of silt	36					
	24								
	25		22'6"						
E			Extremely stiff moist						
UL			blue clay, lenses of						
			silt						
			(cont'd)						
				14					
				29					
				37					
TYPE OF SAMPLE			REMARKS:		GROUND WATER OBSERVATIONS				
D - DISTURBED					G.W. ENCOUNTERED AT 3 FT 6 INS				
U.L. - UNDIST. LINER					G.W. ENCOUNTERED AT 39 FT 0 INS				
S.T. - SHELBY TUBE					G.W. AFTER COMPLETION 34 FT 0 INS				
S.S. - SPLIT SPOON					G.W. AFTER HRS FT INS				
R.C. - ROCK CORE					G.W. VOLUMES Heavy				
( ) - PENETROMETER									
			Standard Penetration Test - Driving 2" OD Sampler 1' With						
			140# Hammer Falling 30"; Count Made At 6" Intervals						



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Geotechnical Engineers

PROJECT Tertiary Pond

JOB NO. 82-99

LOCATION Dow Facilities

SURFACE ELEV. DATE 6-23-82 Midland, Michigan

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Dry Den Wt. P.C.F.	Unc. Comp Strength PSF	Str
	26		Extremely stiff moist blue clay, lenses of silt						
	27								
	28								
	29		Extremely stiff moist blue clay, sand and pebbles						
F	30			14					
UL	30			35					
	31		Layer of fine gray sand	57					
	32								
	33		Extremely stiff moist silty blue clay						
	34								
G	35			35					
UL	35		Extremely compact wet fine silty gray sand	54					
	36			--					
	37								
	38								
	39								
H	40		Extremely compact wet fine grayish brown sand	43					
UL	40			60					
	41			--					
	42								
	43								
	44			60					
I	45			--					
UL	45			--					
	46								
	47								
	48		Extremely compact wet silt, clay content						
	49								
J	50			64					
UL	50			84					
				--					

(cont'd)

TYPE OF SAMPLE	REMARKS:	GROUND WATER OBSERVATIONS			
D. - DISTURBED	Standard Penetration Test - Driving 2" OD Sampler 1' With 140# Hammer Falling 30"; Count Made At 6" Intervals	G.W. ENCOUNTERED AT	3	FT	6
U.L. - UNDIST. LINER		G.W. ENCOUNTERED AT	39	FT	0 INS
S.T. - SHELBY TUBE		G.W. AFTER COMPLETION	34	FT	0 INS
S.S. - SPLIT SPOON		G.W. AFTER	HRS	FT.	INS
R.C. - ROCK CORE		G.W. VOLUMES	Heavy		
( ) - PENETROMETER					

LOG OF SOIL BORING NO. 2804 (cont'd)



McDOWELL & ASSOCIATES  
Geotechnical Engineers

PROJECT Tertiary Pond

JOB NO. 82-99 LOCATION Dow Facilities

SURFACE ELEV. DATE 6-23-82 Midland, Michigan

Sample # Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Dry Den Wt. P.C.F.	Unc. Comp Strength PSF	Str
	51		51'6" Extremely compact wet silt, clay content						
	52								
	53								
	54								
K	55			21					
UL	55			43					
	56			--					
	57								
	58								
	59								
L	60		Extremely stiff moist blue clay, lenses of silt	22					
UL	60			37					
	61			54					
	62								
	63								
	64								
M	65			20					
UL	65			36					
	66			56					
	67								
	68		70'0" 2"x5' - 10 Slot PVC Screen Set At 51'0" From Ground Level 2" Flush Joint PVC Riser With 3' Stick-Up. Silica Sand From Bottom To 42" and Sand To 34'0" From 34'0" To Surface Cement - Bentonite Slurry And Natural Soils						
	69								
N	70			27					
UL	70			53					
	71			--					
	72								
	73								
	74								
	75								

- TYPE OF SAMPLE
- D - DISTURBED
  - UL - UNOIST LINER
  - ST - SHELBY TUBE
  - SS - SPLIT SPOON
  - R.C. - ROCK CORE
  - ( ) - PENETROMETER

REMARKS:

Standard Penetration Test - Driving 2" OD Sampler 1' With 140# Hammer Falling 30"; Count Made At 6" Intervals

GROUND WATER OBSERVATIONS

G.W. ENCOUNTERED AT	3	FT	6	INS
G.W. ENCOUNTERED AT	39	FT	0	INS
G.W. AFTER COMPLETION	34	FT	0	INS
G.W. AFTER	HRS	FT		INS
G.W. VOLUMES	Heavy			



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LOG OF SOIL BORING NO. 2805

PROJECT Tertiary Pond

JOB NO. 82-99

LOCATION Dow Facilities

SURFACE ELEV.

DATE 6-25-28-82

Midland, Michigan

Sample # Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Dry Den Wt. P.C.F.	Unc. Comp Strength PSF	Str %
	1	FILL	Firm moist silty blue clay, fill						
	2								
	3			Compact moist to wet fine discolored sand					
	4								
A UL	5			4					
	6			6					
	7			8					
	8								
	9		Compact wet fine brown sand, oxidized streaks						
	10								
	11								
	12								
	13								
	14								
C UL	15			Very stiff moist silty blue clay, seams of silty gray sand	6				
	16				8				
	17			15					
	18								
	19								
	20								
D UL	21								
	22								
	23								
	24								
E UL	25			14					
				Extremely stiff moist blue clay, sand and pebbles	48				
					--				

LOG OF SOIL BORING NO. 2805 (Cont'd.)



**McDOWELL & ASSOCIATES**  
Geotechnical Engineers

PROJECT Tertiary Pond

JOB NO. 82-99 LOCATION Dow Facilities

SURFACE ELEV. \_\_\_\_\_ DATE 6-25-28-82 Midland, Michigan

Sample # Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Dry Den Wt. P.C.F.	Unc. Comp Strength PSF	Str %
	26								
	27								
	28								
	29								
F				27					
UL	30		Extremely stiff moist blue clay, sand and pebbles	75					
	31			--					
	32								
	33								
	34			34					
G				89					
UL	35			--					
	36		36'0"						
	37								
	38								
	39								
H				17					
UL	40		Extremely stiff moist blue clay, sand and pebbles, seams of gravel	21					
	41			23					
	42								
	43								
	44		44'0"						
I				29					
UL	45			53					
	46		Extremely compact wet medium grayish-brown sand	--					
	47								
	48								
	49		49'0"						
J				27					
UL	50		Extremely compact wet fine grayish-brown sand, seams of clay	66					
				--					
TYPE OF SAMPLE			REMARKS:	GROUND WATER OBSERVATIONS					
D. - DISTURBED			(Cont'd.)	G.W. ENCOUNTERED AT 3 FT 0 INS					
U.L. - UNDIST. LINER				G.W. ENCOUNTERED AT 49 FT 0 INS					
S.T. - SHELBY TUBE				G.W. AFTER COMPLETION FT INS					
S.S. - SPLIT SPOON				G.W. AFTER HRS FT INS					
R.C. - ROCK CORE				G.W. VOLUMES Heavy					
( ) - PENETROMETER									
			Standard Penetration Test - Driving 2" OD Sampler 1' With 140 # Hammer Falling 30"; Count Made At 6" Intervals						





**McDOWELL & ASSOCIATES**  
Geotechnical Engineers

PROJECT Tertiary Pond

JOB NO. 82-99

LOCATION	Dow Facilities
1. <u>ALABAMA</u>	
2. <u>ALASKA</u>	
3. <u>ARIZONA</u>	
4. <u>ARKANSAS</u>	
5. <u>CALIFORNIA</u>	
6. <u>COLORADO</u>	
7. <u>CONNECTICUT</u>	
8. <u>DELAWARE</u>	
9. <u>FLORIDA</u>	
10. <u>GEORGIA</u>	
11. <u>HAWAII</u>	
12. <u>ILLINOIS</u>	
13. <u>INDIANA</u>	
14. <u>IOWA</u>	
15. <u>KANSAS</u>	
16. <u>KENTUCKY</u>	
17. <u>LOUISIANA</u>	
18. <u>MAINE</u>	
19. <u>MARYLAND</u>	
20. <u>MASSACHUSETTS</u>	
21. <u>MICHIGAN</u>	
22. <u>MINNESOTA</u>	
23. <u>MISSISSIPPI</u>	
24. <u>MISSOURI</u>	
25. <u>MONTANA</u>	
26. <u>NEBRASKA</u>	
27. <u>NEVADA</u>	
28. <u>NEW HAMPSHIRE</u>	
29. <u>NEW JERSEY</u>	
30. <u>NEW MEXICO</u>	
31. <u>NEW YORK</u>	
32. <u>NORTH CAROLINA</u>	
33. <u>NORTH DAKOTA</u>	
34. <u>OHIO</u>	
35. <u>OKLAHOMA</u>	
36. <u>OREGON</u>	
37. <u>PENNSYLVANIA</u>	
38. <u>RHODE ISLAND</u>	
39. <u>SOUTH CAROLINA</u>	
40. <u>SOUTH DAKOTA</u>	
41. <u>TENNESSEE</u>	
42. <u>TEXAS</u>	
43. <u>UTAH</u>	
44. <u>VERMONT</u>	
45. <u>VIRGINIA</u>	
46. <u>WASHINGTON</u>	
47. <u>WEST VIRGINIA</u>	
48. <u>WISCONSIN</u>	
49. <u>WYOMING</u>	
50. <u>Foreign</u>	

SURFACE ELEV. \_\_\_\_\_ DATE 6-25-28-82 Midland, Michigan

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Dry Den Wt. P.C.F.	Unc. Comp Strength PSF	Str
	51								
	52								
	53								
	54								
K	55			34					
U.L.	56			62					
	57			--					
	58								
	59			18					
L	60			57					
U.L.	61			--					
	62								
	63								
	64								
M	65			29					
U.L.	66			59					
	67			--					
	68								
	69								
N	70			50					
U.L.	71			55/3"					
	72								
	73								
	74								
	75								

59'6"

70'0"

Extremely compact wet fine grayish-brown sand, seams of clay

Extremely stiff moist blue clay, sand and pebbles

2" diameter by 5' long 10 slot PVC screen set at 61'6" from ground level - 2" flush joint PVC riser - 3' stick-up Silica sand from bottom to 45' Bentonite and cement slurry from 45' to surface - 21' of 4" casing left in place - Air-pumped well 11:40 to 1:00 at 6 gpm - Water reading 2 hours after pumping well - 3'8" from ground level.

**TYPE OF SAMPLE**

D - DISTURBED

U.L. - UNOIST LINER

ST - SHELBY TUBE

S.S. - SPLIT SPOON

R.C. - ROCK CORE

( ) - PENETROMETER

**GROUND WATER OBSERVATIONS**

G.W. ENCOUNTERED AT 3 FT 0 INS

G.W. ENCOUNTERED AT 49 FT 0 INS

G.W. AFTER COMPLETION FT INS

G.W. AFTER HRS. FT INS

G.W. VOLUMES Heavy

Standard Penetration Test - Driving 2" OD Sampler 1' With 140# Hammer Falling 30"; Count Made At 6" Intervals

Exploratory 28-6  
2875 in Antrim  
Dry

28-14N-2E  
Midland Twp. (Midland Co.)

Brazos Oil & Gas Co., Division of the Dow Chemical Company

Dow-Midland Fee No. 1

Permit No. 20281

Drilling Contractor: Union Rotary Corporation (Rotary)

Location: N $\frac{1}{2}$  NW $\frac{1}{4}$  NW $\frac{1}{4}$  section 28, T.14N, R.2E

268.3 feet from north and 657.5 feet from west line of quarter section

Elevation: 613.1 feet above sea level

Record by: R.E. Goodrich from geologic log submitted by company

FLEISTOGENE:

Drift: (Pre. report - Drift to 250):  
sand, clay & gravel

Thickness (feet)	Depth (feet)
220	220

PENNSYLVANIAN - MISSISSIPPIAN

Saginaw - Parma (?) - Bayport - Michigan:

Shale, gray and fine grained	50	270
Shale, gray and sandstone	10	280
Sandstone, gray, fine to medium	45	325
Shale, black, firm	20	345
Shale, gray to black	100	445
Sandstone, medium grained	60	505
Shale, gray to black	115	620
Sand, gray and shale, gray to black	30	650
Shale, gray to black and minor amount of sand & pyrite	120	770
Sandstone, gray & shale, gray to black with minor amount of pyrite	20	790
Shale, gray to black & minor amount of sandstone	20	810
Sandstone, gray & shale, gray to black with minor amount of pyrite	10	820
Shale, gray to black & sand, gray	40	860
Sandstone, gray to black	20	880
Shale, gray to black	130	1010
Dolomite, brown	20	1040
Shale, gray to black & limestone, brown	110	1150
Sandstone, gray & shale, gray to black	10	1160
Shale, gray-brown & black	20	1180
Sandstone, black to gray	20	1200

MISSISSIPPIAN:

(980)

Marshall - Coldwater:

Sandstone, gray & shale, gray & black (water at 1200-1305)	105	1305
Siltstone, red & sandstone & shale, gray to black	55	1360
Shale, gray to dark gray (Pre. report - Marshall Red Rock 1320-90)	100	1460
Shale, gray	50	1510
Shale, gray & red	20	1530
Shale, gray to black	882	2412SLM

Sunbury:

(1212)

Shale, black, firm	40	2452SLM
--------------------	----	---------

Page 2  
Permit #20281

	Thickness (feet)	Depth (feet)
Berea - Bedford:		
Sand, gray & shale, gray to black	43	2495
Shale, gray to black & gray	30	2525
Shale, gray & black	15	2540
Sandstone, gray & shale, gray to black	10	2550
Shale, gray & gray-green & black	39	2589 SLM
	(137)	
MISSISSIPPIAN - DEVONIAN:		
Antrim:	286	2875
Shale, black	(286+)	
	TOTAL DEPTH	2875

## Casing record:

10 3/4" 274' (200cem.)  
7" 2610' (480 cem.)

Commenced: 10-18-56  
Completed: 10-27-56  
Initial Production: Dry hole  
Sand-Frac: 12-1-56 with 34,000 gals.  
water & 30,000 lbs. sand.

5-10-57

# Environmental Data Inc.

a subsidiary of WILLIAMS & WORKS

ENVIRONMENTAL SCIENTISTS/ENGINEERS/GEOLOGISTS/CHEMISTS  
911 CASCADE WEST PARKWAY, S.E., P.O. BOX 6919, GRAND RAPIDS, MICHIGAN 49508



PROJECT NO. 20245 28-7

OWNERS WELL NO. 3066

CLIENT DOW CHEMICAL

DATE 12/7/83

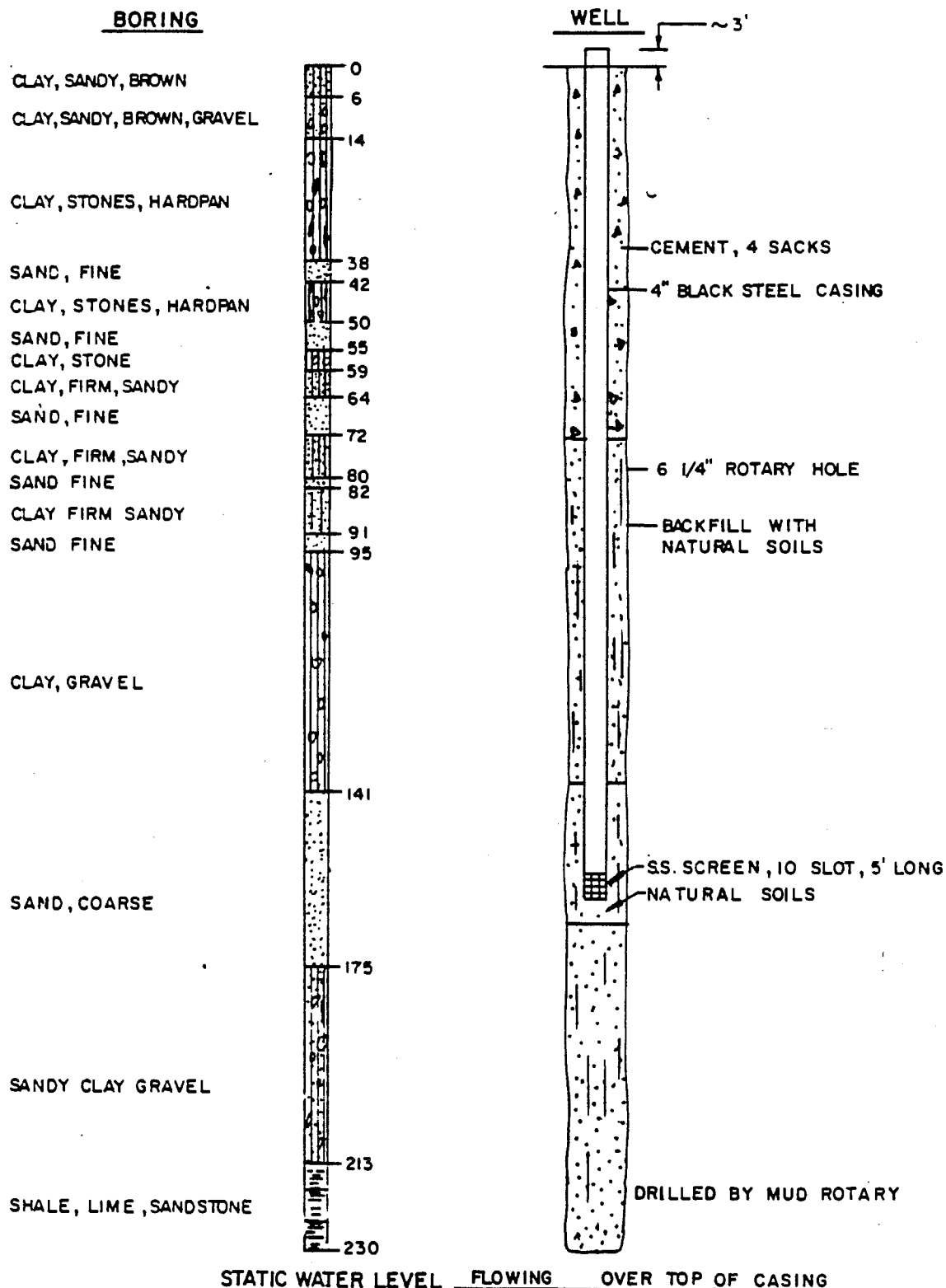
CONTRACTOR: RAYMER CO.

ELEVATIONS: LAND SURFACE 614.0

TOP OF CASING 617.05

## BORING & WELL RECORD

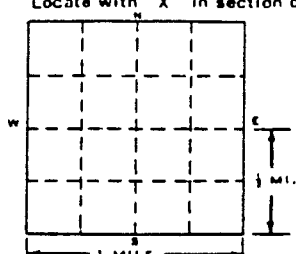

LOCATION: \_\_\_\_\_



## WATER WELL RECORD

ACT 294 PA 1985

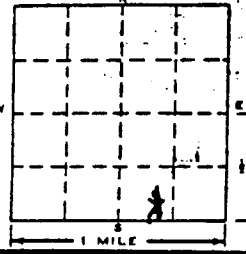
MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH

<b>1 LOCATION OF WELL</b>		<b>OWNERS</b>	
County <b>MIDLAND</b>	Township Name <b>MIDLAND</b>	Section Number <b>29</b>	Range Number <b>2</b>
Distance And Direction from Road Intersections <i>E of Patterson &amp; Miller Rd on the N side of Rd</i>		3 OWNER OF WELL: <b>WILLIAM REHRIG</b>	
Street address & City of Well Location <i>Sam Co Rd</i>		Address <b>E. MILLER RD</b>	
Locate with "X" in section below 		Date of Completion <b>128</b> ft. <b>128</b>	
Sketch Map: 		5 WELL DEPTH: (completed)	
		128 ft.	
2 FORMATION		6 USE: <input checked="" type="checkbox"/> Domestic <input type="checkbox"/> Public Supply <input type="checkbox"/> Industry	
		<input type="checkbox"/> Irrigation <input type="checkbox"/> Air Conditioning <input type="checkbox"/> Commercial	
THICKNESS OF STRATUM		7 CASING: Threaded <input checked="" type="checkbox"/> Welded <input type="checkbox"/> Height: <b>123</b> ft. Below Surface <b>123</b> ft.	
		Weight <b>3.75</b> lbs. ft. Drive Shoe? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
DEPTH TO BOTTOM OF STRATUM		8 SCREEN:	
		Type: <b>SLOTTED/PLAS</b> Dia.: <b>1 1/2 IN.</b>	
CLAY		Slot/Gauze <b>60</b> Length <b>5 FEET</b>	
		Set between <b>123</b> ft. and <b>127</b> ft.	
WATER BEARING SAND		Fittings: <b>FOUR FOOT LEAD PIPE WITH BREMER CHECK VALVE</b>	
		9 STATIC WATER LEVEL	
		<b>10</b> ft. below land surface <b>~ 617</b>	
		10 PUMPING LEVEL below land surface	
		<b>20</b> ft. after <b>Y</b> hrs. pumping <b>10</b> u.p.m.	
		_____ ft. after _____ hrs. pumping _____ g.p.m.	
		11 WATER QUALITY in Parts Per Million:	
		Iron (Fe) <b>0.4</b> Chlorides (Cl) <b>90</b>	
		Hardness <b>220</b> Other _____	
		12 WELL HEAD COMPLETION: <input type="checkbox"/> In Approved Pit	
		<input type="checkbox"/> Pitless Adapter <input checked="" type="checkbox"/> 12" Above Grade	
		13 Well Grouted? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
		<input type="checkbox"/> Neat Cement <input type="checkbox"/> Bentonite <input checked="" type="checkbox"/> Heavy Mud	
		Depth: From <b>0</b> ft. to <b>123</b> ft.	
		14 Nearest Source of possible contamination <b>Not Known</b>	
		_____ feet _____ Direction _____ Type _____	
		Well disinfected upon completion <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
		15 PUMP: <input checked="" type="checkbox"/> Not installed	
ADDED INFO. BY OWNER. ITEM NO.		Manufacturer's Name _____	
		Model Number _____ HP _____ Volts _____	
CORRECTED BY:		Length of Drop Pipe _____ ft. capacity _____ G.P.M.	
		Type: <input type="checkbox"/> Submersible <input type="checkbox"/> Jet <input type="checkbox"/> Reciprocating	
ADDITION BY:			
16 Remarks, elevation, source of data, etc.		17 WATER WELL CONTRACTOR'S CERTIFICATION:	
* LAND DIS. ---THE EAST 132 FEET OF THE WEST 462 FEET OF THE SOUTH 330 FEET OF THE SW 1/4 OF THE SE 1/4 OF SEC. 29 T 14 N R2 E		This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.	
		Address <b>BADGERO AND SONS</b> <b>0999</b>	
		REGISTERED BUSINESS NAME REGISTRATION NO.	
		Address <b>3248 E. MILLER ROAD MIDLAND</b>	
		Signed <b>Alfred E. Badgero</b> Date <b>June 14 - 70</b>	
		AUTHORIZED REPRESENTATIVE	

GEOLOGICAL SURVEY COPY

JUN 23 1981

WATER WELL RECORD  
ACT 284 PA 1965MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH

1 LOCATION OF WELL		County <u>Midland</u> Township <u>Midland</u> Section Number <u>29</u> Town Number <u>14</u> Range Number <u>2</u>	
Distance And Direction from Road Intersections <u>1/4 MI. West of Posseville Rd and,</u> <u>1/4 MI. North of Miller Rd and 40</u> Street address & City of Well Location <u>East of Clarence Ct.</u>		3 OWNER OF WELL: <u>Bullock Creek Schools</u> Address <u>1519 S. Badout Rd</u> <u>Midland Mich</u>	
Locate with "X" in section below 		4 WELL DEPTH: (completed) <u>104</u> ft. Date of Completion <u>4-13-81</u>	
Sketch Map <u>40'</u> <u>Clarence</u> <u>1/4 MI.</u> <u>Posseville</u> <u>Miller</u>		5 <input type="checkbox"/> Cable tool <input checked="" type="checkbox"/> Rotary <input type="checkbox"/> Driven <input type="checkbox"/> Dug <input type="checkbox"/> Hollow rod <input type="checkbox"/> Jetted <input type="checkbox"/> Bored <input type="checkbox"/>	
2 FORMATION		6 USE: <input checked="" type="checkbox"/> Domestic <input type="checkbox"/> Public Supply <input type="checkbox"/> Industry <input type="checkbox"/> Irrigation <input type="checkbox"/> Air Conditioning <input type="checkbox"/> Commercial <input type="checkbox"/> Test Well	
THICKNESS OF STRATUM		7 CASING: Threaded <input checked="" type="checkbox"/> Welded <input type="checkbox"/> Height: Above/Below Surface <u>1</u> ft.	
DEPTH TO BOTTOM OF STRATUM		2 in. to <u>96</u> ft. Depth in. to <u>104</u> ft. Depth Drive Shoe? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
<u>Sand</u>	<u>3'</u>	8 SCREEN: Type: <u>Johnson</u> Dia.: <u>1 1/2"</u> Slot/Gauze <u>3</u> Length <u>8'</u> Set between <u>96</u> ft. and <u>104</u> ft. Fittings: <u>4' 1/2" Pipe Ball Check</u>	
<u>Clay</u>	<u>15'</u>	9 STATIC WATER LEVEL <u>18</u> ft. below land surface <u>620</u>	
<u>Sandy Clay</u>	<u>10'</u>	10 PUMPING LEVEL below land surface <u>30</u> ft. after <u>1</u> hrs. pumping <u>10</u> g.p.m. ft. after <u>   </u> hrs. pumping <u>   </u> g.p.m.	
<u>Clay - Stones</u>	<u>12'</u>	11 WATER QUALITY in Parts Per Million: Iron (Fe) <u>   </u> Chlorides (Cl) <u>   </u> Hardness <u>   </u> Other <u>   </u>	
<u>Clay</u>	<u>54'</u>	12 WELL HEAD COMPLETION: <input type="checkbox"/> In Approved Pit <input checked="" type="checkbox"/> Pitless Adapter <input type="checkbox"/> 12" Above Grade	
<u>Fine Sand</u>	<u>10'</u>	13 Well Grouted? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Neat Cement <input type="checkbox"/> Bentonite <input checked="" type="checkbox"/> Drill mud Depth: From <u>   </u> ft. to <u>   </u> ft.	
		14 Nearest Source of possible contamination <u>75</u> feet <u>West</u> Direction <u>Septic</u> Type Well disinfected upon completion <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
		15 PUMP: <input type="checkbox"/> Not installed Manufacturer's Name <u>Goulds</u> Model Number <u>303N</u> HP <u>3</u> Volts <u>110</u> Length of Drop Pipe <u>42</u> ft. capacity <u>6</u> G.P.M. Type: <input type="checkbox"/> Submersible <input checked="" type="checkbox"/> Jet <input type="checkbox"/> Reciprocating	
16 Remarks, elevation, source of data, etc.  ADDED INFO BY DRILLER, LHM ML *CORRECTED BY **ADDITION BY ELEVATION DEPTH TO ROCK		17 WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief. <u>Card Well Drilling 56-0222</u> REGISTERED BUSINESS NAME <u>RH#2 Midland</u> REGISTRATION NO. <u>   </u> Address <u>   </u> Signed <u>Gauvin</u> Date <u>4-13-81</u> AUTHORIZED REPRESENTATIVE	

AUG 11 1976

## WATER WELL RECORD

ACT 294

MICHIGAN DEPARTMENT

OF

PUBLIC HEALTH

## 1 LOCATION OF WELL

County

Township Name

Fraction

Section Number

Town Number

Range Number

Midland

Midland

NE 1/4

29

14 N/2

2 E/1/2

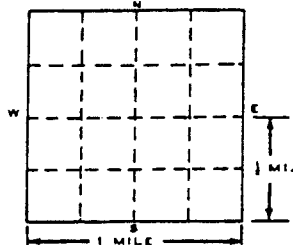
Distance And Direction from Road Intersections

1/2 mile north of Miller Rd. on  
east side of Romanda Rd.

Street address &amp; City of Well Location

Locate with "X" in section below

Sketch Map:



## 3 OWNER OF WELL:

Address

Mike Williams  
4512 N. Saginaw Rd.  
Midland, Michigan 48640

## 4 WELL DEPTH: (completed) Date of Completion

195 ft. 5-12-76

☐ Cable tool ☒ Rotary ☐ Driven ☐ Dug  
☐ Hollow rod ☐ Jetted ☐ Bored ☐

 6 USE: ☒ Domestic ☐ Public Supply ☐ Industry  
☐ Irrigation ☐ Air Conditioning ☐ Commercial  
☐ Test Well ☐
7 CASING: Threaded ☒ Welded ☐

Height: Above/Below

Diam.

Surface 1 ft.

2 in. to 187 ft. Depth

Weight 3.75 lbs./ft.

in. to ft. Depth

Drive Shoe? Yes ☒ No ☐

## 8 SCREEN:

Type: plastic Dia.: 1 1/4

Slot/Gauze slot Length 8 ft

Set between 187 ft. and 195 ft.

Fittings:

## 9 STATIC WATER LEVEL

10 ft. below land surface 2625

## 10 PUMPING LEVEL below land surface

20 ft. after 1 hrs. pumping 20 d.p.m.

ft. after hrs. pumping g.p.m.

## 11 WATER QUALITY in Parts Per Million:

Iron (Fe) Chlorides (Cl)

Hardness Other X

12 WELL HEAD COMPLETION: ☐ In Approved Pit☐ Pitless Adapter ☒ 12" Above Grade13 Well Grouted? ☒ Yes ☐ No☐ Neat Cement ☐ Bentonite ☒ heavy mud

Depth: From ft. to ft.

## 14 Nearest Source of possible contamination none

feet Direction Type

Well disinfected upon completion ☒ Yes ☐ No15 PUMP: ☐ Not installed

Manufacturer's Name

Model Number HP Volts

Length of Drop Pipe ft. capacity G.P.M.

Type: ☐ Submersible☐ Jet ☐ Reciprocating

## 2 FORMATION

THICKNESS  
OF  
STRATUMDEPTH TO  
BOTTOM OF  
STRATUM

Surface Sand

10

10

Soft Clay

70

80

Gravel-Packed Clay

70

150

Sand-Gravel

45

195

USE A 2ND SHEET IF NEEDED

## 16 Remarks, elevation, source of data, etc.

ADDED INFO BY DRILLER, ITEM NO.

\*CORRECTED BY

\*\*ADDITION BY

ELEVATION

DEPTH TO ROCK

## 17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Freeman &amp; Krauss Well Drilling

REGISTERED BUSINESS NAME

REGISTRATION NO.

Address 4823 S. Jones Rd. Beaverton, Mich

Signed Dale Freeman

Date

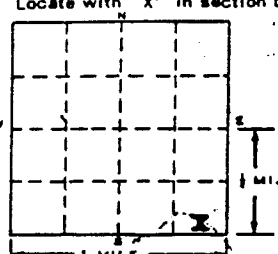
AUTHORIZED REPRESENTATIVE



JAN 23 1991

29-1

WATER WELL RECORD  
ACT 294 PA 1965MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH

1 LOCATION OF WELL		County		Township Name		Fraction		Section Number		Town Number		Range Number	
Midland		Midland		SE 1/4 SE 1/4 SE 1/4		29		14		N 1/4		2	
Distance And Direction from Road Intersections .1 north of Miller at Poseyville, west side, 75' from road													
Street address & City of Well Location Poseyville, Miller													
Locate with "X" in section below 													
3 OWNER OF WELL: LINDA DONNER Address: POSEYVILLE RD. MIDLAND, MICH 48657													
4 WELL DEPTH: (completed) Date of Completion 172 ft. 12-22-80													
5 <input type="checkbox"/> Cable tool <input checked="" type="checkbox"/> Rotary <input type="checkbox"/> Driven <input type="checkbox"/> Dug <input type="checkbox"/> Hollow rod <input type="checkbox"/> Jetted <input type="checkbox"/> Bored													
6 USE: <input checked="" type="checkbox"/> Domestic <input type="checkbox"/> Public Supply <input type="checkbox"/> Industry <input type="checkbox"/> Irrigation <input type="checkbox"/> Air Conditioning <input type="checkbox"/> Commercial <input type="checkbox"/> Test Well													
7 CASING: Threaded <input checked="" type="checkbox"/> Welded <input type="checkbox"/> Height: Above <input checked="" type="checkbox"/> Surface 1 ft. Diam. Weight 3.75 lbs./ft. Drive Shoe? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>													
2 FORMATION		THICKNESS OF STRATUM		DEPTH TO BOTTOM OF STRATUM		8 SCREEN:							
top soil		1		1		Type: galvanized Dia.: 1 1/2							
sand		4		5		Slot: 1/16" Length: 8							
soft clay		17		22		Set between 164 ft. and 172 ft.							
hard clay, stones		16		38		Fittings: 3' of 1 1/2 with K-Packer							
gravel, clay		3		41		9 STATIC WATER LEVEL 6 ft. below land surface							
hard clay, stones		59		100		10 PUMPING LEVEL below land surface 6 ft. after hrs. pumping 6 g.p.m.							
hard, fine sand		10		110		11 WATER QUALITY in Parts Per Million: Iron (Fe) Chlorides (Cl) Hardness Other							
hard clay, stones		40		150		12 WELL HEAD COMPLETION: <input type="checkbox"/> In Approved Pit <input checked="" type="checkbox"/> Pitless Adapter <input type="checkbox"/> 12" Above Grade							
sand		to bottom				13 Well Grouted? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Neat Cement <input type="checkbox"/> Bentonite <input checked="" type="checkbox"/> drilling Depth: From ft. to ft.							
						14 Nearest Source of possible contamination 50 feet NW Direction septic system Type Well disinfected upon completion <input type="checkbox"/> Yes <input type="checkbox"/> No							
						15 PUMP: <input checked="" type="checkbox"/> Not installed Manufacturer's Name Model Number HP Volts Length of Drop Pipe ft. capacity G.P.M. Type: <input type="checkbox"/> Submersible <input type="checkbox"/> Jet <input type="checkbox"/> Reciprocating							
16 Remarks, elevation, source of data, etc. EXCELLENT WELL													
17 WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief. REGISTERED WATER WELL DRILLER Freeland, Mich. 48623 Address: Phone 895-5408 Signed: [Signature] Date: 12/26/80 AUTHORIZED REPRESENTATIVE													

AUG 28 1972

WATER WELL RECORD  
ACT 294 PA 1965MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH

29-

1 LOCATION OF WELL		County		Township Name		Fraction		Section Number		Town Number		Range Number	
Midland		Midland		600' W. of		99		96		4 S.		2 E/W	
Distance And Direction from Road Intersections		Posaville RD. AND 60' S. of Nold RD.		Street address & City of Well Location		Mikano Mich		3 OWNER OF WELL:		ANTHONY TOMLINSON		Address 2970 E. NOLD RD.	
Locate with "X" in section below		Sketch Map:		4 WELL DEPTH: (completed)		Date of Completion		5		6 USE:		7 CASING:	
				99 ft.		6/22/72		<input type="checkbox"/> Cable tool <input checked="" type="checkbox"/> Hollow rod <input type="checkbox"/> Rotary <input type="checkbox"/> Jetted <input type="checkbox"/> Driven <input type="checkbox"/> Bored <input type="checkbox"/> Dug		<input checked="" type="checkbox"/> Domestic <input type="checkbox"/> Irrigation <input type="checkbox"/> Test Well <input type="checkbox"/> Public Supply <input type="checkbox"/> Air Conditioning <input type="checkbox"/> Industry <input type="checkbox"/> Commercial		<input type="checkbox"/> Threaded <input checked="" type="checkbox"/> Welded <input type="checkbox"/> Height: Above/Below Surface <input type="checkbox"/> Weight: lbs./ft. <input type="checkbox"/> Drive Shoe? Yes <input checked="" type="checkbox"/> No	
2 FORMATION		THICKNESS OF STRATUM		DEPTH TO BOTTOM OF STRATUM		8 SCREEN:		9 STATIC WATER LEVEL		10 PUMPING LEVEL below land surface		11 WATER QUALITY in Parts Per Million:	
topsoil		2		2		Type: 4' PLASTIC 4' GALV Dia.: 1 1/4"		8 ft. below land surface = 61'		ft. after hrs. pumping a.p.m.		Iron (Fe) 2.1 Chlorides (Cl) 260	
gray clay		30		32		Slot Gauge 10 Length 8'		ft. after hrs. pumping a.p.m.		Hardness 215 Other		12 WELL HEAD COMPLETION:	
Sandy CLAY & Shale		45		77		Set between 91 ft. and 99 ft.		Fittings: 4' TAIL PIPE WITH CHECK		<input type="checkbox"/> In Approved Pit <input checked="" type="checkbox"/> Pitless Adapter <input type="checkbox"/> 12" Above Grade		13 Well Grouted? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
Fine Sand		12		89		11		14 Nearest Source of possible contamination		15 PUMP:		16 Remarks, elevation, source of data, etc.	
Coarse Sand Water Bearing		10		99		<input type="checkbox"/> Neat Cement <input type="checkbox"/> Bentonite		65' feet S. Direction DR. N. E. C. D. Type		<input checked="" type="checkbox"/> Not installed Manufacturer's Name Model Number HP Volts Length of Drop Pipe ft. capacity G.P.M. Type: <input type="checkbox"/> Submersible <input type="checkbox"/> Jet <input type="checkbox"/> Reciprocating		ADDITIONAL INFO. BY DRILLER, ITEM NO. CORRECTED BY ADDITION BY	
USE A 2ND SHEET IF NEEDED		17 WATER WELL CONTRACTOR'S CERTIFICATION:		This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.		H. M. Card Well Drilling 0292		REGISTERED BUSINESS NAME		REGISTRATION NO.		Address	
						Rt 2 Midland Mich						Signed	
						Guy M Card						Date 6/22/72	
						AUTHORIZED REPRESENTATIVE							

SEP 1 1978

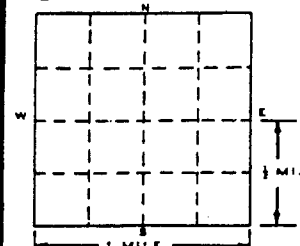
965  
E 1/2 SE 29<sup>10</sup>

**D67D**                  **100M**                  **6-65**

**WATER WELL RECORD**  
ACT 204 PA 1805

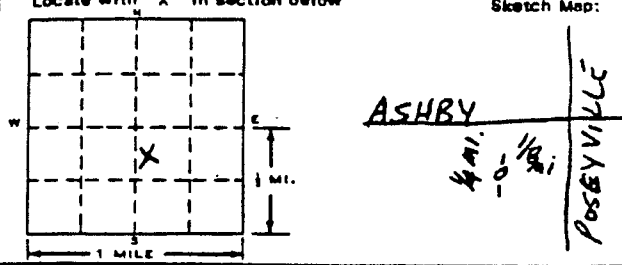
MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH

El. 625

1 LOCATION OF WELL		ACT 284 PA 1985		OF PUBLIC HEALTH		EL. 62	
County	Township Name	Fraction	Section Number	Town Number	Range Number		
Midland	Midland	SE 1/4 NE 1/4 SE 1/4	29	14 (N.S.)	2 (E.W.)		
Distance And Direction from Road Intersections			3 OWNER OF WELL:				
1 mile South of Ashby Rd. on west side			William V. Morthner				
Street address & City of Well Location 2856 E. Nold Rd. Midland			Address 2856 E. Nold, Rt. #7				
Locate with "X" in section below			Midland, Mich.				
Sketch Map:			4 WELL DEPTH: (completed) Date of Completion				
			105 ft. May 17, 1975				
2 FORMATION			5 <input type="checkbox"/> Cable tool <input checked="" type="checkbox"/> Rotary <input type="checkbox"/> Driven <input type="checkbox"/> Dup				
THICKNESS OF STRATUM			<input type="checkbox"/> Hollow rod <input type="checkbox"/> Jetted <input type="checkbox"/> Bored <input type="checkbox"/>				
DEPTH TO BOTTOM OF STRATUM			6 USE: <input checked="" type="checkbox"/> Domestic <input type="checkbox"/> Public Supply <input type="checkbox"/> Industry				
Surface Sand			<input type="checkbox"/> Irrigation <input type="checkbox"/> Air Conditioning <input type="checkbox"/> Commercial				
Brown Clay			<input type="checkbox"/> Test Well <input type="checkbox"/>				
Hard Blue Clay & stones			7 CASING: Threaded <input type="checkbox"/> Welded <input type="checkbox"/> Height: Above <del>XXXX</del>				
Soft clay			Diam. 2 in. to 101 ft. Depth 101 ft. Depth 105 ft. Surface 1 ft.				
Water Bearing Sand			Weight 3.75 lbs./ft. Drive Shoe? Yes <input type="checkbox"/> No <input type="checkbox"/>				
			8 SCREEN:				
			Type: _____ Dia.: 1 1/2"				
			Slot <del>xxx</del> 10 Length 4 ft Plastic				
			Set between 101 ft. and 105 ft.				
			Fittings: _____				
			9 STATIC WATER LEVEL				
			15 ft. below land surface ≈ 610				
			10 PUMPING LEVEL below land surface				
			60 ft. after 1 hrs. pumping 7 g.p.m.				
			_____ ft. after _____ hrs. pumping _____ g.p.m.				
			11 WATER QUALITY in Parts Per Million:				
			Iron (Fe) 0.4 Chlorides (Cl) 103				
			Hardness 225 Other <del>XXXX</del>				
			12 WELL HEAD COMPLETION: <input type="checkbox"/> In Approved Pit				
			<input type="checkbox"/> Pitless Adapter <input checked="" type="checkbox"/> 12" Above Grade				
			13 Well Grouted? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No				
			<input type="checkbox"/> Neat Cement <input type="checkbox"/> Bentonite <input checked="" type="checkbox"/> Heavy mud				
			Depth: From _____ ft. to _____ ft.				
			14 Nearest Source of possible contamination				
			50 feet SW Direction septic tank type				
			Well disinfected upon completion <input type="checkbox"/> Yes <input type="checkbox"/> No				
			15 PUMP:				
			<input checked="" type="checkbox"/> Not installed				
			Manufacturer's Name _____				
			Model Number _____ HP _____ Volts _____				
			Length of Drop Pipe _____ ft. capacity _____ G.P.M.				
			Type: <input type="checkbox"/> Submersible				
			<input type="checkbox"/> Jet <input type="checkbox"/> Reciprocating				
16 Remarks, elevation, source of data, etc.			17 WATER WELL CONTRACTOR'S CERTIFICATION:				
ADDED INFO BY DRILLER, ITEM NO.			This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.				
*CORRECTED BY <i>B</i>			Freeman Well Drilling 0555				
**ADDITION BY			REGISTERED BUSINESS NAME REGISTRATION NO.				
ELEVATION			Address 4888 S. Jones Rd. Rt. #2, Beaverton				
DEPTH TO ROCK			Signed <i>Bob Freeman</i> Date 6-18-75				

MAY 28 1980

WATER WELL RECORD  
ACT 294 PA 1965MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH

1 LOCATION OF WELL			3 OWNER OF WELL:	
County <b>MIDLAND</b>	Township Name <b>MIDLAND</b>	Fraction <b>SE 1/4 NW 1/4 SE 1/4</b>	Section Number <b>29</b>	Town Number <b>T-14 N 1/4</b>
Distance And Direction from Road Intersections <b>1/4 MILE S. OF ASHBY</b> <b>1/8 MILE W. OF POSEYVILLE</b> Street address & City of Well Location <b>900 DEARING, MIDLAND</b>			Address <b>DAVID KLEIN</b> <b>3614 E. ST ANDREWS</b> <b>MIDLAND, MICH.</b>	
Locate with "X" in section below 			4 WELL DEPTH: (completed) Date of Completion <b>109</b> ft. <b>JULY-23-1979</b>	
2 FORMATION			5 <input type="checkbox"/> Cable tool <input checked="" type="checkbox"/> Rotary <input type="checkbox"/> Driven <input type="checkbox"/> Dug <input type="checkbox"/> Hollow rod <input type="checkbox"/> Jetted <input type="checkbox"/> Bored <input type="checkbox"/>	
THICKNESS OF STRATUM			6 USE: <input checked="" type="checkbox"/> Domestic <input type="checkbox"/> Public Supply <input type="checkbox"/> Industry <input type="checkbox"/> Irrigation <input type="checkbox"/> Air Conditioning <input type="checkbox"/> Commercial <input type="checkbox"/> Test Well <input type="checkbox"/>	
DEPTH TO BOTTOM OF STRATUM			7 CASING: Threaded <input checked="" type="checkbox"/> Welded <input type="checkbox"/> Diam. <b>2</b> in. to <b>104</b> ft. Depth Height: Above/Below Surface <b>1</b> ft. Weight <b>3.75</b> lbs./ft. Drive Shoe? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
SURFACE SAND			8 SCREEN: Type: <b>PLASTIC</b> Dia.: <b>1 1/4"</b> Slot/Gauze <b>10</b> Length <b>5 FT</b> Set between <b>104</b> ft. and <b>109</b> ft. Fittings: <b>1 1/4" DIA X 3' LEAD PIPE 1 1/4" X 2"</b> <b>K-PACKER - 2" BREMER</b>	
SOFT CLAY			9 STATIC WATER LEVEL <b>30</b> ft. below land surface <b>60</b>	
GRAVEL PACKED CLAY			10 PUMPING LEVEL below land surface <b>35</b> ft. after <b>1</b> hrs. pumping <b>5</b> g.p.m. ____ ft. after ____ hrs. pumping ____ g.p.m.	
COURSE SAND & GRAVEL			11 WATER QUALITY in Parts Per Million: Iron (Fe) _____ Chlorides (Cl) _____ Hardness _____ Other _____	
			12 WELL HEAD COMPLETION: <input type="checkbox"/> In Approved Pit <input type="checkbox"/> Pitless Adapter <input checked="" type="checkbox"/> 12" Above Grade	
			13 Well Grouted? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Neat Cement <input type="checkbox"/> Bentonite <input checked="" type="checkbox"/> <b>HEAVY MUD</b> Depth: From ____ ft. to ____ ft.	
			14 Nearest Source of possible contamination <b>80</b> feet <b>W</b> Direction <b>SEPTIC</b> Type Well disinfected upon completion <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
			15 PUMP: <input checked="" type="checkbox"/> Not installed Manufacturer's Name _____ Model Number _____ HP _____ Volts _____ Length of Drop Pipe _____ ft. capacity _____ G.P.M. Type: <input type="checkbox"/> Submersible <input type="checkbox"/> Jet <input type="checkbox"/> Reciprocating	
16 Remarks, elevation, source of data, etc. ADDED INFO -- MILLER, ITEM NO. CORRECTED BY ADDITION BY REVISION DATE TO ROCK			17 WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief. <b>FREEMAN E KRAUSS 0555</b> REGISTERED BUSINESS NAME REGISTRATION NO. Address <b>7388 MIDDLE RD HOPE</b> Signed <b>Andrew M. Kohn</b> Date <b>8-6-79</b> AUTHORIZED REPRESENTATIVE	

MAY - 3 1976

WATER WELL RECORD  
ACT 294 PA 1985MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH

EL 632

## 1 LOCATION OF WELL

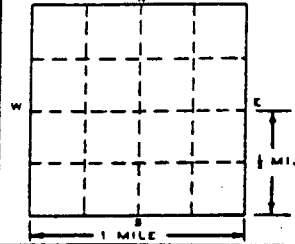
County Midland Township Name Midland Fraction NE 1/4 SE 1/4 Section Number 29 Town Number 14 Range Number 2 E

Distance And Direction from Road Intersections  
1 block south of Ashby Rd. on East side of Dearing Rd

Street address & City of Well Location 803 Dearing

Locate with "X" in section below

Sketchmap:



## 3 OWNER OF WELL:

Address

Thora March  
803 Dearing  
Midland, Michigan 48640

4 WELL DEPTH: (completed) Date of Completion  
177 ft. 3-5-76

5 ☐ Cable tool ☒ Rotary ☐ Driven ☐ Dig  
☐ Hollow rod ☐ Jetted ☐ Bored ☐

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry  
☐ Irrigation ☐ Air Conditioning ☐ Commercial  
☐ Test Well ☐

7 CASING: Threaded ☒ Welded ☐ Height: Above/Below  
Diam.

Surface: 1 ft.

Weight 375 lbs./ft.

Drive Shoe? Yes ☒ No ☐

## 8 SCREEN:

Type: plastic Dia.: 1 1/4

Slot/Gauze slot Length 6 ft

Set between 171 ft. and 177 ft.

Fittings:

## 9 STATIC WATER LEVEL

15 ft. below land surface # 617

## 10 PUMPING LEVEL below land surface

60 ft. after 1 hrs. pumping 6 g.p.m.

\_\_\_\_\_ ft. after \_\_\_\_\_ hrs. pumping \_\_\_\_\_ g.p.m.

## 11 WATER QUALITY in Parts Per Million:

Iron (Fe) \_\_\_\_\_ Chlorides (Cl) \_\_\_\_\_

Hardness \_\_\_\_\_ Other X

## 12 WELL HEAD COMPLETION:

☐ In Approved Pit

☐ Pitless Adapter ☒ 12" Above Grade

13 Well Grouted? ☒ Yes ☐ No

☐ Neat Cement ☐ Bentonite ☒ heavy mud

Depth: From \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

## 14 Nearest Source of possible contamination

80 feet NE Direction septic Type

Well disinfected upon completion ☒ Yes ☐ No

## 15 PUMP:

☐ Not installed

Manufacturer's Name \_\_\_\_\_

Model Number \_\_\_\_\_ HP \_\_\_\_\_ Volts \_\_\_\_\_

Length of Drop Pipe \_\_\_\_\_ ft. capacity \_\_\_\_\_ G.P.M.

Type: ☐ Submersible

☐ Jet ☐ Reciprocating

## 2 FORMATION

THICKNESS  
OF  
STRATUM

DEPTH TO  
BOTTOM OF  
STRATUM

Surface Sand	20	20
Soft Clay	135	155
Water-Bearing Sand	22	177

USE A 2ND SHEET IF NEEDED

## 16 Remarks, elevation, source of data, etc.

ADDED INFO BY DRILLER, ITEM NO.

\*CORRECTED BY

\*\*ADDITION BY

ELEVATION

DEPTH TO ROCK

## 17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Freeman & Krauss Well Drilling  
REGISTERED BUSINESS NAME REGISTRATION NO.

Address 4893 S. Jones Rd. Beaverton, Mich.

Signed Dale Freeman Date \_\_\_\_\_  
AUTHORIZED REPRESENTATIVE

WATER WELL RECORD  
ACT 294 PA 1965MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH

1 LOCATION OF WELL			Fraction		Section No.	Town	Range
County	Twp.						
Midland	Midland		NE 1/4 NE 1/4		27	14 N 1/4	2 E
Distance And Direction from Road Intersection			OWNER No.		3 OWNER OF WELL: Harold Herbert		
60 rods E. of S. and					Address 3147 Bullock Creek Dr.		
Bullock Creek Dr. Intersection. North side of					Midland, Mich.		
Street address & City of Well Location							
2 FORMATION			THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM	4 WELL DEPTH: (completed) Date of Completion		
clay			147	147	152 ft. 9-8-1967		
sand			5	152	5 <input type="checkbox"/> Cable tool <input type="checkbox"/> Rotary <input type="checkbox"/> Driven <input type="checkbox"/> Dug		
					<input checked="" type="checkbox"/> Hollow rod <input type="checkbox"/> Jetted <input type="checkbox"/> Bored <input type="checkbox"/> _____		
					6 USE: <input checked="" type="checkbox"/> Domestic <input type="checkbox"/> Public Supply <input type="checkbox"/> Industry		
					<input type="checkbox"/> Irrigation <input type="checkbox"/> Air Conditioning <input type="checkbox"/> Commercial		
					<input type="checkbox"/> Test Well <input type="checkbox"/> _____		
					7 CASING: Threaded <input checked="" type="checkbox"/> Welded <input type="checkbox"/> Height: Above/Below		
					Diam. 2 in. to 147 ft. Depth surface _____ ft.		
					_____ in. to _____ ft. Depth Weight _____ lbs./ft.		
					Drive Shoe? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		
					8 SCREEN: Type: plastic Dia. 1 1/4"		
					Slot/Gauze 60 Length 5 ft.		
					Set between 102 ft. and 152 ft.		
					Fittings: 1-2" check valve,		
					2-1 1/4" couplings		
					9 STATIC WATER LEVEL		
					flow ft. below land surface at 665		
					10 PUMPING LEVEL below land surface		
					10 ft. after _____ hrs. pumping _____ g		
					_____ ft. after _____ hrs. pumping _____ g.p.m.		
					11 WATER QUALITY in Parts Per Million:		
					Iron (Fe) _____ Chlorides (Cl) _____		
					Hardness _____		
					12 WELL HEAD COMPLETION: <input type="checkbox"/> In Approved Pit		
					<input type="checkbox"/> Pitless Adapter <input checked="" type="checkbox"/> 12" Above Grade		
					13 GROUTING: not needed		
					Well Grouted? <input type="checkbox"/> Yes <input type="checkbox"/> No		
					Material: <input type="checkbox"/> Neat Cement <input type="checkbox"/> _____		
					Depth: From _____ ft. to _____ ft.		
					14 SANITARY: just building		
					Nearest Source of possible contamination		
					_____ feet _____ Direction _____ Type		
					Well disinfected upon completion <input type="checkbox"/> Yes <input type="checkbox"/> No		
					15 PUMP: not installed		
					Manufacturer's Name _____		
					Model Number _____ HP _____		
					Length of Drop Pipe _____ ft. capacity _____ G.P.M.		
					Type: <input type="checkbox"/> Submersible <input type="checkbox"/> _____		
					<input type="checkbox"/> Jet <input type="checkbox"/> Reciprocating		
16 Remarks, elevation, source of data, etc.					17 WATER WELL CONTRACTOR'S CERTIFICATION:		
ADDED INFO. BY DRILLER. ITEM NO. _____					This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.		
CORRECTED BY: _____					Webers Well Drilling 0079		
ADDITION BY: _____					REGISTERED BUSINESS NAME 18748 W. Brant Rd. Brant, MI.		
					Address _____		
					Signed: <u>James Weber</u> Date: 2-8-68		
					AUTHORIZED REPRESENTATIVE		

DEC 11 1979

WATER WELL RECORD  
AQT 294 PA 1965MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH

29-

1 LOCATION OF WELL		County		Township Name		Fraction		Section Number		Town Number		Range Number	
MIDLAND		MIDLAND		NE 1/4 SE 1/4		29		14		N 1/2		12 E.M.	
Distance And Direction from Road Intersections ABOUT 100 WEST OF POSEYVILLE RD ABOUT 150 SOUTH OF ASHBY RD													
Street address & City of Well Location MIDLAND MICHIGAN													
Locate with "X" in section below													
2 FORMATION		THICKNESS OF STRATUM		DEPTH TO BOTTOM OF STRATUM		3 OWNER OF WELL:							
RED CLAY		12'		12'		FIRST MIDLAND BANK & TRUST							
GRAY & BLUE CLAY		75'		87'		Address							
SAND & GRAVEL		13'		100'		MIDLAND MICHIGAN							
						4 WELL DEPTH: (completed) Date of Completion							
						100 ft. 11-26-79							
						5 <input type="checkbox"/> Cable tool <input checked="" type="checkbox"/> Rotary <input type="checkbox"/> Driven <input type="checkbox"/> Dip							
						<input type="checkbox"/> Hollow rod <input type="checkbox"/> Jetted <input type="checkbox"/> Bored <input type="checkbox"/>							
						6 USE: <input type="checkbox"/> Domestic <input type="checkbox"/> Public Supply <input type="checkbox"/> Industry							
						<input type="checkbox"/> Irrigation <input type="checkbox"/> Air Conditioning <input checked="" type="checkbox"/> Commercial							
						<input type="checkbox"/> Test Well <input type="checkbox"/>							
						7 CASING: Threaded <input checked="" type="checkbox"/> Welded <input type="checkbox"/> Height: Above (Below) Surface <u>1</u> ft.							
						4 in. to 96 ft. Depth Weight <u>1</u> lbs./ft.							
						in. to ft. Depth Drive Shoe? Yes <input type="checkbox"/> No <input type="checkbox"/>							
						8 SCREEN:							
						Type: 4X4 SS Dia.: 4"							
						Slot/Gauge 12 Length 4'							
						Set between 100 ft. and 95 ft.							
						Fittings: X PACKER							
						9 STATIC WATER LEVEL							
						ft. below land surface FLOW > 100							
						10 PUMPING LEVEL below land surface							
						00 ft. after 2 hrs. pumping 60 g.p.m.							
						15 ft. after 4 hrs. pumping 60 g.p.m.							
						11 WATER QUALITY in Parts Per Million:							
						Iron (Fe) Chlorides (Cl)							
						Hardness Other							
						12 WELL HEAD COMPLETION: <input type="checkbox"/> In Approved Pit							
						<input checked="" type="checkbox"/> Pitless Adapter <input type="checkbox"/> 12" Above Grade							
						13 Well Grouted? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No							
						<input type="checkbox"/> Neat Cement <input type="checkbox"/> Bentonite <input type="checkbox"/>							
						Depth: From ft. to ft.							
						14 Nearest Source of possible contamination							
						15 feet South Direction DRAIN Type							
						Well disinfected upon completion <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No							
						15 PUMP: <input type="checkbox"/> Not installed							
						Manufacturer's Name MC DONALD							
						Model Number HP 1/2 Volts 230							
						Length of Drop Pipe 50 ft. capacity 12 G.P.M.							
						Type: <input checked="" type="checkbox"/> Submersible <input type="checkbox"/> Jet <input type="checkbox"/> Reciprocating							
16 Remarks, elevation, source of data, etc. ADDED INFO BY DRILLER, ITEM NO. *CORRECTED BY **ADDITION BY ELEVATION DEPTH TO ROCK						17 WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief. RITLEDGE WELL DRILLING 1632 REGISTERED BUSINESS NAME REGISTRATION NO. Address 3741 WOODBRIDGE RD WHEELER Signed [Signature] Date 11-26-79 AUTHORIZED REPRESENTATIVE							



## WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH

29

5  
7

## 1 LOCATION OF WELL

County Midland Township Midland Fraction SE 1/4 NE 1/4 Section No. 29 Town 14 N. Range 2

Distance And Direction from Road Intersections

2913 Ashby Rd, Midland, Mich

Street address &amp; City of Well Location

OWNER No. 2911

## 3 OWNER OF WELL:

Address 2913 Ashby Rd, Midland, Mich  
2911 Ashby Rd

## 2 FORMATION

THICKNESS  
OF  
STRATUMDEPTH TO  
BOTTOM OF  
STRATUM

Top soil

5

5

clay

5

10

yellow

3

13

soft clay

10

23

stone clay

15

38

hard fine clay

14

52

clay

30

82

soft clay

6

88

H 20 sand

8

96

## 4 WELL DEPTH: (completed)

Date of Completion

96

ft.

11-6-69

5 ☐ Cable tool ☐ Rotary ☐ Driven ☐ Dug  
☒ Hollow rod ☐ Jetted ☐ Bored ☐

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry  
☐ Irrigation ☐ Air Conditioning ☐ Commercial  
☐ Test Well ☐

7 CASING: Threaded ☒ Welded ☐  
Diam. 2 in. to 72 ft. Depth  
Height: Above/Below surface 1 ft.  
Weight 375 lbs./ft.  
Drive Shoe? Yes ☒ No ☐

8 SCREEN: Type: Jackson Dia.: 1 1/2  
Slot/Gauge #60 Length 4'  
Set between 92 ft. and 96 ft.  
Fittings: check valve Bail type  
41 1/2 pipe & coupling

9 STATIC WATER LEVEL flour tank  
1 ft. below land surface

10 PUMPING LEVEL below land surface  
88 ft. after 1 hrs. pumping 900 g.  
16 ft. after 1/2 hrs. pumping 702 g.p.m.

## 11 WATER QUALITY in Parts Per Million:

Iron (Fe) 1 Chlorides (Cl) 1Hardness 1

12 WELL HEAD COMPLETION: ☐ In Approved Pit  
☐ Pitless Adapter ☒ 12" Above Grade

13 GROUTING: Well Grouted? ☐ Yes ☐ No  
Material: ☐ Neat Cement ☐  
Depth: From 1 ft. to 1 ft.

14 SANITARY: Nearest Source of possible contamination 50 ft. West Direction surface tank  
Type surface tank  
Well disinfected upon completion ☒ Yes ☐ No

15 PUMP: Manufacturer's Name N.T. installed  
Model Number                      HP                       
Length of Drop Pipe                      ft. capacity                      G.P.M.  
Type: ☐ Submersible ☐  
☐ Jet ☐ Reciprocating

## 16 Remarks, elevation, source of data, etc.

## 17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Signature W.D.  
REGISTERED BUSINESS NAME                      REGISTRATION # 2224

Address 2416 Pine Bluff Rd Rt 9

Signed James H. Jones Date 4/10/69  
AUTHORIZED REPRESENTATIVE

JUL 28 1975

WATER WELL RECORD  
ACT 294 PA 1965MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH

29-1

## 1 LOCATION OF WELL

County **Midland** Township Name **Midland** Fraction **SE 1/4 NE 1/4 E** Section Number **29** Town Number **14** Range Number **2 E**

## Distance And Direction from Road Intersections

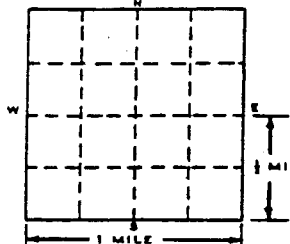
**1 blk west of Poseyville Rd. on north side**

## Street address &amp; City of Well Location

**2901 Ashby Rd., Midland**

Locate with "X" in section below

Sketch Map:



## 3 OWNER OF WELL:

**Ken Robinson**  
Address **2901 Ashby Rd.**  
**Midland, Mich.**

## 4 WELL DEPTH: (completed) Date of Completion

**102** ft. **May 27, 1975**

5 ☐ Cable tool ☒ Rotary ☐ Driven ☐ Dug  
☐ Hollow rod ☐ Jetted ☐ Bored ☐

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry  
☐ Irrigation ☐ Air Conditioning ☐ Commercial  
☐ Test Well ☐

7 CASING: Threaded ☒ Welded ☐ Height: Above ~~Top~~  
Diam. Surface **1** ft.

**2** in. to **93** ft. Depth Weight **3.75** lbs. ft.  
in. to ft. Depth Drive Shoe? Yes ☒ No ☐

## 8 SCREEN:

Type **Plastic** Dia. **1 1/2"**  
Slot ~~1/8"~~ Length **8** ft.  
Set between **94** ft. and **102** ft.  
Fittings:

## 9 STATIC WATER LEVEL

**5** ft. below land surface **≈ 61?**

## 10 PUMPING LEVEL below land surface

**shallow** after **1** hrs. pumping **15** g.p.m.  
**well**  
ft. after hrs. pumping g.p.m.

## 11 WATER QUALITY in Parts Per Million:

Iron (Fe) Chlorides (Cl)  
Hardness Other **XXXX**

## 12 WELL HEAD COMPLETION:

☐ In Approved Pit  
☐ Pitless Adapter ☒ 12" Above Grade

13 Well Grouted ☒ Yes ☐ No  
☐ Neat Cement ☐ Bentonite ☒ **heavy mud**  
Depth: From ft. to ft.

## 14 Nearest Source of possible contamination

ft. Direction **none** Type  
Well disinfected upon completion ☐ Yes ☐ No

## 15 PUMP:

☒ Not installed

Manufacturer's Name  
Model Number HP Volts  
Length of Drop Pipe ft. capacity G.P.M.  
Type: ☐ Submersible ☐ Jet ☐ Reciprocating

USE A 2ND SHEET IF NEEDED

## 16 Remarks, elevation, source of data, etc.

ADDED INFO BY DRILLER, ITEM NO.  
\*CORRECTED BY  
\*\*ADDITION BY  
ELEVATION  
DEPTH TO ROCK

## 17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

**Freeman Well Drilling** **0555**  
REGISTERED BUSINESS NAME REGISTRATION NO.

Address **1888 S. Jones Rd., R#2, Beaverton, Mich**

Signed **Bob Freeman** Date **6-18-75**  
AUTHORIZED REPRESENTATIVE

## WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH

29-16

<b>1 LOCATION OF WELL</b>					
County <b>MIDLAND</b>	Twp. <b>MIDLAND</b>	Fraction <b>SE 1/4 NE 1/4</b>	Section No. <b>29</b>	Town <b>14</b>	Range <b>N.D. 2 E.</b>
Distance And Direction from Road Intersections <b>1/4 MILE NORTH OF ASHBY RD. ON ROSEVILLE RD ON WEST SIDE</b>			3 OWNER OF WELL: <b>LEWIS REAGLE</b> Address <b>3101 S MILLER MIDLAND MICH</b>		
Street address & City of Well Location <b>ROSEVILLE ROAD MIDLAND MICH</b>			6 USE: <input type="checkbox"/> Domestic <input type="checkbox"/> Public Supply <input type="checkbox"/> Industry <input type="checkbox"/> Irrigation <input type="checkbox"/> Air Conditioning <input type="checkbox"/> Commercial <input type="checkbox"/> Test Well <input checked="" type="checkbox"/> <b>BARBER SHOP</b>		
<b>2 FORMATION</b>	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM	4 WELL DEPTH: (completed) Date of Completion <b>107 ft. 7-24-68</b>		
<b>SURFACE SAND</b>	<b>5</b>	<b>5</b>	5 <input type="checkbox"/> Cable tool <input type="checkbox"/> Rotary <input type="checkbox"/> Driven <input type="checkbox"/> Dug <input checked="" type="checkbox"/> Hollow rod <input type="checkbox"/> Jetted <input type="checkbox"/> Bored <input type="checkbox"/> _____		
<b>SOFT CLAY</b>	<b>15</b>	<b>20</b>	7 CASING: Threaded <input checked="" type="checkbox"/> Welded <input type="checkbox"/> Height: <del>103</del> / Below surface <b>103</b> ft. <b>2</b> in. to <b>103</b> ft. Depth Weight <b>3.75</b> lbs./ft. _____ in. to _____ ft. Depth Drive Shoe? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		
<b>GRAVEL PACKED CLAY</b>	<b>40</b>	<b>60</b>	8 SCREEN: Type: <b>SLOTTED PLASTIC</b> Dia.: <b>1 1/4 IN</b> Slot/Gauze <b>60</b> Length <b>4 FT.</b> Set between <b>103</b> ft. and <b>107</b> ft. <b>FOUR FT. LF60 PIPE</b> Fittings: <b>WITH BREMER CHECK VALVE</b>		
<b>SOFT CLAY</b>	<b>42</b>	<b>102</b>	9 STATIC WATER LEVEL <b>FLOW</b> ft. below land surface <b>7608</b>		
<b>WATER BEARING FINE GRAVEL</b>	<b>5</b>	<b>107</b>	10 PUMPING LEVEL below land surface <b>20</b> ft. after <b>X</b> hrs. pumping <b>10</b> g.p. _____ ft. after _____ hrs. pumping _____ g.p.m.		
			11 WATER QUALITY in Parts Per Million: <b>X</b> Iron (Fe) _____ Chlorides (Cl) _____ Hardness _____		
			12 WELL HEAD COMPLETION: <input type="checkbox"/> In Approved Pit <input checked="" type="checkbox"/> Pitless Adapter <input type="checkbox"/> 12" Above Grade		
			13 GROUTING: Well Grouted? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Material: <input type="checkbox"/> Neat Cement <input checked="" type="checkbox"/> <b>HEAVY MUD</b> Depth: From <b>5</b> ft. to <b>102</b> ft.		
			14 SANITARY: Nearest Source of possible contamination <b>50</b> feet <b>E</b> Direction <b>SEPTIC TANK</b> Type _____ Well disinfected upon completion <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
			15 PUMP: Manufacturer's Name <b>F.E. MYERS BROS. INC.</b> Model Number <b>HC-15</b> HP <b>1/2</b> Length of Drop Pipe <b>10</b> ft. capacity <b>10</b> G.P.M. Type: <input type="checkbox"/> Submersible <input type="checkbox"/> _____ <input checked="" type="checkbox"/> Jet <input type="checkbox"/> Reciprocating		
16 Remarks, elevation, source of data, etc.  ADDED INFO. BY DRILLER, <b>MEM NUL</b>  CORRECTED BY: _____  REVISION BY: _____			17 WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief. <b>FREEMAN &amp; GALLIUGH</b> <b>0555</b> REGISTERED BUSINESS NAME REGISTRATION # Address <b>3035 E. FREEMAN DR R-7 MIDLAND</b> Signed <b>Dale Freeman</b> Date <b>9-5-68</b> AUTHORIZED REPRESENTATIVE		

OCT 11 1977

## WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH

1 LOCATION OF WELL		County		Township Name		Fraction		Section Number		Town Number		Range Number	
Midland		Midland		SW 1/4 SW 1/4 NE 1/4		29		14		N.S.		2 E/W	
Distance And Direction from Road Intersections													
quarter mile west of <del>Interstate</del> Poseyville rd. on north side of Ashby, 30 ft. from road													
Street address & City of Well Location													
Locate with "X" in section below													
Sketch Map:													
2 FORMATION		THICKNESS OF STRATUM		DEPTH TO BOTTOM OF STRATUM		3 OWNER OF WELL:							
fill		1		1		Jacoboby Builders							
top soil		1		2		Address 2163 N. Center							
clay		37		39		Saginaw, Mich.							
gravel		1		40		4 WELL DEPTH: (completed) 160 ft. Date of Completion 9-26-77							
clay stones		108		148		5 <input type="checkbox"/> Cable tool <input checked="" type="checkbox"/> Rotary <input type="checkbox"/> Driven <input type="checkbox"/> Dug							
gravel		8		156		<input type="checkbox"/> Hollow rod <input type="checkbox"/> Jetted <input type="checkbox"/> Bored <input type="checkbox"/>							
sand		to bottom				6 USE: <input checked="" type="checkbox"/> Domestic <input type="checkbox"/> Public Supply <input type="checkbox"/> Industry							
						<input type="checkbox"/> Irrigation <input type="checkbox"/> Air Conditioning <input type="checkbox"/> Commercial							
						<input type="checkbox"/> Test Well <input type="checkbox"/>							
						7 CASING: Threaded <input checked="" type="checkbox"/> Welded <input type="checkbox"/> Height: Above <del>SSW</del> Surface 1 ft.							
						2 in. to 152 ft. Depth Weight 3.75 lbs. ft.							
						in. to ft. Depth Drive Shoe? Yes <input type="checkbox"/> No <input type="checkbox"/>							
						8 SCREEN:							
						Type: galvanized Dia.: 1 1/2							
						Slot: <del>10</del> 10 Length 8							
						Set between 152 ft. and 160 ft.							
						Fittings: 3' of 1 1/2 with K-Packer							
						9 STATIC WATER LEVEL							
						12 ft. below land surface 611							
						10 PUMPING LEVEL below land surface							
						ft. after hrs. pumping 10 g.p.m.							
						ft. after hrs. pumping g.p.m.							
						11 WATER QUALITY in Parts Per Million:							
						Iron (Fe) Chlorides (Cl)							
						Hardness Other fresh							
						12 WELL HEAD COMPLETION: <input type="checkbox"/> In Approved Pit							
						<input checked="" type="checkbox"/> Pitless Adapter <input type="checkbox"/> 12" Above Grade							
						13 Well Grouted? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No							
						<input type="checkbox"/> Neat Cement <input type="checkbox"/> Bentonite <input checked="" type="checkbox"/> drilling							
						Depth: From ft. to ft.							
						14 Nearest Source of possible contamination							
						60 feet NE Direction septic system Type							
						Well disinfected upon completion <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No							
						15 PUMP:							
						<input type="checkbox"/> Not installed							
						Manufacturer's Name Burks							
						Model Number 5HD2 HP 1/2 Volts 115							
						Length of Drop Pipe 42 ft. capacity G.P.M.							
						Type: <input type="checkbox"/> Submersible							
						<input checked="" type="checkbox"/> Jet <input type="checkbox"/> Reciprocating							
16 Remarks, elevation, source of data, etc.						17 WATER WELL CONTRACTOR'S CERTIFICATION:							
ADDED INFO BY DRILLER, ITEM NO.						This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.							
*CORRECTED BY JB						Everett Cragg & Sons, Inc. 0711							
**ADDITION BY						REGISTERED BUSINESS NAME REGISTRATION NO.							
ELEVATION						Address 7765 McCarty Rd. Saginaw, Mich.							
DEPTH TO ROCK						Signed Jerome Cragg Date 10-1-77							
						AUTHORIZED REPRESENTATIVE							

1970

## WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH

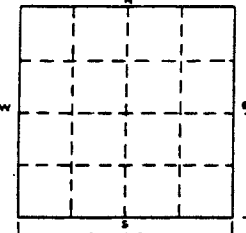
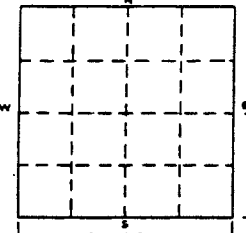
45

1 LOCATION OF WELL			3 OWNER OF WELL:	
County	Town	Fraction	Section No.	Town
Midland	Midland	SUB SUB NE 1/4	29	14 N 1/2
Distance And Direction from Road Intersections			OWNER No. _____	
J.781 Ashby Rd, Midland, Mich			E.B. Jacobs	
Street address & City of Well Location			2781 Ashby Rd	
2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM	4 WELL DEPTH: (completed) Date of Completion	
Top soil	5	5	15 ft. 10/12/70	
clay	5	10	5 <input type="checkbox"/> Cable tool <input type="checkbox"/> Rotary <input type="checkbox"/> Driven <input type="checkbox"/> Dug	
yellow sand	2	12	<input checked="" type="checkbox"/> Hollow rod <input type="checkbox"/> Jetted <input type="checkbox"/> Bored <input type="checkbox"/> _____	
soft clay	20	32	6 USE: <input checked="" type="checkbox"/> Domestic <input type="checkbox"/> Public Supply <input type="checkbox"/> Industry	
Hard pan clay	20	52	<input type="checkbox"/> Irrigation <input type="checkbox"/> Air Conditioning <input type="checkbox"/> Commercial	
clay	40	92	<input type="checkbox"/> Test Well <input type="checkbox"/> _____	
soft clay	30	122	7 CASING: Threaded <input checked="" type="checkbox"/> Welded <input type="checkbox"/> Height: Above/Below	
dead sand & gravel	20	142	Diam. 2 in. to 1 1/2 ft. Depth surface 1 ft.	
clay	4	146	Weight 375 lbs/ft.	
water sand	10	156	Drive Shoe? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
			8 SCREEN: Two screens	
			Type: Johnson Dia.: 1 1/4	
			Slot/Gauze #80 Length 7'	
			Set between 156 ft. and 149 ft. check for	
			Fittings: 4 lead pipe 3/4" type	
			9 STATIC WATER LEVEL	
			7 ft. below land surface ~ 618	
			10 PUMPING LEVEL below land surface	
			145 ft. after 1 hrs. pumping 1300 g.p.	
			16 ft. after 1 hrs. pumping 720 g.p.m.	
			11 WATER QUALITY in Parts Per Million:	
			Iron (Fe) _____ Chlorides (Cl) _____	
			Hardness _____	
			12 WELL HEAD COMPLETION: <input type="checkbox"/> In Approved Pit	
			<input type="checkbox"/> Pitless Adapter <input checked="" type="checkbox"/> 12" Above Grade	
			13 GROUTING:	
			Well Grouted? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
			Material: <input type="checkbox"/> Neat Cement <input type="checkbox"/> _____	
			Depth: From _____ ft. to _____ ft.	
			14 SANITARY: cephic tank	
			Nearest Source of possible contamination	
			60 feet N Direction _____ Type _____	
			Well disinfected upon completion <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
			15 PUMP: Not installed	
			Manufacturer's Name _____	
			Model Number _____ HP _____	
			Length of Drop Pipe _____ ft. capacity _____ G.P.M.	
			Type: <input type="checkbox"/> Submersible <input type="checkbox"/> _____	
			<input type="checkbox"/> Jet <input type="checkbox"/> Reciprocating	
16 Remarks, elevation, source of data, etc.			17 WATER WELL CONTRACTOR'S CERTIFICATION:	
ADDED INFO. BY DRILLER, ITEM NO. _____			This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.	
CORRECTED BY: _____			Signature: <i>W. D. [illegible]</i> REGISTRATION NO. 6224	
ADDITION BY: _____			Address: 2416 Pine St, Apt 9	
			Signed: <i>James [illegible]</i> Date: 10/15/70	

MAY 4 1970

 32-1WATER WELL RECORD  
ACT 294 PA 1965MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH

EX 625

1 LOCATION OF WELL			3 OWNER OF WELL	
County	Township Name	Fraction	Section Number	Town Number
MIDLAND	MIDLAND	E 1/2 NE 1/4	32	14 N.W.
Distance And Direction from Road Intersections 1/2 mile N of Stearns Rd & Pauline Rd Intersection on W side of Rd.			Range Number 2 E.W.	
Street address & City of Well Location Same as Pt. 1			Address 1160 ROSEVILLE RD MIDLAND MICH	
Locate with "X" in section below 			4 WELL DEPTH: (completed) Date of Completion 147 ft. NOV 5 1969	
Sketch Map: 			5 <input type="checkbox"/> Cable tool <input type="checkbox"/> Rotary <input type="checkbox"/> Driven <input type="checkbox"/> D.C.	
			<input checked="" type="checkbox"/> Hollow rod <input type="checkbox"/> Jetted <input type="checkbox"/> Bored <input type="checkbox"/>	
			6 USE: <input checked="" type="checkbox"/> Domestic <input type="checkbox"/> Public Supply <input type="checkbox"/> Industry	
			<input type="checkbox"/> Irrigation <input type="checkbox"/> Air Conditioning <input type="checkbox"/> Commercial	
			7 CASING: Threaded <input checked="" type="checkbox"/> Welded <input type="checkbox"/>	
			Height: Above/Below Surface 139 ft.	
2 FORMATION			2 in. to 139 ft. Depth	
THICKNESS OF STRATUM			in. to ft. Depth	
DEPTH TO BOTTOM OF STRATUM			Drive Shoe? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
DRIFT			8 SCREEN GALVANIZED	
WATER BEARING COARSE SAND			Type: SLOTTED PLAS Dia.: 1 1/4 in.	
			Slot/Gauge 60 Length 4'	
			Set between 139 ft. and 147 ft.	
			Fittings: ROYAL LEAP Pipe/Breaker	
			CHECK VALVE	
			9 STATIC WATER LEVEL	
			2 ft. below land surface 623	
			10 PUMPING LEVEL below land surface	
			20 ft. after X hrs. pumping 20 g.p.m.	
			ft. after hrs. pumping g.p.m.	
			11 WATER QUALITY in Parts Per Million:	
			Iron (Fe) Chlorides (Cl) X	
			Hardness Other	
			12 WELL HEAD COMPLETION: <input type="checkbox"/> In Approved Pit	
			<input type="checkbox"/> Pitless Adapter <input checked="" type="checkbox"/> 12" Above Grade	
			13 Well Grouted? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
			<input type="checkbox"/> Neat Cement <input type="checkbox"/> Bentonite <input checked="" type="checkbox"/> HEAVY MUD	
			Depth: From 8 ft. to 139 ft.	
			14 Nearest Source of possible contamination	
			55 feet W Direction SEPTIC TANK Type	
			Well disinfected upon completion <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
			15 PUMP: <input checked="" type="checkbox"/> Not installed	
			Manufacturer's Name	
			Model Number HP Volts	
			Length of Drop Pipe ft. capacity G.P.M.	
			Type: <input type="checkbox"/> Submersible	
			<input type="checkbox"/> Jet <input type="checkbox"/> Reciprocating	
16 Remarks, elevation, source of data, etc.			17 WATER WELL CONTRACTOR'S CERTIFICATION:	
ADDED INFO. BY DRILLER, ITEM NO.			This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.	
CORRECTED BY:			FREEMAN GALLIUGH 0555	
ADDITION BY:			REGISTERED BUSINESS NAME REGISTRATION NO.	
			Address 3035 FREEMAN DR. MIDLAND	
			Signed Dale Freeman Date 4/30/70	
			AUTHORIZED REPRESENTATIVE	

JUN - 9 1970

GEOLOGICAL SURVEY COPY

## WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH

## 1 LOCATION OF WELL

County MIDLAND Twp. MIDLAND Fraction NE 1/4 SE 1/4 Section No. 32 Town 14 N 1/4 Range K 2 E 1/4

Distance And Direction from Road Intersections

2940 E Stewart RdRt. 10 Midland Mich

Street address &amp; City of Well Location

OWNER No. \_\_\_\_\_

3 OWNER OF WELL: Bob Stillerwagon

Address

2910 E Stewart Rd Rt. 10

2 FORMATION THICKNESS OF STRATUM DEPTH TO BOTTOM OF STRATUM

Top soil55soft clay2025hard yellow clay3055clay4095soft clay25120gravelly sand5125Water sand10135

4 WELL DEPTH: (completed) Date of Completion

135 ft.Sept. 2, 19715 ☐ Cable tool ☐ Rotary ☐ Driven ☐ Dug☐ Hollow rod ☐ Jetted ☐ Bored ☐ \_\_\_\_\_6 USE: ☒ Domestic ☐ Public Supply ☐ Industry☐ Irrigation ☐ Air Conditioning ☐ Commercial☐ Test Well ☐ \_\_\_\_\_7 CASING: Threaded ☒ Welded ☐Diam. 2 in. to 1 1/2 ft. DepthHeight: Above/Below surface 1 ft.Weight 325 lbs./ft.Drive Shoe? Yes ☒ No ☐

8 SCREEN:

Type: 460 Johnson Dia.: 1 1/2Slot/Gauge: 760 Length: 81Set between 126 ft. and 135 ft.Fittings: check (3 and type)lead pipe & coupling

9 STATIC WATER LEVEL

11 ft. below land surface 621

10 PUMPING LEVEL below land surface

120 ft. after 2 hrs. pumping 900 g.p.m.

\_\_\_\_\_ ft. after \_\_\_\_\_ hrs. pumping \_\_\_\_\_ g.p.m.

11 WATER QUALITY in Parts Per Million:

Iron (Fe) \_\_\_\_\_ Chlorides (Cl) \_\_\_\_\_

Hardness \_\_\_\_\_

12 WELL HEAD COMPLETION: ☐ In Approved Pit☐ Pitless Adapter ☐ 12" Above Grade

13 GROUTING:

Well Grouted? ☐ Yes ☐ NoMaterial: ☐ Neat Cement ☐ \_\_\_\_\_

Depth: From \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

14 SANITARY:

Nearest Source of possible contamination

60 feet North Direction cistern tank TypeWell disinfected upon completion ☒ Yes ☐ No15 PUMP: His own pumpManufacturer's Name Leach

Model Number \_\_\_\_\_ HP

Length of Drop Pipe 21 ft. capacity 200 P.M.Type: ☐ Submersible ☐ \_\_\_\_\_☐ Jet ☐ Reciprocating

16 Remarks, elevation, source of data, etc.

ADDED INFO. BY DRILLER, ITEM NO.

CORRECTED BY:

REVISION BY

17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Hignite Well Drilling 0224Address 2411 Pine River Rd, Rt 9Signed James Hignite Date 11/23/71

WATER WELL RECORD  
ACT 294 PA 1965MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH

32-5

## 1 LOCATION OF WELL

County MIDLAND Twp. MIDLAND Fraction NE 1/4 NE 1/4 SE 1/4 Section No. 32 Town 14 N 1/2 Range 12 E 1/2

Distance And Direction from Road Intersections

OWNER No. 1

Street address &amp; City of Well Location

2910 E Stuart Rt. 10

## 3 OWNER OF WELL:

Address Bob Stillwagon1326 Poseyville Rd

## 2 FORMATION

THICKNESS  
OF  
STRATUMDEPTH TO  
BOTTOM OF  
STRATUM

## 4 WELL DEPTH: (completed)

Date of Completion

160 ft. May 15/21

5 ☐ Cable tool ☐ Rotary ☐ Driven ☐ Dug  
☒ Hollow rod ☐ Jetted ☐ Bored ☐

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry  
☐ Irrigation ☐ Air Conditioning ☐ Commercial  
☐ Test Well ☐

7 CASING: Diam. ☐ Threaded ☐ Welded ☐ Height: Above/Below  
surface 1 ft.  
2 in. to 15 1/2 ft. Depth Weight 325 lbs./ft.  
\_\_\_\_\_ in. to \_\_\_\_\_ ft. Depth Drive Shoe? Yes ☒ No ☐

8 SCREEN:  
Type: Two Galvanneal Dia.: 1 1/4  
Slot/Gauge 60 Length 8'  
Set between 160 ft. and 152 ft.  
Fittings: check valve lead  
PIPE & fittings

9 STATIC WATER LEVEL  
5 ft. below land surface 620

10 PUMPING LEVEL below land surface  
95'0 ft. after 1 hrs. pumping 15 g.p.m.  
20 ft. after 1 hrs. pumping 15 g.p.m.

11 WATER QUALITY in Parts Per Million:  
Iron (Fe) \_\_\_\_\_ Chlorides (Cl) \_\_\_\_\_  
Hardness \_\_\_\_\_

12 WELL HEAD COMPLETION: ☐ In Approved Pit  
☒ Fittless Adapter ☐ 12" Above Grade

13 GROUTING:  
Well Grouted? ☐ Yes ☒ No  
Material: ☐ Neat Cement ☐ \_\_\_\_\_  
Depth: From \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

14 SANITARY:  
Nearest Source of possible contamination 60 feet North center tank  
Direction North Type center tank  
Well disinfected upon completion ☒ Yes ☐ No

15 PUMP:  
Manufacturer's Name Bunker S.W.  
Model Number 5 HTS HP 5  
Length of Drop Pipe 52 ft. capacity \_\_\_\_\_ G.P.M.  
Type: ☐ Submersible ☐ \_\_\_\_\_  
☐ Jet ☐ Reciprocating

16 Remarks, elevation, source of data, etc.

## 17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Regina & Sons Well Drilling  
REGISTERED BUSINESS NAME REGISTRATION NO. 0224

Address 2416 Pine & Myer Rd Rt 9  
Signed James Regina Date 5/27/21  
AUTHORIZED REPRESENTATIVE

BY DRILLER, ITEM NO.

CONDUCTED BY:

REVISION BY:

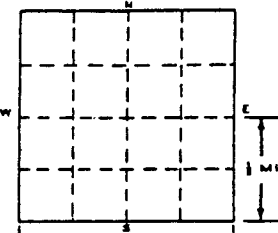
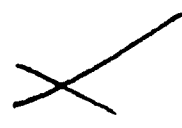


MAY 4 1970

GEOLOGICAL SURVEY SAMPLE No.

**WATER WELL RECORD**  
ACT 284 PA 1965

32-1  
MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH

<b>1 LOCATION OF WELL</b>					
County: <u>MIDLAND</u>	Township Name: <u>MIDLAND</u>	Fraction: <u>E 1/2 NE 1/4</u>	Section Number: <u>32</u>	Town Number: <u>14</u>	Range Number: <u>2</u>
Distance And Direction from Road Intersections: <u>1/2 mile N of Stewart Rd &amp; Poseyville Rd intersection on east side of Rd</u>			3 OWNER OF WELL: <u>EUGENE HOLT</u> Address: <u>1152 POSEYVILLE RD MIDLAND MICH.</u>		
Street address & City of Well Location: <u>Same as Rd</u>			4 WELL DEPTH: (completed) Date of Completion: <u>144 ft. NOV 7 1969</u>		
<div style="display: flex; align-items: center;"><div style="flex: 1;"><p>Locate with "X" in section below</p></div><div style="flex: 1; text-align: center;"><p>Sketch Map:</p></div></div>			5 <input type="checkbox"/> Cable tool <input type="checkbox"/> Rotary <input type="checkbox"/> Driven <input type="checkbox"/> Dug <input checked="" type="checkbox"/> Hollow rod <input type="checkbox"/> Jetted <input type="checkbox"/> Bored		
			6 USE: <input checked="" type="checkbox"/> Domestic <input type="checkbox"/> Public Supply <input type="checkbox"/> Industry <input type="checkbox"/> Irrigation <input type="checkbox"/> Air Conditioning <input type="checkbox"/> Commercial <input type="checkbox"/> Test Well		
2 FORMATION			7 CASING: Threaded <input checked="" type="checkbox"/> Welded <input type="checkbox"/> Height: <u>137</u> ft. Surface <u>137</u> ft. Weight: <u>3.75</u> lbs./ft. Drive Shoe? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		
			8 SCREEN: Type: <u>SLOTTED PLAS</u> Dia.: <u>1 1/4 IN</u> Slot/Gauze: <u>60</u> Length: <u>5'</u> Set between <u>139</u> ft. and <u>144</u> ft. Fittings: <u>FOUR FOOT LEAD PIPE WITH BREMER CHECK VALVE</u>		
DRIFT			9 STATIC WATER LEVEL: <u>Flow</u> ft. below land surface <u>&gt; 6.5</u>		
WATER BEARING COARSE SAND			10 PUMPING LEVEL below land surface: <u>20</u> ft. after <u>1</u> hrs. pumping <u>15</u> g.p.m. _____ ft. after _____ hrs. pumping _____ g.p.m.		
			11 WATER QUALITY in Parts Per Million: Iron (Fe) _____ Chlorides (Cl) <u>X</u> Hardness _____ Other _____		
			12 WELL HEAD COMPLETION: <input type="checkbox"/> In Approved Pit <input type="checkbox"/> Pitless Adapter <input checked="" type="checkbox"/> 12" Above Grade		
			13 Well Grouted? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Neat Cement <input type="checkbox"/> Bentonite <input checked="" type="checkbox"/> HEAVY MUD Depth: From <u>8</u> ft. to <u>138</u> ft.		
			14 Nearest Source of possible contamination: <u>55</u> feet <u>W</u> Direction <u>SEPTIC TANK</u> Type _____ Well disinfected upon completion <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
			15 PUMP: <input checked="" type="checkbox"/> Not installed Manufacturer's Name _____ Model Number _____ HP _____ Volts _____ Length of Drop Pipe _____ ft. capacity _____ G.P.M. Type: <input type="checkbox"/> Submersible <input type="checkbox"/> Jet <input type="checkbox"/> Reciprocating		
16 Remarks, elevation, source of data, etc.  ADDED INFO. BY DRILLER, ITEM NO.  CORRECTED BY:			17 WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief. <u>FREEMAN &amp; GALLINGHAM</u> <u>05555</u> REGISTERED BUSINESS NAME REGISTRATION NO. Address: <u>3035 FREEMAN DR MIDLAND</u> Signed: <u>[Signature]</u> Date: <u>4/30/70</u> AUTHORIZED REPRESENTATIVE		

D67d

ADDITION BY: 100M (REV. 12-68)

JUN - 9 1970

GEOLOGICAL SURVEY COPY

FEB 01 1978

## WATER WELL RECORD

ACT 294 PA 1966

MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH

## 1 LOCATION OF WELL

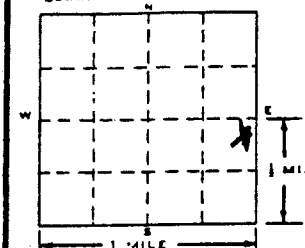
County Midland Township Name Midland Fraction NE 1/4 SE 1/4 Section Number 32 Town Number 14 N 1/4 Range Number 2 E 1/4

Distance And Direction from Road Intersections  
Corner of Poseyville and Stewart Rd.

Street address & City of Well Location 1256 Poseyville Rd

Locate with "X" in section below

Sketch Map:



Stewart  
Poseyville

3 OWNER OF WELL: Mr Paul Owens

Address 1256 Poseyville Rd  
Midland MI 48648

4 WELL DEPTH: (completed) Date of Completion

176 ft. 6-10-77

5 ☐ Cable tool ☒ Rotary ☐ Driven ☐ dug  
☐ Hollow rod ☐ Jetted ☐ Bored ☐

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry  
☐ Irrigation ☐ Air Conditioning ☐ Commercial  
☐ Test Well ☐

7 CASING: Threaded ☒ Welded ☐ Height: Above/BelowDiam. Surface 4 ft.Weight 3.75 lbs./ft.Drive Shoe? Yes ☒ No ☐

8 SCREEN:

Type: Gauze Dia.: 1 1/4Slot/Gauze 10 Length 8Set between 164 ft. and 176 ft.Fittings: 1-4' tail pipe - Breaker

9 STATIC WATER LEVEL

8 ft. below land surface 176

10 PUMPING LEVEL below land surface

\_\_\_\_\_ ft. after \_\_\_\_\_ hrs. pumping \_\_\_\_\_ G.P.M.

\_\_\_\_\_ ft. after \_\_\_\_\_ hrs. pumping \_\_\_\_\_ G.P.M.

11 WATER QUALITY in Parts Per Million:

Iron (Fe) \_\_\_\_\_ Chlorides (Cl) \_\_\_\_\_

Hardness \_\_\_\_\_ Other \_\_\_\_\_

12 WELL HEAD COMPLETION: ☐ In Approved Pit☒ Pitless Adapter ☐ 12" Above Grade13 Well Grouted? ☒ Yes ☐ No☐ Neat Cement ☐ Bentonite ☐

Depth: From \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

14 Nearest Source of possible contamination

75 feet S Direction Drainage Type

Well disinfected upon completion ☒ Yes ☐ No

15 PUMP:

☒ Not installed

Manufacturer's Name \_\_\_\_\_

Model Number \_\_\_\_\_ HP \_\_\_\_\_ Volts \_\_\_\_\_

Length of Drop Pipe \_\_\_\_\_ ft. capacity \_\_\_\_\_ G.P.M.

Type: ☐ Submersible☐ Jet☐ Reciprocating

USE A 2ND SHEET IF NEEDED

16 Remarks, elevation, source of data, etc.

\*CORRECTED BY DRILLER, ITEM NO.

\*CORRECTED BY 3

\*\*ADDITION BY

ELEVATION

DEPTH TO ROCK

17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Carl Well Drilling  
REGISTERED BUSINESS NAME REGISTRATION NO.

Address Rt 2 Midland MI 48648

Signed Gary M. Galt Date 6-20-77  
AUTHORIZED REPRESENTATIVE

JUL 24 1973

## WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH

## 1 LOCATION OF WELL

County MIDLAND Twp. MIDLAND Range 21  
Section No. 32 Township 48 N. Range 21 E.

Distance And Direction from Road Intersections

OWNER No. \_\_\_\_\_

2930 West Stewart Rd

Street address &amp; City of Well Location

M. H. W. D. 11.1.1

## 3 OWNER OF WELL:

Michael Williams

Address 2905 RONAN apt #4

## 2 FORMATION THICKNESS OF STRATUM DEPTH TO BOTTOM OF STRATUM

Top soil	4	4
clay	6	10
yellow sand	2	12
blue (soft)	10	22
hard strong clay	30	52
clay	40	92
soft clay	15	107
gravel	3	110
sand	11	121

## 4 WELL DEPTH: (completed) Date of Completion

121 ft. 8/13/73

## 5 Cable tool Rotary Driven Dug

☒ Hollow rod ☐ Jetted ☐ Bored ☐6 USE: ☒ Domestic ☐ Public Supply ☐ Industry☐ Irrigation ☐ Air Conditioning ☐ Commercial☐ Test Well ☐7 CASING: Threaded ☒ Welded ☐

Diam. 2 in. to 1 1/3 ft. Depth

Height: Above/Below surface 1 ft.

Weight 325 lbs./ft.

Drive Shoe? Yes ☒ No ☐

## 8 SCREEN: 2

Type: Johnson Dia. 1 1/4

Slot/Gauze #80 Length 4' - 1/2

Set between 113 ft. and 121 ft.

Fittings: Check valve

14 Lead pipe &amp; fittings

## 9 STATIC WATER LEVEL

1' ft. below land surface

## 10 PUMPING LEVEL below land surface

108 ft. after 1 hrs. pumping 1100 g.p.

18 ft. after 1 hrs. pumping 900 g.p.

## 11 WATER QUALITY in Parts Per Million:

Iron (Fe) \_\_\_\_\_ Chlorides (Cl) \_\_\_\_\_

Hardness \_\_\_\_\_

12 WELL HEAD COMPLETION: ☐ In Approved Pit☐ Pitless Adapter ☒ 12" Above Grade

## 13 GROUTING:

Well Grouted? ☐ Yes ☒ NoMaterial: ☐ Neat Cement ☐

Depth: From \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

## 14 SANITARY:

Nearest Source of possible contamination

50 feet South Direction Capt. Tank

Well disinfected upon completion ☒ Yes ☐ No

## 15 PUMP:

Manufacturer's Name \_\_\_\_\_

Model Number \_\_\_\_\_ HP \_\_\_\_\_

Length of Drop Pipe \_\_\_\_\_ ft. capacity \_\_\_\_\_ G.P.M.

Type: ☐ Submersible ☐☐ Jet ☐ Reciprocating

## 16 Remarks, elevation, source of data, etc.

ADDED INFO. BY DRILLER, LAM M.

CORRECTED BY [Signature]REVISION BY [Signature]

## 17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Hignite Well Drilling

REGISTERED BUSINESS NAME

REGISTRATION No.

Address 3416 Pine &amp; River Rd, N. 7

Signed James Higuita Date 6/13/73

AUTHORIZED REPRESENTATIVE

## WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH

32

32-12

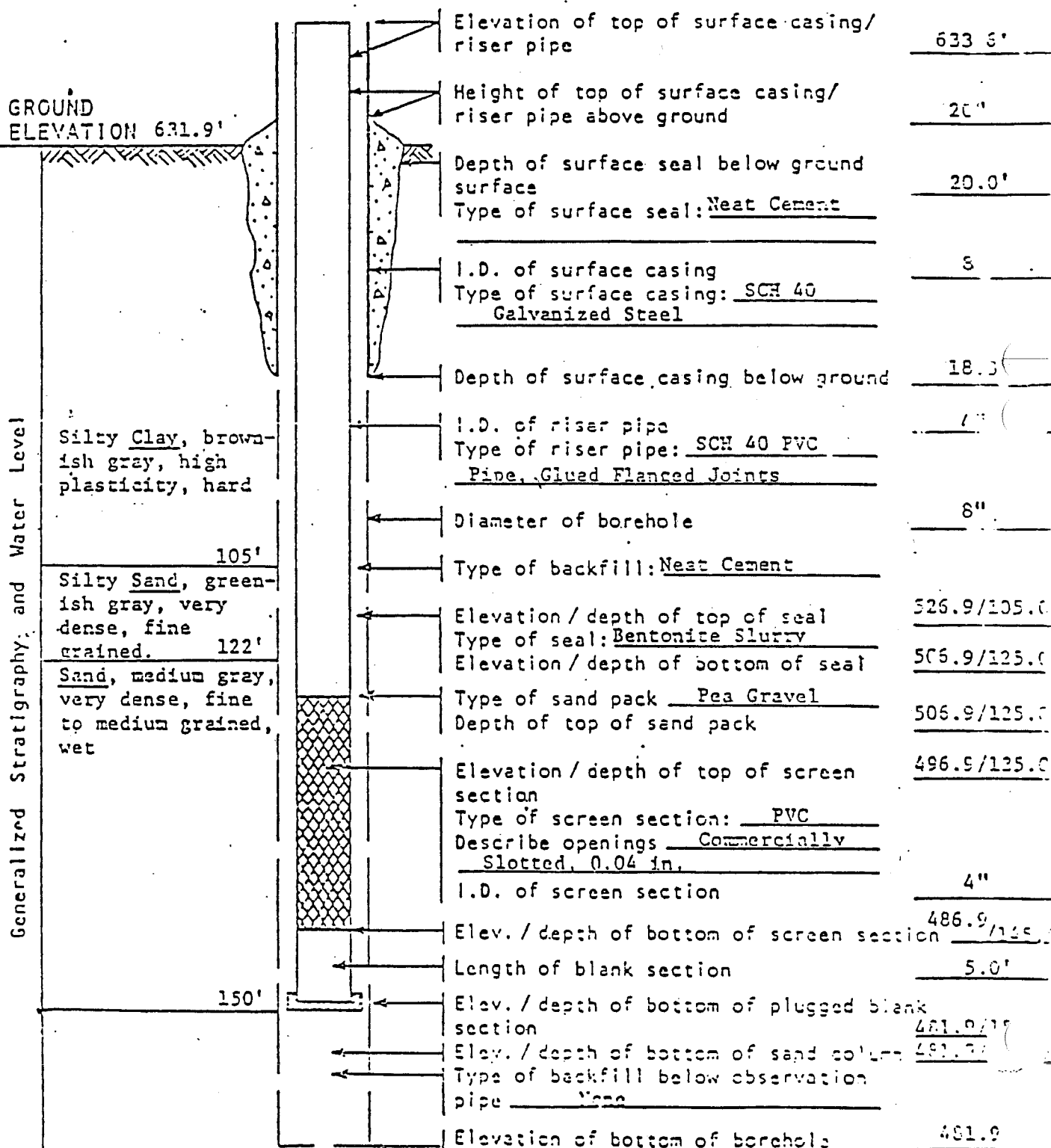
E 62

1 LOCATION OF WELL			32-12		
County <u>Midland</u>	Twp. <u>Midland</u>	Fraction <u>SW 1/4 Sec 32</u>	Section No. <u>32</u>	Town <u>14 N 1/2</u>	Range <u>2 E</u>
Distance And Direction from Road Intersections <u>1/4 mi. west of Cassville on south side of Stewart St. 750 E. Stewart</u>			3 OWNER OF WELL: Address <u>Consumers Fuel Co 212 W. Michigan Ave Jackson, Mich.</u>		
2 FORMATION			4 WELL DEPTH (completed) <u>405 ft.</u> Date of Completion <u>11-14-78</u>		
THICKNESS OF STRATUM			5 <input type="checkbox"/> Cable tool <input checked="" type="checkbox"/> Rotary <input type="checkbox"/> Driven <input type="checkbox"/> Dug		
DEPTH TO BOTTOM OF STRATUM			<input type="checkbox"/> Hollow rod <input type="checkbox"/> Jetted <input type="checkbox"/> Bored <input type="checkbox"/>		
<u>Top Soil</u>			6 USE: <input type="checkbox"/> Domestic <input type="checkbox"/> Public Supply <input checked="" type="checkbox"/> Industry		
<u>Sand - yellow</u>			<input type="checkbox"/> Irrigation <input type="checkbox"/> Air Conditioning <input type="checkbox"/> Commercial		
<u>Clay - soft - brown</u>			<input type="checkbox"/> Test Well <input type="checkbox"/>		
<u>Clay - gray - gravel &amp; stones</u>			7 CASING: Threaded <input checked="" type="checkbox"/> Welded <input type="checkbox"/> Height: Above/Below surface <u>4</u> ft.		
<u>Gravel &amp; large stones</u>			<u>4</u> in. to <u>324</u> ft. Depth Weight <u>11</u> lbs./ft.		
<u>W/ clay</u>			<u>   </u> in. to <u>   </u> ft. Depth Drive Shoe? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		
<u>Clay - gray w/ stones</u>			8 SCREEN: Type: <u>NONE</u> Dia.: <u>   </u>		
<u>Sand - w/ clay</u>			Slot/Gauze: <u>   </u> Length: <u>   </u>		
<u>Clay - gray</u>			Set between <u>   </u> ft. and <u>   </u> ft.		
<u>Shale - dark gray</u>			Fittings: <u>   </u>		
<u>Shale - lt. gray</u>			9 STATIC WATER LEVEL <u>23</u> ft. below land surface <u>603</u>		
<u>Shale - black</u>			10 PUMPING LEVEL below land surface <u>34</u> ft. after <u>5</u> hrs. pumping <u>25-30</u> p.m.		
<u>Shale - lt. gray</u>			<u>   </u> ft. after <u>   </u> hrs. pumping <u>   </u> p.m.		
<u>Shale - black</u>			11 WATER QUALITY in Parts Per Million: Iron (Fe) <u>   </u> Chlorides (Cl) <u>   </u>		
<u>Shale - lt. gray</u>			Hardness <u>   </u>		
<u>Sandstone white</u>			12 WELL HEAD COMPLETION: <input type="checkbox"/> In Approved Pit <input checked="" type="checkbox"/> Pitless Adapter <input type="checkbox"/> 12" Above Grade		
<u>Shale - lt. gray</u>			13 GROUTING: Well Grouted? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
<u>Shale - black</u>			Material: <input checked="" type="checkbox"/> Neat Cement <input checked="" type="checkbox"/> <u>Leaky mud</u>		
<u>Shale - lt. gray w/ some sandstone</u>			Depth: From <u>2</u> ft. to <u>   </u> ft.		
<u>Shale - black</u>			14 SANITARY: Nearest Source of possible contamination <u>85</u> feet <u>S</u> Direction <u>Septic</u> Type <u>   </u>		
<u>Sandstone - clean - white and water bearing</u>			Well disinfected upon completion <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
16 Remarks, elevation, source of data, etc.			15 PUMP: Manufacturer's Name <u>Grundfos</u>		
ADDED INFO BY DRILLER, ITEM NO.			Model Number <u>10E5</u> HP <u>1/2</u>		
CORRECTED BY			Length of Drop Pipe <u>84</u> ft. capacity <u>14</u> G.P.M.		
ADDITION BY			Type: <input checked="" type="checkbox"/> Submersible <input type="checkbox"/> Jet <input type="checkbox"/> Reciprocating		
ELEVATION			17 WATER WELL CONTRACTOR'S CERTIFICATION:		
DEPTH TO ROCK			This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.		
			<u>N. W. McAllister, Jr.</u> <u>1624</u>		
			REGISTERED BUSINESS NAME REGISTRATION NO.		
			Address <u>408 W. Walter Midland, MI</u>		
			Signed <u>N. W. McAllister, Jr.</u> Date <u>   </u>		
			AUTHORIZED REPRESENTATIVE		

## GROUND WATER OBSERVATION WELL RECORD

PROJECT Midland Power Plant  
 LOCATION S 9495 W 3621  
 DATE COMPLETED 20 December 1977  
 INSPECTED BY W. R. Kinzer DATE 12/20/77  
 CHECKED BY G. T. LeFevre DATE 2/14/79

PAGE 1 OF 1  
 WELL NO. W-15  
 AQUIFER Sand  
 THICKNESS 20'



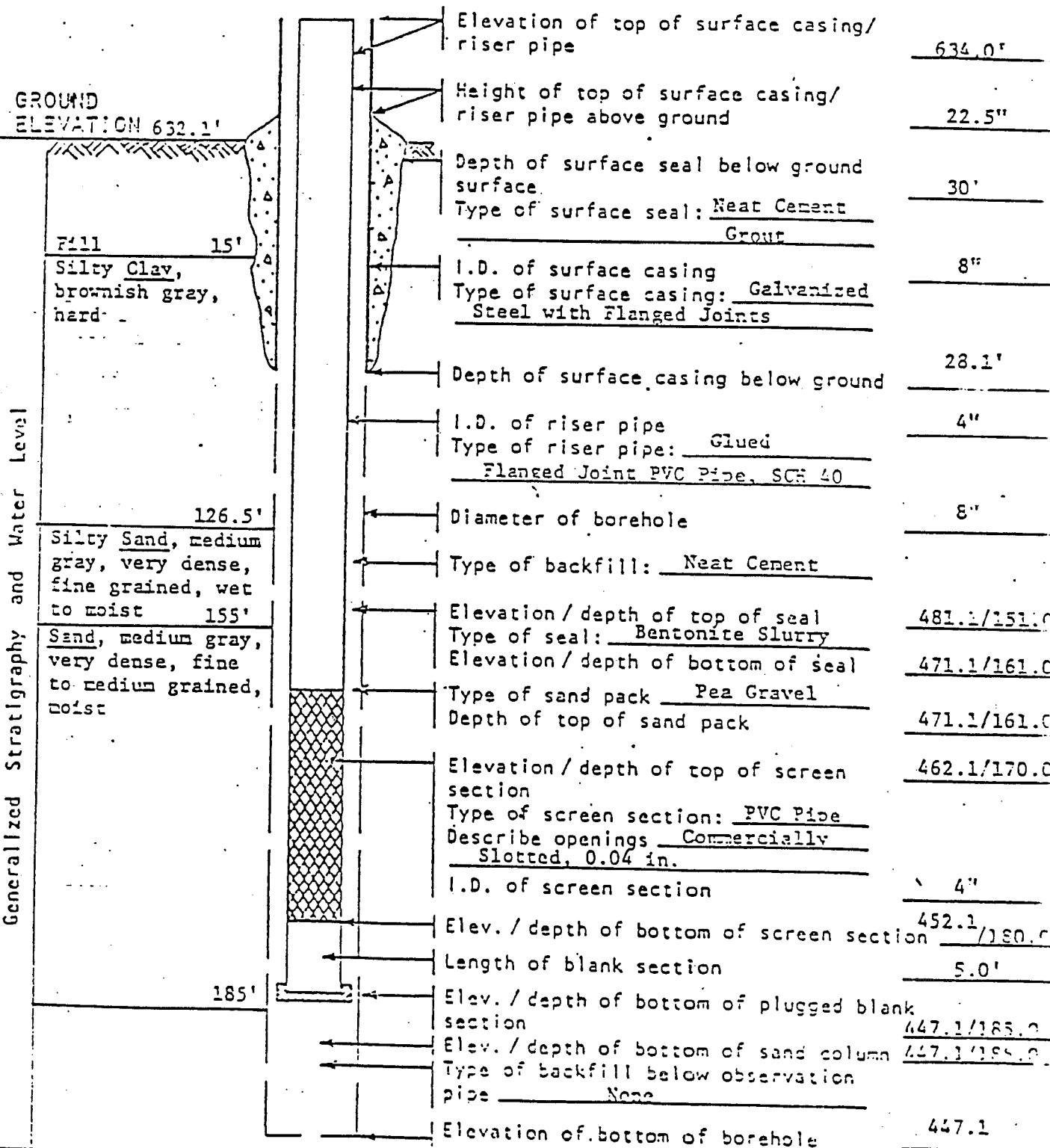


# GROUND WATER OBSERVATION WELL RECORD

33-2

PROJECT Midland Power Plant  
LOCATION S 7371 W 3401  
DATE COMPLETED 5 December 1977  
INSPECTED BY W. R. Kinzer DATE 12/5/77  
CHECKED BY G. T. LeFevre DATE 2/14/79

PAGE 1 OF 1  
WELL NO. W-17  
AQUIFER Sand  
THICKNESS 30'

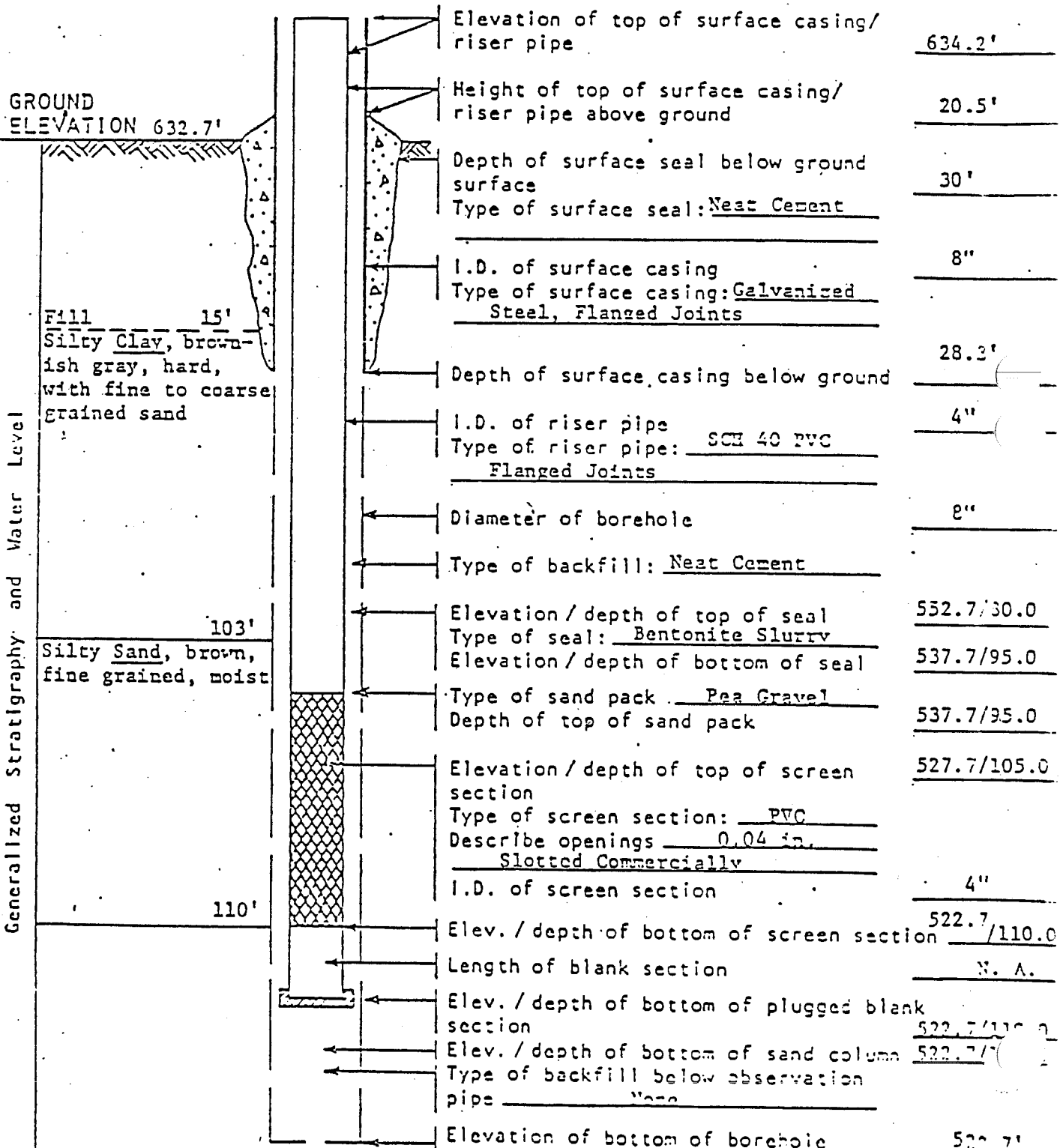


# GROUND WATER OBSERVATION WELL RECORD

3

PROJECT Midland Power Plant  
 LOCATION S 7378 W 3500  
 DATE COMPLETED 21 November 1977  
 INSPECTED BY W. R. Kinzer DATE 11/21/77  
 CHECKED BY G. T. LeFevre DATE 2/14/79

PAGE 1 OF 1  
 WELL NO. W-11  
 AQUIFER Silt. Sand  
 THICKNESS 7.0'

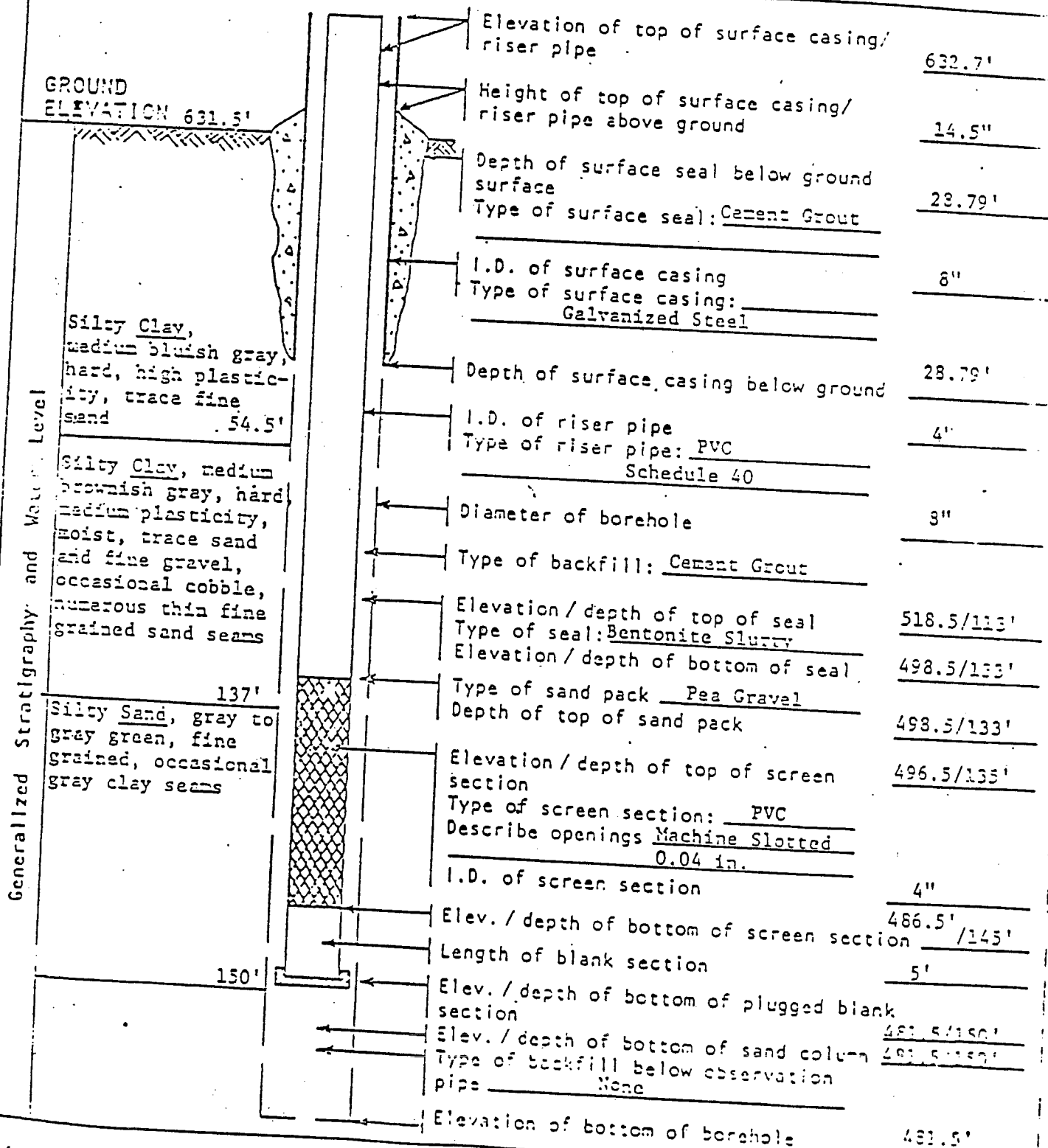


# GROUND WATER OBSERVATION WELL RECORD

33-4

PROJECT Midland Power Plant  
 LOCATION S 6105 W 1495  
 DATE COMPLETED 13 December 1977  
 INSPECTED BY G. T. LeFevre DATE 12/13/77  
 CHECKED BY W. R. Kinzer DATE 3/29/78

PAGE 1 OF 1  
 WELL NO. W-20  
 AQUIFER Silt. Sand  
 THICKNESS 13'





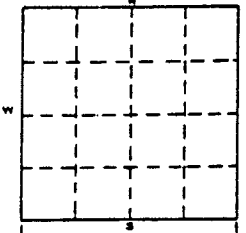
JUN 23 1975

## WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH

33

<b>1 LOCATION OF WELL</b>			<b>3 OWNER OF WELL:</b>	
County <b>Midland</b>	Township Name <b>Midland</b>	Fraction <b>1/2</b>	Section Number <b>33</b>	Town Number <b>14 NYS.</b>
Distance And Direction from Road Intersections <b>Frederick St. Tisland Sub.</b>			Range No. <b>2</b>	
Street address & City of Well Location Locate with "X" in section below			Address <b>3116 Lois Midland, Mich.</b>	
Sketch Map: 			4 WELL DEPTH: (completed) Date of Completion <b>160</b> ft. <b>9/19/74</b>	
2 FORMATION			5 <input type="checkbox"/> Cable tool <input checked="" type="checkbox"/> Rotary <input type="checkbox"/> Driven <input type="checkbox"/> Dug <input type="checkbox"/> Hollow rod <input type="checkbox"/> Jetted <input type="checkbox"/> Bored <input type="checkbox"/>	
			6 USE: <input checked="" type="checkbox"/> Domestic <input type="checkbox"/> Public Supply <input type="checkbox"/> Industry <input type="checkbox"/> Irrigation <input type="checkbox"/> Air Conditioning <input type="checkbox"/> Commercial <input type="checkbox"/> Test Well <input type="checkbox"/>	
			7 CASING: Threaded <input checked="" type="checkbox"/> Welded <input type="checkbox"/> Height: Above/Below Diam. <b>2</b> in. to <b>152</b> ft. Depth Surface <b>1</b> ft. Weight <b>3.75</b> lbs./ft. Drive Shoe? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
			8 SCREEN: <b>Galvanized-4 ft.</b> Type: <b>Plastic</b> Dia.: <b>1 1/2</b> Slot/Gauze Length <b>4 ft.</b> Set between <b>144</b> ft. and <b>152</b> ft. Fittings: <b>4 ft. lead pipe with Breamer check valve.</b>	
9 STATIC WATER LEVEL <b>above</b> ft. below land surface <b>&gt; 613</b>			10 PUMPING LEVEL below land surface <b>Shallow</b> ft. after ___ hrs. pumping ___ g.p. ___ ft. after ___ hrs. pumping ___ g.p.m.	
11 WATER QUALITY in Parts Per Million: Iron (Fe) _____ Chlorides (Cl) <b>XXXXXXXXXXXX</b> Hardness _____ Other _____			12 WELL HEAD COMPLETION: <input type="checkbox"/> In Approved Pit <input type="checkbox"/> Pitless Adapter <input checked="" type="checkbox"/> 12" Above Grade	
13 Well Grouted <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Neat Cement <input type="checkbox"/> Bentonite <input checked="" type="checkbox"/> Heavy Mud Depth: From <b>115</b> ft. to <b>152</b> ft.			14 Nearest Source of possible contamination <b>60</b> feet <b>N</b> Direction <b>Septic</b> Type Well disinfected upon completion <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
15 PUMP: <input checked="" type="checkbox"/> Not installed Manufacturer's Name _____ Model Number _____ HP _____ Volts _____ Length of Drop Pipe _____ ft. capacity _____ G.P.M. Type: <input type="checkbox"/> Submersible <input type="checkbox"/> Jet <input type="checkbox"/> Reciprocating			16 Remarks, elevation, source of data, etc. ADDED INFO BY DRILLER, ITEM NO. *CORRECTED BY <b>ST</b> **ADDITION BY ELEVATION DEPTH TO ROCK	
17 WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief. <b>Freeman Well Drilling</b> <b>0555</b> REGISTERED BUSINESS NAME REGISTRATION NO. Address <b>4888 S. Jones Rd. R#2 Beaver</b> Signed <b>Dale Freeman</b> Date <b>10/16/74</b> AUTHORIZED REPRESENTATIVE				

JAN 02 1973

## WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH

220

1 LOCATION OF WELL		County		Township Name		Fraction		Section Number		Town Number		Range Number	
Midland		Midland		NW 1/4		33		14 N.S.		2		E.W.	
Distance And Direction from Road Intersections													
1/2 mile N of Stewart Rd. on E side of Poseyville Rd.													
Street address & City of Well Location													
3116 Lois St, Tisland Mich. 43640													
3 OWNER OF WELL:													
Jim Zyonse													
Address													
3116 Lois St, Tisland Mich. 43640													
4 WELL DEPTH: (completed) Date of Completion													
153 to 26/72 10/26/72													
5 <input type="checkbox"/> Cable tool <input type="checkbox"/> Rotary <input type="checkbox"/> Driven <input type="checkbox"/> Dig													
<input type="checkbox"/> Hollow rod <input type="checkbox"/> Jetted <input type="checkbox"/> Bored <input type="checkbox"/>													
6 USE: <input type="checkbox"/> Domestic <input type="checkbox"/> Public Supply <input type="checkbox"/> Industry													
<input type="checkbox"/> Irrigation <input type="checkbox"/> Air Conditioning <input type="checkbox"/> Commercial													
<input type="checkbox"/> Test Well <input type="checkbox"/>													
7 CASING: Threaded <input checked="" type="checkbox"/> Welded <input type="checkbox"/> Height: Above Below													
Diam. 2 in. to 147 ft. Depth Surface 1 ft.													
Weight 3.75 lbs./ft. Drive Sharp? Yes <input type="checkbox"/> No <input type="checkbox"/>													
8 SCREEN:													
Type: Slotted Plastic 1 1/2													
Slot size 3 Length 5 ft													
Set between 147 ft. and 153 ft.													
Fittings: 4 ft lead pipe with breaker													
check valve													
9 STATIC WATER LEVEL													
6 ft. below land surface 2614													
10 PUMPING LEVEL below land surface													
20 ft. after 1 hrs. pumping 10 g.p.m.													
ft. after hrs. pumping g.p.m.													
11 WATER QUALITY in Parts Per Million:													
Iron (Fe) Chlorides (Cl) 200000													
Hardness Other													
12 WELL HEAD COMPLETION: <input type="checkbox"/> In Approved Pit													
<input type="checkbox"/> Pitless Adapter <input checked="" type="checkbox"/> 12" Above Grade													
13 Well Grouted? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No													
<input type="checkbox"/> Neat Cement <input type="checkbox"/> Bentonite <input checked="" type="checkbox"/> Heavy mud													
Depth: From 4 ft. to 135 ft.													
14 Nearest Source of possible contamination													
ft. Direction Type													
Well disinfected upon completion <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No													
15 PUMP: <input checked="" type="checkbox"/> Not installed													
Manufacturer's Name													
Model Number HP Volts													
Length of Drop Pipe ft. capacity G.P.M.													
Type: <input type="checkbox"/> Submersible <input type="checkbox"/> Jet <input type="checkbox"/> Reciprocating													
16 Remarks, elevation, source of data, etc.													
17 WATER WELL CONTRACTOR'S CERTIFICATION:													
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.													
Freeman Well Drilling 0555													
REGISTERED BUSINESS NAME REGISTRATION NO.													
Address 4380 S. Jones Rd. R/1 Beaverton													
Signed T. J. Freeman Date 11/14/72													
AUTHORIZED REPRESENTATIVE													

OCT 26 1971

## WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH

## 1 LOCATION OF WELL

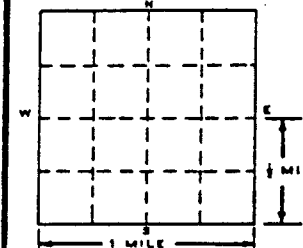
County Midland Township Name Midland Fraction N/4 Section Number 33 Town Number 14 Range N. 2 E/W. W.

Distance And Direction from Road Intersections

Tisdale Sub. E. side Possibility rd.  
Street address & City of Well Location 3123 E. Frederick St.

Locate with "X" in section below

Sketch Map:



## 3 OWNER OF WELL:

Address

Christ DoelMidland

## 4 WELL DEPTH: (completed) Date of Completion

144 ft. 9-1-1971

5 ☐ Cable tool ☐ Rotary ☐ Driven ☐ Duo  
☒ Hollow rod ☒ Jetted ☐ Bored ☐

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry  
☐ Irrigation ☐ Air Conditioning ☐ Commercial  
☐ Test Well ☐

7 CASING: Threaded ☒ Welded ☐ Height: Above/Below

Diam. 2 in. to 136 ft. Depth Surface 1 ft.  
Weight 3.75 lbs./ft.

Drive Shoe? Yes ☒ No ☐

## 8 SCREEN:

Type: Armed. Pipe Dia.: 1 1/4Slot Gauge 70 Length 8'Set between 136 ft. and 144 ft.Fittings: R. Pak + ch. pipe 1/2" x 1/2"

## 9 STATIC WATER LEVEL

1 ft. below land surface ≈ 616

## 10 PUMPING LEVEL below land surface

       ft. after        hrs. pumping        g.p.m.       ft. after        hrs. pumping        g.p.m.

## 11 WATER QUALITY in Parts Per Million:

Iron (Fe)        Chlorides (Cl)       Hardness        Other       12 WELL HEAD COMPLETION: ☐ In Approved Pit☐ Pitless Adapter ☒ 12" Above Grade13 Well Grouted? ☐ Yes ☐ No☐ Neat Cement ☐ Bentonite ☐Depth: From        ft. to        ft.

## 14 Nearest Source of possible contamination

60 feet S.W. Direction till field Type       Well disinfected upon completion ☒ Yes ☐ No

## 15 PUMP:

☒ Not installedManufacturer's Name       Model Number        HP        Volts       Length of Drop Pipe        ft. capacity        G.P.M.Type: ☐ Submersible☐ Jet ☐ Reciprocating

USE A 2ND SHEET IF NEEDED

## 16 Remarks, elevation, source of data, etc.

ADDED INFO. BY DRILLER, GEM NO

CORRECTED BY: R.B.

ADDITION BY:

## 17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

REGISTERED BUSINESS NAME

REGISTRATION NO. 1069Address 763 Townline rd. KalamazooSigned Mike Ferrio Date 9-12-1971

AUTHORIZED REPRESENTATIVE

GEOLOGICAL SURVEY SAMPLE No.  WATER WELL RECORD  
ACT 294 PA 1965MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH EX 620

## 1 LOCATION OF WELL

County <u>MIDLAND</u>	Twp. <u>MIDLAND</u>	Fraction <u>NE SW NW 1/4</u>	Section No. <u>33</u>	Town <u>14N N/S.</u>	Range <u>2E E/W.</u>
--------------------------	------------------------	---------------------------------	--------------------------	-------------------------	-------------------------

Distance And Direction from Road Intersections

LOT 17 TIS-LAND SUB. No 1OWNER No.  

## 3 OWNER OF WELL:

ARTHUR MALPASSAddress 3077 FREDRICK

Street address &amp; City of Well Location

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
<u>BLACK CLAY</u>	<u>1'</u>	<u>1'</u>
<u>GRAY CLAY SOFT</u>	<u>80</u>	<u>81</u>
<u>GRAY CLAY HARD</u>	<u>50</u>	<u>131</u>
<u>FINE SAND</u>	<u>15</u>	<u>146</u>
<u>GRAY CLAY HARD</u>	<u>16</u>	<u>162</u>
<u>FINE GRAVEL</u>	<u>10</u>	<u>172</u>

## 4 WELL DEPTH: (completed) Date of Completion

172 ft. 10-10-665 ☐ Cable tool ☐ Rotary ☐ Driven ☐ Dug  
☒ Hollow rod ☐ Jetted ☐ Bored ☐ 6 USE: ☒ Domestic ☐ Public Supply ☐ Industry  
☐ Irrigation ☐ Air Conditioning ☐ Commercial  
☐ Test Well ☐ 7 CASING: Threaded ☒ Welded ☐  
Diam. 2 in. to 172 ft. Depth Height: Above/Below surface 2 ft.  
Weight 3.75 lbs./ft.  
Drive Shoe? Yes ☒ No ☐8 SCREEN:  
Type: JOHNSON Dia.: 1 1/4  
Slot/Gauze 60 Length 6'  
Set between 146 ft. and 172 ft.  
Fittings: BREMER CHECK VALVE  
TAIL PIPE 4'9 STATIC WATER LEVEL  
3' ft. below land surface 61710 PUMPING LEVEL below land surface  
\_\_\_\_\_ ft. after \_\_\_\_\_ hrs. pumping \_\_\_\_\_ g.p.m.  
\_\_\_\_\_ ft. after \_\_\_\_\_ hrs. pumping \_\_\_\_\_ g.p.m.11 WATER QUALITY in Parts Per Million:  
Iron (Fe) 0.3 Chlorides (Cl) 15  
Hardness 23012 WELL HEAD COMPLETION: ☐ In Approved Pit  
☐ Pitless Adapter ☐ 12" Above Grade13 GROUTING:  
Well Grouted? ☒ Yes ☐ No  
Material: ☒ Neat Cement ☐ \_\_\_\_\_  
Depth: From 1 ft. to 20 ft.14 SANITARY:  
Nearest Source of possible contamination  
650 feet N Direction RAIN FIELD  
Well disinfected upon completion ☒ Yes ☐ No15 PUMP: NOT INSTALLED  
Manufacturer's Name \_\_\_\_\_  
Model Number \_\_\_\_\_ HP  
Length of Drop Pipe \_\_\_\_\_ ft. capacity \_\_\_\_\_ G.P.M.  
Type: ☐ Submersible ☐ \_\_\_\_\_  
☐ Jet ☐ Reciprocating

## 16 Remarks, elevation, source of data, etc.

ADDED INFO. BY DRILLER, ITEM NO.

CORRECTED BY 1ADDITION BY RTS

## 17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Hoyt M. Laird  
REGISTERED BUSINESS NAME0222  
REGISTRATION NO.Address 3077 MIDLAND MICHSigned Hoyt M. Laird Date 10-10-66  
AUTHORIZED REPRESENTATIVE

WATER WELL RECORD  
ACT 294 PA 1965MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH

## 1 LOCATION OF WELL

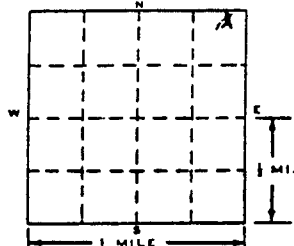
County MIDLAND Township Name MIDLAND Fraction NW 1/4 NE 1/4 Section Number 33 Town Number 14 N/2 Range Number 2

Distance And Direction from Road Intersections  
3/4 MILE EAST of Poseyville RD on  
100 ft SOUTH of MILLER RD

Street address &amp; City of Well Location

Locate with "X" in section below

Sketch Map:



## 3 OWNER OF WELL:

Champion Company  
Address

## 4 WELL DEPTH: (completed) Date of Completion

165 ft. 9/3/70

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dig  
☐ Hollow rod ☐ Jetted ☐ Bored ☐

6 USE: ☐ Domestic ☐ Public Supply ☐ Industry  
☐ Irrigation ☐ Air Conditioning ☐ Commercial  
☐ Test Well ☐

7 CASING: Threaded ☐ Welded ☐ Height: Above/Below

Diam.

Surface 1 ft.Weight 15 lbs./ft.Drive Shoe? Yes ☒ No ☐

## 8 SCREEN:

Type: WIRE WOUND Dia.: 5 3/4Slot/Gauze 12 Length 10Set between 155 ft. and 165 ft.

Fittings:

## 9 STATIC WATER LEVEL

7.0 ft. below land surface > 607

## 10 PUMPING LEVEL below land surface

\_\_\_\_\_ ft. after \_\_\_\_\_ hrs. pumping \_\_\_\_\_ g.p.m.

\_\_\_\_\_ ft. after \_\_\_\_\_ hrs. pumping \_\_\_\_\_ g.p.m.

## 11 WATER QUALITY in Parts Per Million:

Iron (Fe) \_\_\_\_\_ Chlorides (Cl) \_\_\_\_\_

Hardness \_\_\_\_\_ Other \_\_\_\_\_

12 WELL HEAD COMPLETION: ☐ In Approved Pit  
☐ Pitless Adapter ☒ 12" Above Grade13 Well Grouted? ☐ Yes ☐ No☐ Neat Cement ☐ Bentonite ☐

Depth: From \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

## 14 Nearest Source of possible contamination

\_\_\_\_\_ feet \_\_\_\_\_ Direction \_\_\_\_\_ Type

Well disinfected upon completion ☐ Yes ☐ No

## 15 PUMP:

☐ Not installedManufacturer's Name HondaModel Number \_\_\_\_\_ HP 10 Volts \_\_\_\_\_Length of Drop Pipe 63 ft. capacity 150 G.P.M.Type: ☒ Submersible☐ Jet☐ Reciprocating

## 2 FORMATION

THICKNESS  
OF  
STRATUMDEPTH TO  
BOTTOM OF  
STRATUMSurface Sand08Clay865Clay & Hard pan15128Fine Sand128142Good water sand142165Production Good

USE A 2ND SHEET IF NEEDED

## 16 Remarks, elevation, source of data, etc.

ADDED INFO. BY DRILLER, ITEM NO.

CORRECTED BY:

ADDITION BY:

## 17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true  
to the best of my knowledge and belief.

NELSON WELL DRILLING 0241  
REGISTERED BUSINESS NAME REGISTRATION NO.

Address 2425 CONNING STSigned Harry L. Nelson

AUTHORIZED REPRESENTATIVE

Date 9/20/70

2 1878

WATER WELL RECORD  
ACT 294 PA 1965MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH

EL 621

1 LOCATION OF WELL		County		Township Name		Range Number		Section Number		Town Number		Range Number	
MIDLAND		MIDLAND		N 1/4 NW 1/4		28		14		N 1/4		2	
Distance And Direction from Road Intersections													
1/4 M. EAST OF POSIVILLE RD ON FREDRICK ST. ON N. SIDE OF ST.													
Street address & City of Well Location TISLAND SUB.													
Locate with "X" in section below													
Sketch Map:													
2 FORMATION		THICKNESS OF STRATUM		DEPTH TO BOTTOM OF STRATUM		3 OWNER OF WELL: DAVID FICK							
DRIFT		0		6		Address LOT 14 3101 FREDRICK							
CLAY		6		122		4 WELL DEPTH: (completed) Date of Completion							
MED SAND		122		127		127 ft. APRIL 1 76							
						5 <input type="checkbox"/> Cable tool <input type="checkbox"/> Rotary <input type="checkbox"/> Driven <input type="checkbox"/> Dig							
						<input checked="" type="checkbox"/> Hollow rod <input type="checkbox"/> Jetted <input type="checkbox"/> Bored <input type="checkbox"/>							
						6 USE: <input checked="" type="checkbox"/> Domestic <input type="checkbox"/> Public Supply <input type="checkbox"/> Industry							
						<input type="checkbox"/> Irrigation <input type="checkbox"/> Air Conditioning <input type="checkbox"/> Commercial							
						<input type="checkbox"/> Test Well <input type="checkbox"/>							
						7 CASING: Threaded <input checked="" type="checkbox"/> Welded <input type="checkbox"/> Height: Above/Below							
						Diam. 2 in. to 12 ft. Depth 122 ft. Depth 127 ft. Drive Shoe? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>							
						8 SCREEN:							
						Type: PLASTIC Dia.: 1 1/2"							
						Gauze 60 Length 5'							
						Set between 122 ft. and 127 ft.							
						Fittings:							
						9 STATIC WATER LEVEL							
						4 ft. below land surface ≈ 616							
						10 PUMPING LEVEL below land surface							
						51 ft. after 1 hrs. pumping 8 g.p.m.							
						ft. after hrs. pumping g.p.m.							
						11 WATER QUALITY in Parts Per Million:							
						Iron (Fe) Chlorides (Cl)							
						Hardness Other							
						12 WELL HEAD COMPLETION: <input type="checkbox"/> In Approved Pit							
						<input type="checkbox"/> Pitless Adapter <input checked="" type="checkbox"/> 12" Above Grade							
						13 Well Grouted? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No							
						<input type="checkbox"/> Neat Cement <input type="checkbox"/> Bentonite <input checked="" type="checkbox"/> M40							
						Depth: From 0 ft. to 122 ft.							
						14 Nearest Source of possible contamination							
						100 feet W Direction SEPTIC FIELD Type							
						Well disinfected upon completion <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No							
						15 PUMP: <input checked="" type="checkbox"/> Not installed							
						Manufacturer's Name							
						Model Number HP Volts							
						Length of Drop Pipe ft. capacity G.P.M.							
						Type: <input type="checkbox"/> Submersible <input type="checkbox"/> Jet <input type="checkbox"/> Reciprocating							
USE A 2ND SHEET IF NEEDED													
16 Remarks, elevation, source of data, etc.													
ADDED INFO BY DRILLER, ITEM NO.													
*CORRECTED BY													
**ADDITION BY													
ELEVATION													
DEPTH TO ROCK													
17 WATER WELL CONTRACTOR'S CERTIFICATION:													
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.													
BAOSERO & SONS 0999													
REGISTERED BUSINESS NAME REGISTRATION NO.													
Address 3248 E. MILLER RD MIDLAND													
Signed C. B. BAKER Date APRIL 1/76													
AUTHORIZED REPRESENTATIVE													

AUG 25 1975

## WATER WELL RECORD

ACT 294 PA 1986

MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH

## 1 LOCATION OF WELL

County

MIDLAND

Township Name

MIDLAND

Fraction

NE 1/4 NE 1/4 NW 1/4

Section Number

33

Town Number

14 N/S

Range Number

1 E/W

Distance And Direction from Road Intersections

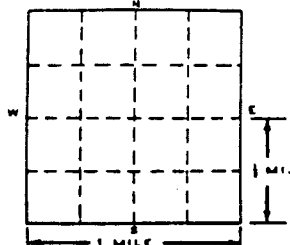
LOT # 48 TISLAND SUB.

E. END OF BULLOCK CREEK RR.

Street address &amp; City of Well Location

Locate with "X" in section below

Sketch Map:



## 2 FORMATION

THICKNESS  
OF  
STRATUMDEPTH TO  
BOTTOM OF  
STRATUM

CLAY

30

30

MARE

3

33

BLUE CLAY

57

90

FINE WATER SAND

3

93

BLUE CLAY

19

112

WATER SAND

8

150

## 3 OWNER OF WELL:

RAY MAXSON

Address

1887 BRADFORD RD  
MIDLAND MI.

## 4 WELL DEPTH: (completed) Date of Completion

150' ft. 7-17-75

5 ☐ Cable tool ☐ Rotary ☐ Driven ☐ Dig  
☒ Hollow rod ☐ Jetted ☐ Bored ☐

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry  
☐ Irrigation ☐ Air Conditioning ☐ Commercial  
☐ Test Well ☐

7 CASING: Threaded ☒ Welded ☐

Height: Above/Below

Diam.

Surface 4 ft.

1 in. to 1 1/4 in. Depth

Weight 375 lbs./ft.

in. to ft. Depth

Drive Shoe? Yes ☒ No ☐

## 8 SCREEN:

Type: PLASTIC Dia.: 1 1/4"

Slot/Gauge 10 Length 4'

Set between 116 ft. and 150 ft.

Fittings: BALL CHECK  
KLEAD PIPE

## 9 STATIC WATER LEVEL

6 ft. ABOVE G/L ~~6 ft. BELOW LAND SURFACE~~

## 10 PUMPING LEVEL below land surface

10 ft. after 4 hrs. pumping 10 g.p.m.

ft. after hrs. pumping g.p.m.

## 11 WATER QUALITY in Parts Per Million:

Iron (Fe) 0.6 Chlorides (Cl) 23

Hardness 210 Other

## 12 WELL HEAD COMPLETION:

☐ In Approved Pit☒ Pitless Adapter ☐ 12" Above Grade13 Well Grouted? ☒ Yes ☐ No☐ Neat Cement ☐ Bentonite ☒ MUD

Depth: From 0 ft. to 116 ft.

## 14 Nearest Source of possible contamination

60 feet SW Direction SEPTIC Type

Well disinfected upon completion ☒ Yes ☐ No

## 15 PUMP:

☒ Not installed

Manufacturer's Name

Model Number HP Volts

Length of Drop Pipe ft. capacity G.P.M.

Type: ☐ Submersible☐ Jet☐ Reciprocating

USE A 2ND SHEET IF NEEDED

## 16 Remarks, elevation, source of data, etc.

ADDED INFO BY DRILLER, ITEM NO.

CORRECTED BY

ADDITION BY

ELEVATION

DEPTH TO ROCK

## 17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Badger &amp; Sons 0999

REGISTERED BUSINESS NAME

REGISTRATION NO.

Address 3448 E. Miller Rd.

Signed Alfred E. Badger Date 7-17-75

AUTHORIZED REPRESENTATIVE

GEOLOGICAL SURVEY SAMPLE NO.    
 AUG 11 1976

**WATER WELL RECORD**  
 ACT 294 PA 1965

MICHIGAN DEPARTMENT  
 OF  
 PUBLIC HEALTH

33-1

<b>1 LOCATION OF WELL</b> County <u>Midland</u> Township <u>Midland</u> Fraction <u>NW 1/4 NW 1/4 NW 1/4</u> Section Number <u>33</u> Town Number <u>14</u> Range Number <u>12 E</u>		
Distance And Direction from Road Intersections <u>200 ft. east of Piseville Rd. on south side of Miller Rd.</u>		
Street address & City of Well Location Locate with "X" in section below Sketch Map: <div style="display: flex; align-items: center;"> <div style="margin-left: 10px;"> <p>1 MILE</p> </div> </div>		
<b>3 OWNER OF WELL:</b> Address <u>Steven Young</u> <u>3020 E. Miller Rd</u> <u>Midland, Michigan 48640</u>		
<b>4 WELL DEPTH: (completed)</b> Date of Completion <u>155 ft.</u> <u>5-5-76</u>		
<b>5</b> <input type="checkbox"/> Cable tool <input checked="" type="checkbox"/> Rotary <input type="checkbox"/> Driven <input type="checkbox"/> Dug <input type="checkbox"/> Hollow rod <input type="checkbox"/> Jetted <input type="checkbox"/> Bored		
<b>6 USE:</b> <input checked="" type="checkbox"/> Domestic <input type="checkbox"/> Public Supply <input type="checkbox"/> Industry <input type="checkbox"/> Irrigation <input type="checkbox"/> Air Conditioning <input type="checkbox"/> Commercial <input type="checkbox"/> Test Well		
<b>7 CASING:</b> Threaded <input checked="" type="checkbox"/> Welded <input type="checkbox"/> Height: Above/Below Diam. Surface <u>1</u> ft. Weight <u>3.75</u> lbs./ft. Drive Shoe? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		
<b>8 SCREEN:</b> Type: <u>plastic</u> Dia.: <u>1 1/4</u> Slot/Gauze <u>slot</u> Length <u>8 ft</u> Set between <u>147</u> ft. and <u>155</u> ft. Fittings:		
<b>9 STATIC WATER LEVEL</b> <u>Flow</u> <u>7625</u> ft. below land surface		
<b>10 PUMPING LEVEL</b> below land surface <u>40</u> ft. after <u>1</u> hrs. pumping <u>20</u> g.p.m. _____ ft. after _____ hrs. pumping _____ g.p.m.		
<b>11 WATER QUALITY</b> in Parts Per Million: Iron (Fe) _____ Chlorides (Cl) _____ Hardness _____ Other <u>X</u>		
<b>12 WELL HEAD COMPLETION:</b> <input type="checkbox"/> In Approved Pit <input type="checkbox"/> Pitless Adapter <input checked="" type="checkbox"/> 12" Above Grade		
<b>13 Well Grouted?</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Neat Cement <input type="checkbox"/> Bentonite <input checked="" type="checkbox"/> <u>heavy mud</u> Depth: From _____ ft. to _____ ft.		
<b>14 Nearest Source of possible contamination</b> <u>70</u> feet <u>E</u> Direction <u>septic</u> Type Well disinfected upon completion <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
<b>15 PUMP:</b> <input type="checkbox"/> Not installed Manufacturer's Name _____ Model Number _____ HP _____ Volts _____ Length of Drop Pipe _____ ft. capacity _____ G.P.M. Type: <input type="checkbox"/> Submersible <input type="checkbox"/> Jet <input type="checkbox"/> Reciprocating		
<b>16 Remarks, elevation, source of data, etc.</b> <div style="text-align: right; margin-top: 20px;">           ADDED INFO BY DRILLER, ITEM NO.            *CORRECTED BY <u>3</u>            **ADDITION BY <u>7</u>            ELEVATION            DEPTH TO ROCK         </div>		
<b>17 WATER WELL CONTRACTOR'S CERTIFICATION:</b> This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief. <u>Freeman &amp; Krauss Well Drilling</u> REGISTERED BUSINESS NAME REGISTRATION NO. _____ Address <u>48935 Jones Rd. Beaverton, Mich.</u> Signed <u>Dale Freeman</u> Date _____ AUTHORIZED REPRESENTATIVE		

D67d

100M (Rev. 12-68)

GEOLOGICAL SURVEY COPY



NOV 17 1975

## WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH

## 1 LOCATION OF WELL

County

Midland

Township Name

Midland

Fraction

SW 1/4 NW 1/4

Section Number

33

Town Number

14 N.W.

Range No.

2 E.V.

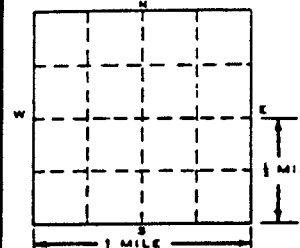
Distance And Direction from Road Intersections

Tisland Dr 1/2 mile east of Roseville  
Tisland Subdivision

Street address &amp; City of Well Location

Locate with "X" in section below

Sketch Map:



## 3 OWNER OF WELL:

Mark Corey  
Address 165 SCHAFFER  
HOPE MICH.

## 4 WELL DEPTH: (completed) Date of Completion

131 ft. 8-18-75

5 ☐ Cable tool ☒ Rotary ☐ Driven ☐ Dug☐ Hollow rod ☐ Jetted ☐ Bored ☐6 USE: ☒ Domestic ☐ Public Supply ☐ Industry☐ Irrigation ☐ Air Conditioning ☐ Commercial☐ Test Well ☐7 CASING: Threaded ☒ Welded ☐

Diam. 2 in. to 129 ft. Depth

Height: Above/Below

Surface 1 ft.

Weight 3.75 lbs./ft.

Drive Shoe? Yes ☒ No ☐

## 8 SCREEN:

Type: plastic Dia.: 1 1/4"

Slot/Gauze slot Length 8 ft.

Set between 129 ft. and 131 ft.

Fittings:

## 9 STATIC WATER LEVEL

0 ft. below land surface 615

## 10 PUMPING LEVEL below land surface

40 ft. after 1 hrs. pumping 10 g.p.m.

ft. after hrs. pumping g.p.m.

## 11 WATER QUALITY in Parts Per Million:

Iron (Fe) Chlorides (Cl)

Hardness Other X

12 WELL HEAD COMPLETION: ☐ In Approved Pit☐ Pitless Adapter ☒ 12" Above Grade13 Well Grouted? ☒ Yes ☐ No☐ Neat Cement ☐ Bentonite ☒ heavy mud

Depth: From ft. to ft.

## 14 Nearest Source of possible contamination none

ft. Direction Type

Well disinfected upon completion ☒ Yes ☐ No15 PUMP: ☐ Not installed

Manufacturer's Name

Model Number HP Volts

Length of Drop Pipe ft. capacity G.P.M.

Type: ☐ Submersible☐ Jet ☐ Reciprocating

USE A 2ND SHEET IF NEEDED

## 16 Remarks, elevation, source of data, etc.

ADDED INFO BY DRILLER, ITEM NO.

\*CORRECTED BY n-hp B

\*\*ADDITION BY n-hp

ELEVATION

DEPTH TO ROCK

## 17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Freeman &amp; Knott's Well Drilling

REGISTERED BUSINESS NAME

REGISTRATION NO.

Address 4893 S. Jones Rd Beaverton, Mi

Signed Dale Freeman Date

AUTHORIZED REPRESENTATIVE

DEC 10 1975

## WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH

EL. 62

## 1 LOCATION OF WELL

County Midland Township Name Midland Fraction N 1/4 N 1/4 N 1/4 Section Number 33 Town Number 14 Range Number 2 E. W.

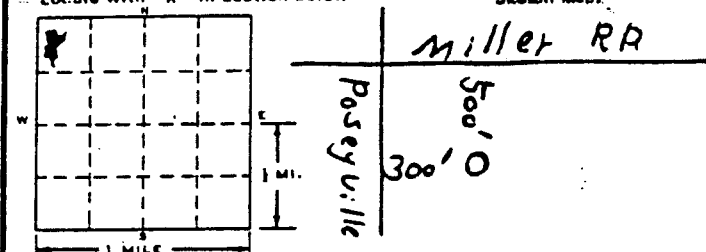
## Distance And Direction from Road Intersections

500' S of Miller RD and 300' E of Poseyville RD  
1037 Poseyville RD  
Midland

## Street address &amp; City of Well Location

Locate with "X" in section below

Sketch Map:



## 3 OWNER OF WELL:

Bullock Creek Schools  
Address 1519 Badger RD  
Midland

## 4 WELL DEPTH: (completed) Date of Completion

160 ft. Aug 25, 1975

5 ☐ Cable tool ☒ Rotary ☐ Driven ☐ Dug  
☐ Hollow rod ☐ Jetted ☐ Bored ☐

6 USE: ☐ Domestic ☐ Public Supply ☐ Industry  
☐ Irrigation ☐ Air Conditioning ☐ Commercial  
☐ Test Well ☒ School

7 CASING: Threaded ☒ Welded ☐ Height: Above/Below  
Diam. 4 in. to 150 ft. Depth Surface 4 ft.  
Weight 11 lbs./ft.  
Drive Shoe? Yes ☒ No ☐

## 2 FORMATION

THICKNESS  
OF  
STRATUMDEPTH TO  
BOTTOM OF  
STRATUM

Sand	10'	10'
Sandy Clay	28'	38'
Clay	94'	132'
Fine Sand (water)	16'	148'
Coarse Sand (bearing)	12'	160'

8 SCREEN:  
Type: Stainless Dia.: 3"  
Slot/Gauge 10 Length 10'  
Set between 150 ft. and 160 ft.  
Fittings: 8' Tail pipe K packer Check

9 STATIC WATER LEVEL  
4 ft. below land surface 621

10 PUMPING LEVEL below land surface  
\_\_\_\_ ft. after \_\_\_\_ hrs. pumping \_\_\_\_ g.p.m.  
\_\_\_\_ ft. after \_\_\_\_ hrs. pumping \_\_\_\_ g.p.m.

11 WATER QUALITY in Parts Per Million:  
Iron (Fe) 1.1 Chlorides (Cl) 84  
Hardness 215 Other \_\_\_\_\_

12 WELL HEAD COMPLETION: ☐ In Approved Pit  
☒ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted? ☒ Yes ☐ No  
☐ Neat Cement ☐ Bentonite ☐  
Depth: From \_\_\_\_ ft. to \_\_\_\_ ft.

14 Nearest Source of possible contamination  
200 feet S Direction Sep. tank Type  
Well disinfected upon completion ☒ Yes ☐ No

15 PUMP: ☐ Not installed  
Manufacturer's Name Geulds  
Model Number 1055 HP 1 Volts 220  
Length of Drop Pipe 105 ft. capacity 20 G.P.M.  
Type: ☒ Submersible ☐ Jet ☐ Reciprocating

USE A 2ND SHEET IF NEEDED

## 16 Remarks, elevation, source of data, etc.

ADDED INFO BY DRILLER, ITEM NO.  
\*CORRECTED BY E  
\*\*ADDITION BY  
ELEVATION  
DEPTH TO ROCK

## 17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Card Well Drilling 0222  
REGISTERED BUSINESS NAME REGISTRATION NO.

Address R#2 Midland

Signed B. M. Card Date Sep 4 75  
AUTHORIZED REPRESENTATIVE

AUG 3 1976

## WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH

33-1

## 1 LOCATION OF WELL

County Midland Township Name Midland Fraction S 1/4 NW 1/4 Section Number 33 Town Number 14 N. Range Number 2 E.

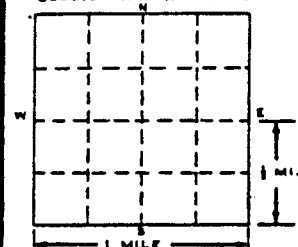
Distance And Direction from Road Intersections

Fredrick Drive  
Tisland Subdivision

Street address &amp; City of Well Location

Locate with "X" in section below

Sketch Map:



## 3 OWNER OF WELL:

Address Mark Corey  
Job Site: Fredrick Dr.

## 4 WELL DEPTH: (completed) Date of Completion

132 ft. 6-15-76

5 ☐ Cable tool ☒ Rotary ☐ Driven ☐ Dug  
☐ Hollow rod ☐ Jetted ☐ Bored

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry  
☐ Irrigation ☐ Air Conditioning ☐ Commercial  
☐ Test Well

7 CASING: Threaded ☒ Welded ☐ Height: Above/Below

Diam. 2 in. to 121 ft. Depth Surface 1 ft.

Weight 375 lbs./ft. Drive Shown? Yes ☒ No ☐

8 SCREEN: Type: plastic Dia.: 1 1/4

Slot/Gauze 3/16 Length 5 ft

Set between 121 ft. and 126 ft.

Fittings:

9 STATIC WATER LEVEL Flowing

42 ft. below land surface > 620

## 10 PUMPING LEVEL below land surface

42 ft. after 1 hrs. pumping 20 g.p.m.

ft. after hrs. pumping g.p.m.

## 11 WATER QUALITY in Parts Per Million:

Iron (Fe) Chlorides (Cl)

Hardness Other X

12 WELL HEAD COMPLETION: ☐ In Approved Pit

☐ Pitless Adapter ☒ 12" Above Grade

13 Well Grouted? ☒ Yes ☐ No

☐ Neat Cement ☐ Bentonite ☒ heavy mud

Depth: From ft. to ft.

14 Nearest Source of possible contamination none

feet Direction Type

Well disinfected upon completion ☒ Yes ☐ No

15 PUMP: ☐ Not installed

Manufacturer's Name

Model Number HP Volts

Length of Drop Pipe ft. capacity G.P.M.

Type: ☐ Submersible ☐ Jet ☐ Reciprocating

USE A 2ND SHEET IF NEEDED

## 16 Remarks, elevation, source of data, etc.

ADDED INFO BY DRILLER, ITEM NO.

\*CORRECTED BY

\*\*ADDITION BY

ELEVATION

DEPTH TO ROCK

## 17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Freeman & Krauss Well Drilling

Address 4893 S. Jones Rd. Beaverton

Signed Dale Freeman Date

GEOLOGICAL SURVEY SAMPLE NO.

NOV 17 1975

## WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH

## 1 LOCATION OF WELL

County

MIDLAND

Township Name

MIDLAND

Fraction

NE 1/4 NW 1/4

Section Number

33

Town Number

14 N/2

Range Number

1 E 1/2

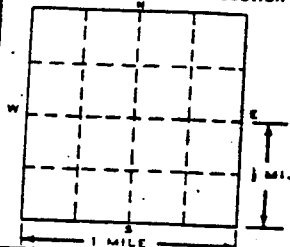
Distance And Direction from Road Intersections

LOT # 49 TISLAND SUB.  
E. END OF BULLOCK PR.

Street address &amp; City of Well Location

Locate with "X" in section below

Sketch Map:



## 3 OWNER OF WELL:

M. DENGLER

Address

## 4 WELL DEPTH: (completed) Date of Completion

130

ft.

SEPT 15 - 75

5 ☐ Cable tool ☐ Rotary ☐ Driven ☐ Dug  
☒ Hollow rod ☐ Jetted ☐ Bored6 USE: ☒ Domestic ☐ Public Supply ☐ Industry  
☐ Irrigation ☐ Air Conditioning ☐ Commercial  
☐ Test Well7 CASING: Threaded ☒ Welded ☐

Diam.

4 in. to 116 ft. Depth

in. to ft. Depth

Height: Above/Below

Surface 4 ft.

Weight 375 lbs./ft.

Drive Shoe? Yes ☒ No ☐

## 8 SCREEN:

Type: PLASTIC Dia.: 1 1/4"

Slot/Groove 10 Length 4

Set between 116 ft. and 130 ft.

Fittings:

BAIL CHECK

## 9 STATIC WATER LEVEL

8

ft.

ABOVE

land surface

2

618

## 10 PUMPING LEVEL below land surface

10

ft. after 4 hrs. pumping

10

g.p.m.

## 11 WATER QUALITY in Parts Per Million:

Iron (Fe)

Chlorides (Cl)

Hardness

Other

## 12 WELL HEAD COMPLETION:

☐ In Approved Pit☒ Pitless Adapter☐ 12" Above Grade13 Well Grouted? ☒ Yes ☐ No☐ Neat Cement ☐ Bentonite

Depth: From 0 ft. to 116 ft.

## 14 Nearest Source of possible contamination

70 feet

E

Direction

SEPTIC

Type

15 PUMP: Well disinfected upon completion ☒ Yes ☐ No☐ Not installed

Manufacturer's Name

SEARS

Model Number

HP

Volts

110

Length of Drop Pipe

30

ft. capacity

10

G.P.M.

Type: ☐ Submersible☒ Jet☐ Reciprocating

## 16 Remarks, elevation, source of data, etc.

USE A 2ND SHEET IF NEEDED

REGISTERED BUSINESS NAME

E

E.E. BAKER

DEPT. TO BAKY

## 17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Badger &amp; Sons

REGISTERED BUSINESS NAME

2999

REGISTRATION NO.

Address

3148 E. MILLER RD.

Signed

Alfred E. Badger

Date

Sept 16 - 75

APR 12 1977

## WATER WELL RECORD

ACT 294

PA-1985



MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH

1 LOCATION OF WELL		Fraction		Section Number		Town Number		Range Number	
County <u>Midland</u>		Township Name <u>Midland</u>		<u>N 1/4 Sec 33</u>		<u>T 14 N 6</u>		<u>R 2 E 1</u>	
Distance and Direction from Road Intersection <u>1/4 mi. N of Bullock Creek Dr and Fredrick St. 3121 Bullock Ck Dr</u>					3 OWNER OF WELL: <u>James Wenzel</u>				
Street address & City of Well Location <u>Midland Mich.</u>					Address <u>3121 Bullock Ck Rd</u>				
Locata with "X" in section below					4 WELL DEPTH: (completed) Date of Completion <u>122 ft. Sep. 13, 1976</u>				
Sketch Map: 					5 <input type="checkbox"/> Cable tool <input checked="" type="checkbox"/> Rotary <input type="checkbox"/> Driven <input type="checkbox"/> Duo <input type="checkbox"/> Hollow rod <input type="checkbox"/> Jetted <input type="checkbox"/> Bored <input type="checkbox"/>				
					6 USE: <input checked="" type="checkbox"/> Domestic <input type="checkbox"/> Public Supply <input type="checkbox"/> Industry <input type="checkbox"/> Irrigation <input type="checkbox"/> Air Conditioning <input type="checkbox"/> Commercial <input type="checkbox"/> Test Well <input type="checkbox"/>				
					7 CASING: Threaded <input checked="" type="checkbox"/> Welded <input type="checkbox"/> Height: Above Below Diam. <u>2</u> in. to <u>1 1/4</u> ft. Depth <u>116</u> ft. Surface <u>4</u> ft. Weight <u>3.75</u> lbs./ft. Drive Shoe? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>				
2 FORMATION		THICKNESS OF STRATUM		DEPTH TO BOTTOM OF STRATUM		8 SCREEN:			
<u>Sandy clay</u>		<u>10'</u>		<u>10'</u>		Type: <u>Johnson</u> Dia.: <u>1 1/4"</u>			
<u>clay</u>		<u>18'</u>		<u>28'</u>		Slot/Screen <u>1/6</u> Length <u>8'</u>			
<u>Fine sand</u>		<u>4'</u>		<u>32'</u>		Set between <u>116</u> ft. and <u>122</u> ft.			
<u>clay</u>		<u>78'</u>		<u>110'</u>		Fittings: <u>4' Tail Pipe</u> <u>Bremer Check</u>			
<u>Med Sand</u>		<u>12'</u>		<u>122'</u>		9 STATIC WATER LEVEL <u>10</u> ft. above surface <u>≈ 617</u>			
<u>water bearing</u>						10 PUMPING LEVEL below land surface _____ ft. after _____ hrs. pumping _____ G.P.M. _____ ft. after _____ hrs. pumping _____ G.P.M.			
						11 WATER QUALITY in Parts Per Million: Iron (Fe) _____ Chlorides (Cl) _____ Hardness _____ Other _____			
						12 WELL HEAD COMPLETION: <input type="checkbox"/> In Approved Pit <input checked="" type="checkbox"/> Pitless Adapter <input type="checkbox"/> 12" Above Grade			
						13 Well Grouted? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Neat Cement <input type="checkbox"/> Bentonite <input type="checkbox"/> _____ Depth: From _____ ft. to _____ ft.			
						14 Nearest Source of possible contamination <u>80</u> feet <u>N</u> Direction <u>Drain Field</u> Type Well disinfected upon completion <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
						15 PUMP: <input checked="" type="checkbox"/> Not installed Manufacturer's Name _____ Model Number _____ HP _____ Volts _____ Length of Drop Pipe _____ ft. capacity _____ G.P.M. Type: <input type="checkbox"/> Submersible <input type="checkbox"/> Jet <input type="checkbox"/> Reciprocating			
16 Remarks, elevation, source of data, etc.  ADDED INFO BY DRILLER, ITEM NO. *CORRECTED BY <u>E</u> **ADDITION BY ELEVATION DEPTH TO ROCK					17 WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief. <u>Card Well Drilling</u> REGISTRATION NO. <u>0222</u> Address <u>R#2 Midland</u> Signed <u>Bayn Card</u> Date <u>Sep. 13, 76</u> AUTHORIZED REPRESENTATIVE				

## WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH33-2  
614

1 LOCATION OF WELL		County		Twp.		Fraction		Section No.		Town		Range	
MIDLAND		MIDLAND		1/4 NW 1/4		33		Keweenaw		2		E.W.	
Distance And Direction from Road Intersections				OWNER No.				3 OWNER OF WELL: ARTHUR MALPASS					
TISLAND SUB. NO. 1 LOT NO. 28 R# 7								Address 3077 FREDRICK					
Street address & City of Well Location													
2 FORMATION		THICKNESS OF STRATUM		DEPTH TO BOTTOM OF STRATUM		4 WELL DEPTH: (completed) Date of Completion							
HARD CLAY		10'		10'		174 ft. 4-13-68							
HARD SANDY CLAY		40'		50'		5 <input type="checkbox"/> Cable tool <input type="checkbox"/> Rotary <input type="checkbox"/> Driven <input type="checkbox"/> Dug <input checked="" type="checkbox"/> Hollow rod <input type="checkbox"/> Jetted <input type="checkbox"/> Bored <input type="checkbox"/>							
HARD CLAY		80'		130'		6 USE: <input checked="" type="checkbox"/> Domestic <input type="checkbox"/> Public Supply <input type="checkbox"/> Industry <input type="checkbox"/> Irrigation <input type="checkbox"/> Air Conditioning <input type="checkbox"/> Commercial <input type="checkbox"/> Test Well <input type="checkbox"/>							
FINE SAND		20'		150'		7 CASING: Threaded <input type="checkbox"/> Welded <input type="checkbox"/> Height: Above/Below surface <u>1</u> ft. 2 in. to 120 ft. Depth Weight <u>3.25</u> lbs./ft. _____ in. to _____ ft. Depth Drive Shoe? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>							
COARSE SAND		24'		174'		8 SCREEN: Type: JOHNSON Dia.: <u>1 1/4</u> Slot/Gauze <u>60</u> Length <u>4</u> Set between <u>170</u> ft. and <u>174</u> ft. Fittings: BREMER CHECK VALVE <u>4' BALL PIPE 1 1/2'</u>							
						9 STATIC WATER LEVEL <u>1</u> ft. below land surface <u>613</u>							
						10 PUMPING LEVEL below land surface <u>1</u> ft. after <u>2</u> hrs. pumping <u>10</u> g.p.m. _____ ft. after _____ hrs. pumping _____ g.p.m.							
						11 WATER QUALITY in Parts Per Million: Iron (Fe) _____ Chlorides (Cl) _____ Hardness _____							
						12 WELL HEAD COMPLETION: <input type="checkbox"/> In Approved Pit <input type="checkbox"/> Pitless Adapter <input checked="" type="checkbox"/> 12" Above Grade							
						13 GROUTING: Well Grouted? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Material: <input type="checkbox"/> Neat Cement <input checked="" type="checkbox"/> UNILLING CLAY Depth: From <u>1</u> ft. to <u>20</u> ft.							
						14 SANITARY: Nearest Source of possible contamination <u>10</u> feet <u>N.E.</u> Direction <u>DRAIN FIELD</u> Type Well disinfected upon completion <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No							
						15 PUMP: NOT INSTALLED Manufacturer's Name _____ Model Number _____ HP _____ Length of Drop Pipe _____ ft. capacity _____ G.P.M. Type: <input type="checkbox"/> Submersible <input type="checkbox"/> _____ <input type="checkbox"/> Jet <input type="checkbox"/> Reciprocating							
16 Remarks, elevation, source of data, etc.												17 WATER WELL CONTRACTOR'S CERTIFICATION:	
ADDED INFO. BY DRILLER, ITEM NO.												This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.	
CORRECTED BY:												 REGISTERED BUSINESS NAME <u>0222</u> REGISTRATION NO.	
ADDITION BY:												Address <u>R 7 MIDLAND MICH</u>	
												Signed  Date <u>4-15-68</u>	

JUN 23 1975

## WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH

## 1 LOCATION OF WELL

County: MIDLAND Township Name: MIDLAND Fraction: 1/4 Section Number: 33 Town Number: 14 Range Number: 2 E-W: E-W

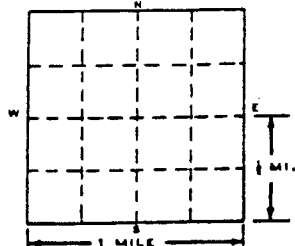
Distance And Direction from Road Intersections

TISLAND SUB.3043 FREDRICK ST.MIDLAND

Street Address &amp; City of Well Location

Locate with "X" in section below

Sketch Map:



## 2 FORMATION

THICKNESS  
OF  
STRATUMDEPTH TO  
BOTTOM OF  
STRATUMCLAY120'120'WATER SAND5'125'

## 3 OWNER OF WELL:

ART MALPASS  
Address: 3077 FREDRICK  
MIDLAND MICH

## 4 WELL DEPTH: (completed) Date of Completion

125 ft. MAR 74

5 ☐ Cable tool ☐ Rotary ☐ Driven ☐ Cug☒ Hollow rod ☐ Jetted ☐ Bored ☐6 USE: ☒ Domestic ☐ Public Supply ☐ Industry☐ Irrigation ☐ Air Conditioning ☐ Commercial☐ Test Well ☐7 CASING: Threaded ☒ Welded ☐

## Diam. Height: Above Below

Surface 4 ft.Weight 325 lbs./ft.Drive Shoe? Yes ☒ No ☐2 in. to 21 ft. Depthin. to     ft. Depth

## 8 SCREEN:

Type: PLASTIC Dia.: 1 1/4"Slot/Gauze 10 Length 4Set between 121 ft. and 125 ft.Fittings: 479 3/4" SMC PIPE + COU

## 9 STATIC WATER LEVEL

0 ft. below land surface 620

## 10 PUMPING LEVEL below land surface

2 ft. after 4 hrs. pumping 15 g.p.m.    ft. after     hrs. pumping     g.p.m.

## 11 WATER QUALITY in Parts Per Million:

Iron (Fe) 0.1 Chlorides (Cl) 17Hardness 170 Other    12 WELL HEAD COMPLETION: ☐ In Approved Pit☒ Pitless Adapter ☐ 12" Above Grade13 Well Grouted? ☐ Yes ☐ No☐ Neat Cement ☐ Bentonite ☐Depth: From 0 ft. to 621 ft.

## 14 Nearest Source of possible contamination

20 feet N/E Direction SEPTIC TypeWell disinfected upon completion ☒ Yes ☐ No15 PUMP: ☐ Not installedManufacturer's Name    Model Number     HP     Volts    Length of Drop Pipe     ft. capacity     G.P.M.Type: ☐ Submersible☐ Jet ☐ Reciprocating

## 16 Remarks, elevation, source of data, etc.

ADDED INFO BY DRILLER, ITEM NO.

\*CORRECTED BY    \*\*ADDITION BY    

ELEVATION

DEPTH TO ROCK

## 17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Badger & Sons 0999  
REGISTERED BUSINESS NAME REGISTRATION NO.

Address 3248 E. MILLER RD

Signed Alfred Badger Date MAY 11 75  
AUTHORIZED REPRESENTATIVE

GEOLOGICAL SURVEY NO. 1581  
SEP 15 1981

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

WATER WELL AND PUMP RECORD

PART 127 ACT 368, P.A. 1978

PERMIT NUMBER

33

1. LOCATION OF WELL		FRACTION		SECTION NUMBER	TOWN NUMBER	RANGE NUMBER
County	Township Name					
Distance And Direction From Road Intersection	Street Address & City of Well Location	3053 E Stewart				
Locate with "X" in Section Below		Sketch Map:				
		<p>184 ft</p> <p>July 8-81</p> <p>2</p> <p>14 N/8</p> <p>2 E/W</p>				
2. FORMATION DESCRIPTION		THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM	3. OWNER OF WELL:		
Sandy Clay		16'	16'	Donald Hayas		
Clay - Stones		26'	42'	Address 3053 E Stewart Rd.		
Clay with Gravel		26'	68'	Address Same As Well Location? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
Clay		26'	144'	4. WELL DEPTH: (completed)		
Med Sand		34'	170'	184 ft		
Coarse Sand		14'	184'	Date of Completion		
				July 8-81		
				5. <input type="checkbox"/> Cable tool <input checked="" type="checkbox"/> Rotary <input type="checkbox"/> Driven <input type="checkbox"/> Dug		
				<input type="checkbox"/> Hollow rod <input type="checkbox"/> Auger <input type="checkbox"/> Jetted <input type="checkbox"/>		
				6. USE <input type="checkbox"/> Domestic <input type="checkbox"/> Type I Public <input type="checkbox"/> Type II Public		
				<input type="checkbox"/> Irrigation <input type="checkbox"/> Type III Public <input type="checkbox"/> Heat pump		
				<input type="checkbox"/> Test Well <input type="checkbox"/> Type IIB Public <input type="checkbox"/>		
				7. CASING Diameter <input checked="" type="checkbox"/> Steel <input type="checkbox"/> Plastic <input type="checkbox"/> Threaded <input type="checkbox"/> Welded		
				Height Above Surface 1 ft		
				Weight 3.25 lbs/ft		
				8. SCREEN <input type="checkbox"/> Not installed		
				Type Galv Diameter 1 1/2"		
				Slot/Gauge 10 Length 2'		
				Set between 177 ft and 184 ft		
				Fittings <input checked="" type="checkbox"/> K Packer <input type="checkbox"/> Lead Packer <input type="checkbox"/> Rubber Check		
				<input type="checkbox"/> Blank above screen 4 ft Other		
				9. STATIC WATER LEVEL 4 ft below land surface 62 ft <input type="checkbox"/> Flow		
				10. PUMPING LEVEL below land surface 15 ft after 1 hr pumping at 10 GPM		
				ft after hr pumping at GPM		
				11. WELL HEAD COMPLETION <input checked="" type="checkbox"/> Pressure adapter <input type="checkbox"/> 12" above grade		
				<input type="checkbox"/> Basement offset <input type="checkbox"/> Approved pit		
				12. WELL GROUTED <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes From to ft		
				<input type="checkbox"/> Neat cement <input type="checkbox"/> Bentonite <input type="checkbox"/> Other		
				No. of bags of cement Additive		
				13. Nearest source of possible contamination		
				Type Septic Distance 65 ft Direction N		
				Well disinfected upon completion? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
				14. PUMP <input checked="" type="checkbox"/> Not installed <input type="checkbox"/> Pump installation Only		
				Manufacturer's name		
				Model number HP Volts		
				Length of Drop Pipe ft capacity GPM		
				TYPE <input type="checkbox"/> Submersible <input type="checkbox"/> Jet		
				PRESSURE TANK		
				Manufacturer's name		
				Model number Capacity Gallons		
15. Remarks, elevation, source of data, etc.		16. WATER WELL CONTRACTOR'S CERTIFICATION				
ADDED INFO BY DRILLER, ITEM NO.		This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief				
*CORRECTED BY		Carl Well Drilling 56-0222				
**ADDITION BY		Address 261 Pine River Rd.				
ELEVATION		Signed [Signature] AUTHORIZED REPRESENTATIVE				
DEPTH TO ROCK		Date July 15-81				

D67d

(Rev. 10-80)



WATER WELL RECORD  
ACT 294 PA 1965MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH

1 LOCATION OF WELL			33-18		33-18	
County	Twp.	Fraction	Section No.	Town	Range	
Midland	Midland	SW 1/4 SW 1/4 SW 1/4	33	North N.S.	2E	
Distance And Direction from Road Intersections 200 FEET North on Poseyville Rd. At Gordonville Rd			3 OWNER OF WELL: Michael Bailey Address R#7 Midland, Mich			
Street address & City of Well Location			OWNER No. <span style="border: 1px solid black; padding: 2px 10px;"> </span>			
2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM	4 WELL DEPTH: (completed) Date of Completion			
Top soil clay	9'	9'	152 ft. SEPT 15, 1966			
SANDY CLAY	9'	30'	5 <input type="checkbox"/> Cable tool <input type="checkbox"/> Rotary <input type="checkbox"/> Driven <input type="checkbox"/> Dug			
SOFT GRAY CLAY	30'	132'	<input checked="" type="checkbox"/> Hollow rod <input type="checkbox"/> Jetted <input type="checkbox"/> Bored <input type="checkbox"/>			
WATER SAND FINE	132'	152'	6 USE: <input checked="" type="checkbox"/> Domestic <input type="checkbox"/> Public Supply <input type="checkbox"/> Industry			
			<input type="checkbox"/> Irrigation <input type="checkbox"/> Air Conditioning <input type="checkbox"/> Commercial			
			<input type="checkbox"/> Test Well <input type="checkbox"/>			
			7 CASING: Threaded <input checked="" type="checkbox"/> Welded <input type="checkbox"/> Height: Above/Below			
			Diam. 2 in. to 148 ft. Depth surface 2 ft.			
			Weight 375 lbs./ft.			
			Drive Shoe? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>			
			8 SCREEN: Johnson Dia.: 1 1/4"			
			Type: 7-80 Length 4' +			
			Slot/Gauze 148 ft. and 152 ft.			
			Set between 4' TAIL PIPE VALVE BREMER CHECK			
			Fittings: 4' TAIL PIPE VALVE			
			9 STATIC WATER LEVEL			
			36 ft. below land surface 621			
			10 PUMPING LEVEL below land surface			
			ft. after hrs. pumping g.p.m.			
			ft. after hrs. pumping g.p.m.			
			11 WATER QUALITY in Parts Per Million:			
			Iron (Fe) 0.3 Chlorides (Cl) 2			
			Hardness 215			
			12 WELL HEAD COMPLETION: <input type="checkbox"/> In Approved Pit			
			<input type="checkbox"/> Pitless Adapter <input type="checkbox"/> 12" Above Grade			
			13 GROUTING:			
			Well Grouted? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
			Material: <input type="checkbox"/> Neat Cement <input type="checkbox"/>			
			Depth: From 18 ft. to 1 ft.			
			14 SANITARY:			
			Nearest Source of possible contamination			
			50 feet NE Direction DRAIN Field Type			
			Well disinfected upon completion <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
			15 PUMP:			
			Manufacturer's Name			
			Model Number HP			
			Length of Drop Pipe ft. capacity G.P.M.			
			Type: <input type="checkbox"/> Submersible <input type="checkbox"/>			
			<input type="checkbox"/> Jet <input type="checkbox"/> Reciprocating			
16 Remarks, elevation, source of data, etc.			17 WATER WELL CONTRACTOR'S CERTIFICATION:			
ADDED INFO. BY DRILLER, MEM ALL			This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.			
*CORRECTED BY			Hoyd m Card 0222			
**ADDITION BY RPS 2/28/67			REGISTERED BUSINESS NAME REGISTRATION			
			Address R#7, Midland Michigan			
			Signed Hoyd m Card Date 9-17-66			
			AUTHORIZED REPRESENTATIVE			

JUL 11 1980

## WATER WELL RECORD

ACT 294 PA-1985

MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH

## 1 LOCATION OF WELL

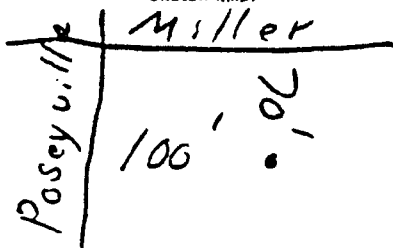
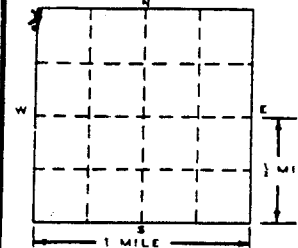
County Midland Township Name Midland Fraction NW 1/4 Section Number 33 Town Number 14 N. Range Number 2 E.

Distance and Direction from Road Intersections  
109' East of Poseyville Rd. and  
70' South of Miller Rd.

Street address & City of Well Location 1011 Poseyville Rd.

Locate with "X" in section below

Sketch Map:



## 3 OWNER OF WELL:

Address Doris Meier  
1011 Poseyville Rd.  
Midland Mich.

## 4 WELL DEPTH: (Completed) Date of Completion

165' ft. July 2 - 1980

5 ☐ Cable tool ☒ Rotary ☐ Driven ☐ Dig  
☐ Hollow rod ☐ Jetted ☐ Bored ☐

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry  
☐ Irrigation ☐ Air Conditioning ☐ Commercial  
☐ Test Well ☐

7 CASING: Threaded ☒ Welded ☐ Height: Above 1 ft.  
Diam. 2 in. to 157 ft. Depth 375 lbs. ft.

Weight 375 lbs. ft. Drive Shoe? Yes ☐ No ☐

## 8 SCREEN:

Type: Galv Diam: 1 1/2"

Slot 10 Length 8'

Set between 157 ft. and 165 ft.

Fittings: 4' lead Pipe Bail Check

9 STATIC WATER LEVEL 1 ft. below land surface 620

10 PUMPING LEVEL below land surface 10 ft. after 1 hrs. pumping 10 g.p.m.

10 ft. after 1 hrs. pumping 10 g.p.m.

11 WATER QUALITY in Parts Per Million:

Iron (Fe)          Chlorides (Cl)         

Hardness          Other         

12 WELL HEAD COMPLETION: ☐ In Approved Pit

☒ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted? ☒ Yes ☐ No

☐ Neat Cement ☐ Bentonite RD Mill Mud

Depth: From          ft. to          ft.

14 Nearest Source of possible contamination 80 feet SW Direction Sept 1: c Type         

Well disinfected upon completion ☒ Yes ☐ No

15 PUMP: ☒ Not installed

Manufacturer's Name         

Model Number          HP          Volts         

Length of Drop Pipe          ft. capacity          G.P.M.

Type: ☐ Submersible ☐ Jet ☐ Reciprocating

USE A 2ND SHEET IF NEEDED

## 16 Remarks, elevation, source of data, etc.

ADDED INFO BY DRILLER, IF ANY  
CORRECTED BY  
OPERATION BY  
ELEVATION  
DEPTH TO ROCK

## 17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Cand Well Drilling 54-0220  
REGISTERED BUSINESS NAME REGISTRATION NO.

Address R#2 Midland

Signed Dawn Card Date 2-2-80  
AUTHORIZED REPRESENTATIVE

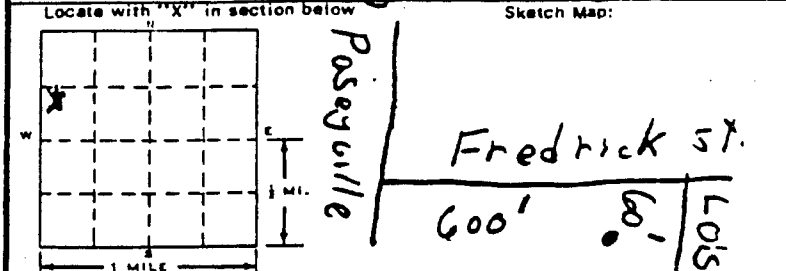
JUN 25 1981

WATER WELL RECORD  
ACT 284 PA 1965MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH

## 1 LOCATION OF WELL

County Midland Township Name Midland Fraction N/4 SW 1/4 NW 1/4 Section Number 33 Town Number 14 Range Number 2 E/W E/W

Distance And Direction from Road Intersections 600' East of Posoyville Rd and 60' South of Fredrick St  
Street address & City of Well Location 3042 Fredrick St



## 2 FORMATION

FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Stoney clay (Hard)	42'	42'
Clay soft	83'	125'
Sandy clay	10'	135'
med Sand	23'	158'

## 3 OWNER OF WELL:

Address Pearl Tomlinson  
3042 Fredrick St  
Midland Mich

## 4 WELL DEPTH: (completed) Date of Completion

158 ft. 2-21-81

5 ☐ Cable tool ☒ Rotary ☐ Driven ☐ Dug  
☐ Hollow rod ☐ Jetted ☐ Bored ☐

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry  
☐ Irrigation ☐ Air Conditioning ☐ Commercial  
☐ Test Well ☐

7 CASING: Threaded ☒ Welded ☐ Height: Above/Below Surface 2 ft.

2 in. to 150 ft. Depth Weight 25 lbs./ft.  
2 in. to 150 ft. Depth Drive Shoe? Yes ☒ No ☐

8 SCREEN:  
Type: 60/10 Dia.: 1 1/4  
Slot/Grate 10 Length 8'  
Set between 150 ft. and 158 ft.  
Fittings: 4" packer ball check  
4" Tail pipe

9 STATIC WATER LEVEL 1 ft. Below land surface 131

10 PUMPING LEVEL below land surface  
10 ft. after 1 hrs. pumping 12 g.p.m.  
10 ft. after 1 hrs. pumping 12 g.p.m.

11 WATER QUALITY in Parts Per Million:  
Iron (Fe) 0.2 Chlorides (Cl) 5  
Hardness 5 Other 5

12 WELL HEAD COMPLETION: ☐ In Approved Pit  
☐ Pitless Adapter ☒ 12" Above Grade

13 Well Grouted? ☒ Yes ☐ No  
☐ Neat Cement ☐ Bentonite ☒ Dr. 11 mud  
Depth: From 150 ft. to 158 ft.

14 Nearest Source of possible contamination  
60 feet S Direction Septic Type  
Well disinfected upon completion ☒ Yes ☐ No

15 PUMP: ☒ Not installed  
Manufacturer's Name \_\_\_\_\_  
Model Number \_\_\_\_\_ HP \_\_\_\_\_ Volts \_\_\_\_\_  
Length of Drop Pipe \_\_\_\_\_ ft. capacity \_\_\_\_\_ G.P.M.  
Type: ☐ Submersible ☐ Jet ☐ Reciprocating

## 16 Remarks, elevation, source of data, etc.

ADDED INFO BY DRILLER, ITEM NO.  
\*CORRECTED BY  
\*\*ADDITION BY  
ELEVATION  
DEPTH TO ROCK

## 17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.  
Card Well Drilling 56-0222  
REGISTERED BUSINESS NAME REGISTRATION NO.  
Address R#2 Midland  
Signed Gaym Paul Date 2-22-81  
AUTHORIZED REPRESENTATIVE

FEB 09 1979

WATER WELL RECORD  
ACT 294 PA 1965MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH

E. 62

1 LOCATION OF WELL		County		Township Name		Fraction		Section Number		Town Number		Range Number	
Midland		Midland		SW 1/4 SE 1/4		33		14 N.E.		2 E.W.			
Distance And Direction from Road Intersections 3/8 mi. East and 100' North of Posoyville and Stewart RD.													
Street address & City of Well Location 3145 East Stewart Posoyville													
Sketch Map: 													
2 FORMATION		THICKNESS OF STRATUM		DEPTH TO BOTTOM OF STRATUM		3 OWNER OF WELL: Richard Kiddor Address 3145 E Stewart RD. Midland Mich.							
Sandy Clay		45'		45'		4 WELL DEPTH: (completed) Date of Completion 245 ft. Sep. 25. 78							
Clay		145'		190'		5 <input type="checkbox"/> Cable tool <input checked="" type="checkbox"/> Rotary <input type="checkbox"/> Driven <input type="checkbox"/> dug <input type="checkbox"/> Hollow rod <input type="checkbox"/> Jetted <input type="checkbox"/> Bored <input type="checkbox"/>							
Fine Sand		40'		230'		6 USE: <input checked="" type="checkbox"/> Domestic <input type="checkbox"/> Public Supply <input type="checkbox"/> Industry <input type="checkbox"/> Irrigation <input type="checkbox"/> Air Conditioning <input type="checkbox"/> Commercial <input type="checkbox"/> Test Well <input type="checkbox"/>							
Med Sand (water bearing)		15'		245'		7 CASING: Threaded <input checked="" type="checkbox"/> Welded <input type="checkbox"/> Diam. 2 in. to 2 3/4 in. Depth 233 ft. to 245 ft. Height: Above Surface 1 ft. Below Surface 1 ft. Weight 3.75 lbs./ft. Drive Shoe? yes <input checked="" type="checkbox"/> No <input type="checkbox"/>							
						8 SCREEN: Type: Galv Dia.: 1 1/2" Slot/Groove 1/8" Length 12" Set between 233 ft. and 245 ft. Fittings: 4" Tail Pipe Blenner Check							
						9 STATIC WATER LEVEL 1 ft. below land surface 624							
						10 PUMPING LEVEL below land surface 10 ft. after 1 hrs. pumping 10 g.p.m. ft. after hrs. pumping g.p.m.							
						11 WATER QUALITY in Parts Per Million: Iron (Fe) Chlorides (Cl) Hardness Other							
						12 WELL HEAD COMPLETION: <input type="checkbox"/> In Approved Pit <input type="checkbox"/> Pitless Adapter <input checked="" type="checkbox"/> 12" Above Grade							
						13 Well Grouted? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Neat Cement <input type="checkbox"/> Bentonite Heavy Mud Depth: From ft. to ft.							
						14 Nearest Source of possible contamination 60 feet N. Direction Septic Type Well disinfected upon completion <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No							
						15 PUMP: <input type="checkbox"/> Not installed Manufacturer's Name Goulds Model Number J-3 HP 1/2 Volts 110 Length of Drop Pipe 42 ft. capacity 8 G.P.M. Type: <input type="checkbox"/> Submersible <input checked="" type="checkbox"/> Jet <input type="checkbox"/> Reciprocating							
16 Remarks, elevation, source of data, etc. ADDED INFO BY DRILLER, ITEM NO. *CORRECTED BY **ADDITION BY ELEVATION DEPTH TO ROCK						17 WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief. Gardner Well Drilling Co. 0222 REGISTERED BUSINESS NAME REGISTRATION NO. Address R.H. 2 Midland Signed Gary M. Lail Date 1-7-79 AUTHORIZED REPRESENTATIVE							

APR 17 1979

WATER WELL RECORD  
ACT 294 PA 1965MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH

## 1 LOCATION OF WELL

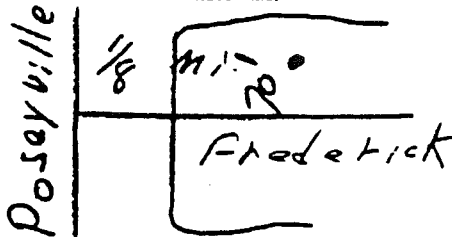
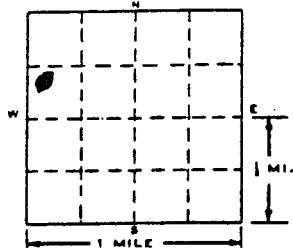
County Midland Township Name Midland Fraction NW 1/4 SW 1/4 Section Number 33 Town Number 14 Range Number 2

Distance And Direction from Road Intersections  
1/2 mi. East of Poseyville and Frederick RD.

Street address & City of Well Location 3089 Frederick

Locate with "X" in section below

Sketch Map:



## 3 OWNER OF WELL:

ART MALPASS  
Address 3077 Frederick  
Midland Mich

## 4 WELL DEPTH: (complete) Date of Completion

135 ft. 3-9-79

5 ☐ Cable tool ☒ Rotary ☐ Driven ☐ Drill  
☐ Hollow rod ☐ Jetted ☐ Bored ☐

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry  
☐ Irrigation ☐ Air Conditioning ☐ Commercial  
☐ Test Well ☐

7 CASING: Threaded ☒ Welded ☐ Height: Above Surface ft.  
Diam. 2 in. to 126 ft. Depth Weight 375 lbs./ft.  
Drive Shoe? Yes ☒ No ☐

## 2 FORMATION

THICKNESS  
OF  
STRATUMDEPTH TO  
BOTTOM OF  
STRATUM

<u>Sandy Clay</u>	<u>40'</u>	<u>40'</u>
<u>Clay</u>	<u>70'</u>	<u>110'</u>
<u>Fine Sand</u>	<u>15'</u>	<u>125'</u>
<u>Med Sand</u>	<u>10'</u>	<u>135'</u>

## 8 SCREEN:

Type Galv Dia. 1 1/4"  
Slot 7 Length 9'  
Set between 126 ft. and 135 ft.  
Fittings: 4 Ball Pipe  
check

## 9 STATIC WATER LEVEL

3 ft. above land surface 23

## 10 PUMPING LEVEL below land surface

6 ft. after 1 hrs. pumping 10 g.p.m.  
ft. after hrs. pumping g.p.m.

## 11 WATER QUALITY in Parts Per Million:

Iron (Fe) Chlorides (Cl)  
Hardness Other

12 WELL HEAD COMPLETION: ☐ In Approved Pit

☐ Pitless Adapter ☒ 12" Above Grade

13 Well Grouted? ☒ Yes ☐ No

☐ Neat Cement ☐ Bentonite Heavy Mod  
Depth: From ft. to ft.

## 14 Nearest Source of possible contamination

75 feet N Direction Sept C Type  
Well disinfected upon completion ☒ Yes ☐ No

## 15 PUMP:

☒ Not installed

Manufacturer's Name  
Model Number HP Volts  
Length of Drop Pipe ft. capacity G.P.M.  
Type: ☐ Submersible  
☐ Jet ☐ Reciprocating

USE A 2ND SHEET IF NEEDED

## 16 Remarks, elevation, source of data, etc.

dy  
ELEVATION  
DEPTH TO ROCK

## 17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Cardwell Drilling 2222  
REGISTERED BUSINESS NAME REGISTRATION NO.  
Address R#2 Midland  
Signed Gay Card Date 3-9-79  
AUTHORIZED REPRESENTATIVE

**PERMIT NUMBER**

33-24

1 LOCATION OF WELL		TOWNSHIP NAME		Fraction	Section Number	Town Number	Range Number
County	MIDLAND	MIDLAND		50 1/4 Sec 1/4	33	T 14 N R 2 E	
Distance And Direction From Road Intersection				3 OWNER OF WELL:			
EAST 1/2 MI. ON PASTVILLE RD ON NORTH SIDE OF GORDONVILLE RD.				CONSUMERS POWER CO.			
Street Address & City of Well Location				Address GORDONVILLE RD MIDLAND MICH			
Locate with "X" in Section Below				Address Same As Well Location? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
Sketch Map				4 WELL DEPTH (Completed) 160 Date of Completion 9/12/81			
				5 <input type="checkbox"/> Cable tool <input checked="" type="checkbox"/> Rotary <input type="checkbox"/> Driven <input type="checkbox"/> Dig			
				<input type="checkbox"/> Hollow rod <input type="checkbox"/> Auger <input type="checkbox"/> Jetted <input type="checkbox"/>			
2 FORMATION DESCRIPTION				6 USE <input type="checkbox"/> Domestic <input type="checkbox"/> Type I Public <input type="checkbox"/> Type III Public			
				<input type="checkbox"/> Irrigation <input type="checkbox"/> Type II Public <input type="checkbox"/> Heat pump			
SURFACE SAND				7 CASING <input type="checkbox"/> Steel <input type="checkbox"/> Threaded <input type="checkbox"/> Plastic <input checked="" type="checkbox"/> Welded			
				Diameter 4 in to 14 1/2 in Depth 145 ft			
GRAVEL PACKED CLAY				Grouted Drill Hole Diameter 145 ft			
				Grouted Drill Hole Diameter 145 ft			
CLAY				8 SCREEN <input type="checkbox"/> Not Installed			
				Type STAINLESS Diameter 3" Slot/Gauge 10 Length 15' Set between 145 ft and 160 ft			
WATER SAND				FITTINGS <input checked="" type="checkbox"/> K-Packer <input type="checkbox"/> Lead Packer <input checked="" type="checkbox"/> Bremer Check			
				<input type="checkbox"/> Blank above screen <input type="checkbox"/> Other			
				9 STATIC WATER LEVEL 5 ft below land surface <input type="checkbox"/> Flow			
				10 PUMPING LEVEL below land surface 90 ft after 3 hrs pumping at 90 GPM			
				11 WELL HEAD COMPLETION <input type="checkbox"/> Pitless adapter <input type="checkbox"/> 12" above grade			
				<input type="checkbox"/> Basement offset <input type="checkbox"/> Approved pit			
				12 WELL GROUTED <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes From 145 to 160 ft			
				<input type="checkbox"/> Neat cement <input type="checkbox"/> Bentonite <input type="checkbox"/> Other HEAVY MUD			
				13 Nearest source of possible contamination			
				Type None Distance ft Direction			
				Well disinfected upon completion? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
				14 PUMP <input type="checkbox"/> Not Installed <input type="checkbox"/> Pump Installation Only			
				Manufacturer's name			
				Model number HP Volts			
				Length of Drop Pipe ft Capacity GPM			
				TYPE <input type="checkbox"/> Submersible <input type="checkbox"/> Jet			
				PRESSURE TANK			
				Manufacturer's name			
				Model number Capacity Gallons			
15. Remarks, elevation, source				16. WATER WELL CONTRACTOR'S CERTIFICATION:			
CORRECTED BY				This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief			
ADDITION BY				FROEMAN & KRAUSS Well Drilling			
				REGISTERED BUSINESS NAME REGISTRATION NO. 0555			
				Address 4893 S. TOWN'S RD BIRMINGHAM			
				Signed Dale Freeman Date 9/15/81			

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

GEOLOGICAL SURVEY NO

OCT 02 1981

WATER WELL AND PUMP RECORD

PART 127 ACT 368, P.A. 1978

PERMIT NUMBER

33-

1 LOCATION OF WELL		3 OWNER OF WELL	
County <b>MIDLAND</b>	Township Name <b>MIDLAND</b>	Fraction <b>SE 1/4 SW 1/4</b>	Section Number <b>34 33</b>
Distance And Direction From Road Intersection <b>EAST 1/2 mi of POSYVILLE RD ON NORTH SIDE OF GORDONVILLE RD.</b>		Town Number <b>T-14 N/3</b>	Range Number <b>R. 2</b>
Street Address & City of Well Location		Address <b>GORDONVILLE RD MIDLAND MICH</b>	
Locate with "X" in Section Below		Address Same As Well Location? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
		4 WELL DEPTH: (completed) <b>150</b> ft Date of Completion <b>9/10/81</b> 5 <input type="checkbox"/> Cable tool <input checked="" type="checkbox"/> Rotary <input type="checkbox"/> Driven <input type="checkbox"/> Dug <input type="checkbox"/> Hollow rod <input type="checkbox"/> Auger <input type="checkbox"/> Jetted <input type="checkbox"/>	
2 FORMATION DESCRIPTION		6 USE	
	THICKNESS OF STRATUM	<input type="checkbox"/> Domestic <input type="checkbox"/> Type I Public <input type="checkbox"/> Type II Public <input type="checkbox"/> Irrigation <input type="checkbox"/> Type III Public <input type="checkbox"/> Heat pump <input type="checkbox"/> Test Well <input type="checkbox"/> Type IV Public <input type="checkbox"/>	
<b>SURFACE SAND</b>	<b>0</b>	7 CASING	
<b>GRAVEL PACKED CLAY</b>	<b>80</b>	Diameter <input checked="" type="checkbox"/> Steel <input checked="" type="checkbox"/> Threaded <input type="checkbox"/> Plastic <input type="checkbox"/> Welded Height Above Surface <b>1</b> ft Weight <b>142</b> lbs ft Grouted Port Hole Diameter <b>2</b> ft	
<b>CLAY</b>	<b>52</b>	8 SCREEN	
<b>WATER SAND</b>	<b>15</b>	Type <b>STAINLESS</b> Diameter <b>3</b> in Slot Gauge <b>10</b> Length <b>8</b> ft Set between <b>142</b> ft and <b>150</b> ft <input checked="" type="checkbox"/> Bittings <input checked="" type="checkbox"/> K Packer <input type="checkbox"/> Lead Packer <input checked="" type="checkbox"/> Eramer Screen <input type="checkbox"/> Blank above screen <b>2</b> ft Other	
		9 STATIC WATER LEVEL	
		<b>5</b> ft below land surface <b>142</b> ft	
		10 PUMPING LEVEL	
		<b>80</b> ft after <b>3</b> hrs pumping at <b>75</b> GPM ft after hrs pumping at GPM	
		11 WELL HEAD COMPLETION	
		<input type="checkbox"/> Pile adapter <input type="checkbox"/> 12" above grade <input type="checkbox"/> Basement offset <input type="checkbox"/> Approved pit	
		12 WELL GROUTED	
		<input type="checkbox"/> No <input checked="" type="checkbox"/> Yes From to <input type="checkbox"/> Near cement <input type="checkbox"/> Bentonite <input type="checkbox"/> Other <b>Heavy mud</b> No. of bags of cement Additives	
		13 Nearest source of possible contamination	
		Type <b>none</b> Distance ft Direction Well disinfected upon completion? <input type="checkbox"/> Yes <input type="checkbox"/> No	
		14 PUMP	
		<input type="checkbox"/> Not installed <input type="checkbox"/> Pump installation Only Manufacturer's name Model number HP Volts Length of Drop Pipe ft capacity GPM TYPE <input type="checkbox"/> Submersible <input type="checkbox"/> Jet PRESSURE TANK Manufacturer's name Model number Capacity Gallons	
15. Remarks, elevation, source of data, etc.		16 WATER WELL CONTRACTOR'S CERTIFICATION	
ADDITIONAL INFO BY DRILLER CORRECTED BY D67d (Rev 10-80)		This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief. <b>Forman &amp; Kress Well Drilling</b> REGISTERED BUSINESS NAME REGISTRATION NO. <b>055</b> Address <b>4893 S. Jarvis Rd. BRIGHTON</b> Signed <b>Mike Forman</b> Date <b>9/15/81</b> AUTHORIZED REPRESENTATIVE	

33-14N-2E

TD 4460' in Detroit Ev.  
(Dry)

Midland Twp., (Midland County)

*Dow Chemical Co.**Ashby Drilling Co.*

T. E. McCann #1

Permit #11579

Drilling Contractor: Company tools (Rotary)

Location: NE $\frac{1}{4}$ , NE $\frac{1}{4}$ , NE $\frac{1}{4}$  section 33, T.14N., R.2E.  
330' from north and 330' from east line of quarter section.

Elevation: 611.8 feet above sea level.

Record by: D. Myers from driller's log.

	Thickness (feet)	Depth (feet)
PLEISTOCENE:		
Drift:		
Clay	316	316
PENNSYLVANIAN:		
Saginaw:		
Sand	331	647
Shale and sand	77	724
MISSISSIPPIAN:		
Michigan-Marshall (Preliminary report Marshall 1181):		
Shale and shells	649	1373
Coldwater-Berea-Antrim (Preliminary report Antrim 2573?):		
Shale and sand	72	1445
Shale	125	1570
Sand	40	1610
Sand and shale	1255	2865
Shale and lime	15	2880
DEVONIAN:		
Traverse:		
Shale (may be part Antrim)	152	3032
Lime (Preliminary report Squaw Bay 2954; Alpena 3030)	595	3627
Dundee-Detroit River (Preliminary report Dundee 3590; Monroe 3850):		
Lime	491	4118
Salt	15	4133
Lime	92	4225
Salt	10	4235
Lime and salt	53	4288
Lime	147	4435
Coring	25	4460

Note: (Preliminary report):

Bleeding Oil 3594-98

" " 3603-07

Show dead oil 3854-58

300' water 4446-50; very small show oil &amp; gas 4450-60

Casing record:

8 $\frac{1}{4}$ " 1335' Commenced: 6-1-45

Completed: 7-14-45

Initial Foundation: 200' 2-1-45

TOTAL DEPTH

4460



# HANDY BROS. MINING CO. & WOLVERINE COAL CO.

33-3

SAGINAW, MICH.

*June 9* 190*6*

COAL CO. No.

*271* ✓

DRILLER'S No.

I HAVE THIS

*8*

DAY OF

*June*

19

*06*

, FINISHED A TEST WELL ON THE FOLLOWING DESCRIBED LAND AND REPORT THE TEST AS FOLLOWS:

*H. B. Ackerman*

DESCRIPTION.

*Midland*

*N 1/2 of SE 1/4 Sect 33*

Give Township and Sec. and Owner's name in country. In City give Street, Lot and Block No. and Addition.

*14N-2E*

THICKNESS OF STRATA.

MATERIAL.

DEPTH.

*6*

*Clay  
Sandy Gravel  
Sandy Clay  
Kaldpan  
Sand  
Sandy Clay  
Clay*

*6*

*8*

*14*

*6 ft*

*78*

*18*

*96*

*34*

*130*

*80*

*210*

*11*

*221*

*(14N-2E)*

REMARKS:

*100 ft west of east line  
200 - south of north line  
200'*

Signed

*Fred Oeder*

Driller.

JUN 28 1982  
GEOLOGICAL SURVEY NO

MICHIGAN DEPARTMENT OF PUBLIC HEALTH  
WATER WELL AND PUMP RECORD

PART 127 ACT 368, P.A. 1978

PERMIT NUMBER 33-

LOCATION OF WELL

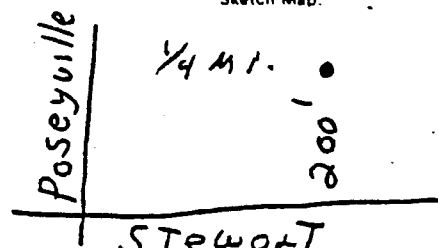
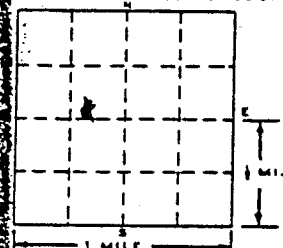
County Midland Township Midland Fraction SW 1/4 SE 1/4 N1/4 Section Number 33 Town Number 14 N1/2 Range Number 2 E1/2

Distance And Direction From Road Intersection  
1/4 mi. East of Poseyville Rd.  
and 200' North of Stewart Rd

Street Address & City of Well Location 3091 E. Stewart.

Locate with "X" in Section Below

Sketch Map:



3 OWNER OF WELL  
Morris Crall  
Address 3091 E. Stewart  
Midland  
Address Same As Well Location? ☒ Yes ☐ No

4 WELL DEPTH: (completed) 182 ft. Date of Completion 4-1-82

5 ☐ Cable tool ☒ Rotary ☐ Driven ☐ Dug  
☐ Hollow rod ☐ Auger ☐ Jetted ☐

6 USE: ☒ Domestic ☐ Type I Public ☐ Type III Public  
☐ Irrigation ☐ Type IIa Public ☐ Heat pump  
☐ Test Well ☐ Type IIb Public ☐

7 CASING: ☒ Steel ☒ Threaded ☐ Plastic ☐ Welded  
Diameter 2 in. to 174 ft. depth  
Height: Above/Below Surface 1 ft.  
Weight 3.75 lbs./ft.  
Grouped Drill Hole Diameter 5 in. to 12 ft. depth  
Drive Shoe ☒ Yes ☐ No  
378 in. to 170 ft. depth

8 SCREEN: ☐ Not installed  
Type Galv. Diameter 1 1/2"  
Slot/Gauge 10 Length 8  
Set between 174 ft. and 182 ft.  
FITTINGS ☒ K-Packer ☐ Lead Packer ☐ Bremer Check  
☐ Blank above screen 4 ft. Other \_\_\_\_\_

9 STATIC WATER LEVEL: 3 ft. below land surface ☐ Flow

10 PUMPING LEVEL below land surface  
20 ft. after 1 hrs. pumping at 12 G.P.M.  
\_\_\_\_\_ ft. after \_\_\_\_\_ hrs. pumping at \_\_\_\_\_ G.P.M.

11 WELL HEAD COMPLETION ☒ Pitless adapter ☐ 12" above grade  
☐ Basement offset ☐ Approved pit

12 WELL GROUTED? ☐ No ☒ Yes From \_\_\_\_\_ to \_\_\_\_\_ ft.  
☐ Neat cement ☐ Bentonite ☐ Other Drill Mud  
No. of bags of cement \_\_\_\_\_ Additives \_\_\_\_\_

13 Nearest source of possible contamination  
Type Septic Distance 160 ft. Direction NE  
Well disinfected upon completion? ☐ Yes ☐ No

14 PUMP ☒ Not installed ☐ Pump installation Only  
Manufacturer's name \_\_\_\_\_  
Model number \_\_\_\_\_ HP \_\_\_\_\_ Volts \_\_\_\_\_  
Length of Drop Pipe \_\_\_\_\_ ft. capacity \_\_\_\_\_ G.P.M.  
TYPE: ☐ Submersible ☐ Jet \_\_\_\_\_  
PRESSURE TANK  
Manufacturer's name \_\_\_\_\_  
Model number \_\_\_\_\_ Capacity \_\_\_\_\_ Gallons

FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Top Soil	2'	2'
Sandy Clay	20'	22'
Stones - Gravel	22'	44'
Clay same stones	108'	152'
med Sand	23'	175'
Coarse Sand	7'	182'
fe 0.2		
cl 4		
hd 5		
fl. 0.4		
Mu. 157		

USE A 2ND SHEET IF NEEDED

15. Remarks, elevation, source of data, etc.  
ADDED INFO BY DRILLER, ITEM NO.  
CORRECTED BY  
ADDITION BY  
ELEVATION  
DEPTH TO ROCK

16. WATER WELL CONTRACTOR'S CERTIFICATION:  
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.  
Card Drill Drilling 560222  
REGISTERED BUSINESS NAME REGISTRATION NO.  
Address RT 2  
Signed Sam Crall AUTHORIZED REPRESENTATIVE Date 4-15-82

1982

## WATER WELL AND PUMP RECORD

PART 127 ACT 368, P.A. 1978

PERMIT NUMBER

33-3

1 LOCATION OF WELL		THICKNESS OF STRATUM		DEPTH TO BOTTOM OF STRATUM	
County	Midland	Township Name	Midland	Fraction	NE 1/4 NW 1/4 SW 1/4
Section Number	33	Town Number	14	Range Number	2
Distance And Direction From Road Intersection		120' East of Poseyville Rd. and 120' South of Stewart Trp.			
Street Address & City of Well Location		1259 Poseyville Rd.			
Locate with "X" in Section Below		Sketch Map			
2 FORMATION DESCRIPTION		THICKNESS OF STRATUM		DEPTH TO BOTTOM OF STRATUM	
Clay		16'		16'	
Sandy Clay		16'		26'	
Clay		84'		110'	
Sandy Clay		12'		122'	
Fine Sand		28'		150'	
Coarse Sand		14'		164'	
15 Remarks, elevation, source of data, etc.		16. WATER WELL CONTRACTOR'S CERTIFICATION			
<p>RECEIVED</p> <p>Mich. Dept. of Public Health</p> <p>OCT 22 1982</p> <p>Environmental and Occupational Health Services Administration</p> <p>USE A 2ND SHEET IF NEEDED</p> <p>ADDED INFO BY DRILLER, LHM MLL</p> <p>*CORRECTED BY</p> <p>**ADDITION BY</p> <p>ELEVATION</p> <p>DEPTH TO ROCK</p>		<p>3 OWNER OF WELL: Fred White, ACE HARDWARE, 414 MAJAN ST, MIDLAND MICH.</p> <p>Address Same As Well Location? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p> <p>4 WELL DEPTH: (completed) 164 ft. Date of Completion Sep 5, 82</p> <p>5 <input type="checkbox"/> Cable tool <input checked="" type="checkbox"/> Rotary <input type="checkbox"/> Driven <input type="checkbox"/> Dug</p> <p><input type="checkbox"/> Hollow rod <input checked="" type="checkbox"/> Auger <input type="checkbox"/> Jetted <input type="checkbox"/></p> <p>6 USE: <input type="checkbox"/> Domestic <input checked="" type="checkbox"/> Type I Public <input type="checkbox"/> Type III Public</p> <p><input type="checkbox"/> Irrigation <input type="checkbox"/> Type IIa Public <input type="checkbox"/> Heat pump</p> <p><input type="checkbox"/> Test Well <input type="checkbox"/> Type IIb Public <input type="checkbox"/></p> <p>7 CASING: <input checked="" type="checkbox"/> Steel <input checked="" type="checkbox"/> Threaded <input type="checkbox"/> Welded</p> <p><input type="checkbox"/> Plastic <input type="checkbox"/> Height Above/Below Surface 1 ft</p> <p>2 in. to 156 ft. depth Weight 3.25 lbs./ft.</p> <p>5 in. to 12 ft. depth Drive Shoe <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>7 in. to 90 ft. depth</p> <p>8 SCREEN <input type="checkbox"/> Not installed</p> <p>Type Galv Diameter 1 1/2"</p> <p>Slot/Groove 10 Length 8'</p> <p>Set between 156 ft and 164 ft</p> <p>FITTINGS <input checked="" type="checkbox"/> K-Packer <input type="checkbox"/> Lead Packer <input type="checkbox"/> Bremer Check</p> <p><input type="checkbox"/> Blank above screen 4 ft Other</p> <p>9 STATIC WATER LEVEL 5 ft below land surface <input type="checkbox"/> Flow</p> <p>10 PUMPING LEVEL below land surface</p> <p>20 ft after 1 hrs pumping at 10 GPM</p> <p>ft after hrs pumping at GPM</p> <p>11 WELL HEAD COMPLETION <input checked="" type="checkbox"/> Pitless adapter <input type="checkbox"/> 12' above grade</p> <p><input type="checkbox"/> Basement offset <input type="checkbox"/> Approved pit</p> <p>12 WELL GROUTED? <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes From to ft</p> <p><input type="checkbox"/> Neat cement <input type="checkbox"/> Bentonite <input checked="" type="checkbox"/> Other Drilled mud</p> <p>No. of bags of cement Additives</p> <p>13 Nearest source of possible contamination</p> <p>Type Septic Distance 25 ft Direction NE</p> <p>Well disinfected upon completion? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>14 PUMP <input checked="" type="checkbox"/> Not installed <input type="checkbox"/> Pump Installation Only</p> <p>Manufacturer's name</p> <p>Model number HP Volts</p> <p>Length of Drop Pipe ft capacity GPM</p> <p>TYPE <input type="checkbox"/> Submersible <input type="checkbox"/> Jet</p> <p>PRESSURE TANK</p> <p>Manufacturer's name</p> <p>Model number Capacity Gallons</p>			



# GROUND WATER OBSERVATION WELL RECORD

34-1

PROJECT Midland Power Plant  
LOCATION S 10913 W 5  
DATE COMPLETED 21 October 1977  
INSPECTED BY W. R. Kinzer DATE 10/21/77  
CHECKED BY G. T. LeFevre DATE 2/14/79

PAGE 1 OF 2  
WELL NO. W-12  
AQUIFER Silty Fine Sand and Gravel  
THICKNESS 20'

Generalized Stratigraphy and Water Level		Elevation of top of surface casing/ riser pipe	
GROUND ELEVATION 631.1'		633.2'	
		Height of top of surface casing/ riser pipe above ground	
		25"	
		Depth of surface seal below ground surface	
		15	
		Type of surface seal: <u>Neat Cement</u> <u>Grout</u>	
		I.D. of surface casing	
		8"	
		Type of surface casing: <u>Galvanized</u> <u>SC# 40 Steel, Flanged Joint</u>	
		Depth of surface casing below ground	
		12.9'	
		I.D. of riser pipe	
		4"	
		Type of riser pipe: <u>Blank SC# 40</u> <u>PVC Glued Slip Joints</u>	
		Diameter of borehole	
		8'	
		Type of backfill: <u>Neat Cement</u>	
		Elevation / depth of top of seal	
		499.1 / 132.1	
		Type of seal: <u>Bentonite Pellets</u>	
		Elevation / depth of bottom of seal	
		497.1 / 134.1	
		Type of sand pack <u>Pea Gravel</u>	
		Depth of top of sand pack	
		134.0	
		Elevation / depth of top of screen section	
		485.1 / 146.0	
		Type of screen section: <u>PVC</u>	
		Describe openings <u>0.04 in. Slots</u> <u>Commercially Prepared</u>	
		I.D. of screen section	
		4"	
		Elev. / depth of bottom of screen section	
		480.1 / 151.1	
		Length of blank section	
		3'	
		Elev. / depth of bottom of plugged blank section	
		477.2 / 154.2	
		Elev. / depth of bottom of sand column	
		475.1 / 155.1	
		Type of backfill below observation pipe	
		<u>Grout</u>	
		Elevation of bottom of borehole	
		475.1	

# GROUND WATER OBSERVATION WELL RECORD

34-2

PROJECT	Midland Power Plant		PAGE	1	OF	1
LOCATION	S 10913	W 10	WELL NO.	W-13		
DATE COMPLETED	2 November 1977		AQUIFER	Fine to Medium Sand		
INSPECTED BY	W. R. Kinzer	DATE	11/2/77			
CHECKED BY	G. T. LaFevre	DATE	2/14/79			
			THICKNESS	50'		

Generalized Stratigraphy and Water Level		Well Construction Details	
GROUND ELEVATION 631.4'		Elevation of top of surface casing/riser pipe	632.9'
		Height of top of surface casing/riser pipe above ground	18"
		Depth of surface seal below ground surface	15'
		Type of surface seal: Neat Cement Grout	
		I.D. of surface casing	8"
		Type of surface casing: Galvanized Steel w/Flanged Couplings	
		Depth of surface casing below ground	13.5'
		I.D. of riser pipe	4"
		Type of riser pipe: FVC SCH 40 with Glued Flanged Joints	
		Diameter of borehole	8"
		Type of backfill: Neat Cement	
		Elevation / depth of top of seal	468.4 / 163.0
		Type of seal: Bentonite Pellets	
		Elevation / depth of bottom of seal	466.4 / 165.
		Type of sand pack: Pea Gravel	
		Depth of top of sand pack	466.4 / 165.0
		Elevation / depth of top of screen section	452.4 / 179..
		Type of screen section: PVC Pipe	
		Describe openings: Commercially Slotted at 0.04 in.	
		I.D. of screen section	4"
		Elev. / depth of bottom of screen section	442.4 / 189.0
		Length of blank section	5.0'
		Elev. / depth of bottom of plugged blank section	437.4 / 196.0
		Elev. / depth of bottom of sand column	437.4 / 196.0
		Type of backfill below observation pipe: Fine Sand	
		Elevation of bottom of borehole	436.4'

# HANDY BROS. MINING CO. & WOLVERINE COAL CO. 34-3

M. O. Co. B.

SAGINAW, MICH.,

Oct 27<sup>th</sup>

1904

COAL CO. No.

342

DRILLER'S No.

I HAVE THIS

22

DAY OF

Oct

1904

FINISHED A TEST WELL ON THE FOLLOWING DESCRIBED LAND AND REPORT THE TEST AS FOLLOWS:

DESCRIPTION.  
Midland Co. Poor Farm.

Midland M

S 1/2 of S E 1/4

Sec 34

14N-2E

Give Township and Sec. and Owner's name in country. In City give Street, Lot and Block No. and Addition.

THICKNESS OF STRATA.

MATERIAL.

DEPTH.

64  
8  
100  
11  
43

Clay  
Sand  
Clay  
Sand  
Clay

64  
72  
172  
183  
226

REMARKS:

1110 ft south of ~~East~~ North line  
600 - east of west line

Signed John C. Woodward Driller.

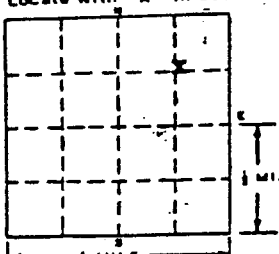
NOV 13 1981

WATER WELL RECORD

ACT 294 PA 1985

MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH

633.4

LOCATION OF WELL		FRACTION		SECTION NUMBER	TOWN NUMBER	RANGE NUMBER
County Midland	Township Name Midland	SW NE SE NE	34	T14	N/2	R2 E/A
Distance And Direction from Road Intersections 1-3/4 miles N. of Roseville Road 3/4 miles W. of Gordonville Road			3 OWNER OF WELL: Consumers Power Company Midland Generating Station Midland, Michigan			
Street address & City of Well Location Locate with "X" in section below			4 WELL DEPTH: (completed) Date of Completion 52.3 ft. 9-1-81			
Sketch Map: 			5 <input checked="" type="checkbox"/> Cable tool <input type="checkbox"/> Rotary <input type="checkbox"/> Driven <input type="checkbox"/> Dug <input type="checkbox"/> Hollow rod <input type="checkbox"/> Jetted <input type="checkbox"/> Bored <input type="checkbox"/>			
			6 USE: <input type="checkbox"/> Domestic <input type="checkbox"/> Public Supply <input type="checkbox"/> Industry <input type="checkbox"/> Irrigation <input type="checkbox"/> Air Conditioning <input type="checkbox"/> Commercial <input type="checkbox"/> Test Well <input checked="" type="checkbox"/> Dewatering			
			7 CASING: Threaded <input type="checkbox"/> Welded <input checked="" type="checkbox"/> Height: Above/Below Diam. Surface .4 ft. Weight 3.56 lbs./ft. 6 in. to 29.3 ft. Depth 6 in. to 36.0 ft. Depth Drive Shoe? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>			
2	H-4 FORMATION 633.4	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM	8 SCREEN: Johnson Type: PVC Wire Wound Dia.: 6 Slot/Gauze 0.18" Length 6.7' Set between 29.3 ft. and 36.0 ft. Fittings: PVC Slip Coupling		
	Gravel (fill)	1.4	1.4	9 STATIC WATER LEVEL 14.8 ft. below land surface 618.6		
	Brown clay (fill)	0.6	2.0	10 PUMPING LEVEL below land surface ft. after hrs. pumping G.D.M.		
	Brown fine to med. sand (fill)	0.5	2.5	ft. after hrs. pumping G.D.M.		
	Grey clay w/trace fine sand (fill)	2	4.5	11 WATER QUALITY in Parts Per Million: Iron (Fe) Chlorides (Cl) Hardness Other		
	Concrete	1	5.5	12 WELL HEAD COMPLETION: <input type="checkbox"/> In Approved Pit <input type="checkbox"/> Pitless Adapter <input type="checkbox"/> 12" Above Grade		
	Brown clay with sand and gravel (fill)	24.5	30	13 Well Grouted? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Neat Cement <input type="checkbox"/> Bentonite Depth: From 5.3 ft. to 23.4 ft.		
	Brown sand with grey clay	2	32	14 Nearest Source of possible contamination 25 feet N Direction Storm Drain Type Well disinfected upon completion <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
	Grey silt to fine sand with clay	3.6	35.6	15 PUMP: <input checked="" type="checkbox"/> Not installed Manufacturer's Name Model Number HP Volts Length of Drop Pipe ft. capacity G.P.M. Type: <input type="checkbox"/> Submersible <input type="checkbox"/> Jet <input type="checkbox"/> Reciprocating		
	Grey clay with fine sand	1.4	37			
	Light grey to dark grey clay	15.3	52.3			
ADDED INFO. BY DRILLER, CEX NO.						
CORRECTED BY						
REVISION						
USE A 2ND SHEET IF NEEDED						

16 Remarks, elevation, source of data, etc.

Dewatering well H-4 Chlorination Bldg  
17" x 6" Gravel Wall Well  
Surface Elevation 633.4'

17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Layne-Northern Co.

REGISTERED BUSINESS NAME

REGISTRATION NO.

Address P.O. Box 468, Mishawaka, IN 46544

Signed

AUTHORIZED REPRESENTATIVE

Date

10-19-81

# Environmental Data Inc.

a subsidiary of WILLIAMS & WORKS

ENVIRONMENTAL SCIENTISTS/ENGINEERS/GEOLOGISTS/CHEMISTS  
871 CASCADE STREET PARKWAY, S.E., P.O. BOX 6916, GRAND RAPIDS, MICHIGAN 49508



## BORING & WELL RECORD

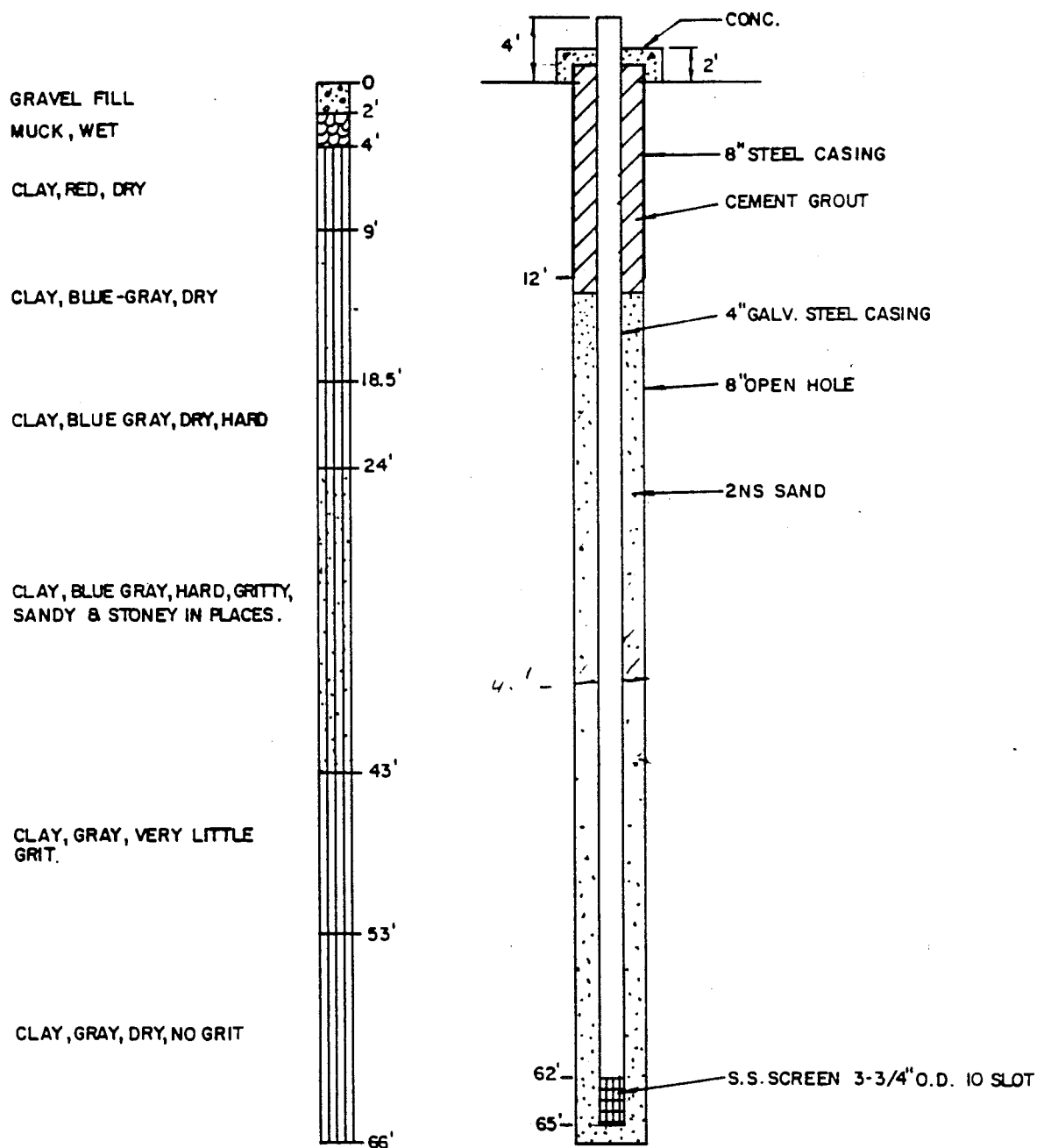
PROJECT NO. 20237  
OWNERS WELL NO. 7  
CLIENT DOW CHEMICAL  
DATE 3-27-81

CONTRACTOR: RIEGLER WELL DRILLING

ELEVATIONS: LAND SURFACE 622.52  
TOP OF CASING 626.52

### BORING

### WELL



STATIC WATER LEVEL 58.3' BELOW TOP OF CASING



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35-2  
PROJECT NO. 20237  
OWNERS WELL NO. 3010  
CLIENT DOW CHEMICAL  
DATE 9-21-83

## BORING & WELL RECORD

LOCATION: 8439S, 9129E

CONTRACTOR: RAYMER CO.  
ELEVATIONS: LAND SURFACE 622.5  
TOP OF CASING 625.59

### BORING (DRILLED BY MUD - ROTARY.)

SAND

CLAY, PLASTIC, BROWN GREY

CLAY, FIRM, SOME GRAVEL,  
GREY.

CLAY, HARD, SOME GRAVEL

GRAVEL, SOME CLAY

CLAY, SOME GRAVEL

CLAY, SANDY, SOME GRAVEL

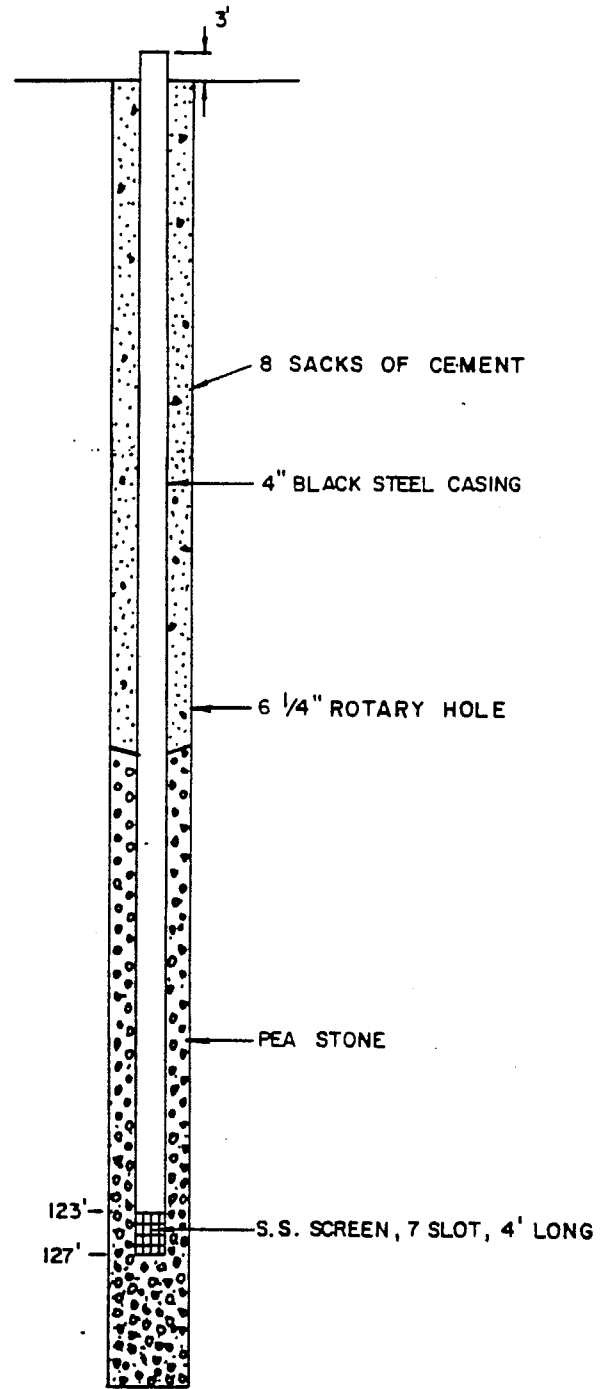
SAND, FINE

CLAY, GRAVEL

ROCKS

CLAY, GRAVEL  
BEDROCK, SHALE

### WELL



STATIC WATER LEVEL 19.9' BELOW TOP OF CASING

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## BORING & WELL RECORD

PROJECT NO. 20237

OWNERS WELL NO. 8

CLIENT DOW CHEMICAL

DATE 4-15-81

CONTRACTOR: RIEGLE WELL DRILLING

ELEVATIONS: LAND SURFACE 623.17

TOP OF CASING 627.17

### BORING

SAND & GRAVEL FILL  
TOPSOIL & SAND  
CLAY, WET, SOME SAND

CLAY, RED

CLAY, BLUE, GRITTY, FINE  
STONES.

CLAY, REDDISH GRAY

CLAY, GRAY, SANDY, GRITTY  
STONES

SAND, WET, COARSE

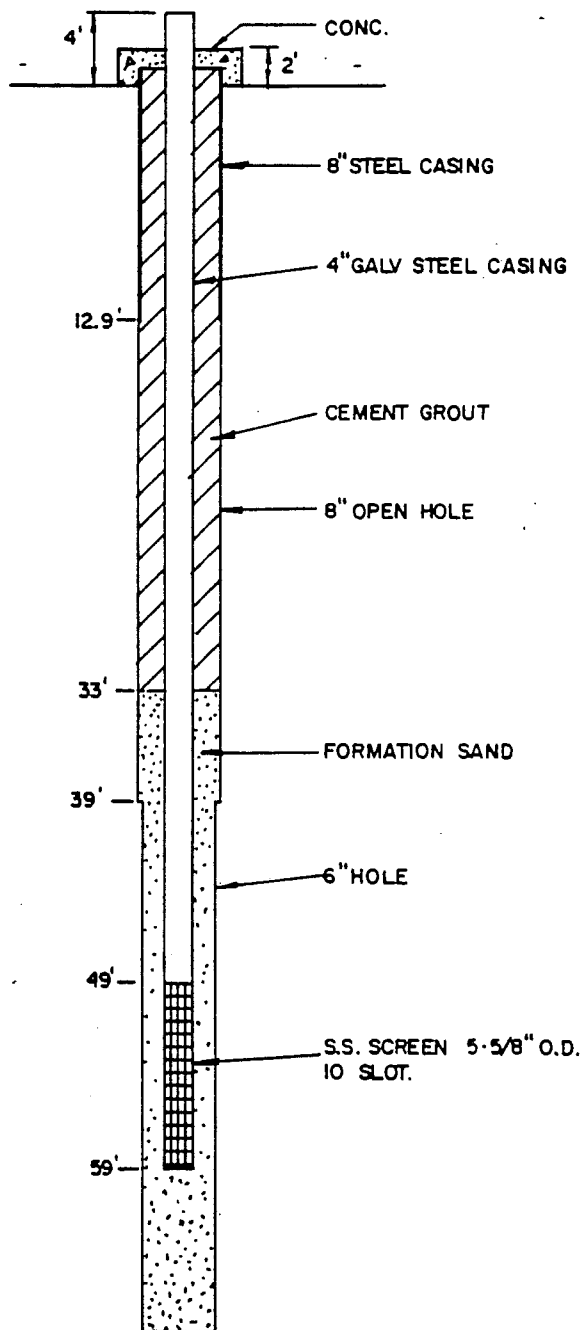
LARGE STONES & COARSE  
GRAVEL

SAND, FINE TO MED.

SAND, MED, CLAY WASH

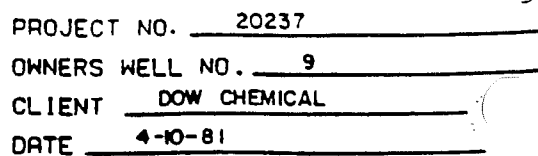
CLAY

### WELL



STATIC WATER LEVEL 21.4' BELOW TOP OF CASING

**ENVIRONMENTAL SCIENTISTS/ENGINEERS/GEOLOGISTS/CHEMISTS**  
891 CASCADE WEST PARKWAY, S.E. P.O. BOX 6119, GRAND RAPIDS, MICHIGAN 49508

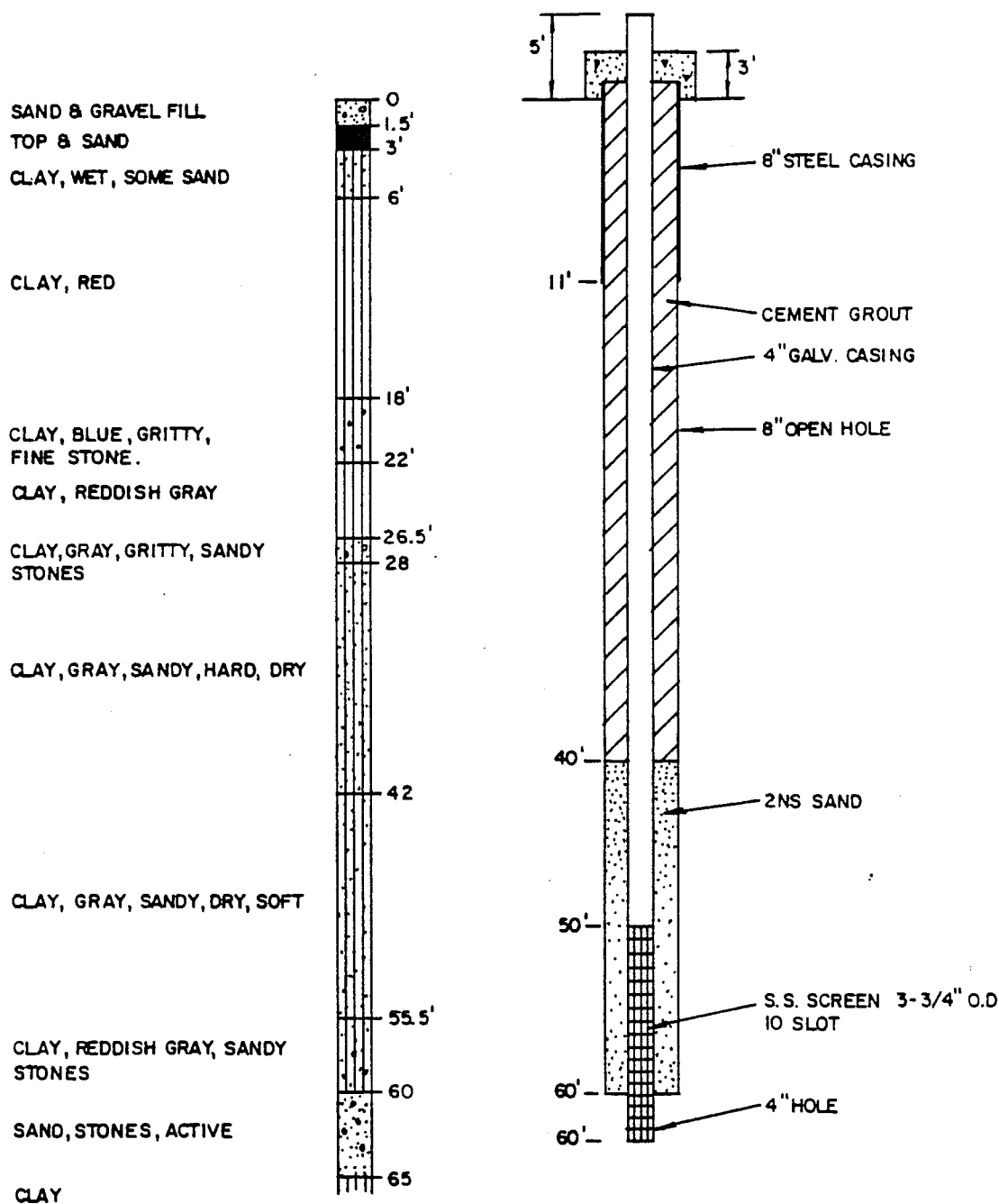


CONTRACTOR: RIEGLER WELL DRILLING

ELEVATIONS: LAND SURFACE 625.44  
TOP OF CASING 630.44

# BORING & WELL RECORD

WELL



STATIC WATER LEVEL 24.8' BELOW TOP OF CASING

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911 CASCADE WEST PARKWAY, S.E., P.O. BOX 6976, GRAND RAPIDS, MICHIGAN 49501



## BORING & WELL RECORD

LOCATION: 7570 S, 9175 E

PROJECT NO. 20237 33  
OWNERS WELL NO. 3009  
CLIENT DOW CHEMICAL  
DATE 9-20-83

CONTRACTOR: RAYMER CO.

ELEVATIONS: LAND SURFACE 628.0  
TOP OF CASING 630.74

SAND

CLAY, PLASTIC, SOFT, GRAY  
OCC. STONES.

CLAY, HARD, GRAY

CLAY & GRAVEL, HARD.

CLAY, VERY GRAVELLY

CLAY, SOME GRAVEL

CLAY, VERY GRAVELLY

CLAY, GRAVELLY

SAND, VERY FINE.

CLAY, GRAVELLY

BEDROCK, SHALE, BLUE

BEDROCK, SHALE, BLK.

0

6.6'

30'

70'

95'

100'

107'

109'

153'

161'

162'

164'

166'

STATIC WATER LEVEL 17.8' BELOW TOP OF CASING (DRILLED BY MUD-ROTARY)

CEMENT, 10 SACKS

4" BLACK STEEL CASING

6 1/4" ROTARY HOLE

3.5 FT.<sup>3</sup> PER STONE FOR  
GRAVEL PACK

SS. SCREEN, 7 SLOT, 4' LONG

**Environmental Data Inc.**a subsidiary of **WILLIAMS & WORKS**ENVIRONMENTAL SCIENTISTS/ENGINEERS/GEOLOGISTS/CHEMISTS  
911 CASCADE WEST PARKWAY, S.E., P.O. BOX 6516, GRAND RAPIDS, MICHIGAN 49506PROJECT NO. 20237OWNERS WELL NO. 3012CLIENT DOW CHEMICALDATE OCT. 3, 1983CONTRACTOR: RAYMERELEVATIONS: LAND SURFACE 611.0TOP OF CASING -**BORING & WELL RECORD**

LOCATION : 7479S, 8103E

SAND, FINE TO MED.

CLAY, GREY TO BROWN, SILTY  
MOIST.

CLAY, GRAY, SANDY, SILTY, MOIST

CLAY, SANDY, GRAVELLY, GRAY

CLAY, GRAY, SANDY, SILTY, HARD

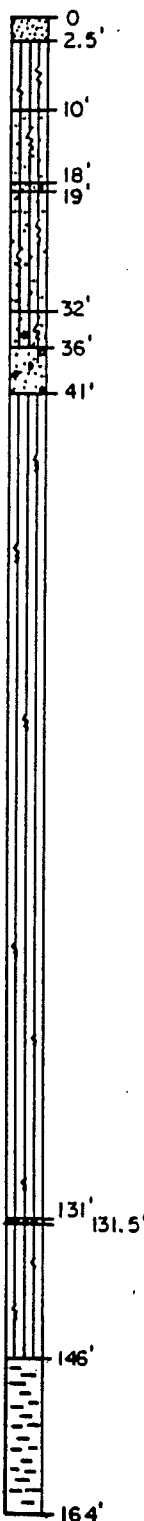
CLAY, GRAY, SANDY, SILTY, SOME  
STONE.

SAND, MED. TO COARSE, GRAVEL

CLAY, GRAY, SILTY SANDY,  
OCC. STONE

LENS OF GRAVEL

CLAY

SHALE, GRAY TO BLUE, OCC  
LIMESTONE CHIP.

- NO WELL SET.

- DRILLED BY MUD-ROTARY.

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911 CASCADE WEST PARKWAY, S.E. P.O. BOX 8514, GRAND RAPIDS, MICHIGAN 49508



PROJECT NO. 20245

OWNERS WELL NO. 3013

CLIENT DOW CHEMICAL

DATE 10-6-83

CONTRACTOR: RAYMER

ELEVATIONS: LAND SURFACE 615.6

TOP OF CASING 618.7

## BORING & WELL RECORD

LOCATION: 6843 S, 4965 E

### BORING

CLAY, GRAY, SANDY, SOFT  
CLAY, GRAY, SANDY, SOFT  
SOME STONES

CLAY, GRAY, SANDY, SILTY, HARD

CLAY, GRAY, SANDY, SILTY,

CLAY, GRAY, SANDY, SILTY, HARD

CLAY, GRAY, LENSES OF SAND.  
SAND & GRAVEL W/CLAY.  
SAND W/CLAY.

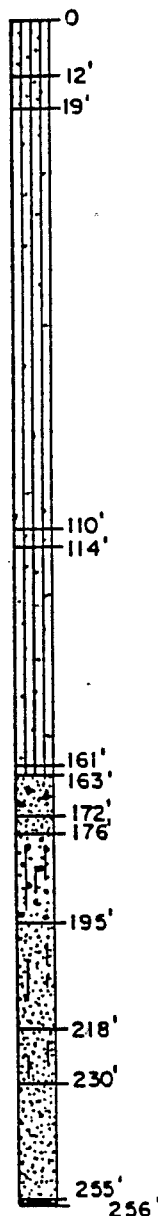
GRAVEL W/CLAY LENSES.

SAND & GRAVEL SOME CLAY

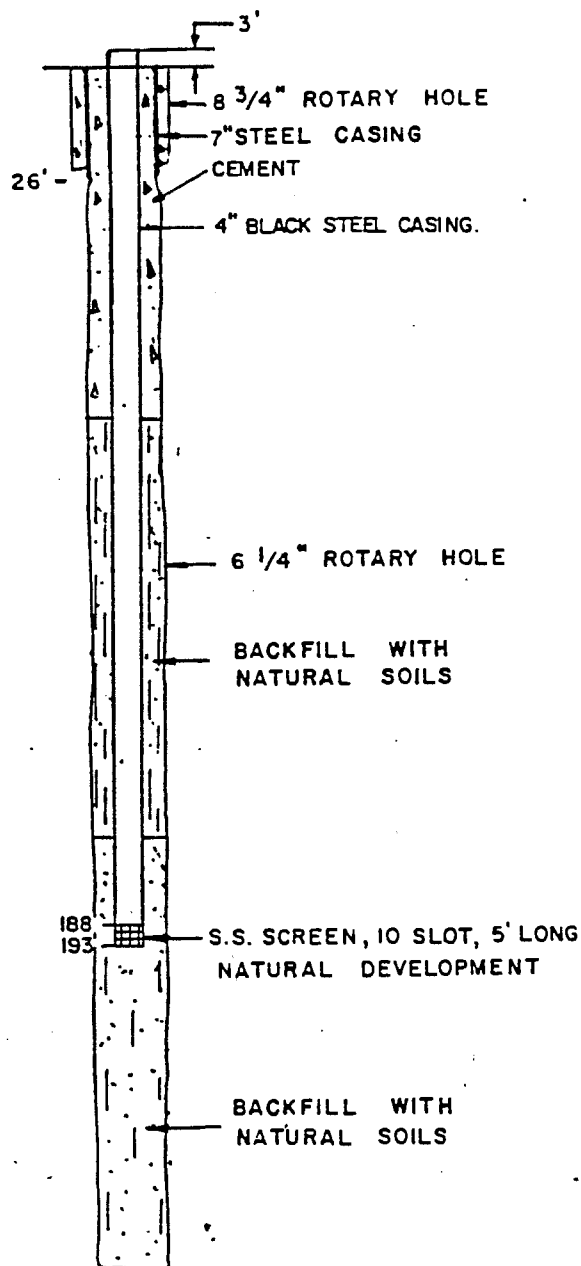
SAND & FINE GRAVEL, CLAY

SAND, MED TO COARSE

SHALE



### WELL



DRILLED BY MUD-ROTARY

STATIC WATER LEVEL FLOWING OVER TOP OF CASING

**WILLIAMS & WORKS**

Engineers/Surveyors/Planners/Geologists  
 611 Cascade West Parkway  
 Grand Rapids, Michigan 49506

Sheet \_\_\_\_\_ of \_\_\_\_\_

Client Dow ChemicalProject No. 85553Date 11/27/79

Permit No. \_\_\_\_\_

Project Salzburg Road Landfill

Location \_\_\_\_\_

Equipment Mud-Rotary (Klienfelt)

Technician \_\_\_\_\_

BORING NO. Dow #2402Surface Elev. 624.9

Hole Plugged With natural clay soils and  
 bentonite drilling mud.

Boring Location

Boring Depth.			No. Blows last 12"			
From	To		No. Blows 3rd 6"			
			No. Blows 2nd 6"			
			No. Blows 1st 6"			
			Depth of Test			
0	3	Clay, brown, sandy				
3	10	Clay brown				
10	40	Clay grey				
40	45	Clay and stones				
45	50	Clay brown				
50	52	Stones				
52	62	Clay, sandy, grey				
62	65	Gravel				
65	100	Clay, grey with stones				

## Groundwater:

Encountered at \_\_\_\_\_ ft.

After Completion \_\_\_\_\_ ft.

After \_\_\_\_\_ Hrs. \_\_\_\_\_ ft.

Boring Cave In \_\_\_\_\_ ft.

## Well Data:

Casing Used: Type \_\_\_\_\_

Diameter \_\_\_\_\_

Length \_\_\_\_\_

Screen Size \_\_\_\_\_

Elev. Top Casing \_\_\_\_\_

**WILLIAMS & WORKS**

**Engineers/Surveyors/Planners/Geologists**  
**811 Cascade West Parkway**  
**Grand Rapids, Michigan 49506**

Sheet        of       

Client Dow Chemical

Project No. 85553

Date 11/28/79

Permit No.

Project Salzburg Road Landfill

### Location

Equipment Mud-Rotary (Klienfelt)

## Technician

BORING NO. Dow #2396

Surface Elev. 627.1

Hole Plugged With natural clay soils and  
bentonite drilling mud.

### Boring Location

7914 S

7498 E

[illegible]

**Groundwater:**

Encountered at \_\_\_\_\_ ft.

After Completion \_\_\_\_\_ ft.

After \_\_\_\_\_ Hrs. \_\_\_\_\_ ft.

Boring Cave In \_\_\_\_\_ ft.

Well Data:

Casing Used: Type\_\_\_\_\_

Diameter

Length \_\_\_\_\_

### Screen Size

Elev. Top Casing\_\_\_\_\_



**WILLIAMS & WORKS**

**Engineers/Surveyors/Planners/Geologists**  
611 Cascade West Parkway  
Grand Rapids, Michigan 49506

Sheet \_\_\_\_\_ of \_\_\_\_\_

Client Dow Chemical

Project No. 85553

Date 11/29/79

Permit No.

Project Salzburg Road Landfill

### Location

Equipment Mud-Rotary (Klienfelt)

## Technician

BORING NO. Dow #2388

Surface Elev. 626.8

Hole Plugged With natural clay soils and  
bentonite drilling mud.

### Boring Location

7217 S

8406 E

[illegible]

**Groundwater:**

Encountered at \_\_\_\_\_ ft.

After Completion ft.

After \_\_\_\_\_ Hrs. \_\_\_\_\_ ft.

Boring	Cave In	ft.
1		
2		
3		
4		
5		
6		
7		
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97		
98		
99		
100		

**Well Data:**

Casing Used: Type \_\_\_\_\_

Diameter \_\_\_\_\_

Length \_\_\_\_\_

### Screen Size

Elev. Top Casing

**WILLIAMS & WORKS**

**Engineers/Surveyors/Planners/Geologists**  
**611 Cascade West Parkway**  
**Grand Rapids, Michigan 49506**

Sheet of

Client      Dow Chemical

Project No. 85553

Date 11/27/79

Permit No.

Project Salzburg Road Landfill

### Location

Equipment Mud-Rotary (Klienfelt)

## Technician

BORING NO.      Dow #2366

Surface Elev. 626.2

Hole Plugged With natural clay soils and  
bentonite drilling mud

### Boring Location

6277 S

7766 E

[illegible]

**Groundwater:**

Encountered at \_\_\_\_\_ ft.

After Completion \_\_\_\_\_ ft.

After \_\_\_\_\_ Hrs. \_\_\_\_\_ ft.

Boring Cave In \_\_\_\_\_ ft.

**Well Data:**

Casing Used: Type\_\_\_\_\_

Diameter

Length \_\_\_\_\_

### Screen Size

Elev. Top Casing \_\_\_\_\_

**WILLIAMS & WORKS**

**Engineers/Surveyors/Planners/Geologists**  
**611 Cascade West Parkway**  
**Grand Rapids, Michigan 49506**

Sheet \_\_\_\_\_ of \_\_\_\_\_

Client      Dow Chemical

Project No. 85553

Date 11/28/79

Permit No.

Project Salzburg Road Landfill

### Location

Equipment Mud-Rotary (Klienfelt)

## Technician

BORING NO. Dow #2373

Surface Elev. 620.9

Hole Plugged With natural clay soils and  
bentonite drilling mud

### Boring Location

6617 S

6356 E

[illegible]

**Groundwater:**

Encountered at \_\_\_\_\_ ft.

After Completion                      ft.

After	Hrs.	ft.
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
10	10	10
11	11	11
12	12	12
13	13	13
14	14	14
15	15	15
16	16	16
17	17	17
18	18	18
19	19	19
20	20	20
21	21	21
22	22	22
23	23	23
24	24	24
25	25	25
26	26	26
27	27	27
28	28	28
29	29	29
30	30	30
31	31	31
32	32	32
33	33	33
34	34	34
35	35	35
36	36	36
37	37	37
38	38	38
39	39	39
40	40	40
41	41	41
42	42	42
43	43	43
44	44	44
45	45	45
46	46	46
47	47	47
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54	54	54
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61	61	61
62	62	62
63	63	63
64	64	64
65	65	65
66	66	66
67	67	67
68	68	68
69	69	69
70	70	70
71	71	71
72	72	72
73	73	73
74	74	74
75	75	75
76	76	76
77	77	77
78	78	78
79	79	79
80	80	80
81	81	81
82	82	82
83	83	83
84	84	84
85	85	85
86	86	86
87	87	87
88	88	88
89	89	89
90	90	90
91	91	91
92	92	92
93	93	93
94	94	94
95	95	95
96	96	96
97	97	97
98	98	98
99	99	99
100	100	100

Boring Cave In \_\_\_\_\_ ft.

Well Data:

Casing Used: Type \_\_\_\_\_

Diameter

Length \_\_\_\_\_

## Screen Size

Elev. Top Casing .

<b>LOG OF SUBSURFACE PROFILE</b>
<b>CLASSIFICATIONS BY:</b> <b>NEYER, TISEO &amp; HINDO, LTD.</b>
<b>GROUND SURFACE ELEVATION:</b>

SOIL SAMPLE DATA									
SAMPLE NUMBER	ELEV. (FEET)	NATURAL MOISTURE CONTENT (PERCENT)	DRY DENSITY (PCF)	PENETRATION RESISTANCE *					
				0	20	40	60	80	
LS-1		-	-						6-8-11
LS-2		24.8	102.8						5-7-8
LS-3		-	-						5-5-5
LS-4		-	-						10-12-15
LS-5		-	-						18-21
LS-6		-	-						35-43-51
LS-7		-	-						24-30-36
LS-8		-	-						17-28-38
LS-9		-	-						26-32-43
LS-10		-	-						22-32-36

Loose to Medium Compact Brown SAND.	4.0
Stiff Brown and Gray MOTTLED SILTY CLAY.	7.0
Stiff Gray SANDY CLAY with Little Silt.	17.0
Hard Gray SANDY CLAY with Some Silt and Trace of Gravel.	27.5
Hard Gray CLAYEY SAND with Some Silt and Trace of Gravel.	37.5
Hard Gray SILTY CLAY.	50.0

## NOTES:

1. Boring advanced with 6-inch hollow-stem auger.
2. Boring dry upon completion.
3. Boring grouted upon completion.

TOTAL DEPTH: 50.0'  
 BORING STARTED: 8/11/78  
 BORING COMPLETED: 8/11/78  
 INSPECTOR: D. Harpstead  
 DRILLER: G. Canfield  
 CONTRACTOR: Geo-Tek, Inc.  
 \* WATER LEVEL IN HOLE AT INDICATED  
 NUMBER OF HOURS AFTER COMPLETION OF BORING  
 WITH 0 FEET OF CASING IN PLACE.  
 \* PENETRATION RESISTANCE:  
 NUMBER OF BLOWS REQUIRED TO DRIVE 2 INCH  
 O.D. SOIL SAMPLE 12 INCHES, USING 140

**NEYER, TISEO & HINDO, LTD.**  
 CONSULTING ENGINEERS

LOG OF TEST BORING NUMBER 2201

PROPOSED LAND DEVELOPMENT  
 DOW CHEMICAL PROPERTY  
 SAGINAW STREET  
 MIDLAND, MICHIGAN

 APPROVED BY: BT DATE: 8/16/78

## LOG OF SUBSURFACE PROFILE

CLASSIFICATIONS BY:

NEYER, TISEO &amp; HINDO, LTD.

GROUND SURFACE ELEVATION:

## SOIL SAMPLE DATA

SAMPLE NUMBER	ELEV. (FEET)	NATURAL MOISTURE CONTENT (PERCENT)	DRY DENSITY (PCF)	PENETRA RESISTA.				
				0	20	40	60	80
LS-1		33.0	89.2	3-3-2				
LS-2		18.1	113.6	7-11-12				
LS-3		-	-	12-15-22				
LS-4		-	-	29-46-62				
LS-5		-	-	22-33-37				
LS-6		-	-	43-48-66				
LS-7		7.5	141.7	34-23-23				
LS-8		-	-	16-28-42				
LS-9		-	-	18-25-40				
LS-10		-	-	18-35-43				

TOPSOIL: Dark Brown SANDY SILT. 4.0

Medium to Stiff Gray and Brown  
MOTTLED SILTY CLAY. 7.0

Stiff Brownish Gray SILTY CLAY. 11.5

Hard Gray SANDY CLAY with Some  
Silt. 21.0Very Compact Gray SILTY SAND, Little  
Clay, Trace of Gravel. 32.5Hard Gray SILTY CLAY with Some  
Sand and Trace of Gravel. 37.0

Hard Gray SILTY CLAY. 50.0

## NOTES:

1. Boring advanced with 6-inch hollow-stem auger.
2. Boring dry upon completion.
3. Boring grouted upon completion.

TOTAL DEPTH: 50.0'

BORING STARTED: 8/10/78

BORING COMPLETED: 8/10/78

INSPECTOR: D. Harpstead

DRILLER: G. Canfield

CONTRACTOR: Geo-Tek, Inc.

WATER LEVEL IN HOLE AT INDICATED  
NUMBER OF HOURS AFTER COMPLETION OF BORING  
WITH 0 FEET OF CASING IN PLACE.

## \* PENETRATION RESISTANCE:

NUMBER OF BLOWS REQUIRED TO DRIVE 2 INCH  
O.D. SOIL SAMPLE 12 INCHES, USING 140

## NEYER, TISEO &amp; HINDO, LTD.

CONSULTING ENGINEERS

## LOG OF TEST BORING NUMBER 2202

PROPOSED LAND DEVELOPMENT  
DOW CHEMICAL PROPERTY  
SAGINAW STREET  
MIDLAND, MICHIGAN

APPROVED BY: AT

DATE: 8/15/78

**LOG OF SUBSURFACE PROFILE**

CLASSIFICATIONS BY:  
NEYER, TISEO & HINDO, LTD.

GROUND SURFACE ELEVATION:

SOIL SAMPLE DATA									
SAMPLE NUMBER	ELEV. (FEET)	NATURAL MOISTURE CONTENT (PERCENT)	DRY DENSITY (PCF)	PENETRATION RESISTANCE *					
				0	20	40	60	80	1
LS-1		-	-	60	100	5"			
LS-2		22.0	125.9	22	33	30			160 12"
LS-3		-	-	17	27	29			
LS-4		-	-	60	100	3"			
LS-5		-	-	44	79	100	4"		150 9"
LS-6		-	-	44	71	120			179 10"
									171

For information to a depth of 23',  
refer to Test Boring No. 2199.

Very Stiff to Hard Gray SILTY CLAY  
w/Some Sand & Trace of Gravel. 270

Hard Gray SILTY CLAY with Some  
Sand. 500

**NOTES:**

1. Boring advanced with 6-inch hollow-stem auger.
2. Boring dry upon completion.
3. Boring grouted upon completion.

TOTAL DEPTH: 50.0'

BORING STARTED: 8/8/78

BORING COMPLETED: 8/10/78

INSPECTOR: D. Harpstead

DRAWER: G. Canfield

CONTRACTOR: Geo-Tek, Inc.

WATER LEVEL IN HOLE AT INDICATED  
NUMBER OF HOURS AFTER COMPLETION OF BORING  
WITH 0 FEET OF CASING IN PLACE.

\* PENETRATION RESISTANCE:  
NUMBER OF BLOWS REQUIRED TO DRIVE 2 INCH  
S.D. SOIL SAMPLER 12 INCHES, USING 140  
POUND WEIGHT WITH 30 LBS. HUB FALL.

**NEYER, TISEO & HINDO, LTD.**  
CONSULTING ENGINEERS

LOG OF TEST BORING NUMBER 2199-A

PROPOSED LAND DEVELOPMENT  
DOW CHEMICAL PROPERTY  
SAGINAW STREET  
MIDLAND, MICHIGAN

APPROVED BY: /s/ DATE: 8/16/78

PROJECT NO. 40400

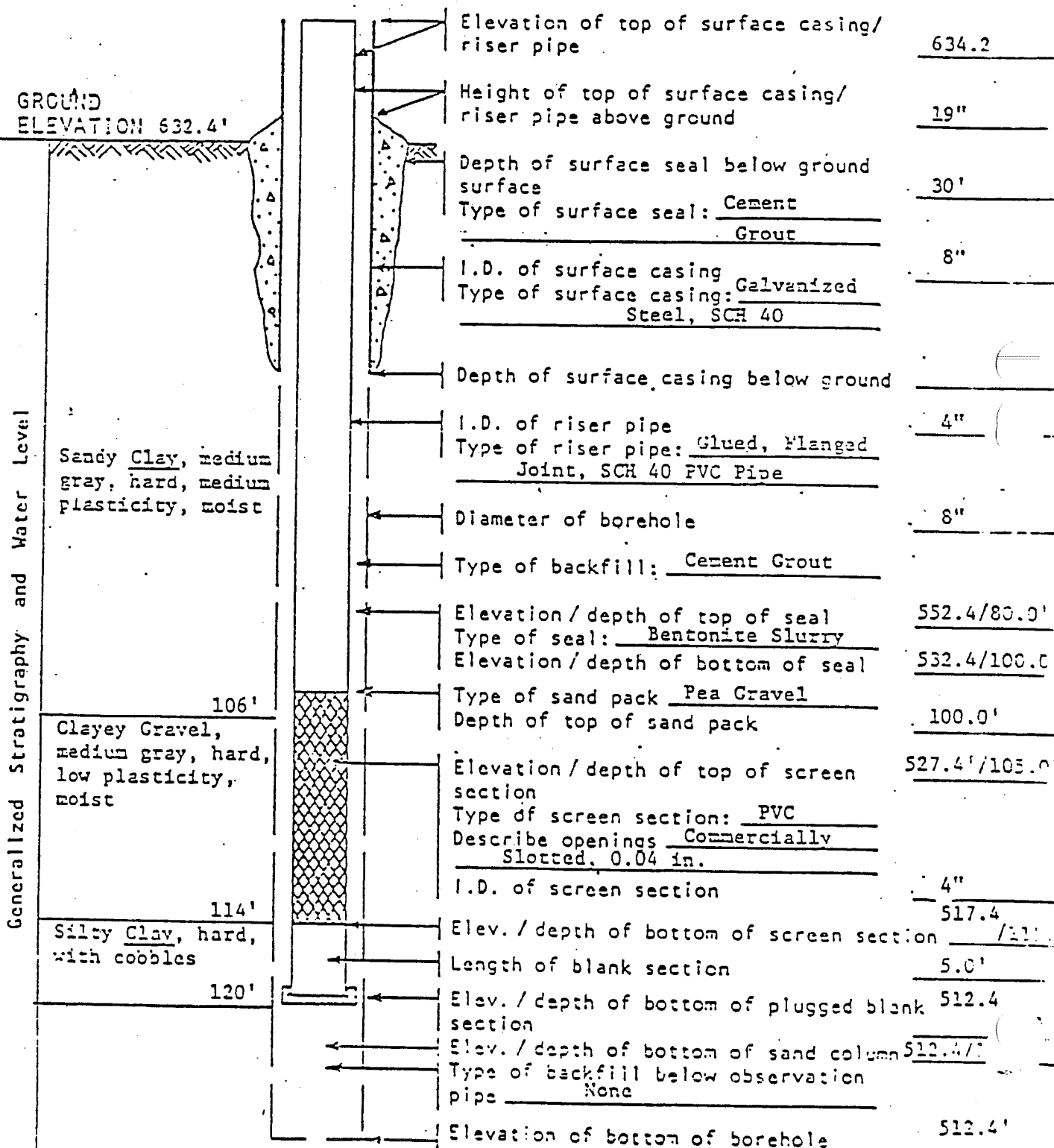


# GROUND WATER OBSERVATION WELL RECORD

35-18

PROJECT Midland Power Plant  
LOCATION S 8110 E 4000  
DATE COMPLETED 7 February 1978  
INSPECTED BY W. R. Kinzer DATE 2/7/78  
CHECKED BY G. T. LeFevre DATE 2/14/79

PAGE 1 OF 1  
WELL NO. 10-7  
AQUIFER Clayey  
Gravel  
THICKNESS 8

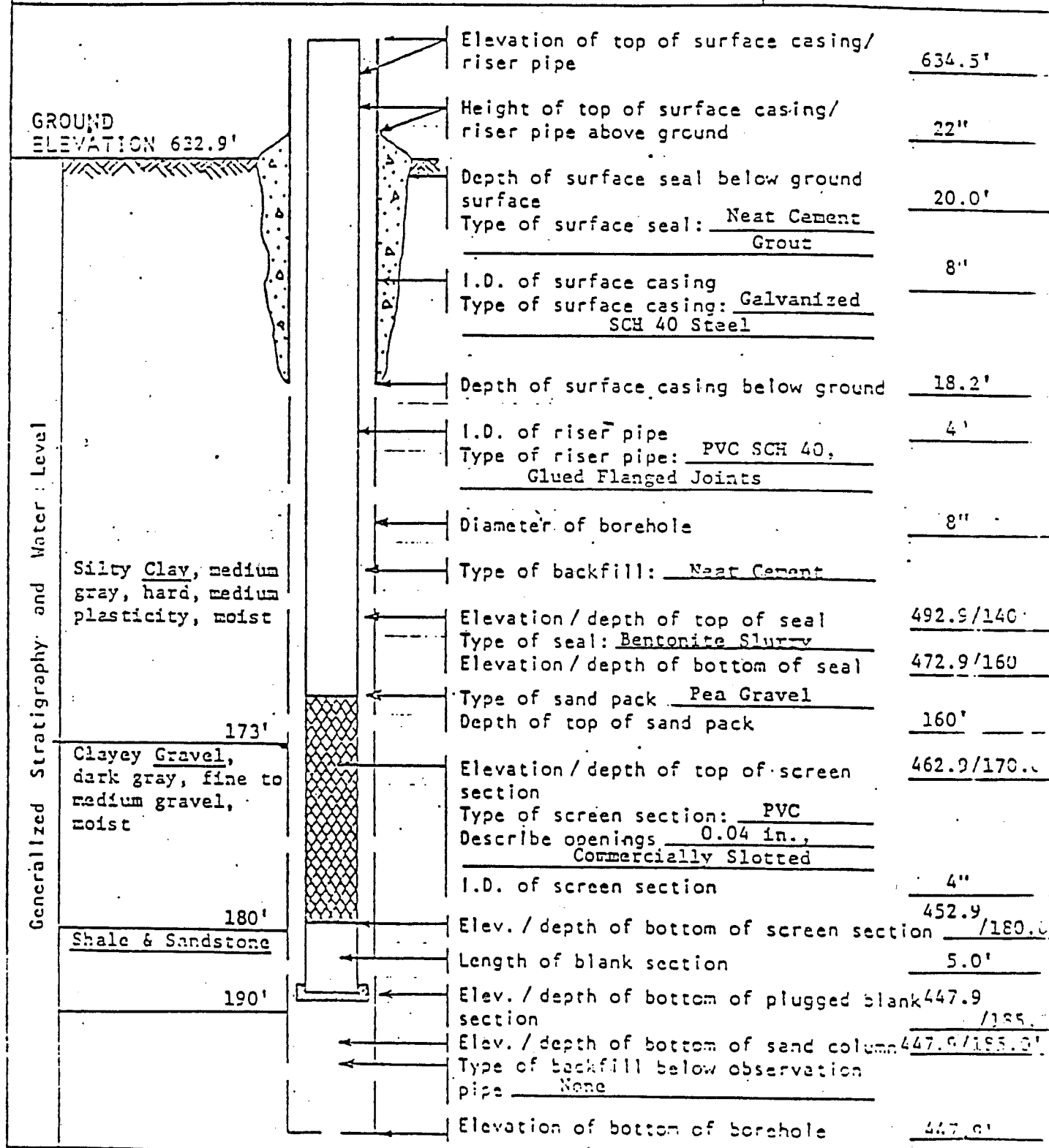


# GROUND WATER OBSERVATION WELL RECORD

35-19

PROJECT Midland Power Plant  
 LOCATION S 8115 E 4001  
 DATE COMPLETED 1 February 1978  
 INSPECTED BY W. R. Kinzer DATE 2/1/78  
 CHECKED BY G. T. LeFevre DATE 2/14/79

PAGE 1 OF 1  
 WELL NO. W-8  
 AQUIFER Clayey Gravel  
 THICKNESS 7.0'





# GROUND WATER OBSERVATION WELL RECORD

35-20

PROJECT Midland Power Plant  
 LOCATION S 10893 E 4139  
 DATE COMPLETED 11 November 1977  
 INSPECTED BY W. R. Kinzer DATE 11/11/77  
 CHECKED BY G. T. LaFevre DATE 2/14/79

PAGE 1 OF 1  
 WELL NO. W-10  
 ACQUIFER clayey  
Gravel  
 THICKNESS 4'

GROUND  
ELEVATION 631.3'

Generalized Stratigraphy and Water Level

Fill 18'  
 Sand, tan, fine  
 grained, moist 22'

Sandy Clay, brown  
 to brownish gray,  
 hard, medium  
 plasticity, moist

162'

Clayey Gravel,  
 tan to dark gray,  
 very dense, moist

166'

Shale, dark gray,  
 firm to hard

173'

**Note:**

Boring W-10 abandoned at 23' and grouted to ground surface.

Elevation of top of surface casing/  
riser pipe 633.1'

Height of top of surface casing/  
riser pipe above ground 22"

Depth of surface seal below ground  
surface 30'

Type of surface seal: Neat Cement  
Grout

8"

I.D. of surface casing  
 Type of surface casing: Galvanized  
Steel with Flanged Joints

Depth of surface casing below ground 28.1'

I.D. of riser pipe 4"

Type of riser pipe: SCR 40 Blank  
PVC Pipe, Glued Flanged Joints

Diameter of borehole 8"

Type of backfill: Neat Cement

Elevation / depth of top of seal 478.3/153.0

Type of seal: Bentonite Pellets

Elevation / depth of bottom of seal 478.3/155.0

Type of sand pack Pea Gravel

Depth of top of sand pack 478.3/155.0

Elevation / depth of top of screen  
section 468.3/163.0

Type of screen section: PVC Pipe

Describe openings 0.04 in.

Commercially Slotted

I.D. of screen section 4"

Elev. / depth of bottom of screen section 463.3/165.0

Length of blank section 5.0'

Elev. / depth of bottom of plugged blank  
section 458.3/172.0

Elev. / depth of bottom of sand column 458.3/172.0

Type of backfill below observation  
pipe None

Elevation of bottom of borehole 458.3'

# CONSOLIDATED COAL COMPANY.

COAL CO'S NO. 661 ✓  
 INCORPORATED. MICHIGAN PROSPECTING CO'S NO. 101 <sup>35-21</sup>  
 I HAVE THIS 4 DAY OF Feb'y 1923, FINISHED A TEST WELL ON THE FOLLOWING DESCRIBED LAND OWNED BY Curry  
 AND REPORT THE TEST AS FOLLOWS:  
 LOCATION OF WELL \_\_\_\_\_

TOWNSHIP OF Midland COUNTY OF Midland STATE OF MICHIGAN.  
 DESCRIPTION: 1000 ft. south and 385 ft. east center of Section 35  
N. N. 1/4 of S. E. 1/4 Sec 35.  
14N 2E

THICKNESS OF STRATA.		MATERIAL.	DEPTH.
55		S. Clay	55
45		Clay	100
30		S. Clay	(130)
5		Red Shale	135
5		Fire Clay	140
7		Sand Shale	147
4		Fire Clay	151
27		S. Shale	178
-2		Shale	178-2
1-7	Coal		179-9
2-3		Fire Clay	182-
3-		S. Shale	185-
-6	Coal		185-6
3-		Shale	188-6
3-1	Coal		191-1
12		S. Shale	203-7
2		B. "	205-7
5		S. "	210-7
15		Sand	225-7
13		" Rock	238-7
238.1			

REMARKS:

Signed, Wm Lafferty Driller.

# CONSOLIDATED COAL COMPANY.

COAL CO'S NO. 662

INCORPORATED.

MICHIGAN PROSPECTING CO'S NO. 1016

I HAVE THIS 29 DAY OF April 1903, FINISHED A TEST WELL ON THE FOLLOWING DESCRIBED LAND OWNED BY Grant AND REPORT THE TEST AS FOLLOWS:

LOCATION OF WELL 600 ft. south and 920 ft. west of the center of East line of N.E. 1/4 Sec. 35

TOWNSHIP OF Midland COUNTY OF Midland STATE OF MICHIGAN.

DESCRIPTION: 14N, 2E

THICKNESS OF STRATA.		MATERIAL.	DEPTH.
90		Clay	90
30		S. "	120
30		Clay	(50)
5		Fire Clay	155
10		Slate	165
16		Fire Clay	181
3		Slate	184
20		Grey Slate (2 ft line)	204
2		Black slate	206
8		Grey "	214
1-7	Coal		215-7
15		S. Fire Clay	230-7
2		B. Slate	232-7
2-8	Coal		235-3
1-10.	Sand		237-1
2-10	Coal		239-11
1-1		F. Clay	241
24.1			

REMARKS:

Signed, Wm. L. L. L. Driller.

# CONSOLIDATED COAL COMPANY.

INCORPORATED.

MICHIGAN PROSPECTING CO'S NO. 1015

COAL CO'S NO. 659 ✓

I HAVE THIS 18-

DAY OF April

1913, FINISHED A TEST WELL ON THE FOLLOWING DESCRIBED LAND OWNED BY Curry

AND REPORT THE TEST AS FOLLOWS:

LOCATION OF WELL 83 rods N and 10 ft West of Cor Sec. 35

TOWNSHIP OF Midland COUNTY OF Midland STATE OF MICHIGAN.

DESCRIPTION: N 2 7. E 1/4 Sec. 35

140, 25

THICKNESS OF STRATA.		MATERIAL.	DEPTH.
10		Sand	10
40		H. Sand	50
30		Sandy Clay	80
40		Clay	120
<del>_____</del>			<del>_____</del>
60		Clay	180 ✓
18		7. Clay	200 ✓
8		Grey slate	208
11		Black "	219
2	Coal (Poor)		221
6		Fire Clay	227
8		Sand shale	235
1-10	Coal		236-10
1-9	Sand		238-7
1-7	Coal		240-2
1-10		7. Clay	242
242			

*used  
✓  
Gut*

REMARKS:

Signed, ✓

*Wm Lafferty*

Driller.

# CONSOLIDATED COAL COMPANY.

COAL CO'S NO. 658

INCORPORATED.

MICHIGAN PROSPECTING CO'S NO. 1014 **35**

I HAVE THIS 1 DAY OF April 1903, FINISHED A TEST WELL ON THE FOLLOWING DESCRIBED LAND OWNED BY Bradley

AND REPORT THE TEST AS FOLLOWS:

LOCATION OF WELL 475 ft. S. of Cor. Sec 35  
85 " N. " " " "

TOWNSHIP OF Midland COUNTY OF Midland STATE OF MICHIGAN.

DESCRIPTION: 1/2 S. E. 1/4 Sec 35.

14W, 2E

THICKNESS OF STRATA.		MATERIAL.	DEPTH.
50		S. Clay	50
40		Clay	90
32		S. "	122
12		Red "	(134)
2		T. Clay	136
2		B. Slate	138
12		" "	150
23		" "	173
1-5	Coal		174-5
2-7		F. Clay	179
4		Slate	181
1-6	Coal		184-6
7	Cent		185-1
4	Coal		185-5
5-7		F. Clay	189
15		Slate	204
1-5		B. "	205-5
9	Coal		206-4
5-10		Slate	212
6		Lime	214-6
8	Coal		213-2
4-10		Slate	218-
14		S. "	234-
8		S. Rock	240
240			

REMARKS:

Signed,

Wm J. Kelly

Driller.

CONSOLIDATED COAL COMPANY.

COAL CO'S NO. 637

**INCORPORATED.**

MICHIGAN PROSPECTING CO'S NO. 1013

I HAVE THIS 27 DAY OF March 1942, FINISHED A TEST WELL ON THE FOL-

LOWING DESCRIBED LAND OWNED BY.  
AND REPORT THE TEST AS FOLLOWS:

LOCATION OF WELL 150 ft. N. of E line 100 ft. S of N line

TOWNSHIP OF Midland COUNTY OF Midland STATE OF MICHIGAN.

DESCRIPTION: 7.E. # 7.E. # Sec. 55

140, 2E

THICKNESS OF STRATA.	MATERIAL.	DEPTH.
5	Sand	5
85	Clay	90
92	S. Clay	182
14	Fire "	196 ✓
6	Black Slate	202
3	G. "	205
3	B. "	208
1-9	Coal	209-9
3-3	Fire Clay	213
3-	Black Slate	216
2-7	Coal	218-7
4-5	Fire Clay	223
12	Sandy Slate	235

USGS  
G-1

REMARKS:

*Signed,*

**Driller.**

## CONSOLIDATED COAL COMPANY.

COAL CO'S NO. 655

INCORPORATED.

MICHIGAN PROSPECTING CO'S NO. 1011I HAVE THIS 4th DAY OF March 1903, FINISHED A TEST WELL ON THELOWING DESCRIBED LAND OWNED BY Curry  
AND REPORT THE TEST AS FOLLOWS:LOCATION OF WELL 600 ft. east of west line575 ft N. of 1 lineTOWNSHIP OF Midland COUNTY OF Midland STATE OF MICHIGAN.DESCRIPTION: S. 7. E. 35.14N, 2E

THICKNESS OF STRATA.	MATERIAL.	DEPTH.
55	Sand Clay	55
40	Clay	95
43	Sand Clay	138
5	Shale	143
13	Fire Clay	156
3	B. Slate	159
29	S.	188
3	S.	191
13	S.	204
-8	Coal	204-
1-4	Fire Clay	206
24	S. Slate	230

REMARKS:

Signed, Wm. Lafferty

Driller.

COAL CO'S NO. 656 INCORPORATED. MICHIGAN PROSPECTING CO'S NO. 101  
 I HAVE THIS 14 DAY OF March 1903, FINISHED A TEST WELL ON THE 35-27  
 LOWING DESCRIBED LAND OWNED BY Carroll  
 AND REPORT THE TEST AS FOLLOWS:  
 LOCATION OF WELL 120 feet N. of S line Center 7 and 8  
 TOWNSHIP OF Midland COUNTY OF Midland STATE OF MICHIGAN  
 DESCRIPTION: N. E. 1/4 Sec 35  
14N, 2E

THICKNESS OF STRATA.		MATERIAL.	DEPT
10		Sand	10
110		Clay	120
48		Sand Clay	(161)
4		Slate	172
5		Fire Clay	177
13		S. Slate	190
10		S. "	200
7		Fire Clay	207
12		S. Slate	219
1-6		S. "	220-6
1-6	Coal		222
4-		Fire Clay	226
2-6		S. Slate	228-6
-9	Coal		229-3
2-		Fire Clay	231-3
2-		S. Slate	233-3
2-9	Coal		236
2-		S. Fire Clay	238

REMARKS:

Signed, Wm. Lafferty Drill



**CONSOLIDATED COAL COMPANY.**

COAL CO'S NO. 654

INCORPORATED.

MICHIGAN PROSPECTING CO'S NO. 1010

I HAVE THIS 25

DAY OF February

1913, FINISHED A TEST WELL ON THE FOLLOWING DESCRIBED LAND OWNED BY Dugald Currie

AND REPORT THE TEST AS FOLLOWS:

LOCATION OF WELL On N line 17<sup>th</sup> N.E. Sec 35.

TOWNSHIP OF Midland COUNTY OF Midland STATE OF MICHIGAN.

DESCRIPTION:

14N, 2E

THICKNESS OF STRATA.	MATERIAL.	DEPTH.
60	S. Clay	60
35	Clay	95
28	S.	123
10	Red shale	133
5	Fire Clay	138
7	Slate	140
3	Lime	143
14	Fire Clay	157
3	B. Slate	160
21	S. Slate	181
7	Fire Clay	188
15	Slate	203
2-1	Coal	205-1
2-11	Fire Clay	208
Continued 6	S. Slate	214
4/5-13 4	Slate	218
7	F. Clay	220
3	B. Slate	223
-6	Lime rock <Very hard>	223-6
3-9	Coal <upper 1' 6" sulphur>	227-3
1-8	Rock hard	228-11
2-1	Coal	231
2	S. Clay	233
233-		

REMARKS:

Signed,

Wm. Lafferty

Driller.

35-29

CONSOLIDATED COAL COMPANY.

COAL CO'S NO. 653 ✓

INCORPORATED.

MICHIGAN PROSPECTING CO'S NO. 1009

I HAVE THIS 18 DAY OF February 1903, FINISHED A TEST WELL ON THE FOLLOWING DESCRIBED LAND OWNED BY Dougal Carrie

AND REPORT THE TEST AS FOLLOWS:

LOCATION OF WELL 1436 S. of Centre of Sec. 35 and east 200 feet from Test line

TOWNSHIP OF Midland COUNTY OF Midland STATE OF MICHIGAN.

DESCRIPTION:

14N, 2E

THICKNESS OF STRATA.	MATERIAL.	DEPTH.
117	Clay	(117)
4	Fire	121
4	Sand Rock	125
5	Fire Clay	130
20	Sandy Slate	150
5	B	155
16	Sandy	171
3	B	174
3-1	Coal	177-1
1-11	Slate	179

*W. C. / 174*

REMARKS:

Signed,

Wm. Lafferty

Driller.



**EDI ENGINEERING & SCIENCE**  
ENGINEERS / GEOLOGISTS / BIOLOGISTS / CHEMISTS  
911 CASCADE W. PKWY, S.E. GRAND RAPIDS, MI 49508 (616) 942-0870

# BORING & WELL RECORD

LOCATION 8716.28 S, 8102.67 E

PROJECT NO. 20245  
OWNERS WELL NO. 3170  
CLIENT DOW CHEMICAL  
DATE 7-2-84

CONTRACTOR: RAYMER CO.

ELEVATIONS: LAND SURFACE 619.7  
TOP OF CASING       

## BORING

## NO WELL SET

8716.28 S, 8102.67 E

CLAY

CLAY & STONES, HARD

SANDY CLAY & STONE

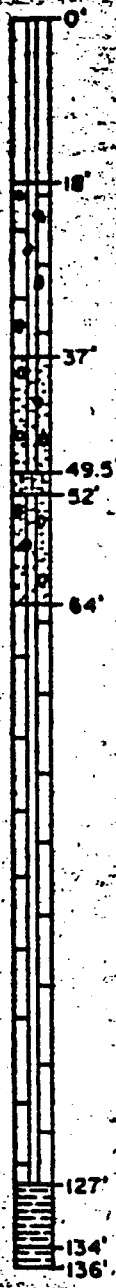
DIRTY SAND

SANDY CLAY & STONES

CLAY, HARD

BROWN SHALE

RED SHALE



WELL PLUGGED WITH BENTONITE

DRILLED BY MUD ROTARY.

STATIC WATER LEVEL        BELOW TOP OF CASING

# HANDY BROS. MINING CO. & WOLVERINE COAL CO. 35-31

SAGINAW, MICH.,

Feb 2 1907

COAL CO. NO.

967

DRILLER'S NO.

I HAVE THIS

29

DAY OF

Jan

1907

FINISHED A TEST WELL ON THE FOLLOWING DESCRIBED LAND AND REPORT THE TEST AS FOLLOWS:

LOWING DESCRIBED LAND AND REPORT THE TEST AS FOLLOWS:

DESCRIPTION.

Thos. Niles Midland

E 1/2 of SE 1/4 of N 6 1/4 Sec 35.

Give Township and Sec. and Owner's name in country. In City give Street, Lot and Block No. and Addition.

14th-2E

THICKNESS OF STRATA	MATERIAL	DEPTH
58	Clay	58
5	Sand & Gravel	63
33	Clay	96
10	Gravel	106
39	Hardpan	145
5	Sand	150
25	Light Shale	175
15	Gray	190
3	Slate	193
0-9	Coal	193-9
12	Light Shale	205-9
4	Slate	209-9
1-3	Coal	211
1	Light Shale	212
2	Slate	214
2-9	Coal	216-9
6	Gray Shale	222-9
5-3	Slate	228
1-8	Coal	229-8
17-4	Gray Shale	247
11	Slate	258
43	Gray Sandy Shale	301

# Top 10 inches of 2'9" vein very poor bony coal.

REMARKS:

150 ft west of east line

500 - North of south line 1/2

Signed

Warren Woodward Driller.

# HANDY BROS. MINING CO. & WOLVERINE COAL CO. 35-38

SAGINAW, MICH.

June 27

1904

COAL CO. No.

290

DRILLER'S No.

11

I HAVE THIS

19

DAY OF

June

1904

FINISHED A TEST WELL ON THE FOLLOWING DESCRIBED LAND AND REPORT THE TEST AS FOLLOWS:

Leonard Girard

DESCRIPTION.

35

Midland

5 1/2 of S E 1/4

Give Township and Sec. and Owner's name in country. In City give Street, Lot and Block No. and Addition.

14N-2E

THICKNESS OF STRATA.

MATERIAL.

DEPTH.

70  
63  
2  
27  
3  
11  
4  
1-10"  
0-2"  
7  
1  
10  
0-10"  
5-2  
4  
4  
8  
12

Coal

Coal

Clay  
Sandy Clay  
Red Shale  
White  
B. Slate  
Grey Shale  
B. Slate  
B. Slate  
Grey Shale  
B. Slate  
Grey Shale  
Coal  
Grey Shale  
Blue  
B. Slate  
Sand rock  
Grey Shale

70  
133  
135  
162  
165  
176  
180  
181-10  
182  
189  
199  
200  
200-10"  
206  
210  
214  
222  
234

REMARKS:

Copy to  
Leonard Girard

630 ft East of west line  
370 ft - South - on RR

Signed A. H. Stewart

Driller.

# HANDY BROS. MINING CO., & WOLVERINE COAL CO.

SAGINAW, MICH.,

35-33

Oct 12 1906

COAL CO. No.

896

DRILLER'S No.

I HAVE THIS

8

DAY OF

Oct

1906

FINISHED A TEST WELL ON THE FOLLOWING DESCRIBED LAND AND REPORT THE TEST AS FOLLOWS:

LOWING DESCRIBED LAND AND REPORT THE TEST AS FOLLOWS:

Jas E. Mayor DESCRIPTION. Midland X  
SE 1/4 of NW 1/4 Sect 35.

Give Township and Sec. and Owner's name in country. In City give Street, Lot and Block No. and Addition.

NW-2E

THICKNESS OF STRATA	MATERIAL	DEPTH
8	Sand	8
11 2	Clay	120
2	Sand	122
20	Hardpan	142
13	Soft Clay	155
20	Hardpan	175
9	Soft Clay	184
19	Thin "	203
7	Gray Slate	220
12	Black "	232
2-2	Coal	234-2
0-10	Slate	225
2	Fire Clay	227

N 56 S

REMARKS:

In N E Corner

Signed E. J. Gayette

Driller.

# HANDY BROS. MINING CO. & WOLVERINE COAL CO. 35-34

SAGINAW, MICH.

July 10

COAL CO. No. 296

DRILLER'S No. 13

I HAVE THIS 8th DAY OF July 1904, FINISHED A TEST WELL ON THE FOLLOWING DESCRIBED LAND AND REPORT THE TEST AS FOLLOWS:

Leonard Girard

DESCRIPTION.

Midland

Sec 35

W 1/2 of Sec 35 of T. 11 N. R. 11 E. S. 11

Give Township and Sec. and Owner's name in country. In City give Street, Lot and Block No. and Addition.

14N-2E

THICKNESS OF STRATA.

MATERIAL.

DEPTH.

3	Sand	3
27	Hard Pan	30
64	Clay	94
10	Red Shale	104
2	Blue "	106
19	Red "	125
0-6	Black Slate	125-6
3	Red Shale	128-6
0-6	Blue "	129
19	White "	148
7	Sand Rock	155
8	Grey Shale	163
1	Black Slate	164
1-8	Coal	165-8
2-4	Sand Rock	168
10-6	White Sandy Shale	178-6
0-6	Coal	179
1	White Shale	180
2	Coal	182
0-6	Black Slate	182-6
3	White Shale	185-6
8-6	Blue Shale	194
1	Black Slate	195
6	Grey Shale	201
3	Black Slate	204
1-3	Coal	205-3
14-9	Grey Shale	220
2	Black Slate	222
2	Blue Shale	224
16	Black Slate	240
4	Grey Shale	246
11	Blue Shale	255
3	Grey "	258

REMARKS:

225 ft west of east line  
50 - South of River road

Copy to  
Saginaw

# HANDY BROS. MINING CO. & WOLVERINE COAL CO. 35.35

SAGINAW, MICH.,

COAL CO. No. 304

DRILLER'S No. 14

I HAVE THIS 29 DAY OF July 19 04, FINISHED A TEST WELL ON THE FOLLOWING DESCRIBED LAND AND REPORT THE TEST AS FOLLOWS:

*Store E. Dean* DESCRIPTION.

*Midland*

*E 1/2 of S E 1/4 of S E 1/4 Sect 35*

Give Township and Sec. and Owner's name in country. In City give Street, Lot and Block No. and Addition.

*HW-2E*

THICKNESS OF STRATA.

MATERIAL.

DEPTH.

136	Clay	136
6	Sand	142
1-6	Red Shale	143-6
24-7	White "	168-1
"	Grey "	179-1
1-10	Black Slate	180-11
1-2	Coal	182-1
1-11	Grey shale	184
7	White "	191
2	Grey "	193
1-6	Black Slate	194-6
7-6	White Shale	202-
15	Grey "	217
9-6	" Slate	226-6
1-	Coal	227-6
9-6	Grey Slate	237
2-	Black "	238-
0-3	Sand Rock	239-3

REMARKS

*Copy to  
Saginaw*

*50 ft west of East line  
North line*

Signed *David M. Jones*



# HANDY BROS. MINING CO. & WOLVERINE COAL CO. 35-36

SAGINAW, MICH.

Aug 13 1904

COAL CO. NO.

310

DRILLER'S NO.

6

I HAVE THIS

6<sup>th</sup>

DAY OF

Aug

1904

FINISHED A TEST WELL ON THE FOLLOWING DESCRIBED LAND AND REPORT THE TEST AS FOLLOWS:

LOWING DESCRIBED LAND AND REPORT THE TEST AS FOLLOWS:

Youngald Curry DESCRIPTION.

SW 1/4 of SE 1/4 Sect 35

Midland

Give Township and Sec. and Owner's name in country. In City give Street, Lot and Block No. and Addition.

40-2E

THICKNESS OF STRATA.

MATERIAL

DEPTH.

78	Clay	78
4	Sand	32
64	Clay	96
25	Sand	121
32	Shale	153
12	Black "	165
2	" Slate	167
2-4	Coal	169-4
8-	Grey Slate	177-4
10-6	Black "	187-10
6-	Grey Shale	193-10
3-6	Black Slate	197-4
2	Grey "	199-4
4	Black "	203-4
1	Coal	204-4
14	Black Slate	218-4
2	Grey Sand Rock	220-4

REMARKS:

Copy to  
Saginaw

600 ft east of West line  
2400 - South - 1/4 Sect line  
24007

Signed John H. Woodworth Driller

# HANDY BROS. MINING CO. & WOLVERINE COAL CO.

35-37

SAGINAW, MICH.,

Aug 15 1904

COAL CO. NO.

3, 3

DRILLER'S NO.

15

I HAVE THIS 12<sup>th</sup> DAY OF Aug 1904, FINISHED A TEST WELL ON THE FOLLOWING DESCRIBED LAND AND REPORT THE TEST AS FOLLOWS:

LOWING DESCRIBED LAND AND REPORT THE TEST AS FOLLOWS:

H. J. Curry

DESCRIPTION.

Midland

SW 1/4 of SE 1/4 Sect 35

Give Township and Sec. and Owner's name in country. In City give Street, Lot and Block No. and Addition.

14N-2E

THICKNESS OF STRATA.	MATERIAL.	DEPTH.
5	Clay	5
3	Sand	38
3	Clay	68
8	Sand	76
40	Clay	116
15	Red Shale	131
2	White "	133
7	Blue "	140
14	Grey "	154
2-6	Black Slate	156-6
2-5	Coal.	158-11
19-1	Blue Shale	178
1-	Sand Rock	179-
6	Grey Shale	185-
2	White "	187-
3	Blue "	190
1	Black Slate	191
2	Blue Shale	193
2	White "	195
11	Black "	199
3	Black Slate	202
4	Grey Shale	206
11	White Shale	210

REMARKS:

250 feet East of West line  
60 - North - South -

Sign:

A. H. Kolbert

Driller.

# BLANDY BROS. MINING CO. & WOLVERINE COAL CO.

35-38

SAGINAW, MICH., *May 10*

COAL CO. No. *764*

DRILLER'S No. *2*

I HAVE THIS \_\_\_\_\_ DAY OF \_\_\_\_\_ 19\_\_\_\_, FINISHED A TEST WELL ON THE FOLLOWING DESCRIBED LAND AND REPORT THE TEST AS FOLLOWS:

## DESCRIPTION.

Give Township and Sec. and Owner's name in country. In City give Street, Lot and Block No. and Addition.

*40-2E*

THICKNESS OF STRATA.	MATERIAL.	DEPTH.
8'	Clay	8'
6	St. Sand	14'
12	Clay	26'
9	St. Sand	35'
7	Sand	42'
8 1/2	Clay	127'
14	Sand & Red Clay	141'
8	Fire Clay	149'
15	Gray Shale	164'
30	Shale	194'
3-4"	Coal	197'-4"
5	Fire Clay	202'-4"
6	Shale	208'-4"
3	Clay	211'-4"
2	Shale	213'-4"
10	Sand Rock	223'-4"

REMARKS:

*550 ft S. of N Line  
260 ft W. of E line*

*Caputo  
Engineer*

Signed

*James J. Blum*

Driller.

# HANDY BROS. MINING CO. & WOLVERINE COAL CO.

35-39

SAGINAW, MICH.,

DRILLER'S NO. 17

COAL CO. NO. 291

I HAVE THIS 27 DAY OF June 1904 FINISHED A TEST WELL ON THE FOLLOWING DESCRIBED LAND AND REPORT THE TEST AS FOLLOWS:

DESCRIPTION. Leonard Gerard Sect 35 Midland E 1/2 S E 1/4

Give Township and Sec. and Owner's name in country. In City give Street, Lot and Block No. and Addition. 14N-2E

THICKNESS OF STRATA.	MATERIAL.	DEPTH.
9	Sand	9
10	Clay	19
11	Hard Pan	30
83	Clay	113
15	Red Shale	128
7	White "	135
1	Grey "	136
20	White "	156
7	Blue "	163
3	Black Slate	166
20	Grey Shale	186
4	Black Slate	190
1	Grey Shale	191
7	Black Slate	198
6-6"	Grey Shale	198-6"
2-3	Coal	200-9"
0-6	Black Slate	201-3"
1-9	Grey Shale	203
15	White "	218
4	Blue "	222
6	Black Slate	228
1-6	Grey Shale	229-6"
0-6	Sand Rock	230

REMARKS:

88 ft east of West line  
10 ft South of River Road

Signed [Signature] Driller

# HANDY BROS. MINING CO. & WOLVERINE COAL CO. 35-4e

SACINAW, MICH.,

May 10

1907

COAL CO. No. 265

DRILLER'S No. 4

I HAVE THIS \_\_\_\_\_ DAY OF \_\_\_\_\_, 19\_\_\_\_, FINISHED A TEST WELL ON THE FOLLOWING DESCRIBED LAND AND REPORT THE TEST AS FOLLOWS:

## DESCRIPTION.

*Girard*

*Midland*

*N E 1/4 of S E 1/4*

Give Township and Sec. and Owner's name in country. In City give Street, Lot and Block No. and Addition. *14N-2E*

THICKNESS OF STRATA.	MATERIAL.	DEPTH.
15	Clay	15
3	to Sand	17
2	Sand	20
8 1/2	to Clay	22
7 1/2	Clay	127
6	Red Clay & sand	131
3 1/2	Fire Clay	137
10 - 6"	Gray shale	171
2 - 8"	shale	181 - 6"
1	<i>Coal</i>	184 - 7"
3	Fire Clay	185 - 2"
3 1/2	shale	188 - 2"
8	Clay	227 - 2"
20	shale	232 - 2"
5	Sand & Fire Clay	252 - 2"
		257 - 2"

REMARKS:

*260 ft N of S line  
200 ft E of W line*

Signed

*James J. [Signature]*

Driller.

# BLANDY BROS. MINING CO. & WOLVERINE COAL CO.

SAGINAW, MICH., May 10 1900

COAL CO. No. 765

DRILLER'S No. 1

I HAVE THIS \_\_\_\_\_ DAY OF \_\_\_\_\_ 19\_\_\_\_, FINISHED A TEST WELL ON THE FOLLOWING DESCRIBED LAND AND REPORT THE TEST AS FOLLOWS:

## DESCRIPTION.

*Curry*

*Township of Midland*

*Range of S E 1/4*

*Sec 35?*

Give Township and Sec. and Owner's name in country. In City give Street, Lot and Block No. and Addition.

*14W-2E*

THICKNESS OF STRATA.

MATERIAL.

DEPTH.

16'	Clay	16'
10	Shale	26
7 1/2	Clay	48
6	Sand	54
7 1/2	Clay	176
13	Grey shale	179
16	Gray "	145
15	Grey shale	149
15	" shale	167
14	Shale	191
2-11	Coal	196
3	Thin clay	198-4
3	Shale	205-4
1	Clay	208-4
2	Shale	209-4
5-6	Coal	211-4
2	" Clay	211-10
1	Shale	216-10
3	Coal	218-10
1 1/2	" Clay	219-10
1 1/2	Shale	222-10
1 1/2	Shale	239-10
1 1/2	Shale	253-10
1 1/2	Sand. Rock	255-10
1 1/2	" Shale	265-10

REMARKS:

*350 S of N line  
200 E of W line*

Signed *James J. Blandy* Driller.

# HANDY BROS. MINING CO. & WOLVERINE COAL CO.

35-42

SAGINAW, MICH., May 1900

COAL CO. No. 760

DRILLER'S No. 5

I HAVE THIS \_\_\_\_\_ DAY OF \_\_\_\_\_ 19\_\_\_\_, FINISHED A TEST WELL ON THE FOLLOWING DESCRIBED LAND AND REPORT THE TEST AS FOLLOWS:

*Richardson*

## DESCRIPTION.

*Michigan*

*SE 1/4 of NW 1/4*

*Sec 25*

Give Township and Sec. and Owner's name in country. In City give Street, Lot and Block No. and Addition.

*14N-2E*

### THICKNESS OF STRATA.

### MATERIAL.

### DEPTH.

3'

*Sand*

3'

18

*Clay*

71

3

*Sand & Gravel*

74

86

*Clay*

110

77

*Red Clay Sand*

132

5

*Gray Shale*

140

3

*Red Shale*

143

12

*Clay*

161

1

*Red*

162

5

*Fire Clay*

167

73

*Gray Shale*

195

14

*Shale*

206

2-5

*Coal*

208-5

5

*Fire Clay*

213-5

10

*Shale*

223-5

1

*Clay*

224-5

2-6

*Coal*

226-11

5

*Rock*

227-7

1-5

*Coal*

229-13

1

*Fire Clay*

230-3

### REMARKS:

*500 W of E Line  
275 N of E Line*

Signed *Isaac D. Dyer* Driller.

# FLANDY BROS. MINING CO. & WOLVERINE COAL CO.

35-43

SAGINAW, MICH.

DRILLER'S No. 1

COAL CO. No. 2871

I HAVE THIS 1st DAY OF June 1902, FINISHED A TEST WELL ON THE FOLLOWING DESCRIBED LAND AND REPORT THE TEST AS FOLLOWS:

DESCRIPTION.

James Major  
NW 1/4 of NE 1/4 Sect 35.  
Midland

Give Township and Sec. and Owner's name in country. In City give Street, Lot and Block No. and Addition.

14N-2E

THICKNESS OF STRATA.

MATERIAL.

DEPTH.

10

Sand

10

46

Clay

56

12

Sand

68

30

Clay

98

6

Sand

104

28

Clay

132

10

Red Clay

142

2

Sand

144

1-6

Black Shale

145-6"

3

Grey Shale

148-6"

28

Light Shale

176-6"

3

Sand Rock

179-6"

8

Light Shale

187-6"

2-1

Black Shale

189-7"

1

Grey Shale

190-7"

1

Slate

191-7"

4-10

Grey Shale

196-5"

2-7

Slate

199

2-1

Coal

207-7"

10-11

Grey Shale

212

19

Black Shale

231

0-7

Coal

231-7"

1

Light Shale

232-7"

REMARKS:

5.0 ft West of east line  
894 " North of south line

Signed

John Nordworth

Driller



# HANDT BROS. MINING CO. & WOLVERINE COAL CO.

35-45

SAGINAW, MICH.,

June 10

1904

COAL CO. NO.

785

DRILLER'S NO.

10

I HAVE THIS

8

DAY OF

June

19

FINISHED A TEST WELL ON THE FOLLOWING DESCRIBED LAND AND REPORT THE TEST AS FOLLOWS:

Douglas Currie.

DESCRIPTION.

Midland

SW 1/4 of NE 1/4

Sec 35

Give Township and Sec. and Owner's name in country. In City give Street, Lot and Block No. and Addition.

17N-2E

THICKNESS OF STRATA.

MATERIAL.

DEPTH.

133

Clay

133

11

Blue Shale

144

20

White

164

4

Grey

168

9

White

177

3

Black Slate

180

5

Grey Shale

185

3

Black Slate

188

9

Grey Shale

197

2-4 1/2

Coal

199-4 1/2

4 1/2

Black Slate

199-9

REMARKS:

4.0 ft West of East line  
8.75 - South of P.M. RR

Signed

A. H. [Signature]

Driller.

# HEARDY BROS. MINING CO. & WOLVERINE COAL CO.

3546

SAGINAW, MICH., May 10 1901

COAL CO. No. 767

DRILLER'S No. 3

I HAVE THIS \_\_\_\_\_ DAY OF \_\_\_\_\_ 19\_\_\_\_, FINISHED A TEST WELL ON THE FOLLOWING DESCRIBED LAND AND REPORT THE TEST AS FOLLOWS:

## DESCRIPTION.

*Brainerd*  
*Midland*  
*N E 1/4 of S W 1/4*

Give Township and Sec. and Owner's name in country. In City give Street, Lot and Block No. and Addition.

*N N 2 E*

THICKNESS OF STRATA.	MATERIAL.	DEPTH.
31	Clay	2
4	Sand	7
18	Clay	25
2	Sand	27
83	Clay	110
23	Red Clay sand	133
8	Gray shale	141
3	Red	144
43	Blue shale	187
2	Dark shale	189
1-6"	Clay	190-6'
8-6	Dark Clay	199
1	Shale	200
8	Clay	200-8'
4	Blue shale	208-8'
4	Dark	212-8'
5	Dark Clay	216-8'
3-4	Shale	221-8'
6	Clay	222-8'
1-8	Red	226-
5	Clay	226-5'
6	Dark Clay	228-2'
11	Gray shale	239-2'
10	Sand	250-2'
		260-2'

## REMARKS:

*250 ft W of E line*  
*340 ft S of N line*

Signed *James D. ...* Driller.

# HANDY BROS. MINING CO. & WOLVERINE COAL CO.

35-47

SAGINAW, MICH.

Sept 24 1901

COAL CO. NO.

331

DRILLER'S NO.

9

I HAVE THIS

22

DAY OF

Sept

19

01

FINISHED A TEST WELL ON THE FOLLOWING DESCRIBED LAND AND REPORT THE TEST AS FOLLOWS:

LOWING DESCRIBED LAND AND REPORT THE TEST AS FOLLOWS:

Geo. Higginsman

DESCRIPTION.

Midland

SE 1/4 of SW 1/4

Sec 35

Give Township and Sec. and Owner's name in country. In City give Street, Lot and Block No. and Addition.

14N-2E

THICKNESS OF STRATA.

MATERIAL.

DEPTH.

10

Clay

10

38

Sand

48

72

Clay

120

72

Red Shale

122

33

Grey "

155

7

Slate

162

1-1

Coal

163-1

3

Slate

166-1

30

Grey Shale

196-1

8

Slate

204-1

2-2

Coal

206-3

1

Slate

207-3

6

Grey Shale

213-3

2

Sand Rock

215-3

REMARKS:

1275 ft north of town line

450 " west of 1/4 Sect line

Signed

John Woodward

# HANDY BROS. MINING CO. & WOLVERINE COAL CO.

35-48

SAGINAW, MICH.,

Sept 7 1904

COAL CO. No.

3701

DRILLER'S No.

8

I HAVE THIS

26

DAY OF

Aug 04

1904

FINISHED A TEST WELL ON THE FOLLOWING DESCRIBED LAND AND REPORT THE TEST AS FOLLOWS:

George A. Aigman

DESCRIPTION.

Midland

SE 1/4 of NW 1/4 Sect 35.

14 N-2 E

Give Township and Sec. and Owner's name in country. In City give Street, Lot and Block No. and Addition.

THICKNESS OF STRATA.

MATERIAL.

DEPTH.

8  
36  
56  
14  
4  
32  
8  
3  
1  
14  
19  
8  
1-5  
8  
6  
3  
6  
2  
4

Clay  
Sand  
Clay  
Sandy  
Red Shale  
Grey "  
Dark "  
Slate  
Coal  
Slate  
Grey Shale  
Slate  
Coal  
Slate  
Dark Shale  
Slate  
Grey Shale  
Slate  
Sand Rock

8  
44  
100  
114  
118  
150  
158  
161  
162  
176  
195  
203  
204-5  
212-5  
218-5  
221-5  
227-5  
229-5  
233-5

REMARKS:

860 ft North of town line  
750 ft East of 1/2 Sect line

Signed

John W. Woodworth

# HANDY BROS. MINING CO. & WOLVERINE COAL CO.

35-49

SAGINAW, MICH.,

Sept 2 1904

COAL CO. NO.

3191

DRILLER'S NO.

16

I HAVE THIS

1

DAY OF

Sept

19

04

FINISHED A TEST WELL ON THE FOLLOWING DESCRIBED LAND AND REPORT THE TEST AS FOLLOWS:

LOWING DESCRIBED LAND AND REPORT THE TEST AS FOLLOWS:

DESCRIPTION.

George Lingman

Midland

SE 1/4 of SW 1/4 Sect 35.

Give Township and Sec. and Owner's name in country. In City give Street, Lot and Block No. and Addition.

14N-2E

THICKNESS OF STRATA.

MATERIAL.

DEPTH.

10

Sandy Clay

10

5

Gravel

15

25

Sand

40

46

Clay

86

40

Red shale

126

13

White

139

5

Grey

144

15

Blue

159

3

Black slate

162

9

Grey shale

171

1-6

Coal

Black slate

172-6

2-1

Grey shale

174-7

1-5

White

176

2

Grey

178

7

Coal

Sulphur

185

1-4

Coal

Grey shale

186-4

0-4

Coal

Grey shale

186-8

0-11

Coal

Grey shale

187

1-10

Coal

Grey shale

187-11

1-3

Grey

189-9

4

Blue

191-

7

Grey

195-

5

Black slate

197-

8

Grey shale

202-

REMARKS

425 ft North of South line  
350 - West of East line

Signed

A. K. Stewart

Driller.

# HANDY BROS. MINING CO. & WOLVERINE COAL CO. 35-50

MPC # 2

SAGINAW, MICH.,

Oct 11 1904

COAL CO. No. 336

DRILLER'S No. 10

I HAVE THIS DAY OF Oct 1904, FINISHED A TEST WELL ON THE FOLLOWING DESCRIBED LAND AND REPORT THE TEST AS FOLLOWS:

DESCRIPTION.  
 Ho Kingman Midland.  
 NW 1/4 of Sec 32  
 NW 1/4 SW 1/4

Give Township and Sec. and Owner's name in country. In City give Street, Lot and Block No. and Addition. 140-2E

THICKNESS OF STRATA.	MATERIAL.	DEPTH.
55	Clay	55
36	Sand	91
72	Clay	113
15	Sand	128
6	Red Shale	134
42	Gray	176
3	Slate	179
13-6	Gray Shale	196
0-6	Slate	199-6
1	Black Rotton Slate	200
13	Coal	201
2	Gray Shale	214
6	Slate	216
11	Gray Shale	222
	Gray Sand Rock	226

REMARKS:

600 ft north of 8<sup>th</sup> line.  
 608 - east of Sect line between 32-35

Signed

Driller.



# BRADY BROS. MINING CO. & WOLVERINE COAL CO. 35-52

SAGINAW, MICH.

July 29 1904

COAL CO. NO.

3021

DRILLER'S NO.

4

I HAVE THIS 19 DAY OF July 1904, FINISHED A TEST WELL ON THE FOLLOWING DESCRIBED LAND AND REPORT THE TEST AS FOLLOWS:

J.B. Bradley DESCRIPTION. Sec 35. Midland

T. 40. N. of R. 10. W.

14N-2E

Give Township and Sec. and Owner's name in country. In City give Street, Lot and Block No. and Addition.

THICKNESS OF STRATA.

MATERIAL.

DEPTH.

10 1/2

8

4

11

6

19

7-6

16

5-6

2

2-6

1-6

1-1

4

5-6

12

Clay  
Red  
Sand  
Shale

Sand  
Grey

Sand Rock

Grey Shale

Sand

Grey

Sand

Shale

Coal

Sand Rock

Shale

Sand Rock

10 1/2

11 1/2

11 1/2

12 1/2

13 1/2

15 1/2

154-6

170-6

176-

178

180-6

182-

183-1

187-1

192-7

204-7

REMARKS:

1635 West of East line  
25 South of North line

Signed

John Woodcock Driller.



# HANDY BROS. MINING CO. & WOLVERINE COAL CO. 35-53

SAGINAW, MICH.

COAL CO. No.

298

DRILLER'S No.

I HAVE THIS

8

DAY OF

July

190

FINISHED A TEST WELL ON THE FOLLOWING DESCRIBED LAND AND REPORT THE TEST AS FOLLOWS:

J.B. Bradley

DESCRIPTION

Sec 35 Midland Twp

NE 1/4 of S.W. 1/4

Give Township and Sec. and Owner's name in country. In City give Street, Lot and Block No. and Addition.

14N-2E

THICKNESS OF STRATA.

MATERIAL.

DEPTH.

98

Clay

98

14

Red "

112

3

Sand

115

5

Grey shale

120

3

Sand "

123

15

Grey "

138

4

Sand Rock

142

24

Grey shale

166

6

Sand "

172

8

Grey "

180

6

Sand "

186

0-4

Slate

186-4

2-14

Coal

188-8

1-6

Slate

190-2

8-

Sand shale

198-2

6-

Light "

204-2

2-6

Slate

206-8

7-

Sand shale

213-8

5

Light "

218-8

4-6

Sand "

223-2

5-

Sand Rock

228-2

REMARKS:

1170 ft west of east line  
750 ft - south of north line

Signed

John Woodward

Driller.

# HANDY BROS. MINING CO. & WOLVERINE COAL CO. 3554

SAGINAW, MICH.

June 25<sup>th</sup> 1904

COAL CO. NO. 2920

DRILLER'S NO. 2

I HAVE THIS 29<sup>th</sup> DAY OF June 1904 FINISHED A TEST WELL ON THE FOLLOWING DESCRIBED LAND AND REPORT THE TEST AS FOLLOWS:

J. B. Bradley  
E 1/2 of SW 1/4 Sect 35 -  
Midland

Give Township and Sec. and Owner's name in country. In City give Street, Lot and Block No. and Addition.

14N-2E

THICKNESS OF STRATA.

MATERIAL.

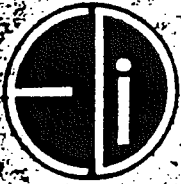
DEPTH.

10 3	Clay	10 3
1 2	Red Clay	11 5
2-6	Sand	11 7 6
29	Grey Shale	14 8 - 6
7	Dark -	14 9 - 6
0-9	Slate	16 8 - 3
19	Dark Shale	17 0 - 3
2	Slate	17 3 - 3
3-	Coal	17 3 - 11
0-8	Slate	17 5 - 27
1-3	Grey Shale	17 6 - 3
1-1	Coal	17 6 - 10
0-7	Slate	17 7 - 4
0-16	Coal	17 8
0-8	Slate	18 4
6-	Grey Shale	18 8
4	Slate	19 8
10	Grey Shale	21 4
16	Sand Rock	

REMARKS:

470 ft West of East line  
1100 ft South - North line

Signed John H. H. H. H. H.



**EDI ENGINEERING & SCIENCE**  
ENGINEERS / GEOLOGISTS / BIOLOGISTS / CHEMISTS  
911 CASCADE ST. PUEBLO, CO. 81001 (303) 848-8899

## BORING & WELL RECORD

LOCATION 8827.88 S, 8364.41 E

PROJECT NO. 20245

OWNER'S WELL NO. 3169

CLIENT DOW CHEMICAL

DATE 6-25-84

CONTRACTOR: RAYMER CO.

ELEVATIONS: LAND SURFACE 520.7

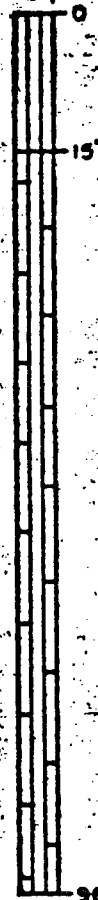
TOP OF CASING

BORING

NO WELL SET

CLAY, SOFT

CLAY, HARD



MOLE PLUGGED WITH BENTONITE  
& ONE SACK OF CEMENT

DRILLED BY MUD ROTARY

STATIC WATER LEVEL \_\_\_\_\_ BELOW TOP OF CASING

# HANDY BROS. MINING CO. & WOLVERINE COAL CO.

36-1

SAGINAW, MICH.,

Nov 10 1906

COAL CO. NO.

973 ✓

DRILLER'S NO.

I HAVE THIS

5

DAY OF

Nov

1906

FINISHED A TEST WELL ON THE FOLLOWING DESCRIBED LAND AND REPORT THE TEST AS FOLLOWS:

Mrs. Mc Crary

DESCRIPTION.

Midland

NW 1/4 of NW 1/4 Sect. 36.

Give Township and Sec. and Owner's name in country. In City give Street, Lot and Block No. and Addition.

14N-2E

THICKNESS OF STRATA.		MATERIAL.	DEPTH.
8		Sand	8
122		Clay	130
35		Sand	165
20		Fire Clay	185
8		Gray slate	193
0-8	Coal		193-8
7		Fire Clay	200-8
50		Gray slate	250-8
8		Black slate	258-8
1-4	Coal		260
3		Fire Clay	263
5		Slate	268
1	Coal		269
2		Fire Clay	271
12		Black slate	283
3-4	Coal		286-4
4		Fire Clay	290-4

3'4" vein poor quality

21565

REMARKS:

32 rods East of West line 528'  
40 - North of South - 630'

Signed

E. J. Gazette

Driller.

# HANDY BROS. MINING CO. & WOLVERINE COAL CO. 36-

SAGINAW, MICH.,

Sept 26

1905

COAL CO. NO.

543

DRILLER'S NO.

I HAVE THIS

23

DAY OF

Sept

1905

FINISHED A TEST WELL ON THE FOLLOWING DESCRIBED LAND AND REPORT THE TEST AS FOLLOWS:

Midland Co.

Roy Aines

DESCRIPTION.

Midland

SE 1/4 of NW 1/4 Sect 36

HN - 2.E

Give Township and Sec. and Owner's name in country. In City give Street, Lot and Block No. and Addition.

THICKNESS OF STRATA.	MATERIAL.	DEPTH.
24	Sandy Clay	24
7	Gravelly	31
29	Hardpan	60
27	Sandy Clay	87
17	Sand & Gravel	104
21	Red Sandy Clay	125
2	Red Sand	127
17	Gray Shale	144
3	Black Sandy Shale	147
2	Gray Shale	149
14	Fire Clay	163
7	Gray Shale	170
1-10	Black Slate	171-10
0-9	Coal	172-7
18-5	Gray shale	191
7	Dark "	198
39	" "	237
6	Black Chip Slate	243
9	Dark Gray Shale	252
29	" "	281
6	" "	287

REMARKS:

1418 ft east of West line  
3.4 ft north of South line

Signed The Archambault Driller.

# HANDY BROS. MINING CO. & WOLVERINE COAL CO.

36-3

SAGINAW, MICH.,

Oct 23<sup>d</sup> 1905

COAL Co. No.

572<sup>✓</sup>

DRILLER'S No.

I HAVE THIS

21<sup>st</sup>

DAY OF

Oct

19

05

FINISHED A TEST WELL ON THE FOLLOWING DESCRIBED LAND AND REPORT THE TEST AS FOLLOWS:

LOWING DESCRIBED LAND AND REPORT THE TEST AS FOLLOWS:

Midland Co.

DESCRIPTION.

Albert Higgins

Midland

SW 1/4 of NW 1/4 Sect 36. 14N-2E

Give Township and Sec. and Owner's name in country. In City give Street, Lot and Block No. and Addition.

THICKNESS OF STRATA.	MATERIAL.	DEPTH.
65	Clay	65
3	Sand	68
57	Clay	125
45	Hardpan	170
3	Sand	173
173		

REMARKS:

In NW Corner

Signed

Thos Archambault Driller.

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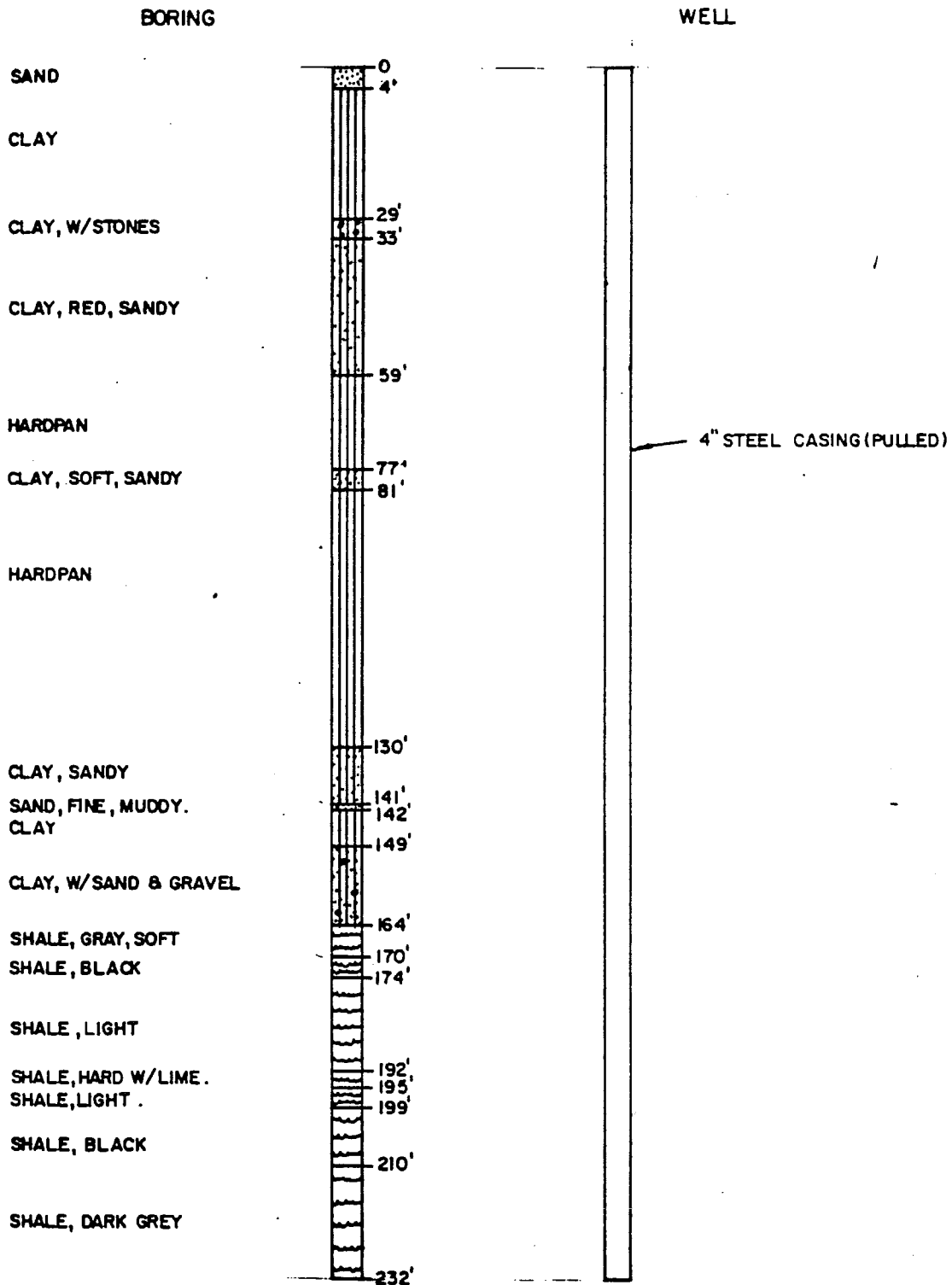
ENVIRONMENTAL SCIENTISTS/ENGINEERS/GEOLOGISTS/CHEMISTS  
801 CASCADIA WEST PARKWAY, S.E., P.O. BOX 696, GRAND RAPIDS, MICHIGAN 49508



PROJECT NO. 20237  
OWNERS WELL NO. 36-5 113! WALDO  
CLIENT DOW CHEMICAL  
DATE 8-17-73

## BORING & WELL RECORD

CONTRACTOR: ROSA WELL DRILLING  
ELEVATIONS: LAND SURFACE -  
TOP OF CASING -



STATIC WATER LEVEL 90' BELOW TOP OF CASING

36-14N-2E  
Midland Twp., (Midland County)

TD 4406 in Detroit River  
(Dry)

**Dow Chemical Co.**  
~~Ashby Drilling Co.~~

Roy Ames #1 Permit #11718  
Drilling Contractor: Ashby Drilling Co. (Rotary)

Location: SW $\frac{1}{4}$  SW $\frac{1}{4}$  SE $\frac{1}{4}$  section 36, T.14N., R.2E.  
330' from south and 330' from west line of quarter section.

Elevation: 621.5 feet above sea level.

Record by: D. Myers from driller's log.

	Thickness (feet)	Depth (feet)
<b>PLEISTOCENE:</b>		
Drift:		
Drift	68	68
<b>PENNSYLVANIAN:</b>		
Saginaw:		
Shale, Probably also part drift)	155	223
Shale and shells	82	305
Shale, sandy	460	765

**MISSISSIPPIAN:**

Michigan-Marshall (Preliminary report Red Rock  
1270-1323):

Shale and shells	55	820
Gypsum	92	912
Shale and shells	77	989
Shale, sandy	11	1000
Shale	85	1085
Shale and shells	21	1106
Shale, sandy	48	1154
Shale and shells	74	1228
Sand, red	37	1265
Red Rock	29	1294
Red Rock and Shale	30	1324
<b>Coldwater-Berea-Antrim (undivided):</b>		
Shale and sand	52	1376
Shale, sandy	24	1400
Shale	110	1510
Shale and sand	132	1642
Shale, sandy	150	1792
Sandy and Shale	183	1975
Shale	60	2035
Shale, black	625	2660
Shale, black, lime	180	2840
Shale, black	25	2865
Shale and lime	22	2887
Lime	25	2912
Coring	9	2924



OCT 08 1973

## WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH8 1973  
36

## 1 LOCATION OF WELL

County Midland Twp. Midland Fraction 1/4 SW 1/4 Section No. 36 Township 14 N. Range 3 E

Distance And Direction from Road Intersections 3/4 mi. S. of Saltsburg Rd. OWNER No. 1

on East side of Waldo Rd. 1584'

Street address & City of Well Location same as owner

3 OWNER OF WELL: C. Horace Withers

Address 1131 Waldo Rd.

Midland Mich.

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM	4 WELL DEPTH: (completed)	Date of Completion
<u>Sand</u>	<u>4'</u>	<u>4'</u>	<u>232</u> ft.	<u>8-17-73</u>
<u>Clay</u>	<u>25'</u>	<u>29'</u>	5 <input checked="" type="checkbox"/> Cable tool <input type="checkbox"/> Rotary <input type="checkbox"/> Driven <input type="checkbox"/> Dug	
<u>Clay w/ stones</u>	<u>4'</u>	<u>33'</u>	<input type="checkbox"/> Hollow rod <input type="checkbox"/> Jetted <input type="checkbox"/> Bored <input type="checkbox"/>	
<u>Red sandy clay</u>	<u>26'</u>	<u>59'</u>	6 USE: <input type="checkbox"/> Domestic <input type="checkbox"/> Public Supply <input type="checkbox"/> Industry	
<u>Hard Pan</u>	<u>18'</u>	<u>77'</u>	<input type="checkbox"/> Irrigation <input type="checkbox"/> Air Conditioning <input type="checkbox"/> Commercial	
<u>Soft sandy clay</u>	<u>4'</u>	<u>81'</u>	<input type="checkbox"/> Test Well <input type="checkbox"/>	
<u>Hard Pan</u>	<u>49'</u>	<u>130'</u>	7 CASING: Threaded <input checked="" type="checkbox"/> Welded <input type="checkbox"/>	
<u>sandy clay</u>	<u>11'</u>	<u>141'</u>	Height Above/Below <u>172</u> ft. Depth	
<u>Fine Muddy sand</u>	<u>1'</u>	<u>142'</u>	Weight <u>17</u> lbs./ft.	
<u>Clay</u>	<u>7'</u>	<u>149'</u>	Drive Shoe? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
<u>Clay w/ sand &amp; gravel</u>	<u>15'</u>	<u>164'</u>	8 SCREEN: Type: <u>None</u> Dia.: _____	
<u>Soft gray shale</u>	<u>6'</u>	<u>170'</u>	Slot/Gauze _____ Length _____	
<u>Black shale</u>	<u>4'</u>	<u>174'</u>	Set between _____ ft. and _____ ft.	
<u>Light shale</u>	<u>18'</u>	<u>192'</u>	Fittings: _____	
<u>Hard slate w/ lime</u>	<u>3'</u>	<u>195'</u>	9 STATIC WATER LEVEL <u>90</u> ft. below land surface	
<u>Light shale</u>	<u>4'</u>	<u>199'</u>	10 PUMPING LEVEL below land surface <u>No test</u>	
<u>Black shale</u>	<u>11'</u>	<u>210'</u>	_____ hrs. pumping _____ g.p.m.	
<u>Dark gray shale</u>	<u>22'</u>	<u>232'</u>	_____ ft. after _____ hrs. pumping _____ g.p.m.	
ADDED INFO. BY DRILLER: <u>None</u>			11 WATER QUALITY in Parts Per Million: Iron (Fe) _____ Chlorides (Cl) <u>Salt</u>	
CORRECTED BY: _____			Hardness _____	
REMARKS: _____			12 WELL HEAD COMPLETION: <input checked="" type="checkbox"/> 12" Approved Pit <input type="checkbox"/> 12" Above Grade	
			13 GROUTING: Well Grouted? <input type="checkbox"/> Yes <input type="checkbox"/> No	
			Material: <input type="checkbox"/> Neat Cement <input type="checkbox"/>	
			Depth: From _____ ft. to _____ ft.	
			14 SANITARY: Nearest Source of possible contamination _____ feet _____ Direction _____ Type _____	
			Well disinfected upon completion <input type="checkbox"/> Yes <input type="checkbox"/> No	
			15 PUMP: Manufacturer's Name <u>None</u>	
			Model Number _____ HP	
			Length of Drop Pipe _____ ft. capacity _____ G.P.M.	
			Type: <input type="checkbox"/> Submersible <input type="checkbox"/>	
			<input type="checkbox"/> Jet <input type="checkbox"/> Reciprocating	

## 16 Remarks, elevation, source of data, etc.

Very small amount of salt water. hole was cemented up to 160 ft. filled with drilling mud to top. Corina. Palled

## 17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Rosa Well Drilling 11111

REGISTERED BUSINESS NAME REGISTRATION #

Address 3344 Midland Rd. S.W.

Signed Rosa Rosa Date 8-27-73

AUTHORIZED REPRESENTATIVE

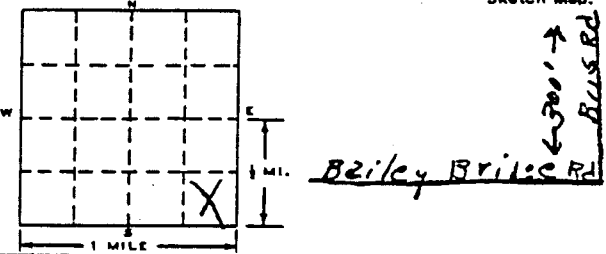
NOV 20 1972

## WATER WELL RECORD

ACT 294 RA 1965

MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH

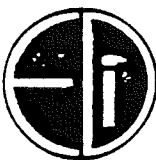
361

<b>1 LOCATION OF WELL</b>					
County <u>Midland</u>	Township Name <u>Midland</u>	Fraction <u>SE 1/4</u>	Section Number <u>36</u>	Town Number <u>14 N.W.</u>	Range Number <u>2 E.W.</u>
Distance And Direction from Road Intersections <u>1/2 mi. North off Bailey Bridge N. on</u> <u>W 1428 BUS Rd</u> <u>R#1 Free/2nd</u>			3 OWNER OF WELL: <u>Warren G. L. ZFever</u> Address <u>4713 EBZIFY BR. RD</u> <u>R#1 Free/2nd Mich. 48623</u>		
Street address & City of Well Location <u>R#1 Free/2nd</u>			4 WELL DEPTH: (completed) Date of Completion <u>50 ft. 25 OCT 72</u>		
Locate with "X" in section below 			5 <input type="checkbox"/> Cable tool <input type="checkbox"/> Rotary <input type="checkbox"/> Driven <input type="checkbox"/> Dug <input checked="" type="checkbox"/> Hollow rod <input type="checkbox"/> Jetted <input type="checkbox"/> Bored <input type="checkbox"/>		
			6 USE: <input checked="" type="checkbox"/> Domestic <input type="checkbox"/> Public Supply <input type="checkbox"/> Industry <input type="checkbox"/> Irrigation <input type="checkbox"/> Air Conditioning <input type="checkbox"/> Commercial <input type="checkbox"/> Test Well <input type="checkbox"/>		
2 FORMATION			7 CASING: Threaded <input checked="" type="checkbox"/> Welded <input type="checkbox"/> Height: Above/below Surface <u>1</u> ft.		
			2 in. to <u>44</u> ft. Depth Weight <u>3</u> lbs./ft. in. to <u>  </u> ft. Depth Drive Shoe? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		
Cly soft			8 SCREEN:		
Sand Brown			Type: <u>Johnson</u> Dia.: <u>1 1/2</u> Slot/Gauze <u>60</u> Length <u>8</u> Set between <u>44</u> ft. and <u>50</u> ft. Fittings:		
			9 STATIC WATER LEVEL <u>12</u> ft. below land surface		
			10 PUMPING LEVEL below land surface <u>12</u> ft. after <u>2</u> hrs. pumping <u>5</u> g.p.m. <u>  </u> ft. after <u>  </u> hrs. pumping <u>  </u> g.p.m.		
			11 WATER QUALITY in Parts Per Million: Iron (Fe) <u>  </u> Chlorides (Cl) <u>  </u> Hardness <u>  </u> Other <u>  </u>		
			12 WELL HEAD COMPLETION: <input type="checkbox"/> In Approved Pit <input checked="" type="checkbox"/> Pitless Adapter <input type="checkbox"/> 12" Above Grade		
			13 Well Grouted? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Neat Cement <input type="checkbox"/> Bentonite <input type="checkbox"/> Depth: From <u>  </u> ft. to <u>  </u> ft.		
			14 Nearest Source of possible contamination <u>None yet</u> <u>  </u> feet <u>  </u> Direction <u>  </u> Type <u>  </u> Well disinfected upon completion <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
			15 PUMP: <input type="checkbox"/> Not installed Manufacturer's Name <u>Goulds</u> Model Number <u>605</u> HP <u>1/2</u> Volts <u>110</u> Length of Drop Pipe <u>21</u> ft. capacity <u>5</u> G.P.M. Type: <input type="checkbox"/> Submersible <input checked="" type="checkbox"/> Jet <input type="checkbox"/> Reciprocating		
16 Remarks, elevation, source of data, etc.  CORRECTED BY: <u>R3</u>  ADDITION BY: <u>  </u>			17 WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief. <u>Hines Well Drilling</u> <u>0487</u> REGISTERED BUSINESS NAME REGISTRATION NO. Address <u>210 Dorr</u> <u>Midland</u> Signed <u>Dexter Hines</u> Date <u>1 NOV 72</u> AUTHORIZED REPRESENTATIVE		

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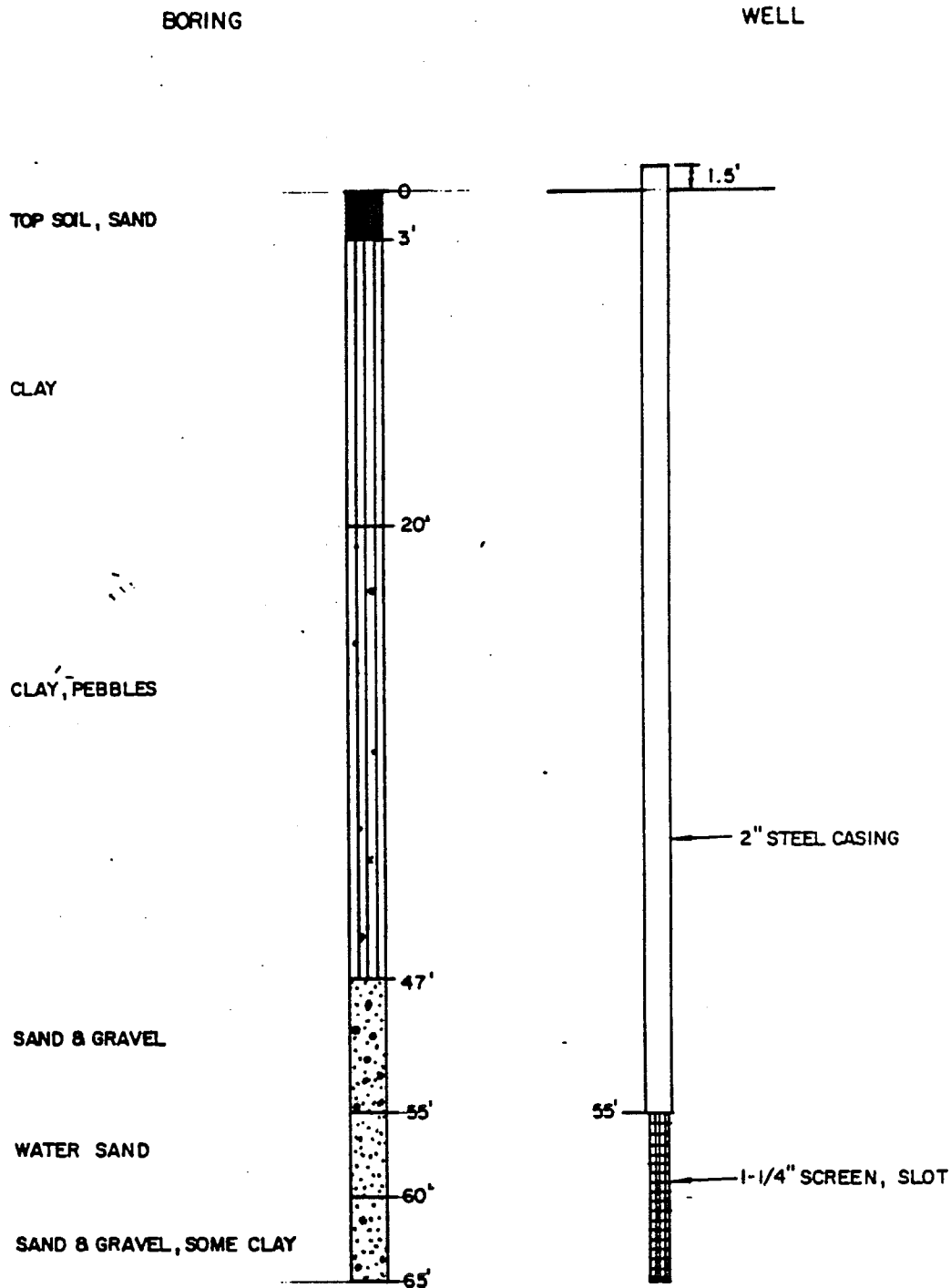
ENVIRONMENTAL SCIENTISTS/ENGINEERS/GEOLOGISTS/CHEMISTS  
871 CASCADE WEST PARKWAY, S.E., P.O. BOX 5046, GRAND RAPIDS, MICHIGAN 49508



PROJECT NO. 20237  
OWNERS WELL NO. 36-7 1185 L4100  
CLIENT DOW CHEMICAL  
DATE 6-24-70

## BORING & WELL RECORD

CONTRACTOR: FERRIO WELL DRILLING  
ELEVATIONS: LAND SURFACE -  
TOP OF CASING -

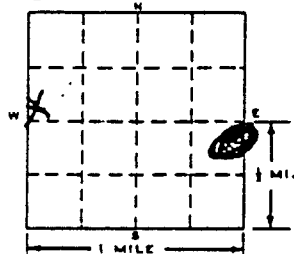


STATIC WATER LEVEL 17.5' BELOW TOP OF CASING

AUG 10 1970

JUL 2 1970 31

WATER WELL RECORD  
ACT 294 PA 1965MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH

1 LOCATION OF WELL			3 OWNER OF WELL:	
County <b>MIDLAND</b>	Township Name <b>Midland</b>	Fraction <b>NW SW NW</b>	Section Number <b>36</b>	Range Number <b>14 N.E. 2 E.W.</b>
Distance And Direction from Road Intersection <b>2000' S. of Salish on Waldon</b>			Address <b>4574-Jefferson</b>	
Street address & City of Well Location <b>1185 S. Waldo. Midland</b>			Date of Completion <b>6-24-1970</b>	
Locate with "X" in section below 			4 WELL DEPTH: (completed) <b>65</b> ft.	
2 FORMATION			5 <input type="checkbox"/> Cable tool <input type="checkbox"/> Rotary <input type="checkbox"/> Driven <input type="checkbox"/> Dug	
			<input checked="" type="checkbox"/> Hollow rod <input type="checkbox"/> Jetted <input type="checkbox"/> Bored <input type="checkbox"/>	
THICKNESS OF STRATUM			6 USE: <input checked="" type="checkbox"/> Domestic <input type="checkbox"/> Public Supply <input type="checkbox"/> Industry	
			<input type="checkbox"/> Irrigation <input type="checkbox"/> Air Conditioning <input type="checkbox"/> Commercial	
DEPTH TO BOTTOM OF STRATUM			7 CASING: Threaded <input checked="" type="checkbox"/> Welded <input type="checkbox"/> Height: Above/Below Surface <b>1 1/2</b> ft.	
			Weight <b>375</b> lbs./ft. Drive Shoe? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
top + sand			8 SCREEN: Type: <b>slot</b> Dia.: <b>1 1/4</b>	
clay -			Strap/Gauze <b>50-60</b> Length <b>10'</b>	
clay - pebbles			Set between <b>5.5</b> ft. and <b>6.5</b> ft.	
sand + gravel			Fittings: <b>3/4 M - ck valve - 3' - 1 1/4" pipe</b>	
clayey			9 STATIC WATER LEVEL <b>16</b> ft. below land surface	
water sand			10 PUMPING LEVEL below land surface	
sand + gravel			ft. after ___ hrs. pumping <b>15</b> g.p.m.	
some clay -			ft. after ___ hrs. pumping ___ g.p.m.	
8 55			11 WATER QUALITY in Parts Per Million:	
5 60			Iron (Fe) ___ Chlorides (Cl) ___	
5 65			Hardness ___ Other ___	
16 Remarks, elevation, source of data, etc.			12 WELL HEAD COMPLETION: <input type="checkbox"/> In Approved Pit	
ADDED INFO. BY DRILLER, ITEM NO.			<input type="checkbox"/> Pitless Adapter <input type="checkbox"/> 12" Above Grade	
CORRECTED BY:			13 Well Grouted? <input type="checkbox"/> Yes <input type="checkbox"/> No	
ADDITION BY:			<input type="checkbox"/> Neat Cement <input type="checkbox"/> Bentonite <input type="checkbox"/>	
17 WATER WELL CONTRACTOR'S CERTIFICATION:			Depth: From ___ ft. to ___ ft.	
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.			14 Nearest Source of possible contamination	
FERRIS Well Drilling 1069			<b>50</b> feet <b>N</b> Direction <b>S. Tank</b> Type	
REGISTERED BUSINESS NAME			Well disinfected upon completion <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Address <b>763 Franklin Rd. Kalamazoo</b>			15 PUMP: <input checked="" type="checkbox"/> Not installed	
Signed <b>Mike Ferris</b> Date <b>6-30-1970</b>			Manufacturer's Name _____	
AUTHORIZED REPRESENTATIVE			Model Number _____ HP _____ Volts _____	
			Length of Drop Pipe _____ ft. capacity _____ G.P.M.	
			Type: <input type="checkbox"/> Submersible	
			<input type="checkbox"/> Jet <input type="checkbox"/> Reciprocating	

# Environmental Data Inc.

a subsidiary of WILLIAMS & WORKS

ENVIRONMENTAL SCIENTISTS/ENGINEERS/GEOLOGISTS/CHEMISTS  
601 CASCADE WEST PARKWAY, S.E., P.O. BOX 6942, GRASSY PARK, MICHIGAN 49608



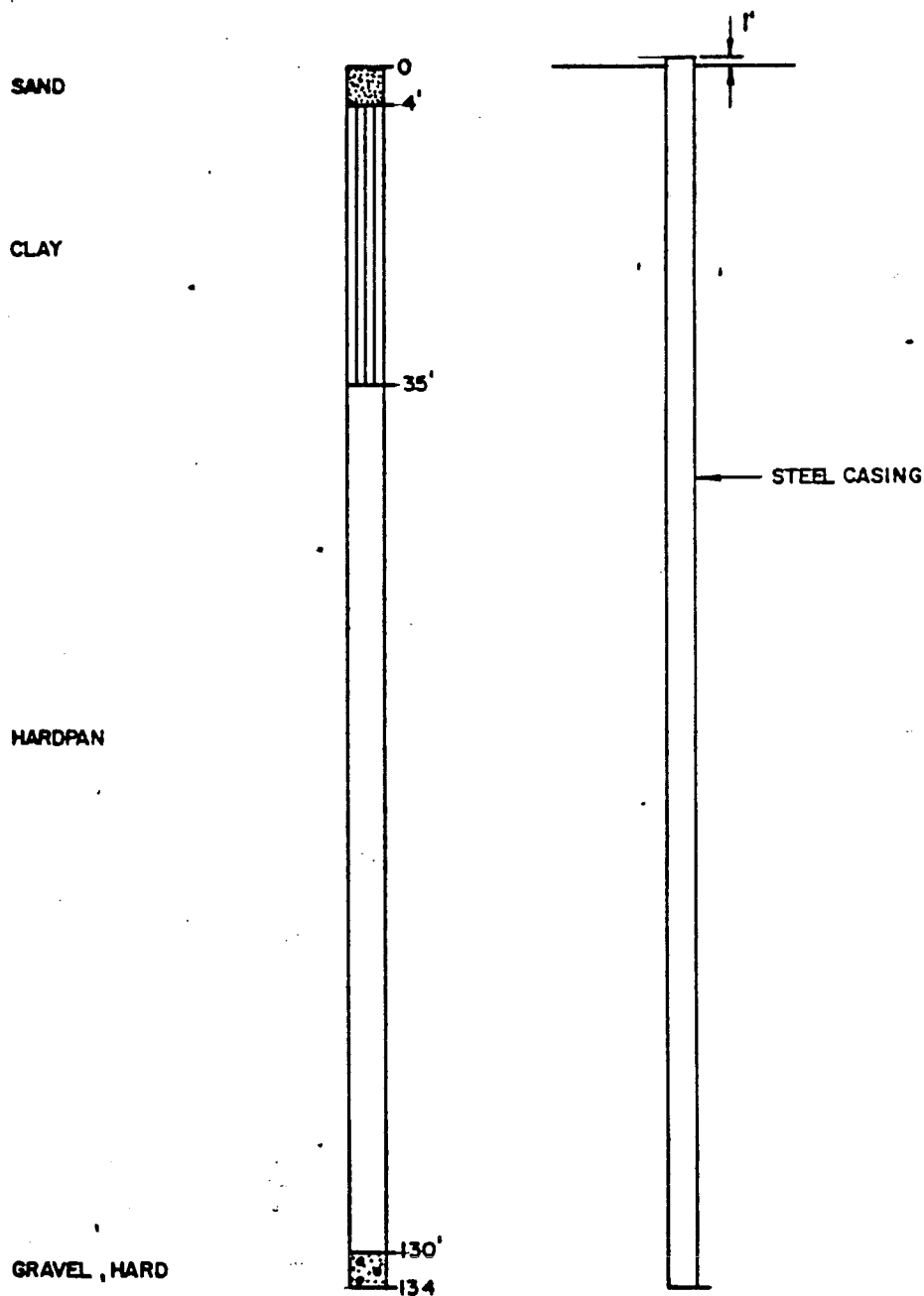
PROJECT NO. 20237  
OWNERS WELL NO. 36-8 1215 WALD  
CLIENT DOW CHEMICAL  
DATE 10-28-70

## BORING & WELL RECORD

CONTRACTOR: NELSON WELL DRILLING

ELEVATIONS: LAND SURFACE -  
TOP OF CASING -

### BORING



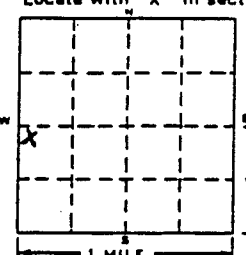
STATIC WATER LEVEL 21' BELOW TOP OF CASING

DEC 30 1971

## WATER WELL RECORD

ACT 284 PA 1965

MICHIGAN DEPARTMENT OF  
PUBLIC HEALTH

1 LOCATION OF WELL			3 OWNER OF WELL:		
County <u>MIDLAND</u>	Township Name <u>MIDLAND</u>	Fraction <u>NW 1/4 Sec 36</u>	Section Number <u>36</u>	Town Number <u>14 N.S.</u>	Range Number <u>2 E.W.</u>
Distance And Direction from Road Intersections <u>1/2 MILE SOUTH OF SALSBERG RD</u> <u>ON WALDO RD</u>			Address <u>1215 SOUTH WALDO RD</u>		
Street address & City of Well Location Locate with "X" in section below			4 WELL DEPTH: (completed) Date of Completion <u>134</u> ft. <u>10/18/70</u>		
Sketch Map: 			5 <input checked="" type="checkbox"/> Cable tool <input type="checkbox"/> Rotary <input checked="" type="checkbox"/> Driven <input type="checkbox"/> Dug <input type="checkbox"/> Hollow rod <input type="checkbox"/> Jetted <input type="checkbox"/> Bored <input type="checkbox"/>		
			6 USE: <input checked="" type="checkbox"/> Domestic <input type="checkbox"/> Public Supply <input type="checkbox"/> Industry <input type="checkbox"/> Irrigation <input type="checkbox"/> Air Conditioning <input type="checkbox"/> Commercial <input type="checkbox"/> Test Well <input type="checkbox"/>		
			7 CASING: Threaded <input type="checkbox"/> Welded <input type="checkbox"/> Height: Above/Below Surface <u>1</u> ft. Diam. <u>1 1/2</u> in. to <u>132</u> ft. Depth Weight <u>11</u> lbs./ft. <u>132</u> in. to <u>134</u> ft. Depth Drive Shoe? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		
2 FORMATION			8 SCREEN:		
THICKNESS OF STRATUM			Type: <u>SCREEN</u> Dia.: <u>1 1/2</u> in.		
DEPTH TO BOTTOM OF STRATUM			Slot/Gauze <u>NO</u> Length <u>10</u> ft.		
<u>Surface sand</u> 0 4			Set between <u>10</u> ft. and <u>132</u> ft.		
<u>Clay</u> 4 35			Fittings: -		
<u>Hard pan</u> 35 130			9 STATIC WATER LEVEL		
<u>Hard gravel</u> 130 134			<u>20</u> ft. below land surface		
			10 PUMPING LEVEL below land surface		
			<u>100</u> ft. after <u>1</u> hrs. pumping <u>100</u> g.p.m.		
			<u>100</u> ft. after <u>1</u> hrs. pumping <u>100</u> g.p.m.		
Water production <u>Good.</u>			11 WATER QUALITY in Parts Per Million:		
			Iron (Fe) <u>0</u> Chlorides (Cl) <u>0</u>		
			Hardness <u>0</u> Other <u>0</u>		
			12 WELL HEAD COMPLETION: <input type="checkbox"/> In Approved Pit <input checked="" type="checkbox"/> Pitless Adapter <input type="checkbox"/> 12" Above Grade		
			13 Well Grouted? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Neat Cement <input type="checkbox"/> Bentonite <input type="checkbox"/> Depth: From <u>0</u> ft. to <u>134</u> ft.		
			14 Nearest Source of possible contamination <u>100</u> feet <u>EAST</u> Direction <u>SEPTIC</u> Type Well disinfected upon completion <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
			15 PUMP: <input type="checkbox"/> Not installed Manufacturer's Name <u>RAPIDATON</u> Model Number <u>HP 6</u> Volts <u>220</u> Length of Drop Pipe <u>60</u> ft. capacity <u>12</u> G.P.M. Type: <input checked="" type="checkbox"/> Submersible <input type="checkbox"/> Jet <input type="checkbox"/> Reciprocating		
16 Remarks, elevation, source of data, etc.			17 WATER WELL CONTRACTOR'S CERTIFICATION:		
ADDED INFO. BY DRILLER, <u>Wm. M.</u>			This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.		
CORRECTED BY:			<u>NELSON WELL DRILLING 0241</u> REGISTERED BUSINESS NAME REGISTRATION NO.		
ADDITION BY:			Address <u>245 CORNING ST FORT WALK</u>		
			Signed <u>Raymond Nelson</u> Date <u>10/18/70</u> AUTHORIZED REPRESENTATIVE		

# MICHIGAN DEPARTMENT OF PUBLIC HEALTH

GEOLOGICAL SURVEY NO.

JUL 05 1983 WATER WELL AND PUMP RECORD

PART 127 ACT 368 P.A. 1978

PERMIT NUMBER

36

<b>1 LOCATION OF WELL</b> County <u>Midland</u> Township Name <u>Midland</u> Fraction <u>56 1/4 N 1/4 N 1/4</u> Section Number <u>36</u> Town Number <u>14 N 1/2</u> Range Number <u>2</u>		
Distance And Direction From Road Intersection <u>1/4 mi. South of Salzbare Rd. and 70'</u> <u>East of Waldo Rd</u>		
Street Address & City of Well Location <u>1119 S. Waldo Midland</u>		
Locate with "X" in Section Below 		
<b>2 FORMATION DESCRIPTION</b>		<b>3 OWNER OF WELL</b> <u>Dow Chemical Co</u> Address <u>Midland Mich</u> Address Same As Well Location? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
THICKNESS OF STRATUM DEPTH TO BOTTOM OF STRATUM		<b>4 WELL DEPTH: (completed)</b> <u>98'</u> ft. Date of Completion <u>May 14-83</u> <b>5</b> <input type="checkbox"/> Cable tool <input checked="" type="checkbox"/> Rotary <input type="checkbox"/> Driven <input type="checkbox"/> Dug <input type="checkbox"/> Hollow rod <input type="checkbox"/> Auger <input type="checkbox"/> Jetted <input type="checkbox"/>
Sand Clay Sandy Clay Fine Sand		<b>6 USE:</b> <input checked="" type="checkbox"/> Domestic <input type="checkbox"/> Type I Public <input type="checkbox"/> Type III Public <input type="checkbox"/> Irrigation <input type="checkbox"/> Type IIa Public <input type="checkbox"/> Heat pump <input type="checkbox"/> Test Well <input type="checkbox"/> Type IIb Public <input type="checkbox"/>
8' 8' 24' 32' 56' 88' 10' 98'		<b>7 CASING:</b> <input checked="" type="checkbox"/> Steel <input checked="" type="checkbox"/> Threaded <input type="checkbox"/> Welded <input type="checkbox"/> Plastic <input type="checkbox"/> Height: Above/Below Surface <u>1</u> ft 2 in. to 90 ft. depth Weight <u>3.75</u> lbs/ft 5 in. to 78 ft. depth Drive Shoe <input checked="" type="checkbox"/> Yes 9 1/2 in. to 80 ft. depth <input type="checkbox"/> No
8' 8' 24' 32' 56' 88' 10' 98'		<b>8 SCREEN:</b> <input type="checkbox"/> Not installed Type <u>Johnson Gale</u> Diameter <u>1 1/2"</u> Slot/Gauge <u>10</u> Length <u>6'</u> Set between <u>90</u> ft. and <u>98</u> ft. FITTINGS <input checked="" type="checkbox"/> K-Packer <input type="checkbox"/> Lead Packer <input checked="" type="checkbox"/> Bremer Check <input type="checkbox"/> Blank above screen <u>4</u> ft. Other _____
8' 8' 24' 32' 56' 88' 10' 98'		<b>9 STATIC WATER LEVEL:</b> <u>30</u> ft. below land surface <input type="checkbox"/> Flr
8' 8' 24' 32' 56' 88' 10' 98'		<b>10 PUMPING LEVEL:</b> below land surface <u>45</u> ft. after <u>1</u> hrs pumping at <u>8</u> GPM _____ ft. after _____ hrs pumping at _____ GPM
8' 8' 24' 32' 56' 88' 10' 98'		<b>11 WELL HEAD COMPLETION:</b> <input checked="" type="checkbox"/> Pitless adapter <input type="checkbox"/> 12" above grade <input type="checkbox"/> Basement offset <input type="checkbox"/> Approved pit
8' 8' 24' 32' 56' 88' 10' 98'		<b>12 WELL GROUTED?</b> <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes From _____ to _____ ft. <input type="checkbox"/> Neat cement <input type="checkbox"/> Bentonite <input checked="" type="checkbox"/> Other <u>Drill Mud</u> No. of bags of cement _____ Additives _____
8' 8' 24' 32' 56' 88' 10' 98'		<b>13 Nearest source of possible contamination</b> Type <u>Septic</u> Distance <u>65'</u> Direction <u>East</u> Well disinfected upon completion? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
8' 8' 24' 32' 56' 88' 10' 98'		<b>14 PUMP</b> <input type="checkbox"/> Not installed <input type="checkbox"/> Pump installation Only Manufacturer's name <u>Goulds</u> Model number <u>VS07</u> HP <u>3/4</u> Volts <u>220</u> Length of Drop Pipe <u>63</u> ft. capacity <u>6</u> G.P.M. TYPE <input type="checkbox"/> Submersible <input checked="" type="checkbox"/> Jet PRESSURE TANK Manufacturer's name <u>Well X Tral</u> Model number <u>WX202</u> Capacity <u>30</u> Gallons
<b>15 Remarks, elevation, source of data, etc.</b> ADDITIONAL INFO BY DRILLER, ITEM NO. *CORRECTED BY **ADDITION BY ELEVATION DEPTH TO ROCK		
<b>16. WATER WELL CONTRACTOR'S CERTIFICATION:</b> This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief <u>Card Well Drilling</u> 56-0222 REGISTERED BUSINESS NAME REGISTRATION NO. Address <u>261 W. Pine River Rd. Midland</u> Signed <u>Wayne Carl</u> Date <u>May 26-83</u> AUTHORIZED REPRESENTATIVE		

ACT 294 - EPA, 1985

MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH

## 1-1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
MILWAUKEE	MILWAUKEE	N 6 N 10 W 2 N 10 W	36	14 N.S.	T 1 E W

Distances And Direction from Road Intersections  
1/4 MILE EAST OF WALDS-ROAD  
300 FT. S. OF JALSAUNG-ROAD  
Street address & City of Well Location

Locate with "X" in section below

### Sketch Map:

Free Date  
SALSBURG - RD  
Waco

## 3 OWNER OF WELL

Address Johnston Contracting Inc.  
624 Poseyville Road Midland

4 WELL DEPTH: (completed) Date of Completion  
752 ft. 4/24/73-1970

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dup  
☐ Hollow rod ☐ Jetted ☐ Bored ☐

6 USE: ☐ Domestic ☐ Public Supply ☒ Industry  
☐ Irrigation ☐ Air Conditioning ☐ Commercial  
☐ Test Well ☐ \_\_\_\_\_

7. CASING: Threaded ☐ Welded ☒ Height: Above/Below  
Diam. \_\_\_\_\_ Surface 1 ft.  
4 in. to 70 ft. Depth Weight 11 lbs./ft.  
\_\_\_\_\_ in. to \_\_\_\_\_ ft. Depth Drive Shoe? Yes ☒ No ☐

## 2 FORMATION

[illegible]

**8 SCREEN:**

Type Vine Wound Dia: 13 5/8  
 Size/Gauge 10 Length 3  
 Set between 20 ft. and 25 ft.  
 Fittings: Tia N. Packer

## 9 STATIC WATER LEVEL

ft. below land surface

10 PUMPING LEVEL below land surface

22 ft. after hrs. pumping 6 a.m.

## 11 WATER QUALITY in Parts Per Millions:

Iron (Fe) \_\_\_\_\_ Chlorides (Cl) \_\_\_\_\_  
Hardness \_\_\_\_\_ Other \_\_\_\_\_

## 12 WELL HEAD COMPLETION:

☒ Pitless Adapter ☐ 12" Above Grade

13 Well Groomed? ☒ Yes ☐ No

☐ Nest Cement ☐ Bentonite ☐ \_\_\_\_\_

Depth: From \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

## 14 Nearest Source of possible contamination

75' ~~feet~~ Direction Septic Ty  
Well disinfected upon completion ☒ Yes ☐ No

## 15 PLUM:

☐ Not installed

Manufacturer's Name Hauco S

Model Number \_\_\_\_\_ HP 2 Volts 220

Length of Drop Pipe 42 ft. capacity 40 G.P.M.

Type: ☒ Submersible  
☐ Jet ☐ Reciprocating

## 16 Remarks, elevation, source of data, etc.

ADDED INFO. BY DRILLER. USM 124

**\*CORRECTED BY**

**ADDITION**

**17 WATER WELL CONTRACTOR'S CERTIFICATION:**

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

**NELSON WELL DRILLING** 0241  
REGISTERED BUSINESS NAME REGISTRATION

Address 245 CORNING ST Forwell

Signed Hugh Nelson Date 11/26/73





Figure B3-2 of Module B3 (Hydrogeologic Report) shows the locations of the wells and borings drilled at the Dow Corning facility. The logs for these on-site borings are included in this Appendix. Each record is designated by a number unique to the section in which it is located. Deep borings will be referred to by the well number, the number of the section in which it is located, a dash, and the number unique to that section in parentheses [e.g., DMW-2 (26-7)1]. Some of these borings/wells were geophysically logged, and these data are in Appendix B3-3.

The soil borings were drilled to investigate soil conditions either for hydrogeologic work or foundation engineering. Most of the soil borings are labeled with two numbers separated by a dash. The first number represents the block number within the Dow Corning facility and the second number identifies the boring (e.g., boring 600-84 is located in the 600 block). The corresponding boring logs in Appendix B3-2 contain one additional two-digit number in the identification code that represents the year in which the boring was drilled (e.g., boring 600-84-74 was drilled in 1974 and is equivalent to Boring 600-84 in Figure B3-2).

The shallow wells are shallow monitoring wells (SMW) installed to monitor shallow ground water in the near-surface sediments. Most of these wells are labeled "SMW" followed by two numbers separated by a dash. As with the soil boring designation, the first number represents the block number within the Dow Corning facility and the second number identifies the boring, though the block numbers are divided by 100 in the shallow monitoring well labels. Therefore, SMW-6-1 is a shallow monitoring well in the 600 block of the Dow Corning facility. Two shallow wells (3S-1 and 3S-2) do not follow this numbering scheme.

DOW CORNING 20839  
WELL AND BORING SUMMARY SHEET

WELL AND BORING SUMMARY SHEET					DEPTH
WELL No.	LOCATION COORDS.		T.O.C.	GRADE	GRADE TO BOTTOM OF BORING
	E-W	N-S			
BORINGS - DEEP AND SHALLOW					
86A	3800.00	9283.00	*	-----	NA 85
86B	3780.00	9283.00	*	-----	NA 96
86C	1937.00	6395.00	*	-----	NA 85
86D	3580.00	7920.00	*	-----	NA 96
3N-1	1902	7075		-----	617.58 25
3N-2	1902	7110		-----	617.18 25
3N-3	1872	7110		-----	616.18 25
3N-4	1877	7080		-----	616.18 25
300-85	2237	6085		-----	616.78 25
300-86	2202	6050		-----	616.58 25
300-87	2262	6050		-----	616.38 25
300-88	1977	6935		-----	617.38 35
300-89	1897	7760		-----	618.48 35
400-56	1997	8580		-----	623.43 35
400-90	1952	8940		-----	624.18 40
400-91	1832	8795		-----	622.58 40
400-92	1837	8690		-----	621.88 35
400-93	1837	8560		-----	621.98 35
400-94	1727	8800		-----	623.88 40
400-95	1727	8690		-----	622.18 40
400-96	1767	8610		-----	622.48 40
600-82	3077	8990		-----	627.48 41
600-83	3077	8580		-----	626.28 35
600-84	3077	8170		-----	623.88 35
700-58	3315	7835		-----	626.38 45
700-61	3620	7835		-----	630.38 45
700-64	3860	7835		-----	628.68 46
700-65	3860	7430		-----	627.88 35
700-66	3860	7015		-----	625.58 35
800-001	3910	9085		-----	630.18 40
800-002	3590	9085		-----	629.18 40
800-003	3290	9085		-----	628.18 40
1000-97	4060	8120		-----	629.68 10
1000-98	4065	8420		-----	630.88 10
1000-99	4075	8722		-----	637.98 15
1000-100	4065	9025		-----	633.98 15
1000-101	4190	8875		-----	636.68 15
1000-102	4310	8720		-----	633.58 13
1000-103	4310	8420		-----	635.58 15
1000-104	4295	8120		-----	625.98 10
1000-105	4305	7925		-----	631.18 40
1000-106	4400	8300		-----	635.68 40
1000-107	4400	8525		-----	635.68 40
2500-106	2522	6630		-----	618.68 20
2500-107	2572	6630		-----	620.58 20
2500-108	2622	6620		-----	621.58 20
2500-109	2672	6630		-----	619.28 25
2500-110	2672	6690		-----	619.28 20
2500-111	2672	6750		-----	618.38 20
2500-112	2622	6745		-----	619.68 20
2700-67	3570	6730		-----	618.68 35

2700-68	3570	6480	-----	NA	35
2700-69	3615	6230	-----	617.38	35
2700-70	3890	6725	-----	NA	35
2700-71	3860	6475	-----	620.58	35
2700-72	3870	6220	-----	621.28	37
2900-73	4050	6725	-----	622.68	34
2900-74	4190	6470	-----	624.58	38
2900-75	4050	6220	-----	621.58	35
2900-76	4460	6725	-----	623.78	40
2900-77	4330	6485	-----	621.28	35
2900-78	4390	6220	-----	623.58	35
2900-79	4685	6680	-----	624.38	40
2900-80	4630	6475	-----	624.88	40
2900-81	4630	6215	-----	622.38	40
DP-2	3444	7818 *	-----	625	100
DP-3	4620	9020 *	-----	630	100
DH-4	2893	8035 *	-----	625	100
DH-5	2235	8638 *	-----	624	140

#### DEEP MONITORING WELLS

DMW1	6005.54	8795.86	641.32	-638	100
DMW2	3635.26	5577.78	621.8	-615	100
DMW3	1736.42	6263.21	620.03	-615	85
DMW4A	3296.55	9209.26	630.32	-630	82
DMW4(DP-1)	3262.04	9210.41	631.41 @	NA	75
DMW5	3770.36	9197.81	635.09 @	NA	NA
DMW6A	3137.86	8864.84	631	-627	75
DMW6	3137.87	8900.42	631.17 @	NA	NA
DMW7	3811.25	7935.54	629.04	626.1	76
DMW8	3821.24	9283.78	634.94	632.8	244
DMW9	1249.09	5892.28	620.39	618.4	245
DMW10	4135.49	9217.92	632.73	630.4	165
DMW11	3338.72	7919.83	627.32	625.3	188
DMW12	3833.24	9283.78	635.01	632.8	53
OW-1	5880	8738 *	NA	638	365
OW-2	6210	6230 *	NA	632	199
OW-3	3380	5460 *	NA	615	177

#### SHALLOW MONITORING WELLS

3S-1	1778.67	6262.21	620.00	618.3	16
3S-2	1790.00	6265.00	620.43	618.3	25
SMW6-1	3134.65	8919.39	631.17	627.7	12
SMW6-2	3132.85	8315.32	629.29	626.0	12
SMW7-1	3349.50	7921.88	628.51	625.0	12
SMW7-2	3902.45	7922.06	631.54	628.3	12
SMW10-1	4195.29	8864.43	635.60	633.0	12
SMW10-2	4396.08	8333.51	633.74	630.0	12
SMW25-1	2799.00	6454.00	621.52	619.6	17
SMW25-2	2686.50	6176.60	621.60	619.2	20
SMW25-3	2492.40	6391.50	620.92	618.2	17
SMW28-1	3394.29	9278.61	633.96	630.9	12.9
SMW28-2	3902.18	9292.39	635.13	632.1	12

\* - INDICATES THAT THE EXACT COORDINATES WERE NOT AVAILABLE AND THAT APPROXIMATE LOCATIONS WERE USED  
 @ - INDICATES THAT THE WELL LISTED IS PLUGGED AND NO LONGER EXISTS  
 N.A. - NOT AVAILABLE



Page: 1 of 1 86-B 02  
Well/Boring No.: \_\_\_\_\_  
Client: Dow Corning  
Project No.: 20600  
Permit No.: \_\_\_\_\_  
Date Started \_\_\_\_\_ Finished 9/17/86

# Well / Boring Log Sheet

County	MIDLAND	Township	MIDLAND	Fraction	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	Section	26	T	14N	R	2E
--------	---------	----------	---------	----------	---------------	---------------	---------------	---------	----	---	-----	---	----

Contractor: Raymer  
Address: Grand Rapids, MI

Equipment: Falling Rig #10

Supervisor: D. Pierce

Drilling Method(s)	Depth
Rotary	

Grouting/Seal	
Depth To	Material

**Development:**

Water Level: \_\_\_\_\_ Ft. Below \_\_\_\_\_

**Measured On:**

**Screen:**

**Manufacturer:** \_\_\_\_\_

**Material:** \_\_\_\_\_

Model: \_\_\_\_\_

Slot/Gauze: \_\_\_\_\_ Dia: \_\_\_\_\_

Length: \_\_\_\_\_

Depth Set: \_\_\_\_\_ To: \_\_\_\_\_

Casing		
Dia	Type	Depth Set

Dia	Type	Depth Set
-----	------	-----------

\_\_\_\_\_ To \_\_\_\_\_

\_\_\_\_\_ To \_\_\_\_\_

### Elevation

**Casing:** \_\_\_\_\_

Ground: \_\_\_\_\_

Ref. Pl: \_\_\_\_\_

**Remarks:** (with the same other data available)

Remarks (include name, other data available)

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County	MIDLAND	Township	MIDLAND	Fraction	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	Section	26	T	14N	R	2E
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# LOG OF BORING NO. 3N-1

OFFSET 5 FT. SOUTH OF  
ORIGINAL BORING LOCATION

PROJECT 318 BLDG. TANK FARM				SITE DOW CORNING CORPORATION MIDLAND PLANT			
BORING				PROJECT NO.		SAMPLE TYPE	
STARTED 10/7/85 COMPLETED 10/7/85				85-331		S.S. <input checked="" type="checkbox"/> AUGER <input checked="" type="checkbox"/> SHELBY <input type="checkbox"/>	
DEPTH IN FEET	LEGEND	SAMPLES	DESCRIPTION OF MATERIAL	SAMPLE NO.	STD. PENETRATION "N" BLOWS PER FOOT	UNIT NAT. WT. LB./FT. <sup>3</sup>	UNCONFINED COMPRESSIVE STRENGTH TONS/FT <sup>2</sup>
							PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT %
			SURFACE ELEVATION ~91.4'				1 2 3 4 5 10 20 30 40 50
5			Sand-fill, loose, dark brown with miscellaneous fill-wood, broken concrete, brick.	A	-	-	*Calibrated Pocket Penetrometer
				B	-	-	
10			Clay-stiff, brown, silty with some sand and pebbles (CL)	C	7	122	
				D	22	127	
15			Silt-compact, gray, some sand and trace clay	E	12	125	
20			Clay-stiff, gray, sandy with silt and trace pebbles (CL-ML)	F	11	127	
25			Hardpan-extremely hard, gray, sandy with silt and trace pebbles (CL-ML)	G	77	124	
			END OF BORING AT 25 1/2 FT.				
WATER LEVEL OBSERVATIONS						SAMTEST, INC.	
W.L. UPON COMPLETION AT 5'6"						DRILLING & TESTING SERVICES	
W.L.							

# LOG OF BORING NO. 3N-2

PROJECT 318 BLDG. TANK FARM					SITE DOW CORNING CORPORATION MIDLAND PLANT						
BORING STARTED 10/4/85 COMPLETED 10/4/85					PROJECT NO. 85-331		SAMPLE TYPE S.S. <u>X</u> AUGER <u>X</u> SHELBY				
DEPTH IN FEET	LEGEND	SAMPLES	DESCRIPTION OF MATERIAL	SAMPLE NO.	STD. PENETRATION "N" BLOWS PER FOOT	UNIT NAT. WT. LB./FT. <sup>3</sup>	UNCONFINED COMPRESSIVE STRENGTH TONS/FT <sup>2</sup>				
							1	2	3	4	5
			SURFACE ELEVATION <u>91.0'</u>				PLASTIC LIMIT % <u>X</u> WATER CONTENT % <u>X</u> LIQUID LIMIT % <u>△</u> 10      20      30      40      50				
			Sand-fill, loose, dark brown, miscellaneous fill-wood, broken concrete, brick	A	-	-	*Calibrated Pocket Penetrometer				
5				B	-	-					
10			Topsoil-black, sandy loam	D	7	129					
			Clay-stiff, brown, silty with some sand and pebbles (CL)								
15			Silt-compact, gray, some sand and trace clay	E	6	126					
			Clay-stiff, gray, sandy with silt and trace pebbles (CL-ML)	F	9	132					
20											
			Hardpan-extremely hard, gray, sandy with silt and trace pebbles (CL-ML)	G	35 1/3	146					
25			END OF BORING AT 25 1/2 FT.								
WATER LEVEL OBSERVATIONS							SAMTEST, INC. DRILLING & TESTING SERVICES				
W.L. ENCOUNTERED AT 5'0" WITH CAVE-IN TO											
W.L. 10'											

# LOG OF BORING NO. 3N-3

PROJECT 318 BLDG. TANK FARM				SITE DOW CORNING CORPORATION MIDLAND PLANT			
BORING STARTED 10/7/85 COMPLETED 10/7/85				PROJECT NO. 85-331		SAMPLE TYPE S.S. <u>X</u> AUGER <u>X</u> SHELBY	
DEPTH IN FEET	LEGEND	SAMPLES	DESCRIPTION OF MATERIAL	SAMPLE NO.	STD. PENETRATION "N" BLOWS PER FOOT	UNIT NAT. WT. (LB./FT <sup>3</sup> )	UNCONFINED COMPRESSIVE STRENGTH TONS/FT <sup>2</sup>
							PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT %
			SURFACE ELEVATION ~ 90.0'				1 2 3 4 5 10 20 30 40 50
			Sand-fill, loose, dark brown with miscellaneous fill-wood, broken concrete, brick	A	-	-	*Calibrated Pocket Penetrometer
5				B	-	-	
				C	3	129	
10				D	2	-	
			Silt-compact, gray, some sand and trace clay	E	9	128	
15				F	20	145	
			Clay-stiff, gray, sandy with silt and trace pebbles (CL-ML)				
20							
			Hardpan-extremely hard, gray, sandy with silt and trace pebbles (CL-ML)				
25				G	90	147	
			END OF BORING AT 25 1/2 FT.				
WATER LEVEL OBSERVATIONS							SAMTEST, INC. DRILLING & TESTING SERVICES
W.L. UPON COMPLETION AT 5'6"							
W.L.							

# LOG OF BORING NO. 3N-4

PROJECT 318 BLDG. TANK FARM					SITE DOW CORNING CORPORATION MIDLAND PLANT						
BORING STARTED 10/4/85 COMPLETED 10/4/85			PROJECT NO. 85-331		SAMPLE TYPE S.S. <u>X</u> AUGER <u>X</u> SHELBY <u>—</u>						
DEPTH IN FEET	LEGEND	SAMPLES	DESCRIPTION OF MATERIAL	SAMPLE NO.	STD. PENETRATION "N" BLOWS PER FOOT	UNIT NAT. WT. (LB./FT. <sup>3</sup> )	UNCONFINED COMPRESSIVE STRENGTH TONS/FT <sup>2</sup>				
							1	2	3	4	5
							PLASTIC LIMIT % X	WATER CONTENT % X	LIQUID LIMIT % △		
							10	20	30	40	50
			SURFACE ELEVATION <u>90.0'</u>								
			Sand-fill, loose, dark brown with miscellaneous fill-wood, broken concrete, brick	A	4	114	*Calibrated Pocket Penetrometer				
5				B	2	124					
				C	7	138					
10			Clay-stiff, brown, silty some sand and pebbles (CL)	D	15	129					
			Silt-compact, gray, some sand and trace clay								
15				E	8	127					
			Clay-stiff, gray, sandy with silt and trace pebbles (CL-ML)								
20				F	13	139					
25			Hardpan-extremely hard, gray, sandy with silt and trace pebbles (CL-ML)	G	77	130					
			END OF BORING AT 25 1/2 FT.								
WATER LEVEL OBSERVATIONS							BAMTEST, INC. DRILLING & TESTING SERVICES				
W.L.		ENCOUNTERED AT 4'0"									
W.L.		UPON COMPLETION-NONE									



**MICHIGAN DRILLING**  
DIVISION OF MICHIGAN TESTING ENGINEERS, INC.  
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS  
14959 WYOMING AVENUE • DETROIT, MICHIGAN 48235

JOB NO. 74-328 LOG OF SOIL BORING NO. \_\_\_\_\_  
PROJECT PROPOSED SILOS 300-85-74  
LOCATION DOW CORNING

DATE 5-6-74 SURFACE ELEV. 90.6

MIDLAND, MICHIGAN

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Unc. Comp. Strength PSF.	St
	1							
A	2							
UL	3		2'7"	2	2	3	19.1	131.1
	4							
B	5			4	5	7	19.3	133.1
UL	6		6'4"					6799
	7			12	20	28	14.0	140.0
C	8							9066
UL	9							
D	10			13	21	30	11.0	145.2
UL	11		10'8"					14366
	12							
	13							
	14		13'0"					
E	15			21	29	35	7.6	142.4
UL	16							19309
	17							
	18							
	19							
F	20			31	50		8.1	150.1
UL	21							25393
	22							
	23							
	24							
G	25		25'0"	28	33	44	9.0	146.5
UL	26							22275
	27							
	28							
	29							
	30							

TYPE OF SAMPLE  
D. -DISTURBED  
U.L.-UNDIST. LINER  
S.T.-SHELBY TUBE  
S.S.-SPLIT SPOON  
R.C.-ROCK CORE  
OTHER-

PLUGGING PROCEDURE

HOLE SEALED WITH \_\_\_\_\_ BETWEEN  
DEPTHS OF \_\_\_\_\_ AND \_\_\_\_\_.

Standard Penetration Test - Driving 2" OD Sampler 1' With  
140 # Hammer Falling 30"; Count Made At 6" Intervals

GROUND WATER OBSERVATIONS

G.W. ENCOUNTERED AT \_\_\_\_\_ FT. INS.  
G.W. ENCOUNTERED AT 22 FT. 9 INS.  
G.W. AFTER COMPLETION 23 FT. 6 INS.  
G.W. AFTER 6 HRS. FT. INS.  
G.W. VOLUMES 23' 4 MEDIUM



**MICHIGAN DRILLING**  
DIVISION OF MICHIGAN TESTING ENGINEERS, INC.  
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS  
14255 WYOMING AVENUE • DETROIT, MICHIGAN 48238

JOB NO. 74-328 LOG OF SOIL BORING NO. \_\_\_\_\_  
PROJECT PROPOSED SILOS 300-86-74  
LOCATION DOW CORNING  
MIDLAND, MICHIGAN

DATE 5-7-74 SURFACE ELEV. 90.40

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Unc. Comp. Strength PSF.	Sr
	1							
A	2		1'6" FIRM MOIST SANDY VARIEGATED CLAY, FILL	4	7	10	12.4	144.2
UL	3							
	4							
B	5		VERY STIFF MOIST SANDY VARIEGATED CLAY				30.1	118.8
UL	6							392.6
	7		6'0" EXTREMELY STIFF MOIST BROWN CLAY WITH OXIDIZED STREAKS WITH SAND AND PEBBLES	12	25	32	9.6	148.8
C	8							1047.1
UL	9							
	10			28	44	49	7.0	145.9
D	11							
UL	12		11'2" EXTREMELY STIFF MOIST BLUE CLAY WITH SAND AND PEBBLES					
	13							
	14							
F	15			32	44		7.9	265
UL	16							
	17							
	18							
F	19			43	57		7.9	147.0
UL	20							1930.9
	21							
	22							
	23							
	24			33	75			
G	25		25'0"					
UL	26							
	27							
	28							
	29							
	30							

TYPE OF SAMPLE  
D. -DISTURBED  
U.L.-UNDIST. LINER  
S.T.-SHELBY TUBE  
S.S.-SPLIT SPOON  
R.C.-ROCK CORE  
OTHER-

PLUGGING PROCEDURE

HOLE SEALED WITH \_\_\_\_\_ BETWEEN

DEPTHS OF \_\_\_\_\_ AND \_\_\_\_\_

Standard Penetration Test - Driving 2" OD Sampler 1' With  
140# Hammer Falling 30"; Count Made At 6" Intervals

GROUND WATER OBSERVATIONS

G.W. ENCOUNTERED AT	FT.	INS.
G.W. ENCOUNTERED AT	FT.	INS.
G.W. AFTER COMPLETION	FT.	INS.
G.W. AFTER	HRS.	FT.
G.W. VOLUMES		
NONE		



**MICHIGAN DRILLING**  
OFFICE OF MICHIGAN TESTING ENGINEERS INC.  
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS  
14000 WYOMING AVENUE • DETROIT, MICHIGAN 48226

JOB NO. 74-328 LOG OF SOIL BORING NO. \_\_\_\_\_  
PROJECT PROPOSED SILOS  
LOCATION DOW CORNING 300-87-74  
MIDLAND, MICHIGAN

DATE 5-7-74 SURFACE ELEV. 90.2

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Unc. Comp. Strength PSF.	St r.
	1							
A	2		FIRM MOIST VARIEGATED SANDY CLAY, FILL	7	7	8		
UL	3							
	4		3'4"					
B	5		VERY STIFF MOIST BROWN CLAY WITH OXIDIZED STREAKS AND SAND AND PEBBLES	8	9	10	8.1	
UL	6							
	7		6'2"					
C	8		EXTREMELY STIFF MOIST BROWN CLAY WITH OXIDIZED STREAKS WITH SAND AND PEBBLES	10	15	23	8.6	22275
UL	9							
D	10			16	28	42	7.3	24556
UL	11		10'9"					
	12							
	13							
	14							
E	15		EXTREMELY STIFF MOIST BLUE CLAY WITH SAND AND PEBBLES	29	53		7.3	
UL	16							
	17							
	18							
F	19							
UL	20			37	57			
	21							
	22							
	23							
G	24							
UL	25		25'0"	42	62		5.7	
	26							
	27							
	28							
	29							
	30							

TYPE OF SAMPLE  
D. -DISTURBED  
U.L.-UNDIST. LINER  
S.T.-SHELBY TUBE  
S.S.-SPLIT SPOON  
R.C.-ROCK CORE  
OTHER-

**PLUGGING PROCEDURE**

HOLE SEALED WITH \_\_\_\_\_ BETWEEN  
DEPTHS OF \_\_\_\_\_ AND \_\_\_\_\_  
Standard Penetration Test - Driving 2" OD Sampler 1' With  
140# Hammer Falling 30"; Count Made At 6" Intervals

**GROUND WATER OBSERVATIONS**

G.W. ENCOUNTERED AT	FT.	INS.
G.W. ENCOUNTERED AT	FT.	INS.
G.W. AFTER COMPLETION	FT.	INS.
G.W. AFTER	HRS.	FT.
G.W. VOLUMES		

NONE

# MTE

JOB NO. 74-523 LOG OF SOIL BORING NO. 88

PROJECT PROPOSED BUILDING

LOCATION DOW CORNING

MIDLAND, MICHIGAN

MIDLAND, MICHIGAN

TYPE OF SAMPLE  
D. -DISTURBED  
U.L.-UNDIST. LINER  
S.T.-SHELBY TUBE  
S.S. -SPLIT SPOON  
R.C. -ROCK CORE

## GROUND WATER OBSERVATIONS

G.W. ENCOUNTERED AT	6	FT.	6	IN.
G.W. ENCOUNTERED AT		FT.		IN.
G.W. AFTER COMPLETION	11	FT.	3	IN.
G.W. AFTER	HRS.	FT.		IN.





**MICHIGAN TESTING ENGINEERS, INC.**  
 MICHIGAN DRILLING DIVISION  
 CONSULTING ENGINEERS IN SOILS & FOUNDATIONS  
 1681 WYOMING AVENUE • DETROIT, MICHIGAN 48221

JOB NO. 74-523 LOG OF SOIL BORING NO. 89

PROJECT PROPOSED SOILS EXPLORATION

LOCATION DOW CORNING

DATE 7-24-74 SURFACE ELEV. 92.3

MIDLAND, MICHIGAN

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Unc. Comp. Strength PSF.	St. %
			0'3" LIMESTONE					
A UL	2							
	4	FILL	3'0" COMPACT MOIST MEDIUM BROWN SAND, FILL, SLIGHT ORGANIC	4 6	7	13.2		
B UL	6	FILL	5'6" STIFF MOIST BROWN CLAY, SAND AND PEBBLES, FILL, STREAKS OF MEDIUM ORGANIC CONTENT	4 5	7	21.5	124.7	510
C UL	8			9 16	20	16.2	130.6	5554
D UL	10		EXTREMELY STIFF MOIST BROWN CLAY, SAND AND PEBBLES					
	12			8 16	21	17.0	132.1	10120
	14							
E UL	16		13'6" EXTREMELY STIFF MOIST BLUE CLAY, SAND AND PEBBLES	9 15	21	9.6	140.0	12450
	18							
F UL	20			7 12	18	8.7	146.7	13536
	22							
	24		23'0" EXTREMELY STIFF MOIST BLUE CLAY, SAND AND PEBBLES, HARDPAN					
G UL	26			21 52	89	8.8	145.2	8555
	28							
H UL	30			34 68		8.0	145.2	32009
	32							
	34							
I UL	36		35'0"	37 76		7.8	145.4	26840
	38							
	40							

**TYPE OF SAMPLE**

D. -DISTURBED  
 U.L.-UNDIST. LINER  
 S.T.-SHELBY TUBE  
 S.S.-SPLIT SPOON  
 R.C.-ROCK CORE

Standard Penetration Test - Driving 2" OD Sampler 1' With

**GROUND WATER OBSERVATIONS**

G.W. ENCOUNTERED AT 7 FT. 6 INS.  
 G.W. ENCOUNTERED AT FT. INS.  
 G.W. AFTER COMPLETION 16 FT. 6 INS.  
 G.W. AFTER HRS. FT. INS.  
 G.W. VOLUMES HEAVY



**MICHIGAN DRILLING**  
OFFICE OF MECHANICAL TESTING ENGINEERS, INC.  
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS  
14999 WYOMING AVENUE • DETROIT, MICHIGAN 48238

JOB NO. 74-220 LOG OF SOIL BORING NO. 56

PROJECT PROPOSED BUILDINGS & STRUCTURES

LOCATION DOW-CORNING

400-56

DATE 4-8-74 SURFACE ELEV. 97.25

MIDLAND, MICHIGAN

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"			Moisture %	Natural Wt. P.C.F.	Unc. Comp. Strength PSF.	St. %
A UL	2		COMPACT WET FINE BROWN SAND, FILL, SLIGHTLY ORGANIC	6	7	7	16.9			
	4									
B UL	6		6'0" EXTREMELY STIFF MOIST BLUE CLAY, PEBBLES	3	3	6	19.8			
C UL	8			10	16	22	29.8	121.8	3990	
D UL	10		9'0" EXTREMELY STIFF MOIST BLUE CLAY, PEBBLES, LAYERS OF SAND	10	16	21	19.7	129.5		
	12									
	14		14'0" EXTREMELY STIFF MOIST SILTY BLUE CLAY							
E UL	16			10	11	14	20.2	132.6	1372	
	18									
F UL	20		22'0" EXTREMELY STIFF MOIST SANDY BLUE CLAY, PEBBLES, THIN LAYERS OF SAND	12	15	16	19.6	134.4	4277	
	22									
G UL	24									
	26			22	43	56	9.6	144.2	8013	
	28									
H UL	30									
	32			60	127		10.0	146.2	19993	
	34									
I UL	36		35'0"	72	131		8.6	145.9	33378+	
	38									
	40									

**TYPE OF SAMPLE**

D. -DISTURBED  
U.L.-UNDIST. LINER  
S.T.-SHELBY TUBE  
S.S.-SPLIT SPOON  
R.C.-ROCK CORE  
OTHER-

**PLUGGING PROCEDURE**

HOLE SEALED WITH NATURAL SOILS BETWEEN  
DEPTHS OF 35' AND SURFACE

Standard Penetration Test - Driving 2" OD Sampler 1' With  
140# Hammer Falling 30"; Count Made At 6" Intervals

**GROUND WATER OBSERVATIONS**

G.W. ENCOUNTERED AT 1 FT. 4 INS.  
G.W. ENCOUNTERED AT  FT.  INS.  
G.W. AFTER COMPLETION 2 FT. 2 INS.  
G.W. AFTER  HRS.  FT.  INS.  
G.W. VOLUMES HEAVY



MICHIGAN DRILLING  
DIVISION OF MICHIGAN TESTING ENGINEERS, INC.  
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS  
14555 WYOMING AVENUE • DETROIT, MICHIGAN 48230

JOB NO. 11550 LOG OF SOIL BORI

PROJECT PROPOSED BUILDING & STRU

LOCATION DOW-CORNING 400

MIDLAND, MICHIGAN

DATE 4-8-74

SURFACE ELEV. \_\_\_\_\_

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Unc. Comp. Strength PSF.
			COMPACT MOIST MIXED SAND FILL				
A UL	2	<i>Fill</i>	1'0" COMPACT WET CINDERS FILL	6	6	5	
	4	<i>Fill</i>	3'3" VERY STIFF MOIST SILTY VARIEGATED CLAY	4	9	14	22.3 128.0 5139
B UL	6		7'0" EXTREMELY STIFF MOIST BROWN CLAY, SAND & PEBBLES, STREAKS OF SILT	7	11	20	17.2 132.9 13376
C UL	8		9'0" EXTREMELY STIFF MOIST BROWN CLAY, SAND AND PEBBLES	8	11	18	21.1 128.0 13727
	10		12'0" STIFF MOIST VARIEGATED CLAY				
	12						
	14						
E UL	16		15'0" STIFF MOIST BLUE CLAY	4	4	5	26.4 125.2 2617
	18						
F UL	20		19'6" VERY STIFF MOIST BLUE CLAY, SAND AND PEBBLES, ROUGE MARKINGS	4	8	9	14.3 137.7 5554
	22		23'0" EXTREMELY STIFF MOIST BLUE CLAY, SAND AND PEBBLES				
	24						
G UL	26			18	32	37	8.9 144.7 19841
	28						
H UL	30			26	40	56	10.7 143.1 13727
	32						
	34						
I UL	36		35'0" EXTREMELY STIFF MOIST BLUE CLAY, SAND AND PEBBLES	13	29	45	8.4 146.8 16723
	38						
	40						

TYPE OF SAMPLE  
D. -DISTURBED  
U.L.-UNDIST. LINER  
S.T.-SHELBY TUBE  
S.S.-SPLIT SPOON  
R.C.-ROCK CORE  
OTHER-

PLUGGING PROCEDURE

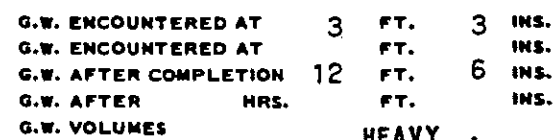
HOLE SEALED WITH NATURAL SOIL BETWEEN  
DEPTHS OF 35 AND SURFACE

Standard Penetration Test - Driving 2" OD Sampler 1' With  
140# Hammer Falling 30"; Count Made At 6" Intervals

GROUND WATER OBSERVATIONS

G.W. ENCOUNTERED AT 1 FT. 0 INS.  
G.W. ENCOUNTERED AT 1 FT. 0 INS.  
G.W. AFTER COMPLETION 1 FT. 0 INS.  
G.W. AFTER HRS. FT. INS.  
G.W. VOLUMES HEAVY







MICHIGAN TESTING ENGINEERS, INC.  
MICHIGAN DRILLING DIVISION  
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS  
10001 WYOMING AVENUE • DETROIT, MICHIGAN 48221

JOB NO. 74-523 LOG OF SOIL BORING NO. 92  
PROJECT PROPOSED SOILS EXPLORATION  
LOCATION DOW CORNING 400-07

DATE 7-24-74 SURFACE ELEV. 95.7

MIDLAND, MICHIGAN

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"		Moisture %	Natural Wt. P.C.F.	Unc. Comp. Strength PSF.	St. %
A	2		SLIGHTLY COMPACT MOIST MEDIUM						
UL			BROWN SAND, FILL, CINDERS,	1	1	2	19.3		
	4		HIGHLY ORGANIC STREAKS						
B			3'6" COMPACT WET MEDIUM ORGANIC						
UL	6		SAND, LIGHT VEGETATION	4	5	8	23.5	118.0	3543
C			4'9" VERY STIFF MOIST VARIEGATED						
UL	8		SILTY CLAY	6	12	16	22.8	125.9	8140
			6'6" EXTREMELY STIFF MOIST BROWN						
	10		CLAY, SAND AND PEBBLES						
D				8	13	19	17.6	132.1	8491
UL	12								
	14		13'6"						
E									
UL	16		VERY STIFF MOIST BLUE SILTY	5	8	11	22.7	126.2	3032
	18		CLAY						
	20								
F				6	9	13	23.0	127.5	3575
UL	22								
	24								
			24'0"						
G									
UL	26		EXTREMELY STIFF MOIST BLUE	26	49	76	10.2	141.3	
	28		CLAY, SAND AND PEBBLES,						
			HARDPAN						
	30								
H				46	81		8.4	146.2	28587
UL	32								
	34								
			35'0"						
I				58	102		9.0	146.5	18624
UL	36								
	38								
	40								

TYPE OF SAMPLE  
D. -DISTURBED  
U.L.-UNDIST. LINER  
S.T.-SHELBY TUBE  
S.S.-SPLIT SPOON  
R.C.-ROCK CORE  
OTHER-

Standard Penetration Test - Driving 2" OD Sampler 1' With  
140# Hammer Falling 30"; Count Made At 6" Intervals

GROUND WATER OBSERVATIONS

G.W. ENCOUNTERED AT 3 FT. 9 INS.  
G.W. ENCOUNTERED AT FT. INS.  
G.W. AFTER COMPLETION 7 FT. 6 INS.  
G.W. AFTER HRS. FT. INS.  
G.W. VOLUMES  
HEAVY



**MICHIGAN TESTING ENGINEERS, INC.**  
MICHIGAN DRILLING DIVISION  
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS  
1801 WYOMING AVENUE • DETROIT, MICHIGAN 48221

JOB NO. 74-523 LOG OF SOIL BORING NO. 93  
PROJECT PROPOSED SOILS EXPLORATION  
LOCATION DOW CORNING 400-93

DATE 7-25-74 SURFACE ELEV. 95.8

MIDLAND, MICHIGAN

DATE 1-20-14		SURFACE ELEV. 52.5		SOIL DESCRIPTION		Penetration Blows For 6"		Moisture %		Natural Wt. P.C.F.		Unc. Comp. Strength PSF.		St		
Sample & Type	Depth	Legend														
A UL	2		3'3"	COMPACT MOIST MEDIUM BROWN SAND, FILL, MEDIUM ORGANIC STREAKS												
	4	FILL			5	4	5	10.5								
B UL	6				3	3	5	19.7								
C UL	8		6'9"	STIFF MOIST VARIEGATED SILTY CLAY	8	12	17	18.1	130.8	10152						
	10															
D UL	12				10	13	19	20.5	128.0	11333						
	14		13'9"	VERY STIFF MOIST BLUE SILTY CLAY												
E UL	16				6	8	12	22.7	130.3	5299						
	18															
F UL	20		23'6"	EXTREMELY STIFF MOIST BLUE CLAY, SAND AND PEBBLES												
	22															
	24															
G UL	26		35'0"		23	51	64	9.3	144.2	8108						
	28															
H UL	30															
	32				41	73		12.3	140.7	3703						
	34															
I UL	36				44	79		8.7	144.9	28130						
	38															
	40															
TYPE OF SAMPLE								GROUND WATER OBSERVATIONS								
D. -DISTURBED								G.W. ENCOUNTERED AT 7 FT. 3 INS								
U.L.-UNDIST. LINER								G.W. ENCOUNTERED AT FT. INS								
S.T.-SHELBY TUBE								G.W. AFTER COMPLETION 21 FT. 4 INS								
S.S.-SPLIT SPOON								G.W. AFTER HRS. FT. INS								
R.C.-ROCK CORE								G.W. VOLUMES HEAVY								
OTHER-																
Standard Penetration Test - Driving 2" OD Sampler 1' With 140# Hammer Felling 30"; Count Made At 6" Intervals																



MICHIGAN TESTING ENGINEERS, INC.  
MICHIGAN DRILLING DIVISION  
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS  
14001 BYRONIA AVENUE • DETROIT, MICHIGAN 48221

JOB NO. 74-523 LOG OF SOIL BORING NO. 94  
PROJECT PROPOSED SOILS EXPLORATION  
LOCATION DOW CORNING 4007

DATE 7-28-74 SURFACE ELEV. 97.7

MIDLAND, MICHIGAN

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Unc. Comp. Strength PSF	St
			0'2" LIMESTONE					
A UL	2		COMPACT MOIST BROWN SAND, FILL, MEDIUM ORGANIC STREAKS	4 6	8	15.5	124.9	
	4	FILL	3'9" STIFF MOIST BROWN SILTY CLAY, STREAKS OF SAND					
B UL	6		6'0" COMPACT WET MEDIUM BROWN SAND	5 9	6	24.6	118.2	
C UL	8		7'6" VERY STIFF MOIST BROWN SILTY CLAY, LIGHT SAND AND PEBBLE CONTENT	4 5	9	21.5		
	10							
D UL	12			5 8	11	27.6		
	14		13'9" STIFF MOIST BLUE SILTY CLAY					
E UL	16			4 5	7	21.3	131.8	4120
	18							
F UL	20			4 5	7	22.1	127.7	2841
	22							
	24		23'0" VERY STIFF MOIST BLUE CLAY, SAND AND PEBBLES					
G UL	26			6 9	12			
	28							
	30		28'0" EXTREMELY STIFF MOIST BLUE CLAY, SAND AND PEBBLES, HARDPAN					
H UL	32			38 72		8.5	144.7	10375
	34							
I UL	36			52 81		8.6	145.9	
	38							
J UL	40		40'0"	51 84		8.2		33

TYPE OF SAMPLE  
D. -DISTURBED  
U.L.-UNDIST. LINER  
S.T.-SHELBY TUBE  
S.S.-SPLIT SPOON  
R.C.-ROCK CORE  
OTHER-

Standard Penetration Test - Driving 2" OD Sampler 1' With  
140# Hammer Falling 30"; Count Made At 6" Intervals

GROUND WATER OBSERVATIONS

G.W. ENCOUNTERED AT 6 FT. 3 INS.  
G.W. ENCOUNTERED AT FT. INS.  
G.W. AFTER COMPLETION 5 FT. 9 INS.  
G.W. AFTER HRS. FT. INS.  
G.W. VOLUMES HEAVY





**MICHIGAN TESTING ENGINEERS, INC.**  
MICHIGAN DRILLING DIVISION  
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS  
16001 WYOMING AVENUE • DETROIT, MICHIGAN 48221

JOB NO. 74-523 LOG OF SOIL BORING NO. 95

PROJECT PROPOSED SOILS EXPLORATION

LOCATION DOW CORNING 400-95

DATE 8-29-74 SURFACE ELEV. 96.0

MIDLAND, MICHIGAN

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Unc. Comp. Strength PSF.	Sr. %
			0'6" COAL					
A	2							
UL			3'3" VERY COMPACT MOIST MEDIUM SAND, FILL, LIGHT CLAY CONTENT	7 10 12	12.0	118.9		
	4		SLIGHTLY ORGANIC STREAKS					
B			4'9" FIRM MOIST ORGANIC CLAY					
UL	6		STIFF MOIST BROWN SILTY CLAY	2 2 5	27.0	109.3	2522	
C			6'6" VERY STIFF MOIST BROWN CLAY, SAND AND PEBBLES, LIGHT OXIDIZATION					
UL	8			5 8 12	16.2	129.0	11077	
D								
UL	10			6 10 12	15.8	131.8	11971	
	12							
	14							
E			14'0" STIFF MOIST BLUE SILTY CLAY					
UL	16			4 5 5	22.2	125.4	3958	
	18							
F								
UL	20			4 5 7	22.0	126.7	3224	
	22							
	24		22'0" VERY STIFF MOIST BLUE CLAY, SAND AND PEBBLES					
G								
UL	26			7 10 13	19.8	132.1	6225	
	28							
	30		27'0" EXTREMELY STIFF MOIST BLUE CLAY, SAND AND PEBBLES					
H								
UL	32			65 100/4"	7.8		32997	
	34							
I								
UL	36			96	5.8	142.1	8523	
	38							
J								
UL	40		40'0"	103	10.1	145.2		

TYPE OF SAMPLE  
D. -DISTURBED  
U.L.-UNDIST. LINER  
S.T.-SHELBY TUBE  
S.S.-SPLIT SPOON  
R.C.-ROCK CORE  
OTHER-

Standard Penetration Test - Driving 2" OD Sampler 1' With  
140# Hammer Falling 30"; Count Made At 6" Intervals

**GROUND WATER OBSERVATIONS**

G.W. ENCOUNTERED AT 17 FT. 3 INS.  
G.W. ENCOUNTERED AT FT. INS.  
G.W. AFTER COMPLETION 27 FT. 6 INS.  
G.W. AFTER HRS. FT. INS.  
G.W. VOLUMES MEDIUM



MICHIGAN TESTING ENGINEERS, INC.  
MICHIGAN DRILLING DIVISION  
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS  
16001 WYOMING AVENUE • DETROIT, MICHIGAN 48221

JOB NO. 74-523 LOG OF SOIL BORING NO. 96  
PROJECT PROPOSED SOILS EXPLORATION  
LOCATION DOW CORNING 400-91

DATE 7-25-74 SURFACE ELEV. 96.3

MIDLAND, MICHIGAN

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Unc. Comp. Strength PSF	Str %
			COAL					
A	2		1'0"					
UL			VERY COMPACT MOIST MEDIUM	6	9	13	14.6	
	4		3'3"					
B			SAND, FILL, TOPSOIL, CINDERS					
UL	6		5'0"	3	4	6	32.1	118.5 2240
			CLAY, FILL					
C	8		6'6"	7	12	13	23.3	126.5 2055
UL			VERY STIFF MOIST VARIEGATED					
			SILTY CLAY, SLIGHTLY ORGANIC					
D	10							
UL			EXTREMELY STIFF MOIST BROWN					
	12		CLAY, LIGHT SAND AND PEBBLE					
			CONTENT	8	13	15	16.2	132.4 10215
	14		13'0"					
E			STIFF MOIST BROWN SILTY CLAY,					
UL	16		LIGHT SAND AND PEBBLE	5	6	6	21.5	127.7 4054
			CONTENT					
	18							
F	20							
UL				5	6	8	22.1	130.3 3352
	22							
	24		23'0"					
G			EXTREMELY STIFF MOIST BLUE					
UL	26		CLAY	9	14	16	13.4	140.8 2388
	28							
H	30							
UL				11	15	19	9.6	140.6 17331
	32		31'6"					
			EXTREMELY STIFF MOIST BLUE					
	34		CLAY, SAND AND PEBBLES,					
			HARDPAN					
I	36			37	63		9.2	148.5 33378
UL								
	38							
J	40		40'0"	42	82		9.3	145.2
UL								
TYPE OF SAMPLE D. -DISTURBED U.L.-UNDIST. LINER S.T.-SHELBY TUBE S.S.-SPLIT SPOON R.C.-ROCK CORE OTHER-				GROUND WATER OBSERVATIONS G.W. ENCOUNTERED AT 16 FT. 9 INS. G.W. ENCOUNTERED AT FT. INS. G.W. AFTER COMPLETION 22 FT. 3 INS. G.W. AFTER HRS. FT. INS. G.W. VOLUMES MEDIUM				
Standard Penetration Test - Driving 2" DD Sampler 1' With 140# Hammer Falling 30"; Count Made At 6" Intervals								

**MICHIGAN DRILLING**  
DIVISION OF MICHIGAN TESTING ENGINEERS, INC.  
**CONSULTING ENGINEERS IN SOILS & FOUNDATIONS**  
14000 WYOMING AVENUE • DETROIT, MICHIGAN 48226

JOB NO. 74-220 LOG OF SOIL BORING NO. 600-82-74  
 PROJECT PROPOSED BUILDINGS & STRUCTURES  
 LOCATION DOW-CORNING

DATE 4-10-74 SURFACE ELEV. 101.3

MIDLAND, MICHIGAN

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"			Moisture %	Natural Wt. P.C.F.	Unc. Comp. Strength PSF.	Str. %
A	2		1'0" MEDIUM COMPACT WET MIXED SAND							
UL	4		COMPACT WET FINE BROWN SAND	4	8	8	17.3			
B	6		5'0" STIFF MOIST VARIEGATED CLAY	5	4	9	25.8	124.9	4420	
UL	8		6'3" VERY STIFF MOIST SILTY VARIEGATED CLAY	6	10	12	24.4	125.7	6991	
C	10		9'0" EXTREMELY STIFF MOIST BROWN CLAY, SAND AND PEBBLES	8	13	20	24.3	101.3	11844	
UL	12									
	14									
E	16			8	11	15	16.8	132.1	8779	
UL	18		17'0"							
	20									
F	22		STIFF MOIST SILTY VARIEGATED CLAY, SAND AND PEBBLES	3	4	5	26.6	123.1	3511	
UL	24									
	26			5	7	9	18.9	130.8	3639	
G	28									
UL	30		29'6" EXTREMELY STIFF MOIST BLUE CLAY, SAND AND PEBBLES	13	17	20	10.4	141.1	14594	
	32		31'0" EXTREMELY STIFF MOIST SANDY BLUE CLAY							
H	34									
UL	36			25	65	-	9.7	144.7	5618	
	38									
J	40									
UL	42		41'0"	19	31	40	8.9	141.0	5682	
	44									
	46									
	48									
	50									
	52									
	54									
	56									
	58									
	60									

TYPE OF SAMPLE  
 D. -DISTURBED  
 U.L.-UNDIST. LINER  
 S.T.-SHELBY TUBE  
 S.S.-SPLIT SPOON  
 R.C.-ROCK CORE  
 OTHER-

PLUGGING PROCEDURE  
 HOLE SEALED WITH NATURAL SOILS BETWEEN  
 DEPTHS OF 41' AND SURFACE  
 Standard Penetration Test - Driving 2" O.D. Sampler 1' With  
 140# Hammer Falling 30"; Count Made At 6" Intervals

GROUND WATER OBSERVATIONS  
 G.W. ENCOUNTERED AT 0 FT. 0 INS.  
 G.W. ENCOUNTERED AT 0 FT. 6 INS.  
 G.W. AFTER COMPLETION FT. INS.  
 G.W. AFTER HRS. FT. INS.  
 G.W. VOLUMES HEAVY



**MICHIGAN DRILLING**  
DIVISION OF MICHIGAN TESTING ENGINEERS, INC.  
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS  
14000 WYOMING AVENUE • DETROIT, MICHIGAN 48232

JOB NO. 74-220 LOG OF SOIL BORING NO. 600-83-74  
PROJECT PROPOSED BUILDING & STRUCTURES  
LOCATION DOW-CORNING

DATE 4-9-74 SURFACE ELEV. 100.10

MIDLAND, MICHIGAN

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"			Moisture %	Natural Wt. P.C.F.	Unc. Comp. Strength PSF	Str. %
A UL	2	.....	VERY COMPACT WET FINE BROWN SAND	6	11	12	16.8	128.9		
B UL	4	3'6"	EXTREMELY COMPACT MOIST GRAY SAND, SILT, WIDE STREAKS OF SILTY BLUE CLAY	5	14	15	20.7			
C UL	6	5'6"	EXTREMELY STIFF MOIST SILTY BLUE CLAY, PEBBLES	10	16	22	21.8	127.5	2330	
D UL	8			12	17	25	24.9	127.5	2266	
E UL	10									
	12									
	14									
F UL	16			10	14	15	20.9	130.8	6959	
	18									
G UL	20			12	16	19	17.7	136.5	3607	
	22									
	24	23'0"	EXTREMELY STIFF MOIST SANDY BLUE CLAY, PEBBLES							
H UL	26			32	43	58	12.1	137.5	23872	
	28									
I UL	30			30	45	61	8.7	147.5	15354	
	32									
	34									
J UL	36	35'0"		35	49	65	8.6	145.9	15430	
	38									
	40									
TYPE OF SAMPLE D. -DISTURBED U.L.-UNDIST. LINER S.T.-SHELBY TUBE S.S.-SPLIT SPOON R.C.-ROCK CORE OTHER-			PLUGGING PROCEDURE HOLE SEALED WITH <u>NATURAL SOILS</u> BETWEEN DEPTHS OF <u>35'</u> AND <u>SURFACE</u> Standard Penetration Test - Driving 2" OD Sampler 1' With 140# Hammer Falling 30"; Count Made At 6" Intervals			GROUND WATER OBSERVATIONS G.W. ENCOUNTERED AT <u>8</u> FT. INS. G.W. ENCOUNTERED AT <u></u> FT. INS. G.W. AFTER COMPLETION <u></u> FT. INS. G.W. AFTER <u></u> HRS. FT. INS. G.W. VOLUMES <u></u>				



**MICHIGAN DRILLING**  
DIVISION OF AMERICAN BORING ENGINEERS, INC.  
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS  
14000 WYOMING AVENUE • DETROIT, MICHIGAN 48226

JOB NO. 74-220 LOG OF SOIL BORING NO. 600-84-74  
PROJECT PROPOSED BUILDINGS & STRUCTURES  
LOCATION DOW-CORNING

DATE 4-9-74 SURFACE ELEV. 97.7

MIDLAND, MICHIGAN

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"			Moisture %	Natural Wt. P.C.F.	Unc. Comp. Strength PSF.	Str. %
				3	5	8				
A UL	2		WET FINE BROWN SAND	3	5	8	8.5			
B UL	4		COMPACT WET FINE GRAY SAND, SLIGHTLY ORGANIC, SLIGHT CHEMICAL CONTENT	6	6	10	17.7	123.5		
C UL	6		5'3"	12	20	30	22.3	128.0	9353	
D UL	8		EXTREMELY STIFF MOIST BLUE CLAY, PEBBLES	8	12	16	19.5	132.1	6736	
E UL	10									
F UL	12									
G UL	14									
H UL	16			10	14	17	18.7	130.0	8619	
I UL	18									
J UL	20		19'0"	8	15	16	17.6	135.7	5714	
K UL	22		EXTREMELY STIFF MOIST SILTY BLUE CLAY, PEBBLES							
L UL	24		24'0"							
M UL	26		EXTREMELY STIFF MOIST SANDY BLUE CLAY, PEBBLES	20	35	39	11.0	142.1	5529	
N UL	28									
O UL	30			17	33	45	10.0	144.2	20525	
P UL	32									
Q UL	34									
R UL	36		35'0"	16	34	47	10.6	149.5	13472	
S UL	38									
T UL	40									
TYPE OF SAMPLE O. -DISTURBED U.L.-UNDIST. LINER S.T.-SHIELD TUBE S.S.-SPLIT SPOON R.C.-ROCK CORE OTHER-				PLUGGING PROCEDURE HOLE SEALED WITH NATURAL SOILS BETWEEN DEPTHS OF <u>35</u> AND SURFACE Standard Penetration Test - Driving 2" OD Sampler 1' With 140# Hammer Falling 30"; Count Made At 6" Intervals				GROUND WATER OBSERVATIONS G.W. ENCOUNTERED AT G.W. ENCOUNTERED AT G.W. AFTER COMPLETION G.W. AFTER G.W. VOLUMES FT. 1/2 INS. FT. INS. 30 FT. 0 INS. HRS. FT. INS. LIGHT		



**MICHIGAN DRILLING**  
DIVISION OF MICHIGAN TESTING ENGINEERS, INC.  
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS  
14000 WYOMING AVENUE • DETROIT, MICHIGAN 48238

JOB NO. 74-220 LOG OF SOIL BORING NO. 700-58-74  
PROJECT PROPOSED BUILDINGS & STRUCTURES  
LOCATION DOW-CORNING

DATE 4-10-74 SURFACE ELEV. 100.2

MIDLAND, MICHIGAN

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Unc. Comp. Strength PSF.	Str. %
A UL	2	• • • • •	1' 0" BROWN CLAY, ORGANIC MATERIAL, FILL	4	10	12	18.5	
B UL	4	• • • • •	— VERY COMPACT WET FINE BROWN SAND, SLIGHT ORGANIC STREAKS	5	8	12	18.2	
C UL	6	• • • • •	6' 6" — VERY COMPACT FINE GRAY SAND, SOME SLIGHT ORGANIC STREAKS	6	10	12	19.3	126.9
D UL	8	• • • • •	8' 0" —	10	14	20	27.7	122.9
E UL	10	• • • • •	EXTREMELY STIFF MOIST SILTY BLUE CLAY	8	12	16	20.9	132.1
F UL	12	• • • • •		9	14	15	19.2	130.8
G UL	14	• • • • •		8	14	15	15.9	138.6
H UL	16	• • • • •	24' 0" EXTREMELY STIFF MOIST SANDY BLUE CLAY, PEBBLES	10	12	16	16.8	137.0
I UL	18	• • • • •	31' 0" EXTREMELY STIFF MOIST SANDY BLUE CLAY, PEBBLES	42	105		10.8	144.9
J UL	20	• • • • •		47	109		9.5	144.4
K UL	22	• • • • •	45' 0"	111			8.7	227.31
	24	• • • • •						
	26	• • • • •						
	28	• • • • •						
	30	• • • • •						
	32	• • • • •						
	34	• • • • •						
	36	• • • • •						
	38	• • • • •						
	40	• • • • •						
	42	• • • • •						
	44	• • • • •						
	46	• • • • •						
	48	• • • • •						
	50	• • • • •						
	52	• • • • •						
	54	• • • • •						
	56	• • • • •						
	58	• • • • •						
	60	• • • • •						
TYPE OF SAMPLE D. -DISTURBED U.L. -UNOIST. LINER S.T. -SHELBY TUBE S.S. -SPLIT SPOON R.C. -ROCK CORE OTHER -			PLUGGING PROCEDURE HOLE SEALED WITH <u>NATURAL SOILS</u> BETWEEN DEPTHS OF <u>45</u> AND <u>SURFACE</u> Standard Penetration Test - Driving 2" OD Sampler 1" With 140# Hammer Falling 30"; Count Made At 6" Intervals		GROUND WATER OBSERVATIONS G.W. ENCOUNTERED AT <u>1</u> FT. <u>2</u> INS. G.W. ENCOUNTERED AT <u></u> FT. <u></u> INS. G.W. AFTER COMPLETION <u></u> FT. <u></u> INS. G.W. AFTER <u>HR.</u> <u></u> FT. <u></u> INS. G.W. VOLUMES <u></u>			

# MICHIGAN DRILLING

DIVISION OF MICHIGAN HIGHWAY DEPARTMENT, INC.  
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS  
1400 WYOMING AVENUE • DETROIT, MICHIGAN 48226

JOB NO. 74-220 LOG OF SOIL BORING NO. 700-61-74  
PROJECT PROPOSED BUILDINGS & STRUCTURES

LOCATION DOW-CORNING

DATE 4-11-74 SURFACE ELEV. 104.2

MIDLAND, MICHIGAN

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows Per 6"	Moisture %	Natural Wt. P.C.F.	Unc. Comp. Strength PSF	Str. %
A UL	2		SLIGHTLY COMPACT MOIST MIXED					
	4		SAND, FILL, HIGH ORGANIC	2	2	15	24.8	
B UL	6		3'0" CONTENT					
C UL	8		5'0" SOFT MOIST SWAMP BOTTOM FILL,	1	1	5	32.9	
	10		6'0" VEGETATION					
D UL	12		8'3" MEDIUM COMPACT WET MIXED SAND	8	13	12	18.0	128.8
	14		VEGETATION, FILL HIGH ORGANIC					
E UL	16		10'3" STREAKS	5	4	7	19.7	
	18		12'6" VERY COMPACT WET BROWN SAND					
F UL	20		COMPACT WET FINE BROWN SAND					
	22		STIFF MOIST SILTY VARIEGATED					
G UL	24		CLAY					
	26		EXTREMELY STIFF MOIST BROWN	8	13	17	15.6	135.2
H UL	28		CLAY, SAND AND PEBBLES					7566
	30		17'3" VERY STIFF MOIST BROWN CLAY,					
I UL	32		SAND AND PEBBLES, STREAKS					
	34		OF SILT	4	8	12	18.8	131.6
J UL	36		22'0" STIFF MOIST SILTY VARIEGATED					8523
	38		CLAY					
K UL	40		34'0" STIFF MOIST SILTY VARIEGATED	3	4	6	24.5	123.6
	42		CLAY					2170
	44		EXTREMELY STIFF MOIST BLUE	3	4	5	27.0	120.8
	46		CLAY, SAND AND PEBBLES					2841
	48		45'0" EXTREMELY STIFF MOIST BLUE	15	25	48	8.7	140.6
	50		CLAY, SAND AND PEBBLES					22731
	52							
	54							
	56							
	58							
	60							
				24	43	62	9.3	144.7
								24480
				61	95	-	8.9	26609

TYPE OF SAMPLE  
U. - DISTURBED  
U.L. - UNDIST. LINER  
S.T. - SHELBY TUBE  
S.S. - SPLIT SPOON  
R.C. - ROCK CORE  
OTHER -

## PLUGGING PROCEDURE

HOLE SEALED WITH NATURAL SOILS BETWEEN  
DEPTHS OF 45 AND SURFACE

Standard Penetration Test - Driving 2" OD Sampler 1" With  
140# Hammer Falling 30"; Count Made at 6" Intervals

## GROUND WATER OBSERVATIONS

G.W. ENCOUNTERED AT 5 FT. 0 INS.  
G.W. ENCOUNTERED AT FT. INS.  
G.W. AFTER COMPLETION 5 FT. 0 INS.  
G.W. AFTER HRS. FT. INS.  
G.W. VOLUMES HEAVY

28



**MICHIGAN DRILLING**  
DIVISION OF GEOTECHNICAL ENGINEERING, INC.  
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS  
14000 WYOMING AVENUE • DETROIT, MICHIGAN 48226

JOB NO. 74-220 LOG OF SOIL BORING NO. 700-64-74  
PROJECT PROPOSED BUILDINGS & STRUCTURES  
LOCATION DOW-CORNING

DATE 4-11-74 SURFACE ELEV. 102.5

MIDLAND, MICHIGAN

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Unc. Comp. Strength PSF	Str. %
A	2		1'0" MEDIUM COMPACT MOIST MIXED					
UL	4		2'0" SAND, FILL	12	2	4	19.0	
B	6		3'9" SOFT WET SWAMP BOTTOM					
UL	8		6'0" MEDIUM COMPACT WET MEDIUM	8	11	12	18.2	
C	10		BROWN SAND					
UL	12		8'2" VERY COMPACT WET MEDIUM BROWN	4	4	8	17.8	128.5
D	14		SAND					
UL	16		12'6" COMPACT WET FINE GRAY SAND	5	11	14	23.9	126.7
E	18		VERY STIFF MOIST SILTY					8619
UL	20		CLAY					
F	22		12'6" STIFF MOIST BLUE CLAY,	6	7	9	23.0	126.2
UL	24		SAND AND PEBBLES					3639
G	26		23'0" STIFF MOIST SILTY BLUE CLAY	4	5	9	17.5	132.9
UL	28							4824
H	30		28'0" STIFF MOIST BLUE CLAY,	3	4	4	27.7	122.9
UL	32		SILT					3096
I	34		35'0" COMPACT WET COARSE GRAY SAND	4	7	9	23.0	129.3
UL	36		36'0" EXTREMELY STIFF MOIST SANDY	24	49	74	8.3	150.1
J	38		BLUE CLAY					31552
K	40		46'0"	45	101		7.5	21894
UL	42							
L	44							
M	46							
N	48							
O	50							
P	52							
Q	54							
R	56							
S	58							
T	60							

**TYPE OF SAMPLE**

D. -DISTURBED  
U.L. -UNDIST. LINER  
S.T. -SHELBY TUBE  
S.S. -SPLIT SPOON  
R.C. -ROCK CORE  
OTHER-

**PLUGGING PROCEDURE**

MOLE SEALED WITH NATURAL SOILS BETWEEN  
DEPTHS OF 46 AND SURFACE

Standard Penetration Test - Driving 2" OD Sampler 1' With  
140# Hammer Falling 30"; Count Made At 6" Intervals

**GROUND WATER OBSERVATIONS**

G.W. ENCOUNTERED AT 1 FT. 0 INS.  
G.W. ENCOUNTERED AT 35 FT. 0 INS.  
G.W. AFTER COMPLETION 2 FT. 6 INS.  
G.W. AFTER HRS.  
G.W. VOLUMES HEAVY





MICHIGAN DRILLING  
DIVISION OF MICHIGAN TESTING ENGINEERS INC.  
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS  
14855 WYOMING AVENUE • DETROIT, MICHIGAN 48226

JOB NO. 74-220 LOG OF SOIL BORING NO. 65

PROJECT PROPOSED BUILDINGS & STRUCTURES

LOCATION DOW-CORNING 700-65

DATE 4-11-74 SURFACE ELEV. 101.7

MIDLAND, MICHIGAN

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Unc. Comp. Strength PSF	Str.
A	2		ORGANIC SAND, PEAT, ROOTS, FILL					
UL	4		VERY COMPACT WET FINE BROWN SAND	4	8	14	16.9	123.0
B	6			7	10	12	22.0	
C	8		6'6" EXTREMELY STIFF MOIST SILTY SANDY BLUE CLAY, PEBBLES	6	12	16	27.7	123.1
UL	10							
D	12			8	14	20	18.5	136.5
UL	14							
E	16		14'0" VERY STIFF MOIST SILTY BLUE CLAY, PEBBLES	7	10	10	20.8	132.4
UL	18							
F	20							
UL	22			6	11	12	23.7	127.2
	24							
G	26		24'0" EXTREMELY STIFF MOIST SANDY BLUE CLAY, STONES	37	58	62	8.9	147.0
UL	28							
H	30							
UL	32			42	145		3.1	140.3
	34							
I	36		35'0"	60	110		8.8	139.5
UL	38							
	40							

TYPE OF SAMPLE  
D. -DISTURBED  
U.L. -UNDIST. LINER  
S.T. -SHELBY TUBE  
S.S. -SPLIT SPOON  
R.C. -ROCK CORE  
OTHER-

PLUGGING PROCEDURE

HOLE SEALED WITH NATURAL SOILS BETWEEN  
DEPTHS OF 35' AND SURFACE

Standard Penetration Test - Driving 2" OD Sampler 1' With  
140# Hammer Falling 30"; Count Made At 6" Intervals

GROUND WATER OBSERVATIONS

G.W. ENCOUNTERED AT 2 FT. 0 INS.  
G.W. ENCOUNTERED AT FT. INS.  
G.W. AFTER COMPLETION 12 FT. 0 INS.  
G.W. AFTER HRS. FT. INS.  
G.W. VOLUMES

HEAVY



**MICHIGAN DRILLING**  
DIVISION OF MICHIGAN TESTING CORPORATION, INC.  
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS  
14985 WYOMING AVENUE • DETROIT, MICHIGAN 48238

JOB NO. \_\_\_\_\_ LOG OF SOIL BORING NO. 66  
PROJECT PROPOSED BUILDINGS & STRUCTURES  
LOCATION DOW-CORNING 700-66  
MIDLAND, MICHIGAN

DATE 4-16-74 SURFACE ELEV. 99.4

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"			Moisture %	Natural Wt. P.C.F.	Unc. Co. Strength PSF
				4	5	6			
A UL	2		1'6" COMPACT MOIST MIXED SAND AND TOPSOIL, FILL	4	5	6	21.1		
B UL	4		4'6" COMPACT WET MEDIUM BROWN SAND, SLIGHT ORGANIC CONTENT	5	9	10	19.9		
C UL	6		VERY COMPACT WET FINE SILTY BROWN SAND	7	8	11	18.9	124.0	
D UL	8		8'0" VERY TO EXTREMELY STIFF MOIST SILTY BLUE CLAY, SAND AND PEBBLES	7	12	16	16.9	131.6	7890
E UL	10		13'0" EXTREMELY STIFF MOIST SILTY BLUE CLAY, OCCASIONAL LAYER OF WET SAND AND SILT	8	13	15	17.5	132.9	7480
F UL	12		EXTREMELY STIFF MOIST SILTY SANDY BLUE CLAY, SAND AND PEBBLES	10	14	18	19.8	132.1	298
G UL	14		25'0" EXTREMELY STIFF MOIST SILTY SANDY BLUE CLAY, SAND AND PEBBLES	22	49	66	8.4	145.4	
H UL	16			41	59	84	8.6	143.1	28620
I UL	18								
	20								
	22								
	24								
	26								
	28								
	30								
	32								
	34								
	36								
	38								
	40								

TYPE OF SAMPLE  
O. -DISTURBED  
U.L. -UNDIST. LINER  
S.T. -SHELBY TUBE  
S.S. -SPLIT SPOON  
R.C. -ROCK CORE  
OTHER-

PLUGGING PROCEDURE

HOLE SEALED WITH NATURAL SOIL BETWEEN  
DEPTHS OF 34'6" AND SURFACE  
Standard Penetration Test - Driving 2" OD Sampler 1' With  
140# Hammer Falling 30"; Count Made At 6" Intervals

GROUND WATER OBSERVATIONS

G.W. ENCOUNTERED AT 4 FT. 0 INS.  
G.W. ENCOUNTERED AT FT. INS.  
G.W. AFTER COMPLETION 5 FT. 0 INS.  
G.W. AFTER HRS. FT. INS.  
G.W. VOLUMES HEAVY

## LOG OF BORING NO. 800-001-79

PROJECT				SITE							
Site Evaluation C & D St.				Dow Corning Corp., Midland, MI							
BORING			PROJECT NO.		SAMPLE TYPE						
STARTED 2-20-79 COMPLETED 2-20-79			B1245		S.S. <input checked="" type="checkbox"/> AUGER <input checked="" type="checkbox"/> SHIELBY						
DEPTH IN FEET	LEGEND	SAMPLES	DESCRIPTION OF MATERIAL	SAMPLE NO.	STD. PENETRATION "N" BLOWS PER FOOT	UNIT NAT. WT. LB./FT. <sup>3</sup>	UNCONFINED COMPRESSIVE STRENGTH TONS/FT <sup>2</sup>				
							1	2	3	4	5
							PLASTIC LIMIT %	WATER CONTENT %	LIQUID LIMIT %		
							X	X	X		
							10	20	30	40	50
			SURFACE ELEVATION 104.0'								
			Sand-black, oily		6						
			Sand-yellow, fine	SP	8						
					14						
			Sand-compact, brown, graded med.	SP	6						
10				A	8	116					
			Clay-stiff, brown, silty, trace of sand & pebbles		12						
				CL							
				B	7	134					
					9						
					15						
20				C	8	137					
					10						
					12						
				D	6	128					
					7						
					10						
30				E	10	135					
					14						
					16						
			Clay-extremely hard, gray, sandy, trace of silt and some pebbles	F	12	147					
					23						
					45						
40				G	50	147					
					60						
					86						
			End of Boring at 40 ft.								
			Boring cement grouted to 30 ft.								
			Mineral Well permit #								
WATER LEVEL OBSERVATIONS							SAM TEST, INC.				
W.L. Encountered initially at 5 ft.							DRILLING & TESTING SERVICES				
W.L. Final level at 5 ft.											

## LOG OF BORING NO. 800-002-79

PROJECT Site Evaluation - C & D Street				SITE Dow Corning Corp., Midland, MI							
BORING STARTED 2-20-79 COMPLETED 2-20-79				PROJECT NO. B1245		SAMPLE TYPE S.S. <input checked="" type="checkbox"/> AUGER <input checked="" type="checkbox"/> SHELBY <input type="checkbox"/>					
DEPTH IN FEET	LEGEND	SAMPLES	DESCRIPTION OF MATERIAL	SAMPLE NO.	STD. PENETRATION $N_{60}$ BLOWS PER FOOT	UNIT WT. WT (pcf)	UNCONFINED COMPRESSIVE STRENGTH TONS/FT <sup>2</sup>				
							1	2	3	4	5
							PLASTIC LIMIT %	WATER CONTENT %	LIQUID LIMIT %		
							10	20	30	40	50
			SURFACE ELEVATION 103.0'								
			Sand-yellow, graded med. fine SP		5						
			Sand-brown, med. fine SP		6						
			Clay-stiff, brown, silty, trace of sand & pebbles		7						
10			CL	A	6	128					
					10						
				B	6	133					
					10						
20				C	5	134					
					10						
			Clayey-silt-compact, gray, some sand ML	D	6	125					
					6						
30					7						
			Sand-compact, brown SP	E	7	130					
					9						
			Clay-extremely hard, gray some sand & pebbles	F	11	144					
					23						
			Clayey-sand-very compact, brown, graded med. SC		42						
40					75						
			End of Boring at 40 ft.	G	40	134					
			Boring cement grouted to 35 ft.		70						
			Mineral Well permit #		79						

WATER LEVEL OBSERVATIONS		S A M T E S T, I N C. DRILLING & TESTING SERVICES
W.L.	Encountered initially at 3 ft.	
W.L.	Final level at 3 ft.	

## LOG OF BORING NO. 800-003-79

PROJECT				SITE							
Site Evaluation - C & D Street				Dow Corning, Midland, MI							
BORING				PROJECT NO.		SAMPLE TYPE					
STARTED 2-15-79 COMPLETED 7-19-79				B1245		S.S. <input checked="" type="checkbox"/> AUGER <input checked="" type="checkbox"/> SHELBY <input type="checkbox"/>					
DEPTH IN FEET	LEGEND	SAMPLES	DESCRIPTION OF MATERIAL	SAMPLE NO.	STD. PENETRATION "N" BLOWS PER FOOT	UNIT NAT. WT. LB/FT <sup>3</sup>	UNCONFINED COMPRESSIVE STRENGTH TONS/FT <sup>2</sup>				
							1	2	3	4	5
							PLASTIC LIMIT %	WATER CONTENT %	LIQUID LIMIT %		
							10	20	30	40	50
			SURFACE ELEVATION 102.0'								
			Crushed stone base								
			Sand-yellow, med. fine	SP	5						
			Sand-brown, silty	SP	7						
			Clay-stiff, brown, silty		10						
			trace of sand & pebbles								
				CL	6						
10				A	7	130					
					9						
				B	6						
					9	132					
					10						
20			Clayey-silty-compact,	C	5	135					
			gray, trace of sand		8						
					9						
				D	4	132					
					5						
			Clay-stiff, gray, silty,	E	7	145					
30			some sand & pebbles		10						
					11						
			Clayey-sand, very compact	F	23	138					
			brown		100						
				G	23	138					
40					44						
					70						
			End of Boring at 40 ft.								
			Boring cement grouted to 30 ft.								
			Mineral well permit #								
WATER LEVEL OBSERVATIONS							SAMTEST, INC.				
W.L. Encountered initially at 1 1/2 ft.							DRILLING & TESTING SERVICES				
W.L. Final level 1 1/2 ft.											

**MICHIGAN TESTING ENGINEERS, INC.**  
MICHIGAN DRILLING DIVISION  
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS  
10001 WYOMING AVENUE • DETROIT, MICHIGAN 48221

JOB NO. 74-523 LOG OF SOIL BORING NO. 1900-97-7  
PROJECT PROPOSED SOILS EXPLORATION  
LOCATION DOW CORNING

DATE 8-1-74 SURFACE ELEV. 103.5

MIDLAND, MICHIGAN

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows Per 6"	Moisture %	Natural Wt. P.C.F.	Unc. Comp. Strength PSF.	Str. %
	1	...	COMPACT MOIST MEDIUM BROWN SAND					
A	2	...						
UL	3	...		4	5	7		
	4	...	3'6" COMPACT WET MEDIUM BROWN SAND					
B	5	...						
UL	6	...		5	6	7		
	7	...	8'3" VERY STIFF MOIST BLUE SILTY CLAY					
C	8	...						
UL	9	...		5	7	9		
	10	...	10'0"					
D	11	...						
UL	12	...		7	10	13		
	13	...						
	14	...						
	15	...						
	16	...						
	17	...						
	18	...						
	19	...						
	20	...						

TYPE OF SAMPLE D. -DISTURBED U.L.-UNOIST. LINER S.T.-SHELBY TUBE S.S.-SPLIT SPOON R.C.-ROCK CORE OTHER-	REMARKS:  Standard Penetration Test - Driving 2" OD Sampler 1' With 140 # Hammer Falling 30"; Count Made At 6" Intervals	GROUND WATER OBSERVATIONS G.W. ENCOUNTERED AT 3 FT. 3 INS. G.W. ENCOUNTERED AT FT. INS. G.W. AFTER COMPLETION 3 FT. 9 INS. G.W. AFTER HRS. FT. INS. G.V. VOLUMES HEAVY
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**MICHIGAN TESTING ENGINEERS, INC.**  
**MICHIGAN DRILLING DIVISION**  
 CONSULTING ENGINEERS IN SOILS & FOUNDATIONS  
 1041 WYOMING AVENUE • DETROIT, MICHIGAN 48201

JOB NO. 74-523 LOG OF SOIL BORING NO. 1000-98-74  
 PROJECT PROPOSED SOILS EXPLORATION  
 LOCATION DOW CORNING

DATE 8-1-74 SURFACE ELEV. 104.7 MIDLAND, MICHIGAN

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Unc. Comp. Strength PSF.	Str. %
	1	...	COMPACT MOIST MEDIUM SAND, FILL					
A	2	...	1'6"	2	11	17		
UL	3	...						
	4	...	3'6"	4	4	5		
B	5	...						
UL	6	...	8'3"	4	5	7		
C	7	...						
UL	8	...	10'0"	7	9	12		
D	9	...						
UL	10	...	VERY STIFF MOIST BLUE SILTY CLAY					
	11	...						
	12	...						
	13	...						
	14	...						
	15	...						
	16	...						
	17	...						
	18	...						
	19	...						
	20	...						

TYPE OF SAMPLE  
 D. -DISTURBED  
 U.L.-UNDIST. LINER  
 S.T.-SHIELD TUBE  
 S.L.-SPLIT SPOON  
 R.C.-ROCK CORE  
 OTHER-

REMARKS:

Standard Penetration Test - Driving 2" OD Sampler 1' With  
 140# Hammer Falling 30"; Count Made At 6" Intervals

GROUND WATER OBSERVATIONS

G.W. ENCOUNTERED AT 2 FT. 6 INS.  
 G.W. ENCOUNTERED AT 3 FT. 2 INS.  
 G.W. AFTER COMPLETION 3 FT. 2 INS.  
 G.W. AFTER HRS. FT. INS.  
 G.W. VOLUMES HEAVY 34

**MICHIGAN TESTING ENGINEERS, INC.**  
MICHIGAN DRILLING DIVISION  
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS  
1001 WYOMING AVENUE • DETROIT, MICHIGAN 48201

JOB NO. 74-523 LOG OF SOIL BORING NO. 1000-99  
PROJECT PROPOSED SOILS EXPLORATION  
LOCATION DOW CORNING  
MIDLAND, MICHIGAN

DATE 7-31-74 SURFACE ELEV. 111.80

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration: Blows For 6"	Moisture %	Natural Wt. P.C.F.	Unc. Comp. Strength PSF.	Str. %
	1							
A	2							
UL	3							
	4	FILL	3'9"					
B	5							
UL	6							
	7							
C	8							
UL	9	FILL	8'6"					
	10							
	11							
	12							
	13							
	14							
E	15							
UL	16							
	17							
	18							
	19							
	20							

TYPE OF SAMPLE  
D. -DISTURBED  
U.L.-UNOIST. LINER  
S.T.-SHELBY TUBE  
S.S.-SPLIT SPOON  
P.C.-PICK CORE

REMARKS:

Standard Penetration Test - Driving 2" OD Sampler 1' With

**GROUND WATER OBSERVATIONS**

G.W. ENCOUNTERED AT 10 FT. 3 INS.  
G.W. ENCOUNTERED AT FT. INS.  
G.W. AFTER COMPLETION 9 FT. 6 INS.  
G.W. AFTER HRS. FT. INS.  
G.W. VOLUMES  
HEAVY





MICHIGAN TESTING ENGINEERS, INC.  
MICHIGAN DRILLING DIVISION  
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS  
10001 WYOMING AVENUE • DETROIT, MICHIGAN 48221

JOB NO. 74-523 LOG OF SOIL BORING NO. 1000-100-74  
PROJECT PROPOSED SOILS EXPLORATION  
LOCATION DOW CORNING

DATE 7-31-74 SURFACE ELEV. 107.8

MIDLAND, MICHIGAN

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Unc. Comp. Strength PSF.	Str. %
			0'4"					
	1		BROWN SANDY LOAM					
	2		STIFF MOIST BROWN CLAY, SAND AND PEBBLES, LIGHT OXIDATION, FILL, SLIGHTLY ORGANIC STREAKS	4	5	7		
A UL	3							
	4							
B UL	5			4	6	7		
	6	FILL P	5'9"					
	7		6'6"					
C UL	8		COMPACT WET MEDIUM BROWN SAND, SLIGHTLY ORGANIC STREAKS	4	5	7		
	9		8'6"					
D UL	10		COMPACT WET FINE BROWN SAND	4	6	7		
	11		11'0"					
	12		VERY STIFF MOIST BLUE SILTY CLAY					
	13							
	14							
E UL	15		15'0"	6	9	12		
	16							
	17							
	18							
	19							
	20							

TYPE OF SAMPLE  
D. -DISTURBED  
U.L.-UNDIST. LINER  
S.T.-SHELBY TUBE  
S.S.-SPLIT SPOON  
R.C.-ROCK CORE  
OTHER-

REMARKS:

Standard Penetration Test - Driving 2" On Sampler 1' With  
140# Hammer Falling 30"; Count Made 4" Intervals

GROUND WATER OBSERVATIONS

G.W. ENCOUNTERED AT 6 FT. 6 INS.  
G.W. ENCOUNTERED AT FT. INS.  
G.W. AFTER COMPLETION 6 FT. 3 INS.  
G.W. AFTER HRS. FT. INS.  
G.W. VOLUMES MEDIUM 36

**MICHIGAN TESTING ENGINEERS, INC.**  
**MICHIGAN DRILLING DIVISION**  
 CONSULTING ENGINEERS IN SOILS & FOUNDATIONS  
 10001 WYOMING AVENUE • DETROIT, MICHIGAN 48221

JOB NO. 74-523 LOG OF SOIL BORING NO. 1000-101  
 PROJECT PROPOSED SOILS EXPLORATION  
 LOCATION DOW CORNING  
MIDLAND, MICHIGAN

DATE 7-31-74 SURFACE ELEV. 110.5

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Unc. Comp. Strength PSF.	Str. %
	1	• • •	COMPACT MOIST SAND, FILL, SLIGHT ORGANIC STREAKS					
A	2	• • •						
UL	3	• • •		4	5	7		
	4	FILL	3'6" STIFF MOIST BROWN CLAY, FILL, SAND AND PEBBLES, SLIGHT ORGANIC STREAKS					
B	5	• • •		4	6	7		
UL	6	• • •						
	7	• • •	8'3" SLIGHTLY COMPACT MOIST, SLIGHTLY ORGANIC SAND	3	4	4		
C	8	• • •						
UL	9	• • •						
	10	• • •	12'0" VERY COMPACT WET MEDIUM BROWN SAND	2	2	3		
D	11	• • •						
UL	12	• • •						
	13	• • •	13'6" VERY STIFF MOIST BLUE SILTY CLAY					
	14	• • •						
E	15	• • •		7	9	12		
UL	16	• • •						
	17	• • •						
	18	• • •						
	19	• • •						
	20	• • •						

TYPE OF SAMPLE  
 D. -DISTURBED  
 U.L.-UNDIST. LINER  
 S.T.-SHELBY TUBE  
 S.S.-SPLIT SPOON  
 R.-ROCK CORE

REMARKS:

Standard Penetration Test - Driving 2" OD Sampler 1' With  
 140# Hammer Falling 30". Count Made At 4" Intervals

GROUND WATER OBSERVATIONS

G.W. ENCOUNTERED AT 11 FT. 6 INS.  
 G.W. ENCOUNTERED AT FT. INS.  
 G.W. AFTER COMPLETION 8 FT. 0 INS.  
 G.W. AFTER HRS. FT. INS.  
 G.W. VOLUMES  
 HEAVY



MICHIGAN TESTING ENGINEERS, INC.  
MICHIGAN DRILLING DIVISION  
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS  
10001 WYOMING AVENUE • DETROIT, MICHIGAN 48221

JOB NO. 74-523 LOG OF SOIL BORING NO. 1000-102-74  
PROJECT PROPOSED SOILS EXPLORATION  
LOCATION DOW CORNING

DATE 7-31-74 SURFACE ELEV. 107.4

MIDLAND, MICHIGAN

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Unc. Comp. Strength PSF.	Str. %
	1		STIFF MOIST BLUE CLAY, SAND AND PEBBLES, FILL, SLIGHT ORGANIC STREAKS					
	2							
A UL	3			5	7	8		
	4							
B UL	5			5	6	4		
	6							
C UL	7			4	5	6		
	8							
	9							
D UL	10			3	4	5		
	11	FILL	11'0"					
	12		VERY STIFF MOIST BLUE SILTY CLAY					
	13							
	14		13'0"					
	15							
	16							
	17							
	18							
	19							
	20							

TYPE OF SAMPLE  
D. - DISTURBED  
U.L. - UNDIST. LINER  
S.T. - SHELBY TUBE  
S.S. - SPLIT SPOON

REMARKS:

Standard Penetration Test - Driving 2" OD Sampler 1' With

GROUND WATER OBSERVATIONS

G.W. ENCOUNTERED AT	FT.	INS.	
G.W. ENCOUNTERED AT	FT.	INS.	
G.W. AFTER COMPLETION	FT.	INS.	
G.W. AFTER	HR.	FT.	INS.

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JOB NO. 74-523 LOG OF SOIL BORING NO. 1000-103-7  
PROJECT PROPOSED SOILS EXPLORATION  
LOCATION DOW CORNING

DATE 7-31-74 SURFACE ELEV. 109.40

MIDLAND, MICHIGAN

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Unc. Comp. Strength PSF.	Str. %
	1		STIFF MOIST BROWN SANDY CLAY, FILL, SLIGHT ORGANIC STREAKS					
A	2			5	7	9		
UL	3	FILL	3'3"					
	4		VERY STIFF MOIST BROWN CLAY, SAND AND PEBBLES, FILL					
B	5			6	8	11		
UL	6	FILL	6'0"					
	7		SLIGHTLY COMPACT WET SWAMP BOTTOM SAND, MEDIUM VEGETATION	2	2	3		
C	8							
UL	9		8'6"					
	10		COMPACT WET MEDIUM BROWN SAND	4	5	7		
D	11							
UL	12							
	13							
	14		13'6"					
E	15		VERY STIFF MOIST BROWN SILTY CLAY	7	9	12		
UL	16		15'0"					
	17							
	18							
	19							
	20							

TYPE OF SAMPLE  
D. -DISTURBED  
U.L.-UNDIST. LINER  
S.T.-SHELBY TUBE  
S.S.-SPLIT SPOON  
R.C.-ROCK CORE

REMARKS:

Standard Penetration Test - Driving 2" OD Sampler 1" With

**GROUND WATER OBSERVATIONS**

G.W. ENCOUNTERED AT 6 FT. 6 INS.  
G.W. ENCOUNTERED AT FT. INS.  
G.W. AFTER COMPLETION 6 FT. 3 INS.  
G.W. AFTER HRS. FT. INS.  
G.W. VOLUMES



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JOB NO. 74-523 LOG OF SOIL BORING NO. 1000-104-74  
PROJECT PROPOSED SOILS EXPLORATION  
LOCATION DOW CORNING

DATE 8-1-74

SURFACE ELEV. 1000

MIDLAND, MICHIGAN

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Unc. Comp. Strength PSF.	Str. PSF.
	1	+	SLIGHTLY COMPACT MOIST SANDY LOAM, FILL, MEDIUM ORGANIC CONTENT, LIGHT VEGETATION					
A	2	+		1	2	2		
UL	3	+						
	4	+	FIRM MOIST MEDIUM ORGANIC CLAY, VEGETATION					
B	5	+		2	2	2		
UL	6	+						
	7	+	VERY STIFF MOIST BLUE SILTY CLAY					
C	8	+		7	9	12		
UL	9	+						
	10	+	10'0"	7	10	12		
D	11	+						
UL	12	+						
	13	+						
	14	+						
	15	+						
	16	+						
	17	+						
	18	+						
	19	+						
	20	+						

TYPE OF SAMPLE  
D. -DISTURBED  
U.L. -UNDIST. LINER  
S.T. -SHELBY TUBE  
S.S. -SPLIT SPOON  
R.C. -ROCK C: E

REMARKS:

Standard Penetration Test - Driving 2" OD Sampler 1' With  
140# Hammer Falling 30"; Count Made At 6" Intervals

GROUND WATER OBSERVATIONS

G.W. ENCOUNTERED AT 5 FT. 3 INS.  
G.W. ENCOUNTERED AT FT. INS.  
G.W. AFTER COMPLETION 4 FT. 6 INS.  
G.W. AFTER HRS. FT. INS.  
G.W. VOLUMES HEAVY 40

## LOG OF BORING NO. 1000-105-79

PROJECT				SITE					
Site Evaluation - C & D Street				Dow Corning, Midland, MI					
BORING			PROJECT NO.		SAMPLE TYPE				
STARTED 2-14-79 COMPLETED 2-14-79			B1245		S.S. <input checked="" type="checkbox"/> AUGER <input checked="" type="checkbox"/> SHELBY <input type="checkbox"/>				
DEPTH IN FEET	LEGEND	SAMPLES	DESCRIPTION OF MATERIAL	SAMPLE NO.	STD. PENETRATION "N" BLOWS PER FOOT	UNIT NAT. WT. pcf	UNCONFINED COMPRESSIVE STRENGTH TONS/FT <sup>2</sup>		
							1	2	3
			SURFACE ELEVATION 105.0'						
			topsoil-black sandy loam						
			Sand-yellow, med. SP		5				
			Sand-brown, silty, trace of clay, graded medium-fine SP		5				
					9				
10			Clay-stiff, brown, silty, trace of sand & pebbles CL	A	5	128			
					7				
				B	8	133			
					10				
					11				
20			Sand seam at 18 ft.	C	5	134			
			Clayey-silt-compact, gray, sandy ML		6				
					6				
				D	8	125			
					8				
					10				
30			Clayey-silt-with gravel	E	9	148			
			Clay-extremely hard, sandy, some silt and pebbles CL		14				
					18				
				F	57	148			
					70				
					72				
40			End of Boring at 40 ft.	G	50	149			
					100				
			Boring cement grouted to 30 ft.						
			Mineral well permit #						
WATER LEVEL OBSERVATIONS							S A M T E S T, I N C.		
W.L. Encountered initially at 18 ft.							DRILLING & TESTING SERVICES		
W.L. Final level at 18 ft.									

 $1.2 \times 10^{-7}$  cm/sec.

# LOG OF BORING NO. 1000-106-79

<b>PROJECT</b> Waste Disposal Site Expansion					<b>SITE</b> Dow Corning, Midland, MI						
<b>BORING</b> STARTED 8-1-79 COMPLETED 8-1-79					<b>PROJECT NO.</b> 79-154		<b>SAMPLE TYPE</b> S.S. <input checked="" type="checkbox"/> AUGER <input checked="" type="checkbox"/> SHELBY <input type="checkbox"/>				
<b>DEPTH IN FEET</b>	<b>LEGEND</b>	<b>SAMPLES</b>	<b>DESCRIPTION OF MATERIAL</b>	<b>SAMPLE NO.</b>	<b>STD. PENETRATION "N" BLOWS PER FOOT</b>	<b>UNIT NAT. WT. LB./FT<sup>3</sup></b>	<b>UNCONFINED COMPRESSIVE STRENGTH TONS/FT<sup>2</sup></b>				
			SURFACE ELEVATION 109.5'								
10			Sand-light yellow brown, graded medium fine fill								
			Clay								
20			Sand-light brown, graded medium fine								
			Clay-stiff, brown, silty CL								
			Sand 6" gray, wet								
30			Clay-stiff, brown, silty	A	6						
					7						
					5						
					4						
				B	5						
			Clay-stiff, gray, silty		4						
40					7						
				C	8						
					8						
					11						
				D	13						
					18						
			End of Boring at 41 ft.								
			Mineral Well Permit								
			626-792-156								
			fully cement grouted								
<b>WATER LEVEL OBSERVATIONS</b>							<b>SAMTEST, INC.</b> DRILLING & TESTING SERVICES				
W.L. Encountered initially at 15 ft.											
W.L.											

# LOG OF BORING NO. 1000-107-9

<b>PROJECT</b> Waste Disposal Site - Expansion					<b>SITE</b> Dow Corning - Midland, MI						
<b>BORING</b> STARTED 8-1-79 COMPLETED 8-1-79					<b>PROJECT NO.</b> 79-154		<b>SAMPLE TYPE</b> S.S. <input checked="" type="checkbox"/> AUGER <input checked="" type="checkbox"/> SHELBY <input type="checkbox"/>				
<b>DEPTH IN FEET</b>	<b>LEGEND</b>	<b>SAMPLES</b>	<b>DESCRIPTION OF MATERIAL</b>	<b>SAMPLE NO.</b>	<b>SIG. PENETRATION "N"</b> BLOWS PER FOOT	<b>UNIT WT. LB/FT<sup>3</sup></b>	<b>UNCONFINED COMPRESSIVE STRENGTH TONS/FT<sup>2</sup></b> 				
							<b>PLASTIC LIMIT %</b> <input checked="" type="checkbox"/> <b>WATER CONTENT %</b> <input checked="" type="checkbox"/> <b>LIQUID LIMIT %</b> <input checked="" type="checkbox"/> 10 20 30 40 50				
			SURFACE ELEVATION 109.5'								
			Sand-light yellow, graded medium fine fill								
10			Clay-black, sandy								
			Sand-light brown, med. fine								
			Clay-black, sandy								
			Sand-light brown, med. fine								
20			Clay-stiff, brown, silty trace sand & gravel CL	A	5 6		1.8X10 <sup>-8</sup> CM/SEC				
			Sand-12" gray, wet								
30			Clay-stiff, brown, silty CL	B	5 5 7		2.0X10 <sup>-8</sup> CM/SEC				
			Clayey-silt-gray, some sand ML	C	8 9 9		1.4X10 <sup>-7</sup> CM/SEC				
40			Clay-stiff, gray, silty D	D	8 10		2.6X10 <sup>-8</sup> CM/SEC				
			End of Boring at 40 ft. Mineral Well Permit 626-792-165 boring fully cement grouted								
<b>WATER LEVEL OBSERVATIONS</b>							<b>SAMTEST, INC.</b> DRILLING & TESTING SERVICES				
W.L. Encountered initially at 18 ft											
W.L.											



## LOG OF BORING NO. 1 (2500-176 78)

PROJECT 2502 Bldg. - Tank Farm				SITE Dow Corning - Midland, MI			
BORING STARTED 10-24-78 COMPLETED 10-24-78				PROJECT NO. B1236		SAMPLE TYPE S.S. <input checked="" type="checkbox"/> AUGER <input checked="" type="checkbox"/> SHELBY <input type="checkbox"/>	
DEPTH IN FEET	LEGEND	SAMPLES	DESCRIPTION OF MATERIAL	SAMPLE NO.	STD. PENETRATION "N" BLOWS PER FOOT	UNIT NAT. WT. $\frac{LB}{FT^3}$	UNCONFINED COMPRESSIVE STRENGTH TONS/FT <sup>2</sup>
							PLASTIC LIMIT % <input checked="" type="checkbox"/> 10 WATER CONTENT % <input checked="" type="checkbox"/> 30 LIQUID LIMIT % <input checked="" type="checkbox"/> 50
			SURFACE ELEVATION 92.5				
5			Clay-firm, tan & gray, silty occas. sand layers possible fill CL	A	10	131	
			Clay-stiff, tan silty, mottled with gray, some sand & pebbles CL	B	17	123	
			Clay-stiff, brown, silty, trace of sand & pebbles CL	C	22	-	
10			Clay-stiff, gray, silty, trace of sand & pebbles CL	D	13	127	
15			Clay-very hard, gray, sandy, some silt & pebbles CL	E	53	145	
20			End of Boring at 20 ft.	F	91	147	
WATER LEVEL OBSERVATIONS						SAM TEST, INC.	
W.L. none encountered						DRILLING & TESTING SERVICES	
W.L.							

# LOG OF BORING NO. 2 (2500-107-78)

<b>PROJECT</b> 2502 Bldg. - Tank Farm				<b>SITE</b> Dow Corning Corp., Midland, MI			
<b>BORING</b> STARTED 10-24-78 COMPLETED 10-24-78				<b>PROJECT NO.</b> B1236		<b>SAMPLE TYPE</b> S.S. <input checked="" type="checkbox"/> AUGER <input checked="" type="checkbox"/> SHELBY <input type="checkbox"/>	

DEPTH IN FEET	LEGEND	SAMPLES	DESCRIPTION OF MATERIAL	SAMPLE NO.	STD. PENETRATION <sup>N</sup> BLOWS PER FOOT	UNIT NAT. WT <sup>LB</sup> ( <sup>KG</sup> )	UNCONFINED COMPRESSIVE STRENGTH TONS/FT <sup>2</sup>		
							1	2	3
			SURFACE ELEVATION 94.4					PLASTIC LIMIT % <input checked="" type="checkbox"/> 10 WATER CONTENT % <input checked="" type="checkbox"/> 30 LIQUID LIMIT % <input checked="" type="checkbox"/> 50	
5		X	Clay-firm, brown, silty layers of sand & colored clays, fill	A	14	122			
			Clay-stiff, brown, silty mottled with gray	B	21	124			
			CL						
			Clay-hard, brown, silty trace of sand & pebbles	C	22	136			
10			Clay-very stiff, gray, silty, occ. layers of silt, trace of sand & pebbles	D	17	126			
			CL						
15			Clay-very hard, gray, sandy, some silt & pebbles	E	38	139			
			CL						
20			End of Boring at 20 ft.	F	98	140			

<b>WATER LEVEL OBSERVATIONS</b>		<b>SAMTEST, INC.</b> DRILLING & TESTING SERVICES
W.L.	Encountered initially at 14 1/2 ft.	
W.L.	upon completion - 19 ft.	

## LOG OF BORING NO. 3 (2500-108-78)

PROJECT 2502 Bldg. - Tank Farm				SITE Dow Corning Corp., Midland, MI			
BORING STARTED 11-9-78 COMPLETED 11-9-78				PROJECT NO. B1236		SAMPLE TYPE S.S. <input checked="" type="checkbox"/> AUGER <input checked="" type="checkbox"/> SHELBY <input type="checkbox"/>	
DEPTH IN FEET	LEGEND	SAMPLES	DESCRIPTION OF MATERIAL	SAMPLE NO.	STD. PENETRATION "N" BLOWS PER FOOT	UNIT MAT. WT. lb./ft. <sup>3</sup>	UNCONFINED COMPRESSIVE STRENGTH TONS/FT <sup>2</sup>
							PLASTIC LIMIT % <input checked="" type="checkbox"/> 10 WATER CONTENT % <input checked="" type="checkbox"/> 30 LIQUID LIMIT % <input checked="" type="checkbox"/> 50
			SURFACE ELEVATION 95.4				
			Clay-firm, brown, sandy occas. layers sand fill	A	17	136	
5			Clay-stiff, brown, silty, mottled with gray silt CL	B	17	127	
			Clay-stiff, brown, silty, some sand & pebbles occ. layers of silt	C	24	128	
10			Clay-water bearing seam of gravelly sand	D	21	133	
15			Clay-very hard, gray sandy, some silt & pebbles	E	42	142	
20			End of Boring at 20 ft.	F	100	143	7.7
WATER LEVEL OBSERVATIONS							SAMTEST, INC. DRILLING & TESTING SERVICES
W.L. None encountered							
W.L.							

# LOG OF BORING NO. 4 (2500-109-78)

PROJECT 2502 Bldg. - Tank Farm				SITE Dow Corning Corp., Midland, MI			
BORING STARTED 10-23-78 COMPLETED 10-23-78				PROJECT NO. B1236		SAMPLE TYPE S.S. <input checked="" type="checkbox"/> AUGER <input checked="" type="checkbox"/> SHELBY <input type="checkbox"/>	
DEPTH IN FEET	LEGEND	SAMPLES	DESCRIPTION OF MATERIAL	SAMPLE NO.	STD. PENETRATION "N" BLOWS PER FOOT	UNIT NAT. WT (lb/ft <sup>3</sup> )	UNCONFINED COMPRESSIVE STRENGTH TONS/FT <sup>2</sup>
							PLASTIC LIMIT % X
			SURFACE ELEVATION 93.1				
5			Clay-brown, silty, layers of sand & slightly mottled, possibly fill	A	20	120	
			Clay-stiff, brown, silty mottled with gray some sand & pebbles	B	23	129	
			CL	C	19	128	
10			Clay-stiff, gray, silty, occasional layers of silt, trace of sand	D	17	133	
			CL & ML	E	15	139	
15			Clay-hard, gray, sandy some silt & pebbles	F	127	148	
			CL	G	100	147	
20			Clay-very hard, gray, sandy, some silt and pebbles				
			CL				
25			End of Boring at 25 ft.				
WATER LEVEL OBSERVATIONS							<b>SAMTEST, INC.</b> DRILLING & TESTING SERVICES
W.L. None encountered							
W.L.							

\*calibrated penetrometer

18  
TS

# LOG OF BORING NO. 5 (2500-110-78)

<b>PROJECT</b> 2502 Bldg. - Tank Farm					<b>SITE</b> Dow Corning Corp., Midland, MI						
<b>BORING</b> STARTED 10-23-78 COMPLETED 10-23-78					<b>PROJECT NO.</b> B1236		<b>SAMPLE TYPE</b> S.S. <input checked="" type="checkbox"/> AUGER <input checked="" type="checkbox"/> SHELBY <input type="checkbox"/>				
DEPTH IN FEET	LEGEND	SAMPLES	DESCRIPTION OF MATERIAL	SAMPLE NO.	STD. PENETRATION "N" BLOWS PER FOOT	UNIT MAT. WT. LB./FT <sup>3</sup>	UNCONFINED COMPRESSIVE STRENGTH TONS/FT <sup>2</sup>				
							1	2	3	4	5
							PLASTIC LIMIT % X	WATER CONTENT % X	LIQUID LIMIT % △		
			SURFACE ELEVATION 93.1				10	20	30	40	50
5		X	Clay-stiff, brown, silty some sand & pebbles mottled with gray CL	A	19	123		X			
		X	Clay-stiff brown, silty trace of sand & pebbles CL	B	28	130		X		○	
		X	Clay-stiff, gray silty	C	21	130		X			
10		X	Clay-becoming more silty after 8 1/2 ft.	D	20	132		X		○	
15		X	Clay-extremely hard, gray sandy with some silt & pebbles CL	E	142	144		X		○	
20		X	End of Boring at 20 ft.	F	100	147		X		○	1 T

**WATER LEVEL OBSERVATIONS**

W.L. Encountered initially at 13 1/2 ft.

W.L. After 24 hrs. 3 1/2 ft.

**SAMTEST, INC.**

DRILLING & TESTING SERVICES

# LOG OF BORING NO. 6 (2500-111-78)

PROJECT 2502 Bldg. - Tank Farm					SITE Dow Corning Corp., Midland, MI							
BORING STARTED 10-23-78 COMPLETED 10-23-78					PROJECT NO. B1236		SAMPLE TYPE S.S. <input checked="" type="checkbox"/> AUGER <input checked="" type="checkbox"/> SHELBY <input type="checkbox"/>					
DEPTH IN FEET	LEGEND	SAMPLES	DESCRIPTION OF MATERIAL	SAMPLE NO.	STD. PENETRATION "N" BLOWS PER FOOT	UNIT NAT. WT. LB./FT <sup>3</sup>	UNCONFINED COMPRESSIVE STRENGTH TONS/FT <sup>2</sup>					
							PLASTIC LIMIT % <input checked="" type="checkbox"/> WATER CONTENT % <input checked="" type="checkbox"/> LIQUID LIMIT % <input checked="" type="checkbox"/> 10 20 30 40 50					
			SURFACE ELEVATION 92.2									
0			Clay-stiff, brown, silty mottled with gray, some sand & pebbles CL	A	13	-						
5				B	23	-						
				C	16	-						
10				Clay-stiff, gray, silty trace of sand & pebbles CL	D	21	131					
15					E	22	134					
20					F	100	144					
			Clay-extremely hard, gray, sandy with some silt and pebbles CL									
			End of Boring at 21 ft.									
WATER LEVEL OBSERVATIONS							SAMTEST, INC. DRILLING & TESTING SERVICES					
W.L. Encountered initially at 15 1/2 ft.												
W.L. After 24 hrs. 18 1/2 ft.												

# LOG OF BORING NO. 7 (2500 - 112-78)

PROJECT 2502 Bldg. - Tank Farm					SITE Dow Corning Corp., Midland, MI						
BORING STARTED 10-20-78 COMPLETED 10-20-78					PROJECT NO. B1236		SAMPLE TYPE S.S. <input checked="" type="checkbox"/> AUGER <input checked="" type="checkbox"/> SHELBY <input type="checkbox"/>				
DEPTH IN FEET	LEGEND	SAMPLES	DESCRIPTION OF MATERIAL	SAMPLE NO.	STD. PENETRATION "N" BLOWS PER FOOT	UNIT WT. WT (FT)	UNCONFINED COMPRESSIVE STRENGTH TONS/FT <sup>2</sup>				
							1	2	3	4	5
							PLASTIC LIMIT %	WATER CONTENT %	LIQUID LIMIT %		
							10	20	30	40	50
			SURFACE ELEVATION 93.5								
			Clay-soft, brown with gravel, silt & some sand CL	A	7	110					
5			Clay-becoming wet below 2 1/2 ft.	B	11	122					
			Clay-stiff, brown, silty some sand & pebbles CL	C	28	132					
10			Clay-occas. layers of gray silt ML	D	17	134					
			Clay, stiff, gray, silty, trace of sand & pebbles CL								
15			Clay-extremely hard, gray, sandy, with some silt and pebbles	E	100/4"	147					
20				F	73	144					
25			End of Boring at 25 ft.	G	100/2"	144					
WATER LEVEL OBSERVATIONS							SAMTEST, INC. DRILLING & TESTING SERVICES				
W.L.											
W.L.											

calibrated penetrometer


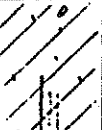
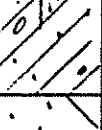

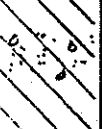

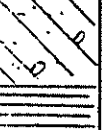
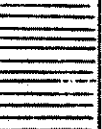
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**MICHIGAN DRILLING**  
DIVISION OF MICHIGAN TESTING ENGINEERS, INC.  
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS  
14998 WYOMING AVENUE • DETROIT, MICHIGAN 48238

JOB NO. 17-220 LOG OF SOIL BORING NO. 62  
PROJECT PROPOSED BUILDINGS & STRUCTURES  
LOCATION DOW-CORNING 2700 - 17  
MIDLAND, MICHIGAN

DATE 4-16-74 SURFACE ELEV. 92.5

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"			Moisture %	Natural Wt. P.C.F.	Unc. Com. Strength PSF.	Stn.
A UL	2		1'3" MEDIUM COMPACT WET BROWN SAND	7	10	12	27.2	121.3	8340	
	4		VERY STIFF MOIST BROWN CLAY, OXIDIZED STREAKS, LAYERS OF SILT, SAND AND PEBBLES							
B UL	6		4'0" EXTREMELY STIFF MOIST BROWN CLAY, OXIDIZED STREAKS, LAYERS OF SILT, SAND AND PEBBLES	8	13	15	17.6	133.4	13110	
	8									
C UL	10		10'0" STIFF MOIST BLUE CLAY, LENSES OF SILT, SAND AND PEBBLES	4	7	9	27.5	122.6	4090	
	12									
E UL	14		13'5" EXTREMELY STIFF MOIST BLUE CLAY, LAYERS OF SAND AND PEBBLES	7	12	15	12.6	140.3	7150	
	16									
	18									
F UL	20		19'0" EXTREMELY STIFF MOIST BLUE CLAY, SAND AND PEBBLES	10	27	30	6.8		1871	
	22									
	24									
G UL	26		23'4" EXTREMELY STIFF HARDPAN	12	31	43	8.4	142.9	4900	
	28									
	30									
H UL	32			25	44	52	8.6	145.9	24020	
	34									
	36									
I UL	38		35'0"	26	42	54	7.8		31170+	
	40									

TYPE OF SAMPLE  
D. -DISTURBED  
U.L. -UNDIST. LINER  
S.T. -SHELBY TUBE  
S.S. -SPLIT SPOON  
R.C. -ROCK CORE  
OTHER-

**PLUGGING PROCEDURE**

HOLE SEALED WITH NATURAL SOILS BETWEEN  
DEPTHS OF 35' AND SURFACE

Standard Penetration Test - Driving 2" OD Sampler 1' With  
140# Hammer Falling 30"; Count Made At 6" Intervals

**GROUND WATER OBSERVATIONS**

G.W. ENCOUNTERED AT 0 FT. 6 INS.  
G.W. ENCOUNTERED AT 18 FT. 0 INS.  
G.W. AFTER COMPLETION 30 FT. 0 INS.  
G.W. AFTER 3 HRS. 31 FT. 0 INS.  
G.W. VOLUMES HEAVY





**MICHIGAN DRILLING**  
DIVISION OF MICHIGAN TESTING ENGINEERS, INC.  
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS  
14888 WYOMING AVENUE • DETROIT, MICHIGAN 48226

JOB NO. 14-LLV LOG OF SOIL BORING NO. 68  
PROJECT PROPOSED BUILDINGS & STRUCTURES  
LOCATION DOW-CORNING 2700-68  
MIDLAND, MICHIGAN

DATE 4-16-74 SURFACE ELEV. \_\_\_\_\_

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"			Moisture %	Natural Wt. P.C.F.	Unc. Comp. Strength PSF.	St %
			SOFT MOIST SANDY CLAY							
A UL	2		1'3"	3	4	7	28.9		4040	
	4		STIFF MOIST BROWN CLAY, OXIDIZED STREAKS, LAYERS OF SILT, SAND AND PEBBLES							
B UL	6		5'10"	4	6	8	20.7	125.7	5400	
C UL	8		EXTREMELY STIFF MOIST BROWN CLAY, OXIDIZED STREAKS, LAYERS OF SILT, SAND AND PEBBLES	8	12	15	22.6	131.8	11480	
D UL	10		9'0"	5	6	7	20.6	130.6	3350	
	12		STIFF MOIST BROWN CLAY, OXIDIZED STREAKS, LAYERS OF SILT, SAND AND PEBBLES							
	14		13'0"							
E UL	16		VERY STIFF MOIST BLUE CLAY, OXIDIZED STREAKS, LAYERS OF SILT, SAND AND PEBBLES	6	8	9	19.0	131.8	6410	
	18									
F U	20		ENCOUNTERED STONE IN SAMPLE NOSE AT 19'0"	12	16	30	15.3	139.3		
	22									
	24		23'7"							
G UL	26		EXTREMELY STIFF MOIST BLUE CLAY, OCCASIONAL STONES	19	33	50	8.1	144.9	25860	
	28									
H UL	30			36	43		8.9	147.7		
	32									
	34									
I UL	36		35'0"	34	45		8.7		27630	
	38									
	40									

**TYPE OF SAMPLE**

D. -DISTURBED  
U.L.-UNDIST. LINER  
S.T.-SHELBY TUBE  
S.S.-SPLIT SPOON  
R.C.-ROCK CORE  
OTHER-

**PLUGGING PROCEDURE**

HOLE SEALED WITH NATURAL SOILS BETWEEN  
35' SURFACE  
DEPTHS OF \_\_\_\_\_ AND \_\_\_\_\_

Standard Penetration Test - Driving 2" OD Sampler 1' With  
140# Hammer Falling 30"; Count Made At 6" Intervals

**GROUND WATER OBSERVATIONS**

G.W. ENCOUNTERED AT 18 FT. 3 INS.  
G.W. ENCOUNTERED AT \_\_\_\_\_ FT. \_\_\_\_\_ INS.  
G.W. AFTER COMPLETION 32 FT. 0 INS.  
G.W. AFTER 6 HRS. 31 FT. 6 INS.  
G.W. VOLUMES



MICHIGAN DRILLING  
DIVISION OF MICHIGAN TESTING ENGINEERS, INC.  
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS  
14222 WYOMING AVENUE • DETROIT, MICHIGAN 48226

JOB NO. 14-220 LOG OF SOIL BORING NO. 69

PROJECT PROPOSED BUILDINGS & STRUCTURES

LOCATION DOW-CORNING 2700 - 6

MIDLAND, MICHIGAN

DATE 4-18-74 SURFACE ELEV. 91.2

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"			Moisture %	Natural Wt. P.C.F.	Unc. Comp. Strength PSF.	Gr. %
A UL	2		0'4" SOFT MOIST SANDY BLACK TOPSOIL, VEGETATION SLIGHTLY COMPACT MOIST MEDIUM TO FINE BROWN SAND & PEBBLES	1	2	2	15.9	123.9		
	4									
B UL	6		3'0" VERY STIFF MOIST BROWN CLAY, OXIDIZED STREAKS, LAYERS OF SILT, SAND AND PEBBLES	8	10	12	17.7	131.6	11190	
	8			6	9	10	17.2	130.8	7890	
C UL	10		10'0" STIFF MOIST BLUE CLAY, OXIDIZED STREAKS, LAYERS OF SILT, SAND AND PEBBLES	6	7	8	21.1	129.3	2820	
	12									
D UL	14		13'8" VERY STIFF MOIST BLUE CLAY, SAND AND PEBBLES	6	8	10	16.4	133.1	3320	
	16									
E UL	18		19'0" EXTREMELY STIFF MOIST SANDY BLUE CLAY, PEBBLES	17	25	31	29.3	144.9	718	
	20									
F UL	22									
	24									
G UL	26			19	32	43	7.8	145.4	18000	
	28									
H UL	30			21	33	46	7.9	144.4	25010	
	32									
I UL	34		35'0"	25	35	50	7.7	140.0		
	36									
	38									
	40									

TYPE OF SAMPLE  
D. -DISTURBED  
U.L. -UNDIST. LINER  
S.T. -SHELBY TUBE  
S.S. -SPLIT SPOON  
R.C. -ROCK CORE  
OTHER-

PLUGGING PROCEDURE

HOLE SEALED WITH NATURAL SOILS BETWEEN  
DEPTHS OF 35 AND SURFACE

Standard Penetration Test - Driving 2" O.D. Sampler 1' With  
140# Hammer Falling 30"; Count Made At 6" Intervals

GROUND WATER OBSERVATIONS

G.W. ENCOUNTERED AT	FT.	INS.
G.W. ENCOUNTERED AT	FT.	INS.
G.W. AFTER COMPLETION	FT.	INS.
G.W. AFTER	HRS.	FT.
G.W. VOLUMES	NONE	



**MICHIGAN DRILLING**  
DIVISION OF MICHIGAN TESTING ENGINEERS, INC.  
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS  
14895 WYOMING AVENUE • DETROIT, MICHIGAN 48230

JOB NO. 17220 LOG OF SOIL BORING NO. 20  
PROJECT PROPOSED BUILDINGS & STRUCTURES  
LOCATION DOW-CORNING 2700 - 70  
MIDLAND, MICHIGAN

DATE 4-16-74 SURFACE ELEV. \_\_\_\_\_

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Unc. Comp. Strength PSF.	St. %
			COMPACT SANDY TOPSOIL					
A	2		1'0"	4	5	7	20.4	114.1
UL	4		COMPACT WET MEDIUM BROWN SAND, TRACES OF ORGANIC CONTENT					
B	6		5'0"	6	9	10	20.3	121.2
UL	8		VERY COMPACT WET MEDIUM TO FINE SILTY BROWN SAND	10	14	21	23.0	11460
C	10		7'0"					
UL	12		EXTREMELY STIFF MOIST SILTY BLUE CLAY, SAND AND PEBBLES	9	12	15	21.4	129.3
D	14		13'0"					
UL	16		STIFF MOIST VERY SILTY BLUE CLAY, SAND AND PEBBLES, ROUGE MARKS	4	5	7	21.1	129.3
E	18							
UL	20			4	6	7	24.6	124.4
F	22							
UL	24		24'0"	19	30	47	9.1	144.2
G	26		EXTREMELY STIFF MOIST SILTY SANDY BLUE CLAY, SAND AND PEBBLES					
UL	28							
H	30			25	49	67	9.4	144.0
UL	32		32'0"					
	34		EXTREMELY STIFF MOIST SILTY SANDY BLUE CLAY, SAND AND PEBBLES, OCCASIONAL LAYERS OF WET FINE GRAY SAND	38	59		8.7	18700
I	36		35'0"					
UL	38							
	40							

TYPE OF SAMPLE  
D. -DISTURBED  
U.L.-UNDIST. LINER  
S.T.-SHELBY TUBE  
S.S.-SPLIT SPOON  
R.C.-ROCK CORE  
OTHER-

PLUGGING PROCEDURE  
HOLE SEALED WITH NATURAL SOILS BETWEEN  
DEPTHS OF \_\_\_\_\_ AND \_\_\_\_\_.  
Standard Penetration Test - Driving 2" OD Sampler 1' With  
140# Hammer Falling 30"; Count Made At 6" Intervals

GROUND WATER OBSERVATIONS  
G.W. ENCOUNTERED AT 2 FT. 0 INS.  
G.W. ENCOUNTERED AT \_\_\_\_\_ FT. \_\_\_\_\_ INS.  
G.W. AFTER COMPLETION 3 FT. 6 INS.  
G.W. AFTER \_\_\_\_\_ HRS. \_\_\_\_\_ FT. \_\_\_\_\_ INS.  
G.W. VOLUMES \_\_\_\_\_  
HEAVY



MICHIGAN DRILLING  
DIVISION OF MICHIGAN TESTING ENGINEERS, INC.  
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS  
14895 WYOMING AVENUE • DETROIT, MICHIGAN 48238

JOB NO. 14-220 LOG OF SOIL BORING NO. 10

71-7

PROJECT PROPOSED BUILDING

LOCATION DOW CORNING 2700 71

DATE 4-16-74 SURFACE ELEV. 94.4

MIDLAND, MICHIGAN

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"			Moisture %	Natural Wt. P.C.F.	Unc. C Strength PSF
A UL	2	FILL	1'3" FIRM CLAY, SAND, BACKFILL, ROADWAY	2	3	4	21.6		
	4		3'6" FIRM WET SILTY SANDY CLAY, SLIGHT ORGANIC CONTENT						
B UL	6		COMPACT WET MEDIUM BROWN SAND	4	5	7	15.5	121.7	
C UL	8		7'0" EXTREMELY STIFF MOIST OXIDIZED SILTY BROWN CLAY, SAND AND PEBBLES, LAYER OF WET BROWN SAND	7	10	19	22.4	126.7	12035
D UL	10			6	12	15	20.5	131.1	6710
	12								
	14								
E UL	16		16'0" VERY STIFF MOIST OXIDIZED SILTY BLUE CLAY, SAND AND PEBBLES	5	7	10	23.0	127.5	2649
	18								
F UL	20			6	9	11	20.3	132.4	881
	22								
	24		24'6" EXTREMELY STIFF MOIST SILTY SANDY BLUE CLAY, SAND AND PEBBLES	19	25	35	10.7	143.4	17560
G UL	26								
	28								
H UL	30		29'0" EXTREMELY STIFF MOIST SILTY SANDY BLUE CLAY, LAYERS OF WET GRAY SAND	25	35	45	13.9	134.8	
	32								
	34								
I UL	36		35'0"	22	35	49	22.6		19537
	38								
	40								

TYPE OF SAMPLE

D. -DISTURBED  
U.L.-UNDIST. LINER  
S.T.-SHELBY TUBE  
S.S.-SPLIT SPOON  
R.C.-ROCK CORE  
OTHER-

PLUGGING PROCEDURE

HOLE SEALED WITH NATURAL SOILS BETWEEN  
DEPTHS OF 35' AND SURFACE

Standard Penetration Test - Driving 2" OD Sampler 1' With  
140# Hammer Falling 30"; Count Made At 6" Intervals

GROUND WATER OBSERVATIONS

G.W. ENCOUNTERED AT 1 FT. 6 INS.  
G.W. ENCOUNTERED AT FT. INS.  
G.W. AFTER COMPLETION 4 FT. 0 INS.  
G.W. AFTER HRS. FT. INS.  
G.W. VOLUMES

HEAVY

MIDLAND, MICHIGAN

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Unc. Comp. Strength PSF.	Str %	
A UL	2		1'0" — SAND, CLAY, BACKFILL, ROADWAY						
	4		2'0" — MEDIUM COMPACT WET ORGANIC MATERIAL, SAND	2	4	4	19.0		
B UL	6		5'2" — COMPACT WET MEDIUM BROWN SAND	4	5	5	17.1	123.3	
C UL	8		VERY STIFF MOIST OXIDIZED SILTY BROWN CLAY, SAND AND PEBBLES	8	12	17	23.6	128.8	14238
D UL	10								
	12			6	10	13	19.1	131.1	11397
E UL	14		14'6" —						
	16		STIFF MOIST VERY STILY BLUE CLAY, SAND AND PEBBLES, OCCASIONAL LAYERS OF FINE WET GRAY SILT	4	4	5	23.9	126.5	2522
F UL	18								
	20			5	7	9	21.7	128.0	
G UL	22								
	24		24'4" —						
	26		EXTREMELY STIFF MOIST SILTY SANDY BLUE CLAY, SAND AND PEBBLES	12	19	31	15.4	138.2	10215
	28		27'0" —						
H UL	30		EXTREMELY STIFF MOIST SILTY SANDY BLUE CLAY, OCCASIONAL FINE LAYERS OF WET SAND	21	37	58	11.8	143.6	12801
	32								
	34								
	36								
I UL	38		37'0" —	35	71	-	8.7	144.4	17788
	40								

TYPE OF SAMPLE  
O. -DISTURBED  
U.L.-UNDIST. LINER  
S.T.-SHELBY TUBE  
S.S.-SPLIT SPOON  
R.C.-ROCK CORE  
OTHER-

## PLUGGING PROCEDURE

HOLE SEALED WITH NATURAL SOILS BETWEEN  
DEPTHS OF 37' AND SURFACE

Standard Penetration Test - Driving 2" OD Sampler 1' With  
140# Hammer Falling 30"; Count Made At 6" Intervals

## GROUND WATER OBSERVATIONS

G.W. ENCOUNTERED AT	2	FT.	0	INS.
G.W. ENCOUNTERED AT		FT.		INS.
G.W. AFTER COMPLETION	5	FT.	6	INS.
G.W. AFTER	HRS.	FT.		INS.
G.W. VOLUMES				

HEAVY



**MICHIGAN DRILLING**  
DIVISION OF MICHIGAN TESTING ENGINEERS INC.  
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS  
14885 WYOMING AVENUE • DETROIT, MICHIGAN 48238

JOB NO. 74-220 LOG OF SOIL BORING NO. 2900  
PROJECT PROPOSED BUILDING  
LOCATION DOW CORNING

DATE 4-17-74 SURFACE ELEV. 96.5

MIDLAND, MICHIGAN

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"			Moisture %	Natural Wt. P.C.F.	Unc. Comp. Strength PSF.	Str. %
A UL	2		0'8"	3	8	9	20.6			
	4		VERY COMPACT WET MEDIUM TO FINE BROWN SAND, PEBBLES							
B UL	6		3'3"	7	9	16	20.2	129.8	5880	
	8		VERY STIFF MOIST BLUE CLAY, OXIDIZED STREAKS, LENSES OF SILT, SOME SAND AND PEBBLES							
C UL	10		8'6"	11	15	20	17.0	129.0	8310	
	12		EXTREMELY STIFF MOIST BROWN CLAY, OXIDIZED STREAKS, LAYERS OF SILT, MEDIUM SAND AND PEBBLE CONTENT							
D UL	14		13'0"	6	6	8	10.0	129.5	2910	
	16		STIFF MOIST BLUE SILTY CLAY, SAND AND PEBBLES							
E UL	18			6	7	9	24.7	121.6	3230	
	20									
F UL	22			13	19	31	9.5	145.4	21610	
	24									
G UL	26		23'7"	25	37	45	8.8	145.7	20190	
	28		EXTREMELY STIFF MOIST BLUE CLAY, SLIGHT SAND AND PEBBLE CONTENT							
H UL	30		26'0"	26	38	47	6.6		16870	
	32		EXTREMELY STIFF MOIST BLUE CLAY, HIGH SAND AND PEBBLE CONTENT							
I UL	34									
	36									
J UL	38		34'0"							
	40									

TYPE OF SAMPLE  
D. -DISTURBED  
U.L.-UNDIST. LINER  
S.T.-SHELBY TUBE  
S.S.-SPLIT SPOON  
R.C.-ROCK CORE  
OTHER-

PLUGGING PROCEDURE  
HOLE SEALED WITH NATURAL SOILS BETWEEN DEPTHS OF 34' AND SURFACE  
Standard Penetration Test - Driving 2" OD Sampler 1' With 140# Hammer Falling 30"; Count Made At 6" Intervals

GROUND WATER OBSERVATIONS  
G.W. ENCOUNTERED AT 2 FT. 0 INS.  
G.W. ENCOUNTERED AT  FT.  INS.  
G.W. AFTER COMPLETION NONE FT.  INS.  
G.W. AFTER HRS. FT.  INS.  
G.W. VOLUMES LIGHT



**MICHIGAN TESTING ENGINEERS, INC.**  
MICHIGAN DRILLING DIVISION  
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS  
15001 WYOMING AVENUE • DETROIT, MICHIGAN 48221

JOB NO. 74-220 LOG OF SOIL BORING NO. 74

PROJECT PROPOSED BUILDINGS & STRUCTURES

LOCATION DOW-CORNING 2400-74

MIDLAND, MICHIGAN

DATE 4-17-74 SURFACE ELEV. 98.4

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Unc. Comp. Strength PSF.	Str. %
A UL	2		1'0" STIFF MOIST CLAY TOPSOIL	3	4	4	23.1	125.7
	4		STIFF MOIST OXIDIZED CLAY					
B UL	6		3'8" COMPACT WET MEDIUM BROWN	4	4	5	18.1	
C UL	8		SAND WITH SOME TRACES OF	8	12	7		
			SLIGHT ORGANIC					
D UL	10		8'10" VERY STIFF MOIST OXIDIZED	7	11	14	21.4	128.0
	12		EXTREMELY SILTY BROWN					
	14		CLAY WITH SAND AND PEBBLES					
E UL	16			6	10	12	23.9	127.7
	18							8715
F UL	20		19'6" STIFF MOIST VERY SILTY	4	5	6	19.9	131.6
	22		BLUE CLAY WITH ROUGE					2649
	24		MARKS AND OCCASIONAL					
			LAYERS OF WET FINE GRAY					
G UL	26		SAND AND SILT	3	4	5	22.7	131.6
	28							3160
H UL	30		28'0" EXTREMELY STIFF MOIST	14	27	34	8.9	144.7
	32		SILTY SANDY BLUE CLAY					23643
	34		WITH SAND AND PEBBLES					
I UL	36			20	37	53	9.1	144.7
	38							
	40		38'0"					
TYPE OF SAMPLE D. -DISTURBED U.L.-UNDIST. LINER S.T.-SHELBY TUBE S.S.-SPLIT SPOON R.C.-ROCK CORE OTHER-				GROUND WATER OBSERVATIONS G.W. ENCOUNTERED AT 4 FT. INS. G.W. ENCOUNTERED AT NONE FT. INS. G.W. AFTER COMPLETION NONE FT. INS. G.W. AFTER HRS. FT. INS. G.W. VOLUMES LIGHT				
HOLE SEALED WITH NATURAL SOILS BETWEEN DEPTHS OF 28'0" TO SURFACE Standard Penetration Test - Driving 2" OD Sampler 1' With 140# Hammer Falling 30"; Count Made At 6" Intervals								



MICHIGAN TESTING ENGINEERS, INC.  
MICHIGAN DRILLING DIVISION  
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS  
18001 WYOMING AVENUE • DETROIT, MICHIGAN 48221

JOB NO. 74-220 LOG OF SOIL BORING NO. 25  
PROJECT PROPOSED BUILDINGS & STRUCTURES  
LOCATION DOW-CORNING 2900-75  
MIDLAND, MICHIGAN

DATE 4-17-74 SURFACE ELEV. 95.4

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Unc. Comp. Strength PSF.	Str. %
A	2		0'8" COMPACT MOIST SANDY TOPSOIL	8	10	14	15.2	
UL	4		VERY COMPACT WET MEDIUM BROWN SAND					
B	6		4'6" VERY TO EXTREMELY STIFF	7	10	14	23.6	126.2
UL	8		MOIST SILTY BLUE CLAY WITH SOME SAND AND PEBBLES	9	12	14	21.4	130.8 13504
C	10		8'6" EXTREMELY STIFF MOIST	10	13	16	22.2	128.5 12003
UL	12		SILTY BLUE CLAY WITH SOME SAND AND PEBBLES					
	14		12'0" STIFF MOIST OXIDIZED					
E	16		VERY SILTY BLUE CLAY WITH ROUGE MARKS	3	4	4	25.6	124.7 3543
UL	18							
	20			3	4	6	21.9	131.9 3990
F	22							
UL	24							
	26		25'0" EXTREMELY STIFF MOIST	7	22	31	10.6	147.0
G	28		SILTY BLUE CLAY WITH SAND AND PEBBLES AND OCCASIONAL LAYERS OF WET GRAY SAND					
UL	30			20	39	47	9.3	144.2
	32							
	34							
I	36		35'0"	25	41	58	9.0	
UL	38							
	40							

TYPE OF SAMPLE  
D. -DISTURBED  
U.L.-UNDIST. LINER  
S.T.-SHELBY TUBE  
S.S.-SPLIT SPOON  
R.C.-ROCK CORE  
OTHER-

HOLE SEALED WITH NATURAL SOILS  
BETWEEN DEPTHS OF 35'0" TO SURFACE

Standard Penetration Test - Driving 2" OD Sampler 1" With  
140# Hammer Falling 30"; Count Made At 6" Intervals

GROUND WATER OBSERVATIONS

G.W. ENCOUNTERED AT	1	FT.	8	INS.
G.W. ENCOUNTERED AT		FT.		INS.
G.W. AFTER COMPLETION		FT.		INS.
G.W. AFTER	HRS.	FT.		INS.
G.W. VOLUMES				





MICHIGAN TESTING ENGINEERS, INC.  
MICHIGAN DRILLING DIVISION  
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS  
18001 WYOMING AVENUE • DETROIT, MICHIGAN 48231

JOB NO. 74-220 LOG OF SOIL BORING NO. 26  
PROJECT PROPOSED BUILDINGS & STRUCTURES  
LOCATION DOW-CORNING 2400 -76

DATE 4-19-74 SURFACE ELEV. 97.6

MIDLAND, MICHIGAN

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"			Moisture %	Natural Wt. P.C.F.	Unc. Comp. Strength PSF.	St
A UL	2		1'0" FIRM MOIST DISCOLORED CLAY, FILL	5	6	7	21.0	117.1		
	4		3'2" COMPACT WET MEDIUM TO FINE BROWN SAND WITH PEBBLES							
B UL C UL	6		EXTREMELY STIFF MOIST BROWN CLAY WITH OXIDIZED STREAKS AND LAYERS OF SILT, SAND AND PEBBLES	9	13	16	18.8	131.3	11620	
	8			9	15	18	18.4	132.1	11780	
D UL	10		8'5" EXTREMELY STIFF MOIST BLUE CLAY WITH OXIDIZED STREAKS AND LENSES OF SILT SAND AND PEBBLES	13	16	19	18.1	132.4	12769	
	12		12'0"							
E UL	14		VERY STIFF MOIST BLUE CLAY WITH LENSES OF SILT, SAND AND PEBBLES	6	8	9	26.3	123.1	3735	
	16									
F UL	18		17'6" STIFF MOIST BLUE CLAY WITH LENSES OF SILT, SAND AND PEBBLES							
	20			5	6	7	22.0	130.8	2426	
	22									
	24									
G UL	26			4	5	7	22.7	130.6	3352	
	28									
H UL	30			5	6	7	24.4	128.0	2681	
	32		31'2" EXTREMELY STIFF MOIST BLUE CLAY WITH SAND AND PEBBLES							
I UL	34									
	36			23	30	42	9.3	145.2	14518	
J UL	38									
	40		40'0"	25	35	47	8.4	141.8		

TYPE OF SAMPLE  
D. -DISTURBED  
U.L.-UNDIST. LINER  
S.T.-SHELBY TUBE  
S.S.-SPLIT SPOON  
R.C.-ROCK CORE  
OTHER-

HOLE SEALED WITH NATURAL SOILS  
BETWEEN DEPTHS OF 40' TO SURFACE

Standard Penetration Test - Driving 2" OD Sampler 1' With  
140# Hammer Falling 30"; Count Made At 6" Intervals

GROUND WATER OBSERVATIONS

G.W. ENCOUNTERED AT 1 FT. 6 INS.  
G.W. ENCOUNTERED AT FT. INS.  
G.W. AFTER COMPLETION NONE FT. INS.  
G.W. AFTER HRS. FT. INS.  
G.W. VOLUMES MEDIUM



MICHIGAN TESTING ENGINEERS, INC.  
MICHIGAN DRILLING DIVISION  
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS  
10001 WYOMING AVENUE • DETROIT, MICHIGAN 48221

JOB NO. 74-220 LOG OF SOIL BORING NO. 22  
PROJECT PROPOSED BUILDINGS & STRUCTURES  
LOCATION DOW-CORNING 2900 -  
MIDLAND, MICHIGAN

DATE 4-18-74 SURFACE ELEV. 95.1

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Unc. Comp. Strength PSF.	Str.
A	2		1'0" SAND BACKFILL, ROADWAY	2	3	3	20.3	
UL	4		MEDIUM COMPACT MOIST SAND, MEDIUM ORGANIC MEDIUM VEGETATION					
B	6		5'2" STIFF MOIST OXIDIZED VARIE-	4	4	4	16.3	
UL	8		6'0" GATED CLAY WITH SAND AND PEBBLES	7	10	15	17.7	129.8
C	10		EXTREMELY STIFF MOIST OXIDIZED BROWN CLAY WITH SAND AND PEBBLES	9	12	17	19.1	125.5
UL	12							10311
D	14		13'0" VERY STIFF MOIST OXIDIZED BROWN CLAY WITH SAND AND PEBBLES	6	7	10	20.3	129.3
UL	16							3511
E	18		17'6" STIFF MOIST SILTY BLUE CLAY WITH SOME SAND AND PEBBLES	4	5	8	25.2	129.8
UL	20							
F	22							
UL	24							
G	26		25'0" EXTREMELY STIFF MOIST SILTY SANDY BLUE CLAY WITH SAND AND PEBBLES	9	12	21	11.0	148.0
UL	28							5810
H	30			20	39	51	8.5	
UL	32							20297
I	34							
UL	36		35'0"	24	40	50/3"	9.0	145.7
	38							9864
	40							

TYPE OF SAMPLE  
D. -DISTURBED  
U.L.-UNDIST. LINER  
S.T.-SHELBY TUBE  
S.S.-SPLIT SPOON  
R.C.-ROCK CORE  
OTHER-

HOLE SEALED WITH NATURAL SOILS  
BETWEEN DEPTHS OF 35'0" TO SURFACE

Standard Penetration Test - Driving 2" OD Sampler 1' With  
140# Hammer Falling 30"; Count Made At 6" Intervals

GROUND WATER OBSERVATIONS

G.W. ENCOUNTERED AT	FT.	INS.
G.W. ENCOUNTERED AT	FT.	INS.
G.W. AFTER COMPLETION	FT.	INS.
G.W. AFTER	HRS.	FT.
G.W. VOLUMES		

NONE



MICHIGAN TESTING ENGINEERS, INC.  
MICHIGAN DRILLING DIVISION  
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS  
15901 WYOMING AVENUE • DETROIT, MICHIGAN 48221

JOB NO. 74-220 LOG OF SOIL BORING NO. 22  
PROJECT PROPOSED BUILDINGS & STRUCTURES  
LOCATION DOW-CORNING 2900 - 78

DATE 4-18-74 SURFACE ELEV. 97.4

MIDLAND, MICHIGAN

DATE			SURFACE ELEV.											
Sample & Type	Depth	Legend	SOIL DESCRIPTION			Penetration Blows For 6"			Moisture %	Natural Wt. P.C.F.	Unc. Comp. Strength PSF.	Str. %		
A UL	2		1'0"	MEDIUM COMPACT SAND BACK-FILL, ROADWAY			3	4	4	20.0	123.3			
	4		2'10"	COMPACT MOIST SILTY FINE BROWN SAND WITH TRACES OF SLIGHT ORGANIC			4	5	7	20.3	118.9			
B UL	6		7'0"	COMPACT WET FINE BROWN SILTY SAND WITH TRACES OF ORGANIC			7	10	16	20.3	129.0	8310		
C UL	8			EXTREMELY STIFF MOIST OXIDIZED SILTY BROWN CLAY WITH SAND AND PEBBLES AND SOME ROUGE			10	11	17	23.0	128.8	10450		
	10		17'0"											
D UL	12													
	14		17'0"											
E UL	16						11	15	13	17.8	123.6	6620		
	18		17'0"											
F UL	20			STIFF MOIST VERY SILTY BLUE CLAY WITH LAYERS OF WET FINE GRAY SAND AND SILT			4	5	8	24.2	130.3	2250		
	22		26'0"											
	24													
G UL	26		26'0"	EXTREMELY STIFF MOIST SILTY SANDY BLUE CLAY			7	8	10	24.1	129.3	3590		
	28													
H UL	30		35'0"				25	39	49	9.4	146.5	14600		
	32													
	34		35'0"											
L UL	36						29	41	50/4	9.2	146.5	16940		
	38		35'0"											
	40													

TYPE OF SAMPLE  
D. -DISTURBED  
U.L.-UNOIST. LINER  
S.T.-SHELBY TUBE  
S.S.-SPLIT SPOON  
R.C.-ROCK CORE  
OTHER-

HOLE SEALED WITH NATURAL SOILS  
BETWEEN DEPTHS OF 35'0" TO SURFACE

Standard Penetration Test - Driving 2" OD Sampler 1" With  
140# Hammer Falling 30"; Count Made At 6" Intervals

GROUND WATER OBSERVATIONS

G.W. ENCOUNTERED AT 1 FT. 6 INS.  
G.W. ENCOUNTERED AT FT. INS.  
G.W. AFTER COMPLETION 10 FT. INS.  
G.W. AFTER HRS. FT. INS.  
G.W. VOLUMES MEDIUM

# MICHIGAN TESTING ENGINEERS, INC.

MICHIGAN DRILLING DIVISION

CONSULTING ENGINEERS IN SOILS & FOUNDATIONS

18001 WYOMING AVENUE • DETROIT, MICHIGAN 48221

JOB NO. 74-220 LOG OF SOIL BORING NO. 29

PROJECT PROPOSED BUILDINGS & STRUCTURES

LOCATION DOW-CORNING 2900 74

DATE 4-18-74 SURFACE ELEV. 98.2

MIDLAND, MICHIGAN

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Unc. Comp. Strength PSF.	St.
A	2		0'5" SOFT MOIST SANDY BLACK TOPSOIL WITH VEGETATION	5	5	7	21.3	
UL	4		COMPACT WET MEDIUM TO FINE BROWN SAND WITH PEBBLES					
B	6		5'0" EXTREMELY STIFF MOIST BROWN CLAY WITH OXIDIZED STREAKS AND LAYERS OF SILT, SAND AND PEBBLES	9	16	23	21.8	132.1 9410
C	8			10	15	19	18.6	134.1 7000
UL	10							
D	12		11'6" EXTREMELY STIFF MOIST BROWN CLAY WITH SAND AND PEBBLES	12	16	20	19.2	133.9 9820
E	14							
UL	16			8	13	15	18.4	136.7 6910
	18		17'0" VERY STIFF MOIST BLUE CLAY WITH SAND AND PEBBLES					
F	20			8	10	11	24.4	129.5 3170
UL	22							
	24							
G	26			6	8	10	26.3	128.0 3120
UL	28							
	30		29'3" EXTREMELY STIFF MOIST BLUE CLAY WITH SAND AND PEBBLES	9	18	20	9.9	145.7 12760
H	32							
UL	34							
	36			36	44		9.5	144.9 19630
I	38							
UL	40		39'0" EXTREMELY STIFF MOIST BLUE CLAY WITH OCCASIONAL STONES AND PEBBLES	39	48		8.7	
J			40'0"					
III								

## TYPE OF SAMPLE

D. -DISTURBED  
U.L.-UNDIST. LINER  
S.T.-SHELBY TUBE  
S.S.-SPLIT SPOON  
R.C.-ROCK CORE  
OTHER-

HOLE SEALED WITH NATURAL SOILS BETWEEN DEPTHS OF 40'0" TO SURFACE

Standard Penetration Test - Driving 2" OD Sampler 1' With 140 # Hammer Falling 30"; Count Made At 6" Intervals

## GROUND WATER OBSERVATIONS

G.W. ENCOUNTERED AT 1 FT. 6 INS.  
G.W. ENCOUNTERED AT 28 FT. 5 INS.  
G.W. AFTER COMPLETION 27 FT. 6 INS.  
G.W. AFTER HRS. FT. 6 INS.  
G.W. VOLUMES MEDIUM



MICHIGAN TESTING ENGINEERS, INC.  
MICHIGAN DRILLING DIVISION  
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS  
16001 WYOMING AVENUE • DETROIT, MICHIGAN 48221

JOB NO. 74-220 LOG OF SOIL BORING NO. 80  
PROJECT PROPOSED BUILDINGS & STRUCTURES  
LOCATION DOW-CORNING 2900-80

DATE 4-18-74 SURFACE ELEV. 98.7

MIDLAND, MICHIGAN

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Unc. Comp. Strength PSF.	Str. %
A UL	2		1'0" MEDIUM COMPACT MOIST BROWN SAND DISCOLORED	3	3	5	6.4	
B UL	4		COMPACT WET MEDIUM TO FINE BROWN SAND WITH PEBBLES	4	7	8	19.4	132.9 5700
C UL	6		5'0" STIFF MOIST BROWN CLAY WITH OXIDIZED STREAKS AND LAYERS OF SILT, SAND AND PEBBLES	5	9	10	18.8	131.6 8250
D UL	8		7'6" VERY STIFF MOIST BLUE CLAY WITH OXIDIZED STREAKS AND LENSES OF SILT SAND AND PEBBLES	10	17	19	17.1	131.6 14670
E UL	10		9'0" EXTREMELY STIFF MOIST BLUE CLAY WITH SAND AND PEBBLES	8	14	19	18.5	133.1 7980
F UL	12		18'2" VERY STIFF MOIST BLUE CLAY WITH LAYERS OF SILT, SAND AND PEBBLES	7	8	9	23.0	131.6 1420
G UL	14		23'4" VERY STIFF MOIST BLUE CLAY WITH SAND AND PEBBLES	8	9	10	17.6	130.0 15450
H UL	16		27'0" VERY STIFF MOIST SANDY BLUE CLAY WITH PEBBLES	12	19	33	9.3	144.4 10300
I UL	18		32'0" EXTREMELY STIFF MOIST BLUE CLAY WITH SAND AND PEBBLES	19	34	44	10.0	15950
J UL	20		40'0"	37	53		7.7	146.7 25430

TYPE OF SAMPLE  
D. -DISTURBED  
U.L.-UNDIST. LINER  
S.T.-SHELBY TUBE  
S.S.-SPLIT SPOON  
R.C.-ROCK CORE  
OTHER-

HOLE SEALED WITH NATURAL SOILS  
BETWEEN DEPTHS OF 40'0" TO SURFACE

Standard Penetration Test - Driving 2" OD Sampler 1' With  
140 # Hammer Falling 30"; Count Made At 6" Intervals

GROUND WATER OBSERVATIONS

G.W. ENCOUNTERED AT	FT.	INS.
G.W. ENCOUNTERED AT	FT.	INS.
G.W. AFTER COMPLETION	FT.	INS.
G.W. AFTER	HRS.	FT.
G.W. VOLUMES	NONE	



MICHIGAN TESTING ENGINEERS, INC.  
MICHIGAN DRILLING DIVISION  
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS  
18861 WYOMING AVENUE • DETROIT, MICHIGAN 48221

JOB NO. 74-220 LOG OF SOIL BORING NO. 21  
PROJECT PROPOSED BUILDINGS & STRUCTURES  
LOCATION DOW-CORNING 7400-01

DATE 4-19-74 SURFACE ELEV. 96.2

MIDLAND, MICHIGAN

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Unc. Comp. Strength PSF.	Str.
A UL	2		1'2" MEDIUM COMPACT WET SAND AND ORGANIC MATERIALS HEAVILY WOODED AREA	2 2 4	33.7	118.0	2340	
B UL	4		2'10" MEDIUM COMPACT WET MEDIUM BROWN SAND	4 7 10	22.4	126.2	7890	
C UL	6		5'0" STIFF MOIST OXIDIZED SILTY VARIEGATED CLAY WITH SAND AND PEBBLES	8 12 16	25.1	125.4	3560	
D UL	8		VERY STIFF MOIST OXIDIZED SILTY VARIEGATED CLAY WITH SAND AND PEBBLES	10 15 19	20.3	130.8	12550	
E UL	10		13'0" STIFF MOIST OXIDIZED SILTY VARIEGATED CLAY WITH SAND AND PEBBLES	4 5 9	23.1	127.0	3500	
F UL	12		17'0" VERY STIFF MOIST VERY SILTY BLUE CLAY WITH SAND AND PEBBLES	4 7 11	21.1	129.5	383	
G UL	14			6 8 14	22.0	135.2	3200	
H UL	16			6 8 25	20.4	130.3	2280	
I UL	18		30'0" EXTREMELY STIFF MOIST SILTY BLUE CLAY WITH SAND AND PEBBLES WITH OCCASIONAL LAYERS OF WET GRAY SAND	25 37 51	7.5			
J UL	20			33 52	8.2		10	
	22		40'0"					

TYPE OF SAMPLE  
D. -DISTURBED  
U.L.-UNDIST. LINER  
S.T.-SHELBY TUBE  
S.S.-SPLIT SPOON  
R.C.-ROCK CORE  
OTHER-

HOLE SEALED WITH NATURAL SOILS  
BETWEEN DEPTHS OF 40'0" TO SURFACE

Standard Penetration Test - Driving 2" OD Sampler 1' With  
140 # Hammer Falling 30"; Count Made At 6" Intervals

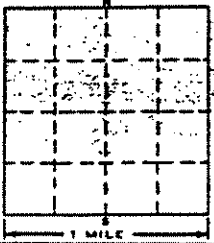
GROUND WATER OBSERVATIONS

G.W. ENCOUNTERED AT 1 FT. 6 INS.  
G.W. ENCOUNTERED AT FT. INS.  
G.W. AFTER COMPLETION 14 FT. INS.  
G.W. AFTER HRS. FT. INS.  
G.W. VOLUMES MEDIUM

GEOLOGICAL SURVEY SAMPLE No. 

DP-2

WATER WELL RECORD  
ACT 284 PA 1965MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH

1 LOCATION OF WELL			Fraction		Section Number	Town Number	Range Number
County	Township Name		$\frac{1}{4}$	$\frac{3}{4}$	$\frac{1}{4}$	N/S.	E/W.
Midland							
Distance And Direction from Road Intersections  WELL #2			3 OWNER OF WELL: Drilled For — Address Dow-Corning Midland Plant				
Street address & City of Well Location Locate with "X" in section below 			4 WELL DEPTH: (completed) Date of Completion 100 ft.				
Sketch Map:			5 <input type="checkbox"/> Cable tool <input checked="" type="checkbox"/> Rotary <input type="checkbox"/> Driven <input type="checkbox"/> Dug. <input type="checkbox"/> Hollow rod <input type="checkbox"/> Jetted <input type="checkbox"/> Bored <input type="checkbox"/>				
			6 USE: <input type="checkbox"/> Domestic <input type="checkbox"/> Public Supply <input type="checkbox"/> Industry <input type="checkbox"/> Irrigation <input type="checkbox"/> Air Conditioning <input type="checkbox"/> Commercial <input checked="" type="checkbox"/> Test Well <input checked="" type="checkbox"/> DAY HOLE				
			7 CASING: Threaded <input type="checkbox"/> Welded <input type="checkbox"/> Height: Above/Below Diam. N/A Surface _____ ft. _____ in. to _____ ft. Depth Weight _____ lbs./ft. _____ in. to _____ ft. Depth Drive Shoe? Yes <input type="checkbox"/> No <input type="checkbox"/>				
			8 SCREEN: Type: NONE USED Slot/Gauze _____ Length _____ Set between _____ ft. and _____ ft. Fittings: _____				
2 FORMATION			THICKNESS OF STRATUM		DEPTH TO BOTTOM OF STRATUM		
SURFACE SAND			3		3		
SOFT CLAY			27		30		
GRAVEL PACKED CLAY			70		100		
			9 STATIC WATER LEVEL _____ ft. below land surface N/A				
			10 PUMPING LEVEL below land surface _____ ft. after _____ hrs. pumping _____ g.p.m. N/A _____ ft. after _____ hrs. pumping _____ g.p.m.				
			11 WATER QUALITY in Parts Per Million: Iron (Fe) _____ Chlorides (Cl) _____ Hardness N/A Other _____				
			12 WELL HEAD COMPLETION: <input type="checkbox"/> In Approved Pit <input type="checkbox"/> Pitless Adapter <input type="checkbox"/> 12" Above Grade N/A				
			13 Well Grouted? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Neat Cement <input checked="" type="checkbox"/> Bentonite <input type="checkbox"/> Depth: From 0 ft. to 100 ft.				
			14 Nearest Source of possible contamination _____ feet _____ Direction N/A Type _____ Well disinfected upon completion <input type="checkbox"/> Yes <input type="checkbox"/> No				
			15 PUMP: <input type="checkbox"/> Not installed Manufacturer's Name N/A Model Number N/A HP _____ Volts _____ Length of Drop Pipe _____ ft. capacity _____ G.P.M. Type: <input type="checkbox"/> Submersible <input type="checkbox"/> Jet <input type="checkbox"/> Reciprocating				
16 Remarks, elevation, source of data, etc. TEST HOLE drilled TO 100 FT. COMPLETED BY GROUTING w/ BENTONITE FROM 0 TO 100 FT. #2 WELL NON-PRODUCTIVE			17 WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief. FREEMAN & KRAUSS 0555 REGISTERED BUSINESS NAME REGISTRATION NO. Address 7388 Middle Rd. HOPE Signed [Signature] AUTHORIZED REPRESENTATIVE 20-5207-79				

D67d

100M (Rev. 12-68)

IMPORTANT: File with deed.

WELL OWNER COPY

DP-2

Dow Corning-Midland

September 20, 1979

Test Well  
LOG OF BORING NO. 2 (D.P.#2)

PROJECT Dow - Corning				SITE			
BORING STARTED			COMPLETED		PROJECT NO.	SAMPLE TYPE S.S. _____ AUGER _____ SHELBY _____	
DEPTH IN FEET	LEGEND	SAMPLES	DESCRIPTION OF MATERIAL	SAMPLE NO.	STD. PENETRATION "N" BLOWS PER FOOT	UNIT NAT. WT. LB./FT. <sup>3</sup>	UNCONFINED COMPRESSIVE STRENGTH TONS/FT <sup>2</sup> 
							PLASTIC LIMIT % 
			SURFACE ELEVATION _____				
			Sand-Surface, brown				
20			Clay - Soft, silty				
40			- Hard, gravel Packed				
60							
80							
100							
			End of Boring at 100ft				
WATER LEVEL OBSERVATIONS							As drilled by T. Krauss of Freeman & Krauss  Grouted with bentonite 0-100 ft. well non-productive
W.L.							
W.L.							
SAMTEST, INC. DRILLING & TESTING SERVICES							



DP-3

Dow Corning-Midland  
September 20, 1979

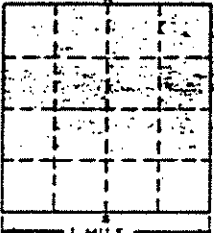
Test Well  
LOG OF BORING NO. 3 (DP-3)

PROJECT Dow - Corning				SITE		
BORING			PROJECT NO.	SAMPLE TYPE		
STARTED			S.S. — AUGER — SHELBY —			
COMPLETED			UNCONFINED COMPRESSIVE STRENGTH TONS/FT <sup>2</sup>			
DEPTH IN FEET	LEGEND	DESCRIPTION OF MATERIAL	SAMPLE NO.	STD. PENETRATION IN BLOWS PER FOOT	UNIT WT. WT LB. / FT <sup>3</sup>	PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT %
SURFACE ELEVATION —			10 20 30 40 50			
		Surface Brown Sand-Some Fill				
20		Clay - Soft, silty				
40		CLAY - Hard, gravel packed				
60						
80						
100		End of boring 100ft.				
As drilled by T. Krauss of Freeman & Krauss. Grouted with bentonite 0-100 ft., well non-productive						
WATER LEVEL OBSERVATIONS						S A M T E S T, I N C. DRILLING & TESTING SERVICES
W.L.						
W.L.						

GEOLOGICAL SURVEY SAMPLE NO.

WATER WELL RECORD  
ACT 294 PA 1986MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH

08-3

1 LOCATION OF WELL			Fraction		Section Number	Town Number	Range Number
County	Township Name	Distance, And Direction from Road Intersections	N/S.	E/W.			
Midland		WEH #3					
Street address & City of Well Location Locate with "X" in section below 			3 OWNER OF WELL: DRILL 24 FOR Address Dow-Corning Midland Plant 4 WELL DEPTH: (completed) Date of Completion 100 ft. 5 <input type="checkbox"/> Cable tool <input checked="" type="checkbox"/> Rotary <input type="checkbox"/> Driven <input type="checkbox"/> Dug <input type="checkbox"/> Hollow rod <input type="checkbox"/> Jetted <input type="checkbox"/> Bored <input type="checkbox"/> 6 USE: <input type="checkbox"/> Domestic <input type="checkbox"/> Public Supply <input type="checkbox"/> Industry <input type="checkbox"/> Irrigation <input type="checkbox"/> Air Conditioning <input type="checkbox"/> Commercial <input checked="" type="checkbox"/> Test Well <input checked="" type="checkbox"/> DAY HOLE 7 CASING: Threaded <input type="checkbox"/> Welded <input type="checkbox"/> Height: Above/Below N/A Surface _____ ft. _____ in. to _____ ft. Depth Weight _____ lbs./ft. _____ in. to _____ ft. Depth Drive Shoe? Yes <input type="checkbox"/> No <input type="checkbox"/>				
2 FORMATION			THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM	8 SCREEN: Type: NONE USED Dia.: _____ Slot/Gauze _____ Length _____ Set between _____ ft. and _____ ft. Fittings: _____ 9 STATIC WATER LEVEL N/A _____ ft. below land surface 10 PUMPING LEVEL below land surface _____ ft. after _____ hrs. pumping _____ G.P.M. N/A _____ ft. after _____ hrs. pumping _____ G.P.M. 11 WATER QUALITY in Parts Per Million: Iron (Fe) _____ Chlorides (Cl) _____ Hardness _____ Other _____ 12 WELL HEAD COMPLETION: <input type="checkbox"/> In Approved Pit N/A <input type="checkbox"/> Pitless Adapter <input type="checkbox"/> 12" Above Grade 13 Well Grouted? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Neat Cement <input checked="" type="checkbox"/> Bentonite Depth: From 70 ft. to 100 ft. 14 Nearest Source of possible contamination N/A _____ feet: _____ Direction _____ Type _____ Well disinfected upon completion <input type="checkbox"/> Yes <input type="checkbox"/> No 15 PUMP: <input type="checkbox"/> Not installed Manufacturer's Name _____ Model Number _____ HP _____ Volts _____ Length of Drop Pipe _____ ft. capacity _____ G.P.M. Type: <input type="checkbox"/> Submersible <input checked="" type="checkbox"/> JCB <input type="checkbox"/> Reciprocating		
SURFACE SAND 5 5 Soft CLAY 20 25 GRAVEL Packed CLAY 75 100 FT.							
16 Remarks, elevation, source of data, etc. TEST HOLE DRILLED TO 100 FT. COMPLETED BY GROUTING w/ BENTONITE FROM 0 TO 100 FT. #3 WELL, NON-PRODUCTIVE.			17 WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief. FREEMAN & KRAUSS 0555 REGISTERED BUSINESS NAME REGISTRATION NO. Address 7388 Middle Rd. Hope Signed _____ Date 20-SEP-79 AUTHORIZED REPRESENTATIVE				

D674

100M (Rev. 12-68)

IMPORTANT: File with deed.

WELL OWNER COPY

## LOG OF BORING NO. 5

DH-4

PROJECT OBSERVATION WELLS				SITE DOW CORNING - MIDLAND, MI			
BORING STARTED 11-10-81 COMPLETED 11-11-81		PROJECT NO. 81-210		SAMPLE TYPE S.S. _____ AUGER _____ SHELBY _____			
DEPTH IN FEET	LEGEND	SAMPLES	DESCRIPTION OF MATERIAL	SAMPLE NO.	STD. PENETRATION "N" BLOWS PER FOOT	UNIT NAT. WT (pcf)	UNCONFINED COMPRESSIVE STRENGTH TONS/FT <sup>2</sup>
							PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT %
			SURFACE ELEVATION _____				10 20 30 40 50 X ———— X ———— Δ
			Fill-stiff, moist, silty brn clay				
			Sand-moist fine oxidized brown to discolored				
			Clay-stiff moist silty brn. blue clay				
10			-stiff moist silty blue clay				
20			-very stiff moist silty blue clay				
30			-extremely stiff moist silty blue clay <i>Lakebed Clay</i> <i>Glacial Till</i>				
40			-extremely stiff moist gravelly blue clay, hardpan				
50			-extremely stiff moist silty blue claypan, sand & pebbles, occas. stones				

WATER LEVEL OBSERVATIONS (Cont'd.)		S A M T E S T, I N C. DRILLING & TESTING SERVICES
W.L.	Ground water encountered at 4 ft.	
W.L.	Medium flow upon completion	

LOG OF BORING NO. 5 (Cont'd.)

PROJECT				SITE							
OBSERVATION WELLS				DOW CORNING - MIDLAND, MI							
BORING			PROJECT NO.		SAMPLE TYPE						
STARTED 11-10-81 COMPLETED 11-11-81			81-210		S.S. _____ AUGER _____ SHELBY.						
DEPTH IN FEET	LEGEND	SAMPLES	DESCRIPTION OF MATERIAL	SAMPLE NO.	STD. PENETRATION "N" BLOWS PER FOOT	UNIT NAT. WT. LB./CU. FT.	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. <sup>2</sup>				
							1	2	3	4	5
							PLASTIC LIMIT %	WATER CONTENT %	LIQUID LIMIT %		
							X	⊗	△		
							10	20	30	40	50
50			-extremely stiff moist silty blue claypan, sand & pebbles, occasional stones								
70			-extremely stiff moist sandy blue clay, hardpan, occasional stones								
80											
90			Hole backfilled with mud. Bailed hole dry								
100			End of Boring at 100 ft.								
WATER LEVEL OBSERVATIONS							BAMTEST, INC. DRILLING & TESTING SERVICES				
W.L.											
W.L.											

LOG OF BORING NO. 6

PROJECT OBSERVATION WELLS				SITE DOW CORNING - MIDLAND, MI			
BORING STARTED 11-11-81 COMPLETED 11-12-81				PROJECT NO. 81-210		SAMPLE TYPE S.S. _____ AUGER _____ SHELBY _____	
DEPTH IN FEET	LEGEND	SAMPLES	DESCRIPTION OF MATERIAL	SAMPLE NO.	SID. PENETRATION "N" BLOWS PER FOOT	UNIT MAT. WT (lb)	UNCONFINED COMPRESSIVE STRENGTH TONS/FT <sup>2</sup>
							1 2 3 4 5 PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT % X ⊗ △ 10 20 30 40 50
			SURFACE ELEVATION _____				
			Fill-moist fine clayey brown sand				
			Sand-moist to wet fine oxidized brown sand				
			Clay-stiff to very stiff moist silty blue clay				
10							
20			-extremely stiff moist silty blue clay				
30			-extremely stiff moist silty blue claypan				
40							
50			(Cont'd.)				
WATER LEVEL OBSERVATIONS							S A M T E S T, I N C. DRILLING & TESTING SERVICES
W.L. Ground water encountered at 4 ft.							
W.L. Medium flow upon completion							

DH-5

## LOG OF BORING NO. 6 (Cont'd.)

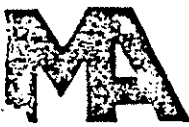
PROJECT OBSERVATION WELLS				SITE DOH CORNING - MIDLAND, MI			
BORING STARTED 11-11-81 COMPLETED 11-12-81			PROJECT NO. 81-210		SAMPLE TYPE S.S. _____ AUGER _____ SHELBY _____		
DEPTH IN FEET	LEGEND	SAMPLES	DESCRIPTION OF MATERIAL	SAMPLE NO.	STD. PENETRATION "N" BLOWS PER FOOT	UNIT NAT. WT lb/ft <sup>3</sup>	UNCONFINED COMPRESSIVE STRENGTH TONS/FT <sup>2</sup>
							PLASTIC LIMIT % 10 20 30 40 50 X
60							
70							
80			-extremely stiff moist silty blue claypan				
90							
100							
(Cont'd.)							
WATER LEVEL OBSERVATIONS							SAMTEST, INC. DRILLING & TESTING SERVICES
W.L.							
W.L.							

DH-5

## LOG OF BORING NO. 6 (Cont'd.)

PROJECT OBSERVATION WELLS				SITE DOW CORNING - MIDLAND, MI			
BORING STARTED 11-11-81 COMPLETED 11-12-81			PROJECT NO. 81-210		SAMPLE TYPE S.S. _____ AUGER _____ SHELBY _____		
DEPTH IN FEET	LEGEND	SAMPLES	DESCRIPTION OF MATERIAL	SAMPLE NO.	SPT. PENETRATION "N" BLOWS PER FOOT	UNIT NAT. WT. (lb./ft. <sup>3</sup> )	UNCONFINED COMPRESSIVE STRENGTH TONS/FT <sup>2</sup>
							PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT %
			SURFACE ELEVATION _____				1 2 3 4 5 10 20 30 40 50
			-extremely stiff moist silty blue clay pan				
110			-extremely stiff moist sandy blue clay, hardpan, occasional stones				
120			-extremely stiff moist silty blue clay, hardpan				
130							
140			End of Boring at 140 ft.				
			Hole backfilled with mud. Bailed hole dry.				
WATER LEVEL OBSERVATIONS						S A M T E S T, I N C. DRILLING & TESTING SERVICES	
W.L.							
W.L.							

DMW1



**McDOWELL & ASSOCIATES**  
Geotechnical Engineers

PLW1

LOG OF SOIL BORING NO. \_\_\_\_\_

PROJECT Observation Wells

JOB NO. 81-111

LOCATION Dow-Corning

SURFACE ELEV. \_\_\_\_\_ DATE 8-10-81

Midland, Michigan

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Dry Gen. Wt. P.C.F.	Unc. Comp. Strength PSF	Su %
	1		Moist to wet fine brown sand						
	2								
	3								
	4								
	5								
	6		Wet fine silty gray sand, discolored seams						
	7								
	8								
	9								
	10		10'0" <i>Surface Sand</i> <i>Underbed Clay</i>  Very stiff to extremely stiff moist silty blue clay						
	11								
	12								
	13								
	14								
	15								
	16								
	17								
	18								
	19								
	20								
	21								
	22								
	23								
	24								
	25								

(Cont'd.)

TYPE OF SAMPLE  
 O - DISTURBED  
 U.L. - UNDIST. LINER  
 S.T. - SHELBY TUBE  
 S.S. - SPLIT SPOON  
 R.C. - ROCK CORE  
 P. - PENETROMETER

REMARKS:

Standard Penetration Test - Driving 2" OD Sampler 1' With  
 140# Hammer Exposed 30" Count Made At 5' Intervals

GROUND WATER OBSERVATIONS

G.W. ENCOUNTERED AT	4	FT	0	INS
G.W. ENCOUNTERED AT	49	FT	0	INS
G.W. AFTER COMPLETION	57	FT	0	INS
G.W. AFTER	HRS	FT		INS





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JOB NO. 81-111

PROJECT Observation Wells

LOCATION Dow-Corning

SURFACE ELEV. DATE 8-10-81 Midland, Michigan

Sample No. Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Dry Den. Wt. P.C.F.	Unc. Comp. Strength PSF	St %
	26								
	27								
	28								
	29								
	30								
	31		Very stiff to extremely stiff moist silty blue clay						
	32								
	33								
	34								
	35								
	36								
	37								
	38								
	39								
	40		39'6" Lake bed Clay Glacial Till						
	41		Extremely stiff moist gravelly blue clay, hardpan, sand and pebbles						
	42								
	43								
	44		43'6"						
	45								
	46		Extremely stiff moist silty blue clay, hardpan, layers of sand						
	47								
	48								
	49		49'0"						
	50		Extremely compact wet fine brown and gray sand						

TYPE OF SAMPLE D. - DISTURBED U.L. - UNDIST. LINER S.T. - SHELBY TUBE S.S. - SPLIT SPOON R.C. - ROCK CORE ( ) - PENETROMETER	REMARKS: (Cont'd.)  Standard Penetration Test - Driving 2" OD Sampler 1' With 140# Hammer Falling 30". Count Made At 6" Intervals	GROUND WATER OBSERVATIONS G.W. ENCOUNTERED AT 4 FT 0 INS G.W. ENCOUNTERED AT 49 FT 0 INS G.W. AFTER COMPLETION 57 FT 0 INS G.W. AFTER HRS. FT INS G.W. VOLUMES Heavy - Medium
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LOG OF SOIL BORING NO. \_\_\_\_\_ DATE 8-10-81

PROJECT Observation Wells

JOB NO. 81-111

LOCATION Dow-Corning

SURFACE ELEV. \_\_\_\_\_

DATE 8-10-81

Midland, Michigan

Sample # & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Dry Den Wt. P.C.F.	Unc. Comp Strength PSF	Str %
	53		52'6" Extremely compact wet fine brown and gray sand						
	54								
	55		Extremely stiff moist blue clay, hardpan, slight seams of sand						
	56								
	57		57'0"						
	58								
	59		Extremely compact wet fine gray sand (4.1')	23					
SS	60			51					
	61			55					
	62		61'3"						
	63								
	64		Extremely compact wet gray silt, lenses of clay	27					
SS	65			34					
	66			39					
	67								
	68								
	69			20					
SS	70		69'9"	26					
	71			32					
	72		Extremely compact wet clayey gray silt						
	73								
	74			24					
SS	75			30					
	76		76'0"	41					
			Extremely stiff moist sandy blue clay, hardpan, occasional stones (Cont'd.)						
TYPE OF SAMPLE D. - DISTURBED U.L. - UNDIST. LINER S.T. - SHELBY TUBE S.S. - SPLIT SPOON R.C. - ROCK CORE ( ) - PENETROMETER				REMARKS:  Standard Penetration Test - Driving 2" OD Sampler 1' Wth 140# Hammer Falling 30"; Count Made At 6" Intervals					
				GROUND WATER OBSERVATIONS G.W. ENCOUNTERED AT 4 FT. 0 INS G.W. ENCOUNTERED AT 49 FT. 0 INS G.W. AFTER COMPLETION 57 FT. 0 INS G.W. AFTER HRS FT. INS G.W. VOLUMES Heavy - Medium					

**McDOWELL & ASSOCIATES**  
Geotechnical Engineers

JOB NO. \_\_\_\_\_ 81-111

SURFACE ELEV. \_\_\_\_\_ DATE 8-10-81

LOG OF SOIL BORING NO. DMW 1

PROJECT Observation Wells

LOCATION Dow-Corning

Midland, Michigan

Sample 6 Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows for 6"	Moisture %	Natural WL P.C.F.	Dry Den WL P.C.F.	Unc. Comp Strength PSF	Str. %
	73								
	79			44					
SS				72					
	80			--					
	81								
	82								
	83								
	84			38					
SS				64					
	85		Extremely stiff moist sandy blue clay, hardpan, occasional stones	--					
	86								
	87								
	88								
	89			37					
SS				71					
	90			--					
	91								
	92		Set bottom of 5' screen at 62' with 60' riser.						
	93		Backfilled with 2NS sand up to 55' - Bentonite slurry from 55' to surface.						
	94			35					
SS	95		Blew hole for 30 minutes at 3 gallons per minute.	82					
	96			--					
	97								
	98								
	99								
SS	100		100' 0"	32					
				66					
	101			--					
	102								

**TYPE OF SAMPLE**

D. - DISTURBED

UL - UNOIST. LINER

ST - SHELBY TUBE

SS - SPLIT SPOON

R.C. - ROCK CORE

P. - PENETROMETER

**REMARKS:**

Standard Penetration Test - Driving 2" OD Sampler 1' With  
140# Hammer Falling 30". Count Made At 6" Intervals

**GROUND WATER OBSERVATIONS**

G.W. ENCOUNTERED AT	4	FT.	0	INS
G.W. ENCOUNTERED AT	49	FT.	0	INS
G.W. AFTER COMPLETION	57	FT.	0	INS
G.W. AFTER	HRS	FT.		INS
G.W. VOLUMES	Heavy - Medium			



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JOB NO.

*mw 2*

81-111

PROJECT Observation Wells

LOCATION Dow-Corning

SURFACE ELEV.

DATE 8-17 & 18-81

Midland, Michigan

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 5"	Moisture %	Natural Wt. P.C.F.	Dry Den Wt. P.C.F.	Unc. Comp. Strength PSF	St. %
	1		0'6" Firm moist clayey black topsoil						
	2								
	3								
	4		Stiff moist silty oxidized variegated clay						
	5								
	6								
	7								
	8		8'0"						
	9								
	10								
	11		Stiff to very stiff moist silty brown clay						
	12								
	13								
	14								
	15								
	16		16'0" Stiff moist silty blue clay, sand and pebbles						
	17								
	18		17'6" Very stiff moist silty blue clay, sand and pebbles						
	19								
	20								
	21		21'0" <i>Labeled Clay</i> <i>Glacial Till</i>						
	22		Extremely stiff moist silty blue clay, claypan, sand and pebbles						
	23								
	24								
	25								

(Cont'd.)

TYPE OF SAMPLE

D. - DISTURBED  
U.L. - UNDIST. LINER  
S.T. - SHELBY TUBE  
S.S. - SPLIT SPOON  
R.C. - ROCK CORE  
DETACHED

REMARKS:

Standard Penetration Test - Driving 2" OD Sampler 1' Wm  
140 lb. Hammer Falling 30" Foot Made At 5" Intervals

GROUND WATER OBSERVATIONS

G.W. ENCOUNTERED AT 7 FT 10 INS  
G.W. ENCOUNTERED AT 71 FT 0 INS  
G.W. AFTER COMPLETION FT INS  
G.W. AFTER HRS FT INS  
G.W. AFTER LIGHT SPOON



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LOG OF SOIL BORING NO. 011W2

PROJECT Observation Wells

JOB NO. 81-111

LOCATION Dow-Corning

SURFACE ELEV. \_\_\_\_\_

DATE 8-17 & 18-81

Midland, Michigan

Sample & Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural WL P.C.F.	Dry Den Wt. P.C.F.	Unc. Comp Strength P.S.F.	St. %
	26		Extremely stiff moist silty blue clay, claypan, sand and pebbles						
	27								
	28								
	29								
	30								
	31								
	32								
	33								
	34								
	35								
	36								
	37								
	38								
	39								
	40								
	41								
	42		42'0"						
	43								
	44								
	45								
	46								
	47								
	48								
	49								
	50								

(Cont'd.)

TYPE OF SAMPLE  
D. - DISTURBED  
U.L. - UNDIST. LINER  
S.T. - SHELBY TUBE  
S.S. - SPLIT SPOON  
R.C. - ROCK CORE  
( ) - PENETROMETER

REMARKS:

Standard Penetration Test - Driving 2" O.D. Sampler 1' With  
140# Hammer Falling 30"; Count Made At 6" Intervals

GROUND WATER OBSERVATIONS

G.W. ENCOUNTERED AT	7	FT	10	INS
G.W. ENCOUNTERED AT	71	FT	0	INS
G.W. AFTER COMPLETION		FT		INS
G.W. AFTER	HRS	FT		INS
G.W. VOLUMES	Light Seepage			



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LOG OF SOIL BORING NO. DMW 2

PROJECT Observation Wells

JOB NO. 81-111

LOCATION Dow-Corning

SURFACE ELEV. \_\_\_\_\_

DATE 8-17 & 18-81

Midland, Michigan

Sample Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Grv. Den. Wt. P.C.F.	Unc. Comp. Strength PSF	Str. %
	51								
	52								
	53								
	54								
SS	55			17					
				31					
	56			35					
	57								
	58		Extremely stiff moist sandy blue clay, hardpan, medium pebble content						
	59								
SS	60			21					
				32					
	61			37					
	62								
	63								
	64								
SS	65			21					
				39					
	66			43					
	67								
	68								
	69		68'6"						
SS	70		Extremely stiff moist silty blue clay, sand and pebbles	16					
				28					
	71		71'0"	33					
	72		Extremely compact wet fine to medium gray sand						
SS	73		72'0"	17					
				26					
	74			29					
			Extremely stiff moist silty blue clay, sand and pebbles						
SS	75		(Cont'd.)	19					
				28					
				30					

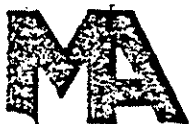
TYPE OF SAMPLE  
D. - DISTURBED  
U.L. - UNDIST. LINER  
S.T. - SHELBY TUBE  
S.S. - SPLIT SPOON  
R.C. - ROCK CORE  
P. - PENETROMETER

REMARKS:

Standard Penetration Test - Driving 2" OD Sampler 1' With  
140# Hammer Falling 30". Count Made At 2' Intervals

GROUND WATER OBSERVATIONS

G.W. ENCOUNTERED AT 7 FT 10 INS  
G.W. ENCOUNTERED AT 71 FT 0 INS  
G.W. AFTER COMPLETION FT INS  
G.W. AFTER HPS FT INS  
G.W. AFTER Light Seepage



McDOWELL & ASSOCIATES  
Geotechnical Engineers

LOG OF SOIL BORING NO. 03002

PROJECT Observation Wells

JOB NO. 81-111

LOCATION Dow-Corning

SURFACE ELEV. \_\_\_\_\_ DATE 8-17 & 18-81 Midland, Michigan

Sample # Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Dry Den Wt. P.C.F.	Unc. Comp. Strength PSF	Sir %
	76		Extremely stiff moist silty blue clay, sand and pebbles	18					
SS	77			29					
	78			32					
	79								
SS	80			21					
	81		82'0"	33					
	82			33					
	83								
	84								
SS	85			14					
	86		Extremely stiff moist silty sandy blue clay, sand and pebbles	20					
	87			26					
	88								
	89								
SS	90			21					
	91		Set bottom of 5' No. 10 slot screen at 73' with 70' riser - Backfilled with 2NS sand to 60' - Bentonite slurry from 60' to surface.	29					
	92			33					
	93								
	94								
SS	95			19					
	96		Blew hole dry - waited 10 minutes - No inflow.	27					
	97			34					
	98								
	99								
	100			16					
			100'0"	31					
				33					

TYPE OF SAMPLE  
D. - DISTURBED  
U.L. - UNDIST. LINER  
S.T. - SHELBY TUBE  
S.S. - SPLIT SPOON  
R.C. - ROCK CORE  
( ) - PENETROMETER

REMARKS:  
  
Standard Penetration Test - Driving 2" OD Sampler 1' With  
140 # Hammer Falling 30"; Count Made At 6" Intervals

GROUND WATER OBSERVATIONS  
G.W. ENCOUNTERED AT 7 ft 10 INS  
G.W. ENCOUNTERED AT 71 ft 0 INS  
G.W. AFTER COMPLETION ft INS  
G.W. AFTER HRS ft INS  
G.W. VOLUMES Light Seepage

DMW3



McDOWELL & ASSOCIATES  
Geotechnical Engineers

LOG OF SOIL BORING NO. 4

PROJECT Observation WellsJOB NO. MW3 81-111LOCATION Dow-CorningSURFACE ELEV. \_\_\_\_\_ DATE 11-9-10-81 Midland, Michigan

Sample # Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows for 6"	Moisture %	Natural Wt. P.C.F.	Dry Den Wt. P.C.F.	Unc. Comp Strength PSF	Sr %
	2	FILL	1'0" Firm moist brown clay, fill						
	4		2'9" Moist fine oxidized brown sand						
	6		Very stiff moist silty brown clay						
	8		6'6" Moist clayey brown silt, oxidized streaks						
	10		8'0" Very stiff moist silty brown clay						
	12								
	14		12'6" Extremely stiff moist silty gravelly brown clay, layers of sand						
	16		15'0"						
	18								
	20								
	22								
	24		Extremely stiff moist silty blue clay, occasional stones						
	26								
	28								
	30								
	32								
	34		33'0" <i>Labeled Clay</i> <i>Gravelly Fill</i> Extremely stiff moist sandy gravelly blue clay, hardpan, streaks of sand						
	36								
	38		37'0"						
	40								
	42		Extremely stiff moist sandy gravelly blue clay, hardpan						
	44								
	46								
	48								
	50								

(Cont'd.)

TYPE OF SAMPLE  
O. - DISTURBED  
UL - UNOIST. LINER  
ST - SHELBY TUBE  
SS - SPLIT SPOON  
RC - ROCK CORE

REMARKS:

Standard Penetration Test - Driving 2" OD Sampler 1' With  
140 lb. Hammer falling 30". Count Made At 6" Intervals

GROUND WATER OBSERVATIONS

G.W. ENCOUNTERED AT 13 FT 0 INS  
G.W. ENCOUNTERED AT FT INS  
G.W. AFTER COMPLETION Washed FT INS  
G.W. AFTER HRS FT INS





McDOWELL & ASSOCIATES  
Geotechnical Engineers

JOB NO.

81-111

PROJECT Observation Wells

LOCATION Dow-Corning

SURFACE ELEV.

DATE 11-9-10-81

Midland, Michigan

LOG OF SOIL BORING NO. DMW3 + (CONT. G.)

Sample Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows for 6"	Moisture %	Natural Wt. P.C.F.	Dry Den Wt. P.C.F.	Unc. Comp. Strength PSF	Str. %
	52		52'0" Extremely stiff moist sandy gravelly blue clay, hardpan						
	54								
	56								
	58								
	60								
	62		Extremely stiff moist silty blue claypan, occasional stones						
	64								
	66								
	68								
	70								
	72		71'6" Extremely compact wet fine to medium sand (5.5')						
	74								
	76								
	78		77'0" Extremely stiff moist blue clay, hardpan, occasional stones						
	80								
	82								
	84								
	86		85'0" Set 5' of 2" No. 10 slot screen from 73'0" to 78'0". Riser pipe from 73'0" to 3' above ground elevation. Backfilled with sand up to 62'0". Bentonite from 62'0" to surface. Blew for 40 minutes at 1 gallon per minute.						
	88								
	90								
	92								
	94								
	96								
	98								
	100								
TYPE OF SAMPLE			REMARKS:		GROUND WATER OBSERVATIONS				
D. - DISTURBED					G.W. ENCOUNTERED AT 13 FT. 0 INS				
U.L. - UNDIST. LINER					G.W. ENCOUNTERED AT FT. INS				
S.T. - SHELBY TUBE					G.W. AFTER COMPLETION Washed FT. INS				
S.S. - SPLIT SPOON					G.W. AFTER HRS FT. INS				
R.C. - ROCK CORE					G.W. VOLUMES Medium				
P. - PNEUMATIC									

# WATER WELL RECORD ACT 294 PA 1965

MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH DM

## LOCATION OF WELL

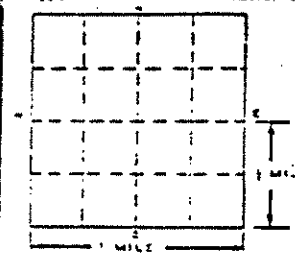
County Midland Township Name                      Fraction 1/4 1/4 1/4 Section Number              Town Number N/S. Range Number E/W.

### Distance And Direction from Road Intersections

NORTH WELL (MW-4A)

### See Address & City of Well Location

### Sketch Map of Section Below



### Sketch Map:

### 3 OWNER OF WELL:

Dow Corning

Address Midland, Michigan

### 4 WELL DEPTH: (Completed) Date of Completion

82 ft. May 8, 1984

5 ☐ Cable tool ☒ Rotary ☐ Driven ☐ Dug  
☐ Hollow rod ☐ Jetted ☐ Bored ☐

6 USE: ☐ Domestic ☐ Public Supply ☐ Industry  
☐ Irrigation ☐ Air Conditioning ☐ Commercial  
☐ Test Well ☒ Monitoring

### 7 CASING: Threaded ☒ Welded ☐ Diam.

Height: Above Surface 1 ft.

4 in. to          ft. Depth Weight 11 lbs./ft.

         in. to          ft. Depth Drive Shoe? Yes ☐ No ☐

### 8 SCREEN:

Type: Stainless St. Dia. 4"

Slot Gauge 10 Length 5'

Set between 77 ft. and 82 ft.

### Fittings:

### 9 STATIC WATER LEVEL

5' 9" ft. below land surface

### 10 PUMPING LEVEL below land surface

         ft. after 4 hrs. pumping 50 to 60 g.p.m.

         ft. after          hrs. pumping          g.p.m.

### 11 WATER QUALITY in Parts Per Million:

Iron (Fe) 0.6 P.P.M. Chlorides (Cl)         

Hardness 15 RTS. Other         

### 12 WELL HEAD COMPLETION:

☐ In Approved Pit  
☐ Pitless Adapter ☒ 12" Above Grade

### 13 Well Grouted? ☒ Yes ☐ No

☐ Neat Cement ☒ Bentonite ☐         

Depth: From 0 ft. to 77 ft.

### 14 Nearest Source of possible contamination

         feet          Direction          Type         

Well disinfected upon completion ☐ Yes ☐ No

### 15 PUMP:

☒ Not installed

Manufacturer's Name         

Model Number          HP          Volts         

Length of Drop Pipe          ft. capacity          G.P.M.

Type: ☐ Submersible

☐ Jet

☐ Reciprocating

USE A 2ND SHEET IF NEEDED

### 16 Remarks, elevat on, source of data, etc.

### 17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Raymer Co., Inc.

028

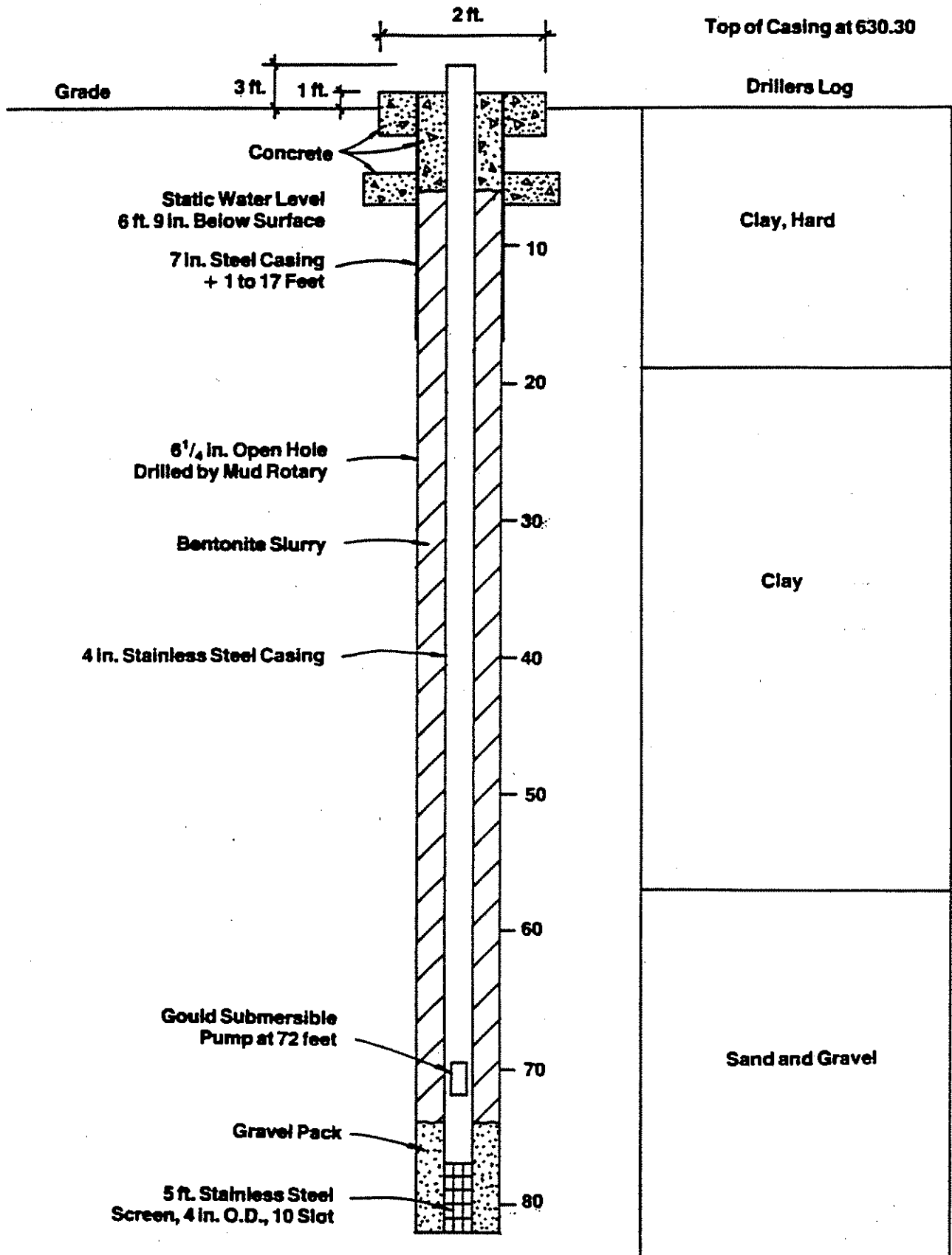
REGISTERED BUSINESS NAME

REGISTRATION NO.

Address 3311 Three Mile Rd., N.W., Grand Rapids

Signed G. J. Meunier Date May 23, 1984

AUTHORIZED REPRESENTATIVE



DMW4  
(DP-1)

GEOLOGICAL SURVEY SAMPLE NO.

**WATER WELL RECORD**  
ACT 294 PA 1985

MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH

1 LOCATION OF WELL			3 OWNER OF WELL: <u>DRILLED FOR</u>		
County <u>MIDLAND</u>	Township Name	Fraction %    %    %	Section Number	Town Number N/S.	Range Number E/W.
Distance And Direction from Road Intersections <u>WELL #1</u> <span style="float: right;"><u>NEW</u> <u>GOWAN</u></span>			Address <u>DOW-CORNING</u> <u>MIDLAND PLANT</u>		
Street address & City of Well Location Locate with "X" in section below <div style="border: 1px solid black; width: 100px; height: 100px; margin: 10px auto; position: relative;"><div style="position: absolute; top: 0; left: 0; width: 100%; height: 100%; border: 1px dashed black;"></div><div style="position: absolute; top: 50%; left: 50%; transform: translate(-50%, -50%); font-size: 2em;">X</div></div>			4 WELL DEPTH: (completed) Date of Completion <u>75 FT. DEEP</u>		
Sketch Map:			5 <input type="checkbox"/> Cable tool <input checked="" type="checkbox"/> Rotary <input type="checkbox"/> Driven <input type="checkbox"/> Dug <input type="checkbox"/> Hollow rod <input type="checkbox"/> Jetted <input type="checkbox"/> Bored <input type="checkbox"/>		
			6 USE: <input type="checkbox"/> Domestic <input type="checkbox"/> Public Supply <input type="checkbox"/> Industry <input type="checkbox"/> Irrigation <input type="checkbox"/> Air Conditioning <input type="checkbox"/> Commercial <input type="checkbox"/> Test Well <input checked="" type="checkbox"/> <u>MONITORING WELL</u>		
			7 CASING: Threaded <input checked="" type="checkbox"/> Welded <input type="checkbox"/> Diam. <u>4</u> in. to <u>    </u> ft. Depth <u>    </u> in. to <u>    </u> ft. Depth Height: Above <u>    </u> Surface <u>4</u> ft. Weight <u>    </u> lbs./ft. Drive Shoe? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		
2 FORMATION		THICKNESS OF STRATUM	8 SCREEN:		
<u>SURFACE SAND</u>		<u>22</u>	Type: <u>ST. STEEL</u> Dia.: <u>3"</u>		
<u>SOFT CLAY</u>		<u>6</u>	Slot/Gauze <u>#10 SLOT</u> Length <u>5 FT.</u>		
<u>GRAVEL PACKED CLAY</u>		<u>42</u>	Set between <u>70</u> ft. and <u>75</u> ft.		
<u>COURSE GRAVEL <sup>WATER</sup> BEARING</u>		<u>5</u>	Fittings: <u>W/K-PACKER &amp; 3'x3" LEAD PIPE</u>		
		<u>75</u>	9 STATIC WATER LEVEL <u>10</u> ft. below land surface		
			10 PUMPING LEVEL below land surface <u>42</u> ft. after <u>2</u> hrs. pumping <u>12</u> g.p.m.		
			<u>    </u> ft. after <u>    </u> hrs. pumping <u>    </u> g.p.m.		
			11 WATER QUALITY in Parts Per Million: Iron (Fe) <u>    </u> Chlorides (Cl) <u>    </u> Hardness <u>    </u> Other <u>    </u>		
			12 WELL HEAD COMPLETION: <input type="checkbox"/> In Approved Pit <input type="checkbox"/> Pitless Adapter <input checked="" type="checkbox"/> 12" Above Grade		
			13 Well Grouted? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Neat Cement <input type="checkbox"/> Bentonite <input checked="" type="checkbox"/> <u>HEAVY MUD</u> Depth: From <u>0</u> ft. to <u>81</u> ft.		
			14 Nearest Source of possible contamination <u>    </u> feet <u>    </u> Direction <u>    </u> Type <u>    </u>		
			Well disinfected upon completion <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
			15 PUMP: <input type="checkbox"/> Not installed Manufacturer's Name <u>McDONALD</u>		
			Model Number <u>    </u> HP <u>1/2</u> Volts <u>230</u>		
			Length of Drop Pipe <u>42</u> ft. capacity <u>1K</u> G.P.M.		
			Type: <input checked="" type="checkbox"/> Submersible <input type="checkbox"/> Jet <input type="checkbox"/> Reciprocating		
16 Remarks, elevation, source of data, etc. <u>ELEVATION - APPROX. 4 FT. ABOVE GROUND</u> <u>looked-up with WELL SEAL.</u> <u>CLOSED BOTTOM SCREEN.</u> <u>WELL WOULD PRODUCE 100-150 G.P.M.</u>		17 WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief. <u>FREEMAN &amp; KRAUSS</u> <u>0555</u> REGISTERED BUSINESS NAME      REGISTRATION NO. Address <u>7388 Middle Rd. HOPE</u> Signed <u>[Signature]</u> Date <u>20-SEP-77</u> AUTHORIZED REPRESENTATIVE			

IMPORTANT: File with deed.

WELL OWNER COPY

DMW 4  
(DF-1)

45



McDOWELL & ASSOCIATES  
Geotechnical Engineers

LOG OF SOIL BORING NO. \_\_\_\_\_

PROJECT Observation Well

JOB NO. MWS 81-111

LOCATION Dow-Corning

SURFACE ELEV. \_\_\_\_\_ DATE 11-16-17-81 Midland, Michigan

Sample Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows For 6"	Moisture %	Natural Wt. P.C.F.	Dry Den Wt. P.C.F.	Unc. Comp. Strength PSF	Sr %
	2	FILL	1'6" Moist fine brown sand, fill						
	4		4'6" Moist fine oxidized brown sand						
	6		Moist to wet fine brown and discolored sand						
	8		8'6" <u>Surface Sand</u>						
	10		<u>Lakebed clay</u>						
	12								
	14		Stiff moist silty blue clay						
	16								
	18								
	20								
	22								
	24		23'0" <u>Extremely stiff moist gravelly blue clay</u>						
	26								
	28		<u>Lakebed clay</u>						
	30		29'6" <u>Glacial Till</u>						
	32		Extremely stiff moist sandy blue claypan						
	34								
	36								
	38								
	40		39'6" Extremely compact wet medium brown sand						
	42								
	44								
	46		45'0" Extremely stiff moist gravelly blue clay						
	48		occasional stones						
	50		(Cont'd.)						

TYPE OF SAMPLE

D - DISTURBED  
UL - UNDIST. LINER  
ST - SHELBY TUBE  
SS - SPLIT SPOON  
RC - ROCK CORE

REMARKS:

Standard Penetration Test - Driving 2" OD Sampler 1' With

GROUND WATER OBSERVATIONS

G.W. ENCOUNTERED AT	5	FT	6	INS
G.W. ENCOUNTERED AT	59	FT	0	INS
G.W. AFTER COMPLETION		FT		INS
G.W. AFTER	HRS	FT		INS

Sample # Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blows for 6"	Moisture %	Natural Wt. P.C.F.	Dry Den Wt. P.C.F.	Unconsolidated Strength PSF	Sw %
	52		Extremely stiff moist gravelly blue clay, occasional stones						
	54								
	56								
	58								
	60		59'0"						
B UL	62		Extremely compact wet medium to coarse gray sand (9')	60					
	64			60/3"					
	66								
	68								
	70		Extremely stiff moist silty blue clay, hardpan, layers of sand and gravel						
	72								
	74								
	76								
	78		78'0"						
	80		2½' Stick-Up. Bottom of screen 68'0". 10' - .010 screen. Blew for 30 minutes at 10 gallons per minute ±						
	82								
	84								
	86								
	88								
	90								
	92								
	94								
	96								
	98								

TYPE OF SAMPLE

D - DISTURBED

U.L. - UNDIST. LINER

S.T. - SHELBY TUBE

S.S. - SPLIT SPOON

R.C. - ROCK CORE

P.C. - PENETROMETER

REMARKS.

Standard Penetration Test - Driving 2" OD Sampler 1' With  
140# Hammer Falling 30"; Count Made At 6" Intervals

GROUND WATER OBSERVATIONS

GW. ENCOUNTERED AT	5	FT	6	INS
GW. ENCOUNTERED AT	59	FT	0	INS
GW. AFTER COMPLETION		FT		INS
GW. AFTER	HRS	FT		INS
GW. VOLUMES	Washed			

WATER WELL RECORD  
ACT 294 PA 1965MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH

DMW6A

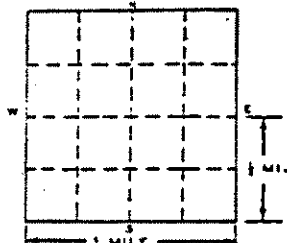
~ 627

1 LOCATION OF WELL

County Midland Township Name \_\_\_\_\_ Fraction 1/4 1/4 1/4 Section Number \_\_\_\_\_ Town Number \_\_\_\_\_ Range Number \_\_\_\_\_  
N/S. E/W.

Distance And Direction from Road Intersections  
SOUTH WELL MW-6A

Address & City of Well Location  
Locate with "X" in section below Sketch Map:



2 FORMATION

FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Clay, hard	17	17
Sandy Clay	29	46
Sand, fine	85	54
Sandy Clay & Gravel	14	68
Sand & Gravel	7	75

3 OWNER OF WELL Dow Corning  
Address Midland, Michigan

4 WELL DEPTH: (completed) 75 ft. Date of Completion May 3, 1984

5 ☐ Cable tool ☒ Rotary ☐ Driven ☐ Dug  
☐ Hollow rod ☐ Jetted ☐ Bored

6 USE: ☐ Domestic ☐ Public Supply ☐ Industry  
☐ Irrigation ☐ Air Conditioning ☐ Commercial  
☐ Test Well ☒ Monitoring

7 CASING: Threaded ☒ Welded ☐ Height: Above/Surface 1 ft.  
Diam. \_\_\_\_\_ Surface 1 ft.  
Weight 11 lbs./ft.  
Drive Shoe? Yes ☐ No ☐

8 SCREEN:

Type: Stainless St. Dia.: 4"  
Slot/Gauze 10 Length 5'  
Set between 70 ft. and 75 ft.  
Fittings: \_\_\_\_\_

9 STATIC WATER LEVEL 7.7" ft. below land surface

10 PUMPING LEVEL below land surface  
\_\_\_\_\_ ft. after 4 hrs. pumping 3 G.P.M.  
\_\_\_\_\_ ft. after \_\_\_\_\_ hrs. pumping \_\_\_\_\_ G.P.M.

11 WATER QUALITY in Parts Per Million:  
Iron (Fe) 0.6 Chlorides (Cl) 175 parts  
Hardness 11 GTS. Other \_\_\_\_\_

12 WELL HEAD COMPLETION: ☐ In Approved Pit  
☐ Pitless Adapter ☒ 12" Above Grade

13 Well Grouted ☒ Yes ☐ No  
☐ Neat Cement ☒ Bentonite ☐ \_\_\_\_\_  
Depth: From 0 ft. to 70 ft.

14 Nearest Source of possible contamination  
\_\_\_\_\_ feet \_\_\_\_\_ Direction \_\_\_\_\_ Type \_\_\_\_\_  
Well disinfected upon completion ☐ Yes ☐ No

15 PUMP: ☒ Not installed  
Manufacturer's Name \_\_\_\_\_  
Model Number \_\_\_\_\_ HP \_\_\_\_\_ Volts \_\_\_\_\_  
Length of Drop Pipe \_\_\_\_\_ ft. capacity \_\_\_\_\_ G.P.M.  
Type: ☐ Submersible ☐ Jet ☐ Reciprocating

16 Remarks. elevation, source of dist., etc.

17 WATER WELL CONTRACTOR'S CERTIFICATION:  
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.  
Raymond Company, Inc. 2284  
REGISTERED BUSINESS NAME REGISTRATION NO.  
Address 3311 Three Mile Rd. N.E., Grand Rapids.  
Signed S. F. Hawkeker May 23, 1984  
AUTHORIZED REPRESENTATIVE



## Well / Boring Log Sheet

County	MIDLAND	Township	MIDLAND	Fraction	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	Section	26	T	14N	R	2E
--------	---------	----------	---------	----------	---------------	---------------	---------------	---------	----	---	-----	---	----

Contractor: Raymer  
Address: Grand Rapids, MI  
Equipment: Falling Rig #10  
Supervisor: D. Pierce  
Drilling Method(s) Rotary Depth

Screen: \_\_\_\_\_  
 Manufacturer: Johnson  
 Material: stainless steel  
 Model: 960  
 Slot/Gauze: 10 slot Dia.: 2"  
 Length: 5'  
 Depth Set: 37.8" To: 42.8"

**Location Sketch** 7935.54 N  
3811.25 E

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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Grouting/Seal		Material
Depth	To	
34	36'	Bentonite Pellets
0	34'	Bentonite/Cement

Casing		Depth Set	
Dia.	Type		
<u>2"</u>	<u>S.S.</u>	<u>+2.2</u>	<u>To 37.8'</u>
<u>7"</u>	<u>81k.</u>	<u>+0.5</u>	<u>To 10.0'</u>
Elevation			
Casing:	<u>629.04'</u>		
Ground:	<u>626.8'</u>		
Ref. Pt.:			

Development: Water Jet w/  
Deionized Water

**Remarks (include here, other data available)**

Water Level: \_\_\_\_\_ Ft. Below: \_\_\_\_\_  
Measured On: \_\_\_\_\_

Filter pack from 36' to 44' #7 grade.  
Pea gravel from 44' to 75'.

[illegible]

# EDI Engineering & Science

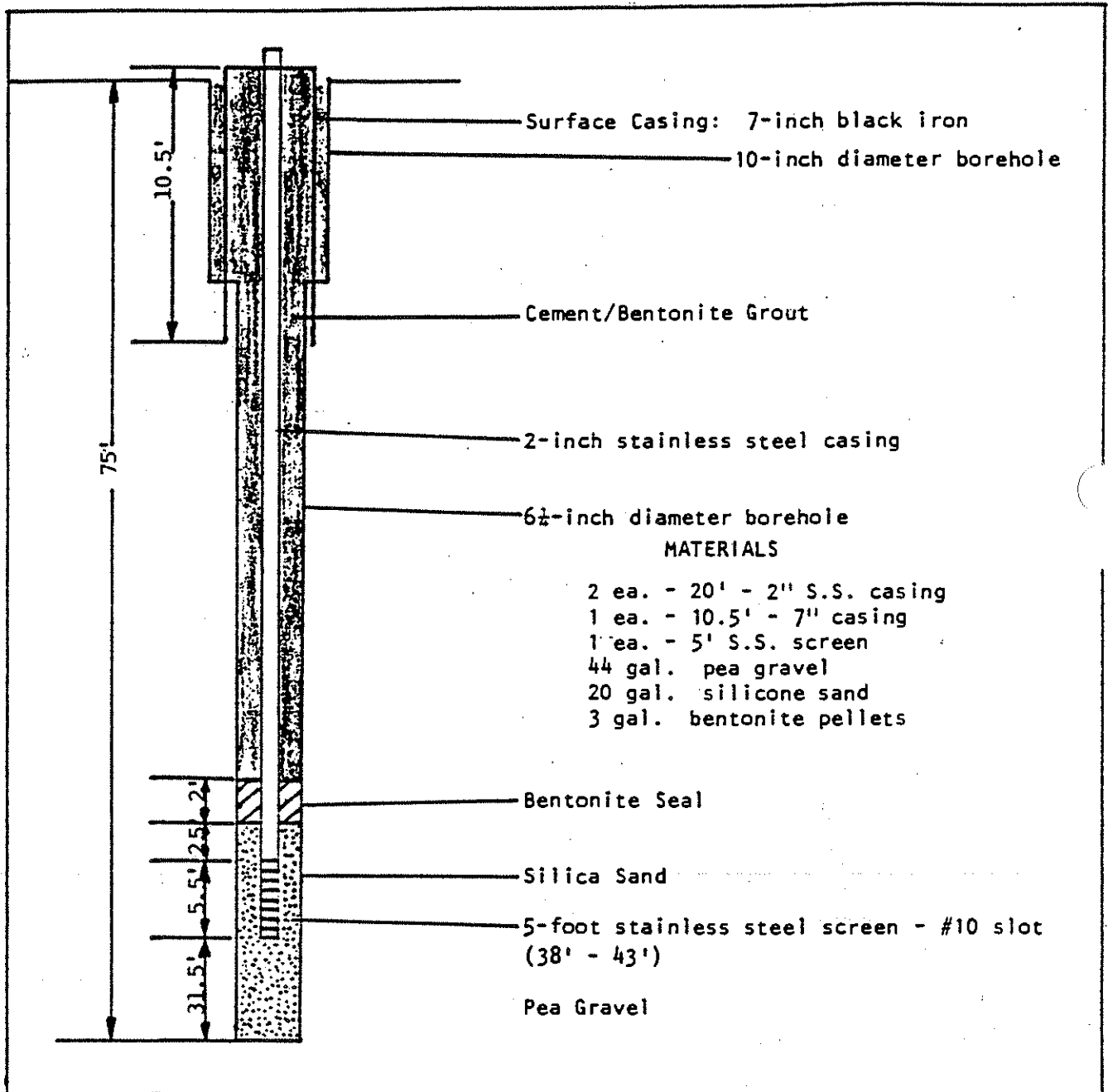
Environmental Engineering  
Geology, Biology and Chemistry



WELL IDENTIFICATION: DMV - 7

PLANT COORDINATES: 7935.54 N 3811.25 E

DATE COMPLETED: 9/10/86



[illegible]

# EDI Engineering & Science

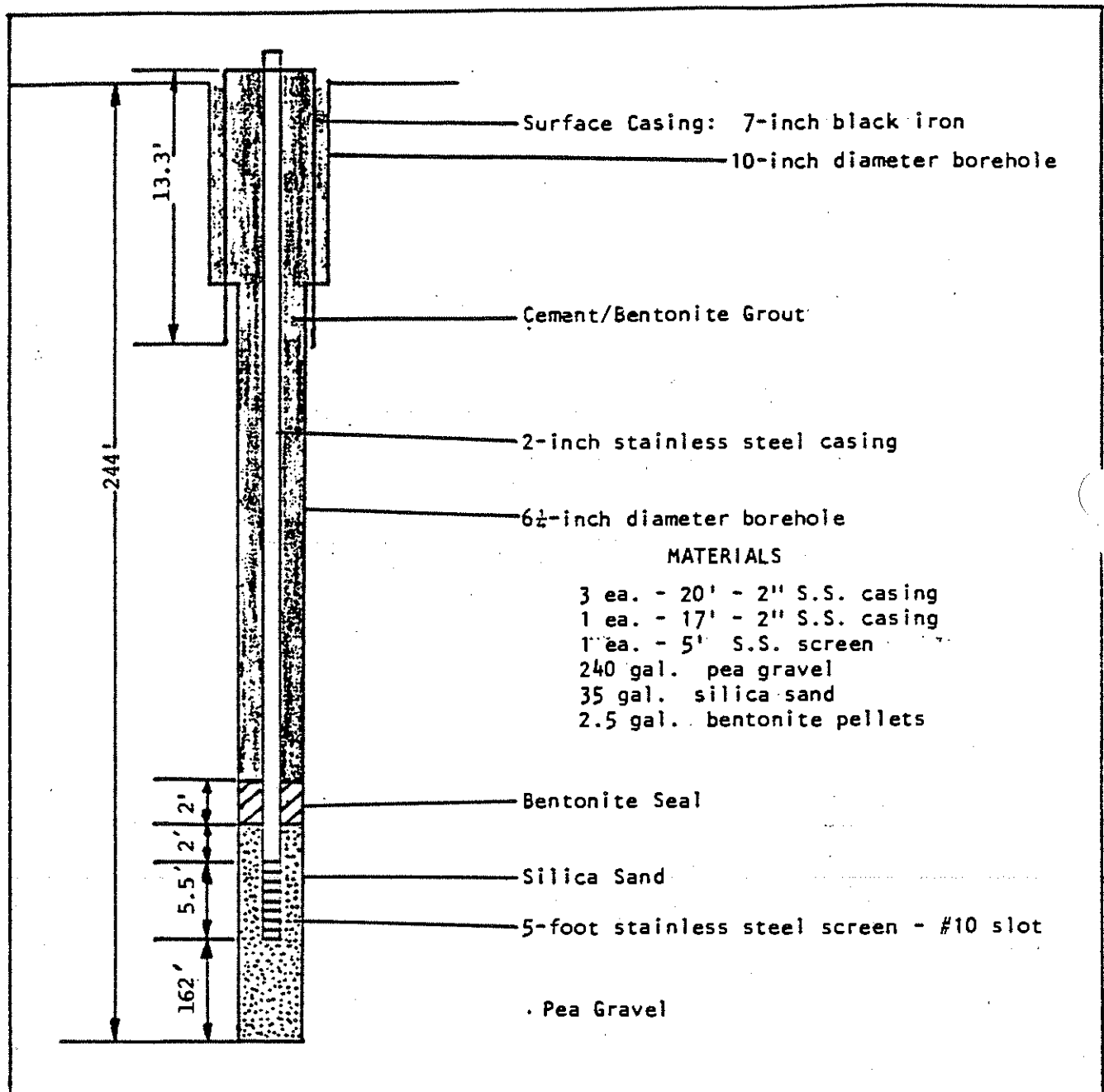
Environmental Engineering  
Geology, Biology and Chemistry



WELL IDENTIFICATION: DMW - 8

PLANT COORDINATES: 9283.78 N 3821.24 E

DATE COMPLETED: 10/1/86





Client: Dow Corning

Project No.: 20600

Permit No.: \_\_\_\_\_

Date Started \_\_\_\_\_ Finished 10/10/86

County	MIDLAND	Township	MIDLAND	Fraction	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	Section	26	T	14N	R	2E
--------	---------	----------	---------	----------	---------------	---------------	---------------	---------	----	---	-----	---	----

Measured On: \_\_\_\_\_

Ref. Pt.:

1249.09 E

[illegible]

Remarks (include here, other data available)

Filter pack from 230' to 245'. #7 grade.

[illegible]

# EDI Engineering & Science

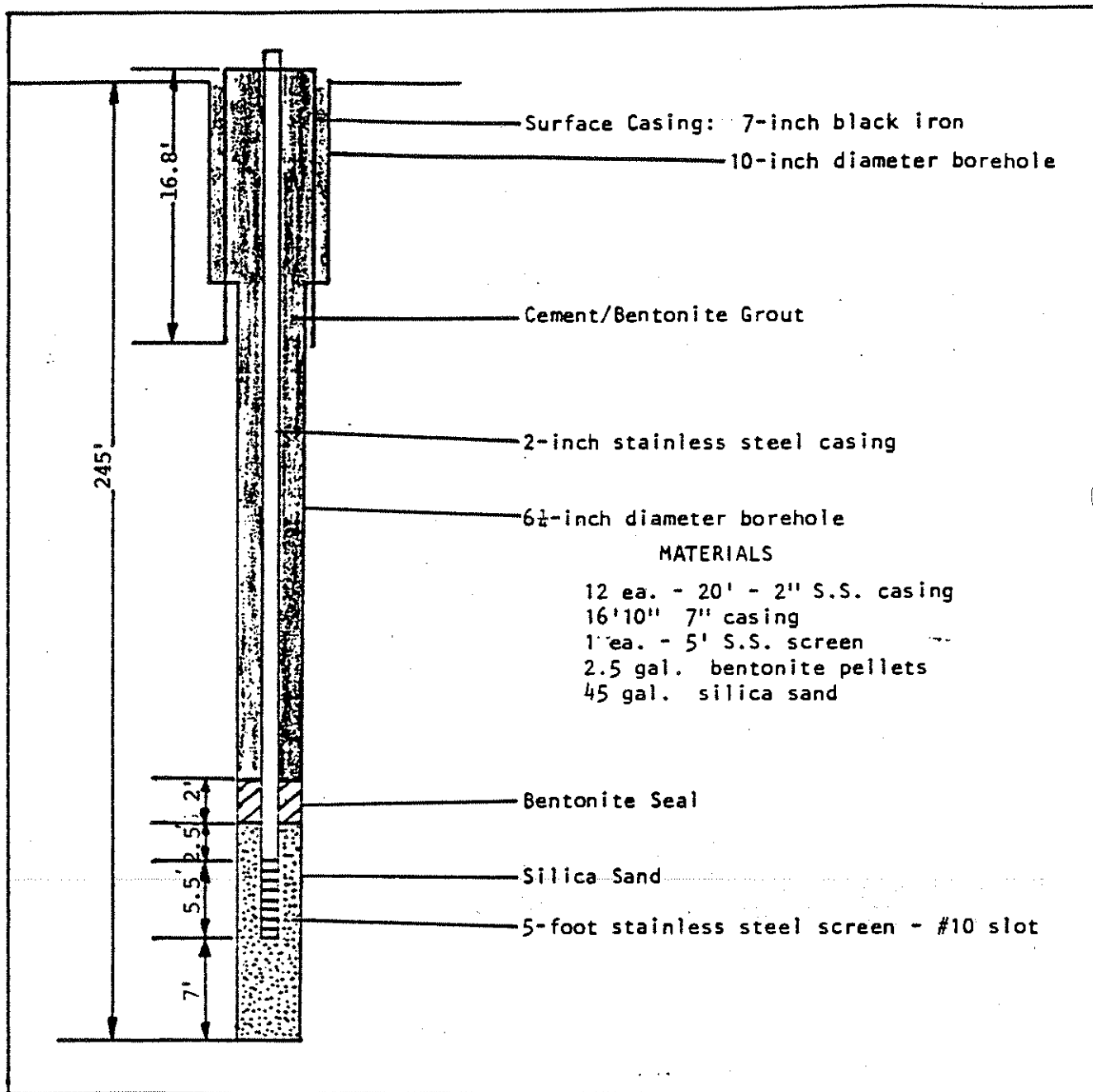
Environmental Engineering  
Geology, Biology and Chemistry

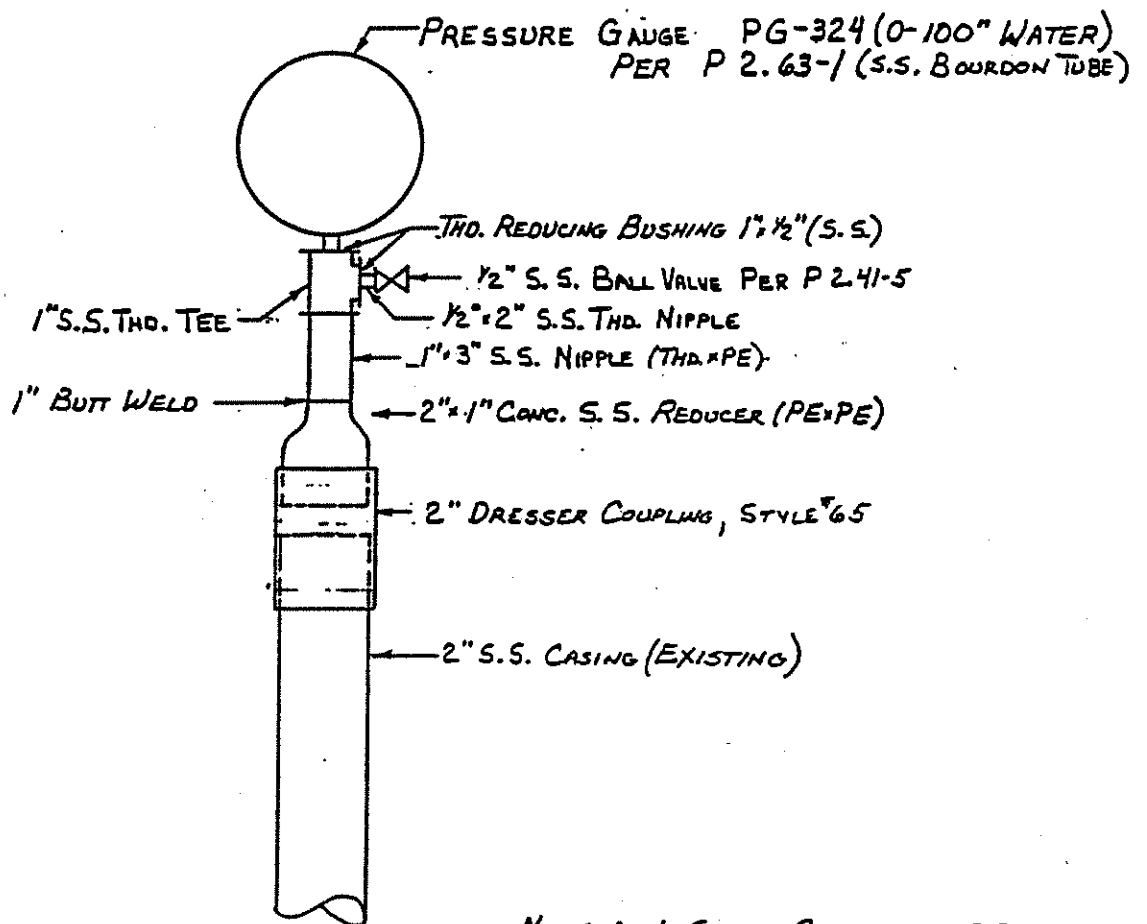


WELL IDENTIFICATION: DMW - 9

PLANT COORDINATES: 5892.29 N 1249.09 E

DATE COMPLETED: 10/10/86





- NOTES: 1. STEAM CLEAN ALL PIPE FITTINGS PRIOR TO FABRICATION.
2. COMPLETE ALL THREADED JOINTS WITH TEFLON TAPE JOINT COMPOUND.
3. ALL MATERIAL TO BE OF STAINLESS STEEL CONSTRUCTION EXCEPT FOR THE 2" COUPLING.

<b>DOW CORNING</b> 	DEEP MONITORING WELL #9 GAUGE ASSEMBLY			SKETCH NO.	REVISION
				JVM-1-87	
DRAWN JVM	DATE 1-5-87	CHECKED JVM	APPROVED RGC	REVISION DATE	

# Well / Boring Log Sheet

County	MIDLAND	Township	MIDLAND	Fraction	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	Section	26	T	14N	R	2E
--------	---------	----------	---------	----------	---------------	---------------	---------------	---------	----	---	-----	---	----

Contractor: Raymer  
Address: Grand Rapids, MI  
Equipment: Failing Rig #10  
Supervisor: D. Pierce  
Drilling Method(s) Rotary Depth

Screen: \_\_\_\_\_  
 Manufacturer: Johnson  
 Material: stainless steel  
 Model: 960  
 Slot/Gauze: 10 slot Dia: 2"  
 Length: 5'  
 Depth Set: 57.7' To: 62.7'

Location Sketch	9217.91	N
	4135.29	E

Grouting/Seal		
Depth	To	Material
54	56'	Bentonite Pellet
0	54'	Bentonite/Cement

Casing		
Dia.	Type	Depth Set
<u>2"</u>	<u>S.S.</u>	<u>+ 2.3 to 57.7'</u>
<u>7"</u>	<u>Blk.</u>	<u>+ 0.5 to 11.6'</u>
Elevation		
Casing:	<u>632.73'</u>	
Ground:	<u>630.4'</u>	
Ref. Pt.:		

Development: Water Jet w/  
Deionized Water

Water Level: \_\_\_\_\_ Ft. Below: \_\_\_\_\_  
Measured On: \_\_\_\_\_

Remarks (include here other data available)

Filter pack from 66' to 56' #7 grade.

Pea gravel from 165' to 66'.

[illegible]



# EDI Engineering & Science

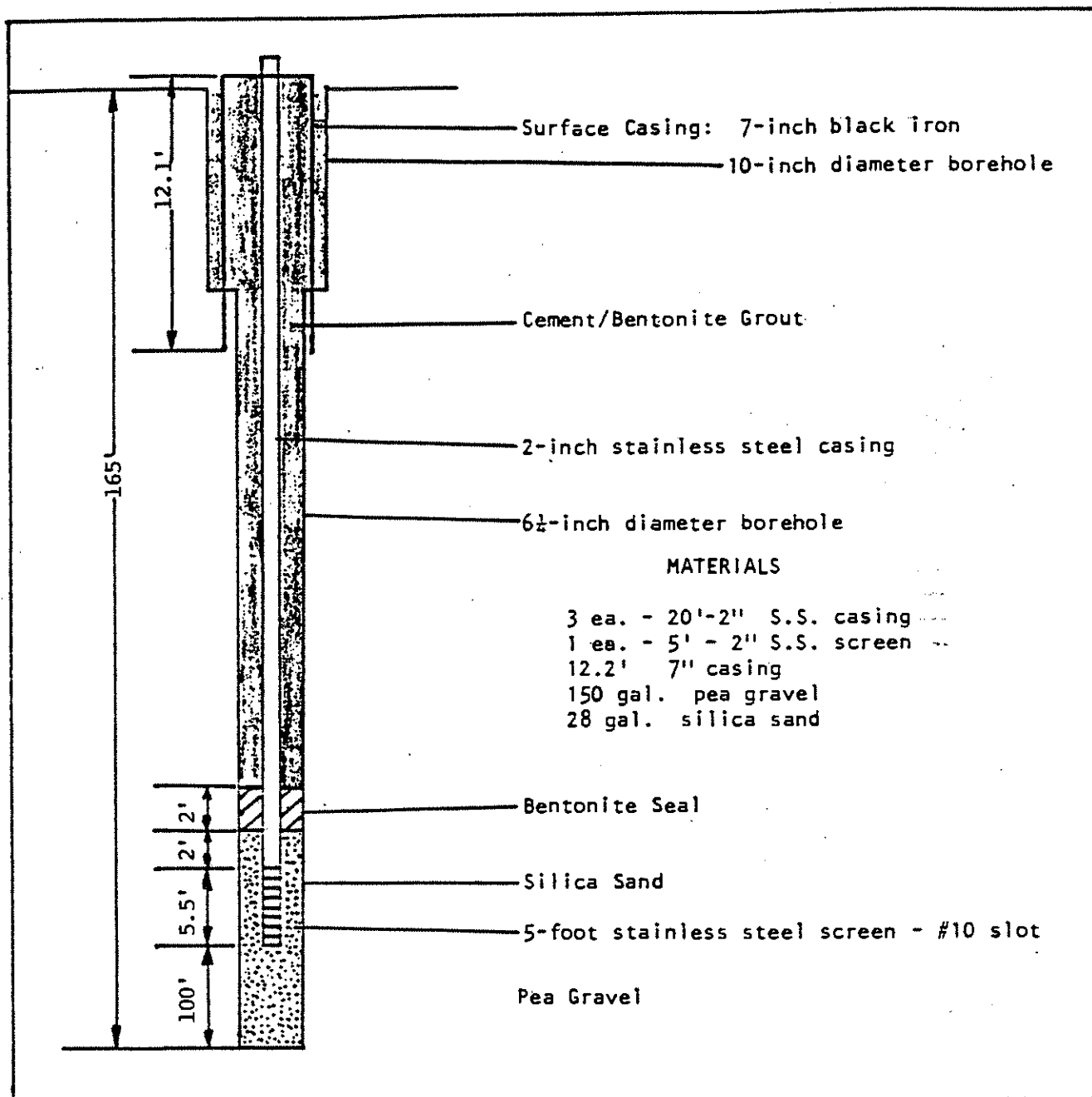
Environmental Engineering  
Geology, Biology and Chemistry



WELL IDENTIFICATION: DMW - 10

PLANT COORDINATES: 9217.91 N 1435.29 E

DATE COMPLETED: 10/16/86



# Well / Boring Log Sheet

County	Township	Fraction	Section	T	R
MIDLAND	MIDLAND	$\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$	26	14N	2E

Contractor: Raymer  
Address: Grand Rapids, MI  
Equipment: Falling Rig #10  
Supervisor: D. Pierce  
Drilling Method(s) Rotary Depth           

Grouting/Seal		Material
Depth	To	
55	57'	Bentonite Pellet
0	55'	Bentonite/Cement

Development: Water Jet w/  
Deionized Water

Water Level: \_\_\_\_\_ Ft. Below: \_\_\_\_\_  
Measured On: \_\_\_\_\_

Screen: \_\_\_\_\_  
 Manufacturer: Johnson  
 Material: stainless steel  
 Model: 960  
 Slot/Gauze: 10 slot Dia: 2"  
 Length: 5'  
 Depth Set: 116' To: 121'

Dia.	Type	Depth Set
2"	S.S.	+2.0 To 116'
7"	Blk.	+ 0.5 To 9.0'

Elevation	627.32'
Casing:	
Ground:	625.32'
Ref. Pt.:	

Remarks (include here other data available)

Filter pack from 57' to 67' #7 grade.

Pea gravel from 67' to 188'.

	7919.83	N
Location Sketch	3338.72	E

[illegible][illegible]

# EDI Engineering & Science

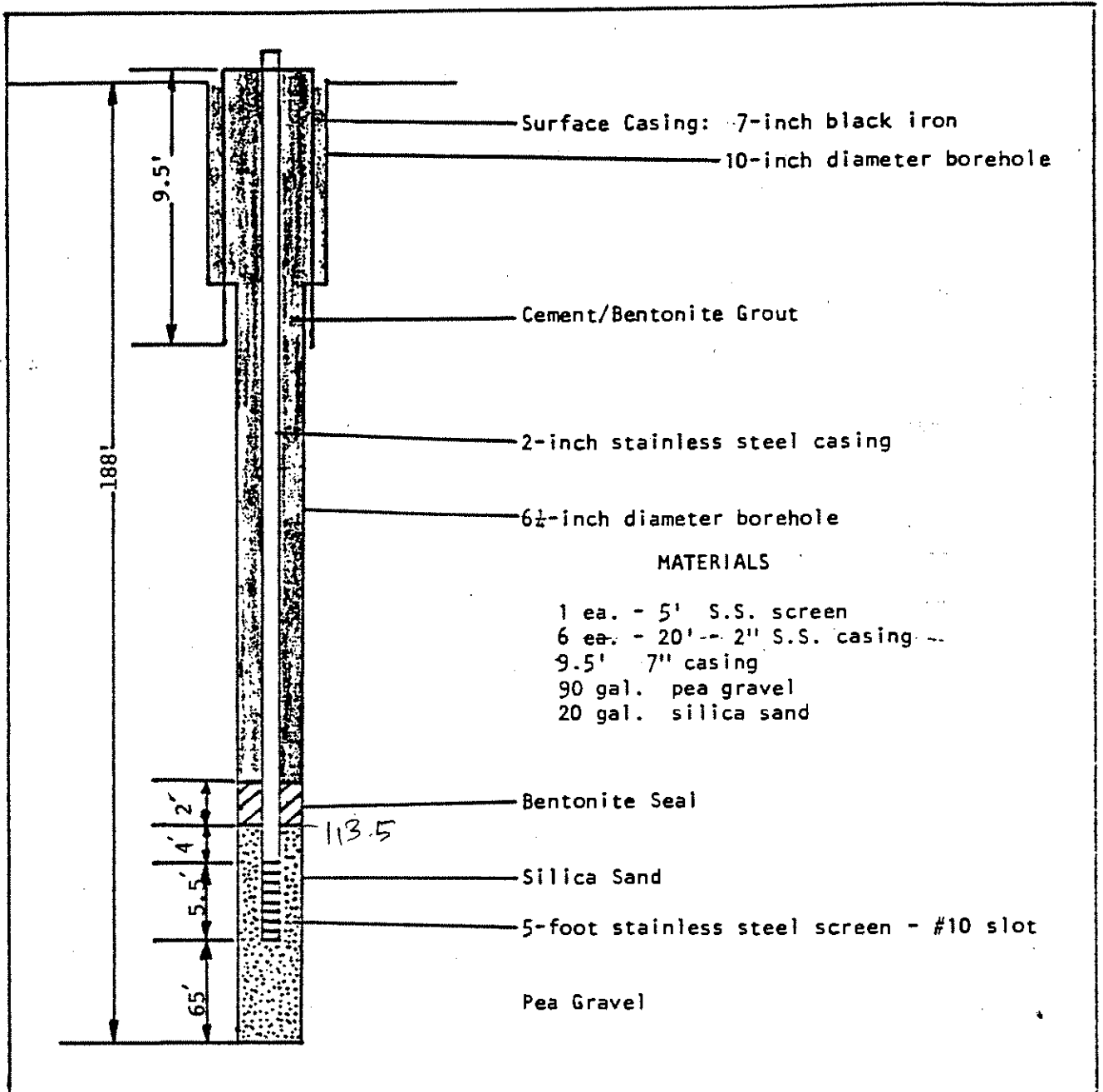
Environmental Engineering  
Geology, Biology and Chemistry



WELL IDENTIFICATION: DMW - 11

PLANT COORDINATES: 7919.83 N 3338.72 E

DATE COMPLETED: 10/27/86



Page: 1 of 1 79  
Well/Boring No.: DMW-12  
Client: Dow Corning  
Project No.: 20600  
Permit No.: \_\_\_\_\_  
Date Started \_\_\_\_\_ Finished 10/30/86

## Well / Boring Log Sheet

County	Township	Fraction	Section	T	R
MIDLAND	MIDLAND	$\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$	26	14N	2E

Contractor: Raymer  
Address: Grand Rapids, MI  
Equipment: Failing Rig #10  
Supervisor: D. Pierce  
Drilling Method(s) Rotary Depth           

Screen: \_\_\_\_\_  
 Manufacturer: Johnson  
 Material: stainless steel  
 Model: 960  
 Slot/Gauze: 10 slot Dia.: 2"  
 Length: 5'  
 Depth Set: 44.8" To: 49.8"

Location Sketch      9283    N  
                                 3833    E

Grouting/Seal		
Depth	Tp	Material
40	42'	Bentonite Pellet
0	40'	Bentonite/Cement

Casing		
Dia.	Type	Depth Set
2" <u>          </u>	S.S. <u>          </u>	+2.2 To 44.8'
<u>          </u>	<u>          </u>	+0.5 To 12.5'

Elevation	635.01'
Casing:	
Ground:	632.8'
Ref. Pt:	

Development: Water Jet w/  
Deionized Water

Remarks (include here, other data available)

Filter pack from 42' to 53'. #7 grade.

Water Level: \_\_\_\_\_ Ft. Below: \_\_\_\_\_  
Measured On: \_\_\_\_\_

[illegible]

# EDI Engineering & Science

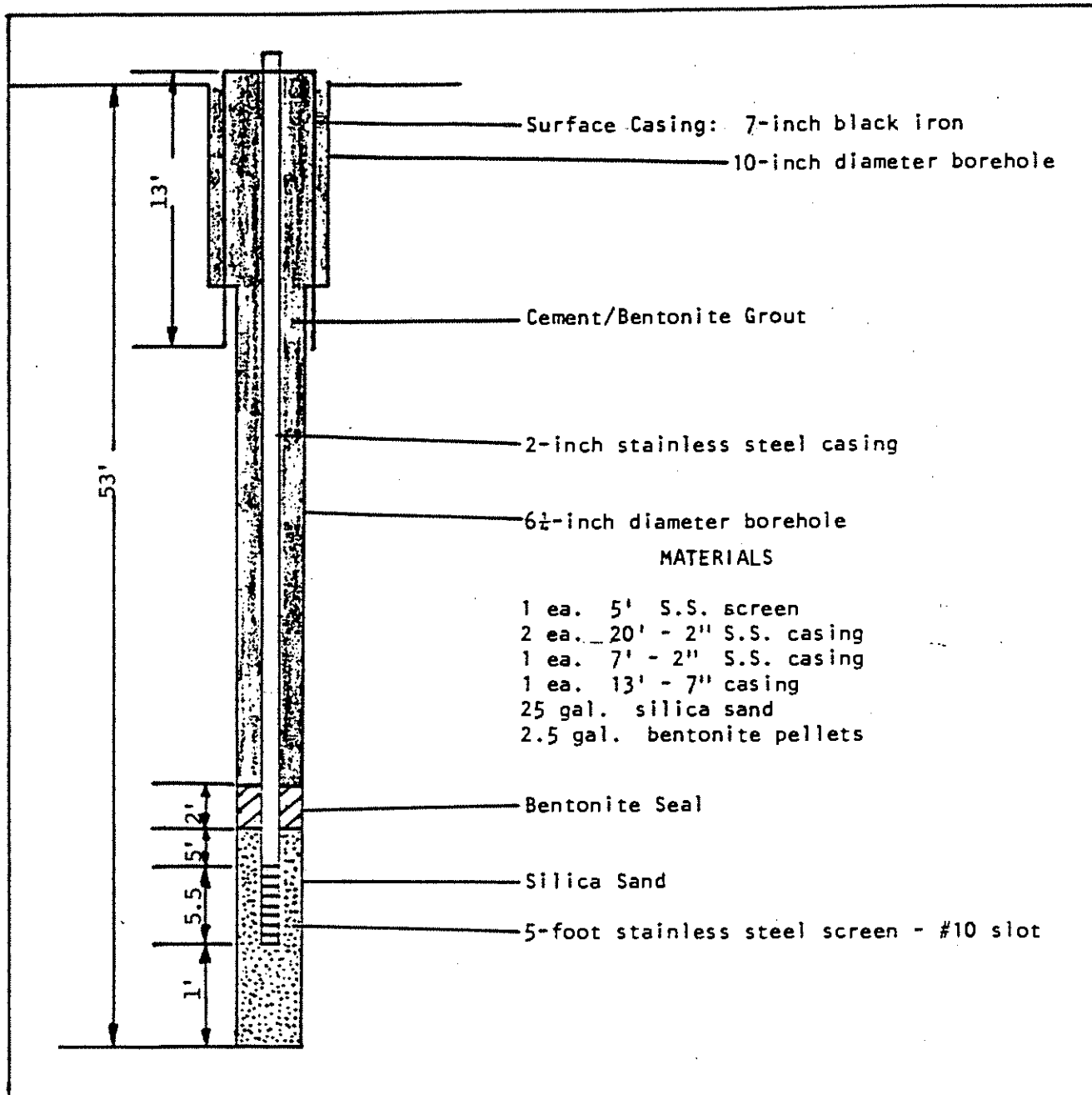
Environmental Engineering  
Geology, Biology and Chemistry



WELL IDENTIFICATION: DW -12

PLANT COORDINATES: 9283 N 3833 E

DATE COMPLETED: 10/30/86



OW-1 (26-17)

GEOPHYSICAL LOG ONLY

SEE APPENDIX 3

*Low Corning*

OW-2

Drilling in -

*midland-26*

Cleaning Out

## HUGH NELSON

~~Oil, Gas and~~ Water Well Service

PHONE LU-3-4571

FARWELL, MICHIGAN

*near Well house*

Order No. 39050-X-F  
McNroe well No. 6  
BX11/56

4 Inch casing				Formation			
		ft.	plus inches	From	0 ft. to	110 ft.	
1	--	22					sand.
2	--	22	" 4 "		10	" 25	clay.
3	--	22	" 6 "		35	" 105	hard pan and clay.
4	--	22	" 4 "		105	" 112	muddy sand, little
5	--	22	" 8 "				show of water.
6	--	22	" 2 "		112	" 165	Clay.
7	--	11	" 4 "		165	" 192	Muddy sand.
8	--	10	" 8 "		192	" 207	Fine sand, good wa-
9	--	20	" 4 "				ter.
10	--	10	" 8 "				
11	--	11	" 4 "				
Total 199 ft.							

### Description of well

Well bailed 25 gal. per minute. No draw down.  
Static water head 8 ft. from surface.

*#10 slot 10 ft. Lead pipe down.*

MIDLAND — 26

Down Cor. 4.

OW-3

Drilling r

#7 M

Cleaning Out

## HUGH NELSON

~~Oil and Gas~~ Water Well Service

PHONE ~~222~~ 126 Ludlow 3-4571

FARWELL, MICHIGAN

3/11/56  
Order #311  
A-5

4 Inch casing			Formation	
	From	To		
1-- 22 ft.	0	9 ft.	Sand	
2-- 21 ' plus 5 inches.	9 ft.	26 ' 26	Clay	
3-- 13 ' 6 "	26 ' 140	140 ' 145	clay and hard pan	
4-- 13 ' 9 "			Fine sand good show of water	
5-- 13 ' 3 "			to much silt, would not develop	
6-- 19 ' 2 "			out.	
7-- 19 ' 6 "	145 ' 163	163 ' 177	Clay	
8-- 19 ' 1 "			Fine sand. Lot of silt in sand	
9-- 13 ' 2 "			from 163 ft. to 172.	
10-- 13 ' 3 "				
Total 177 ft. plus 2 inches				

### Description of Well

7 ft. #10 Slot Johnson wire wound screen with lead packer, set at 177 ft in fine sand. 171 ft. 4 inch pipe in well.

Static water head . ft. from surface.

Well pumped 20 gal. per minute. No draw down.



*High Hill*

TEST 1

Formation:

<u>From</u>	<u>To</u>	
0	10	Sand
10	25	Clay
25	45	Clay Hard pan
45	68	Water Sand
68	81	Clay
81	90	Hard pan
90	100	Hard pan
100	110	Clay and gravel
110	120	Hard pan
120	135	Clay Hard pan
135	203	Clay
203	218	Water sand
218	236	Hard pan
236	250	gravel water bearing
250	270	gravel
270	282	gravel
282	310	gravel
310	330	gravel
330	340	gravel
340	355	gravel
355	370	gravel
370	375	gravel and coal
375	385	gravel
385	395	hard gravel some shale breaks
395	405	Hard gravel, some show sand rock
405	417	Sand rock, gravel and shale

Base of drift 405

Very good water bearing gravel from 320 ft. to 370 ft.

"45' top of water sand .

Top of water sand and gravel at 203

36 to 250 Hard pan and - some water

Good show water from 270 to 310

Base of Drift 405

Drilling time from 395 to 417 6 to 10 min per foot

our screens were  
set to test 335-37.

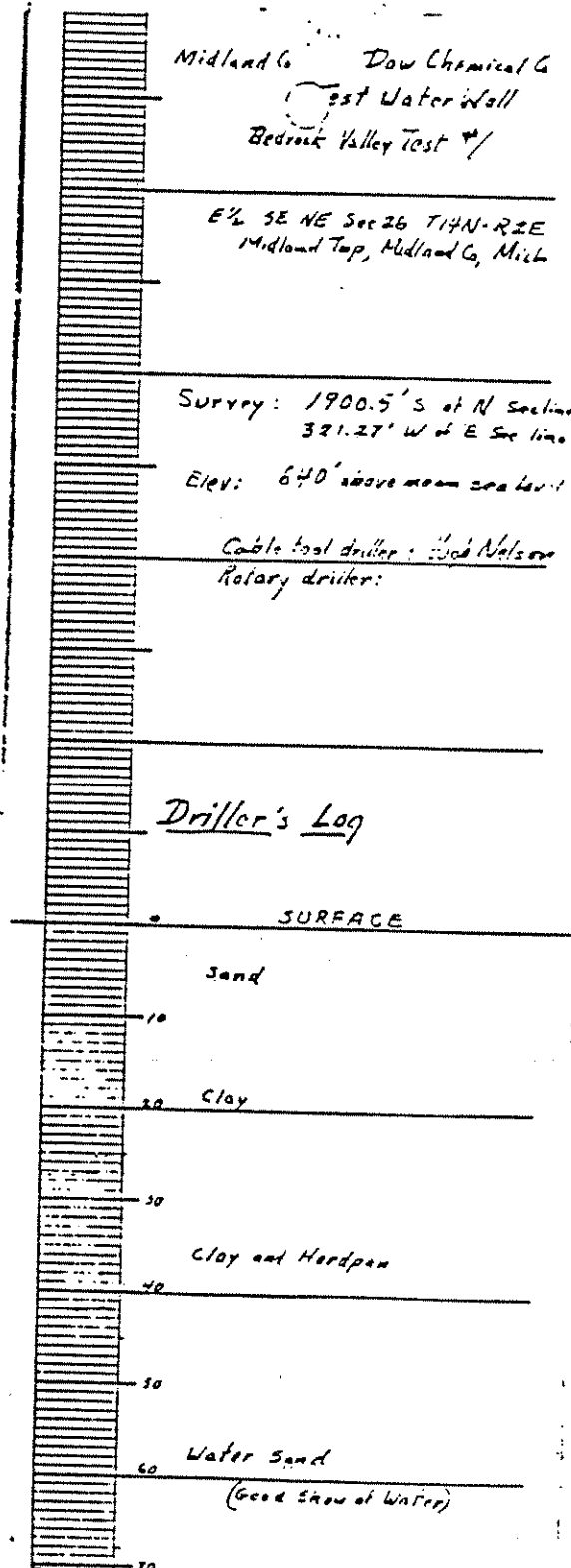
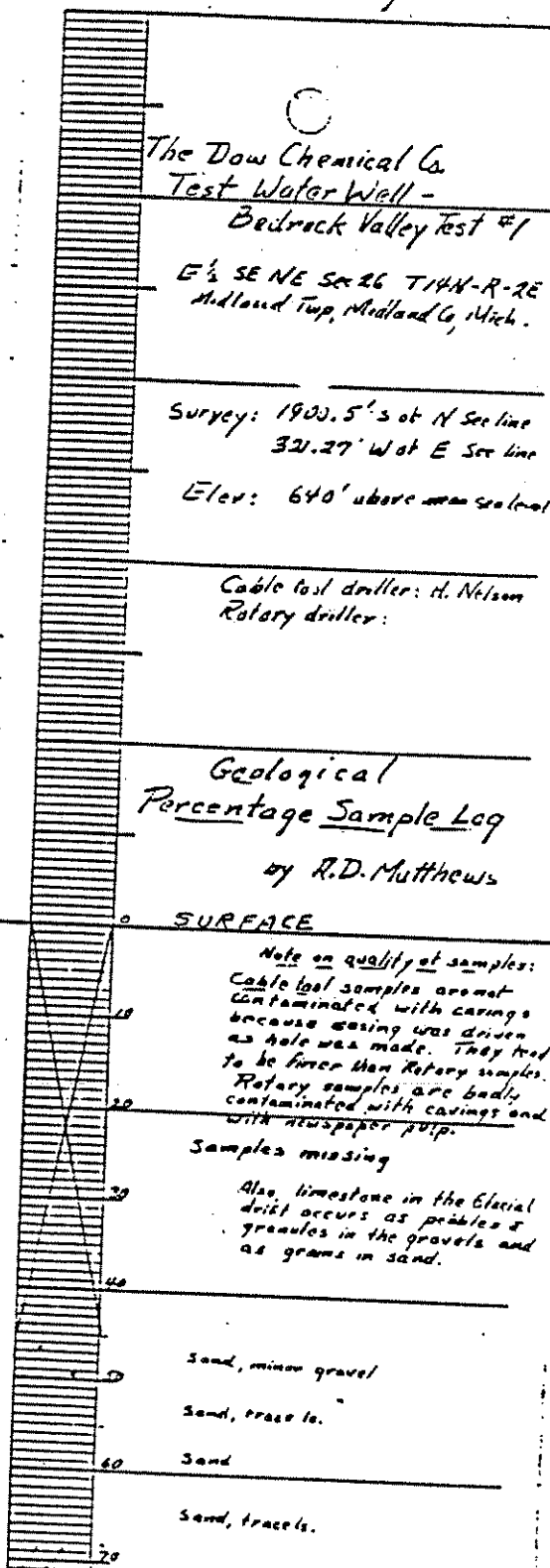
Test #

# Dow Bedrock Valley Test #1

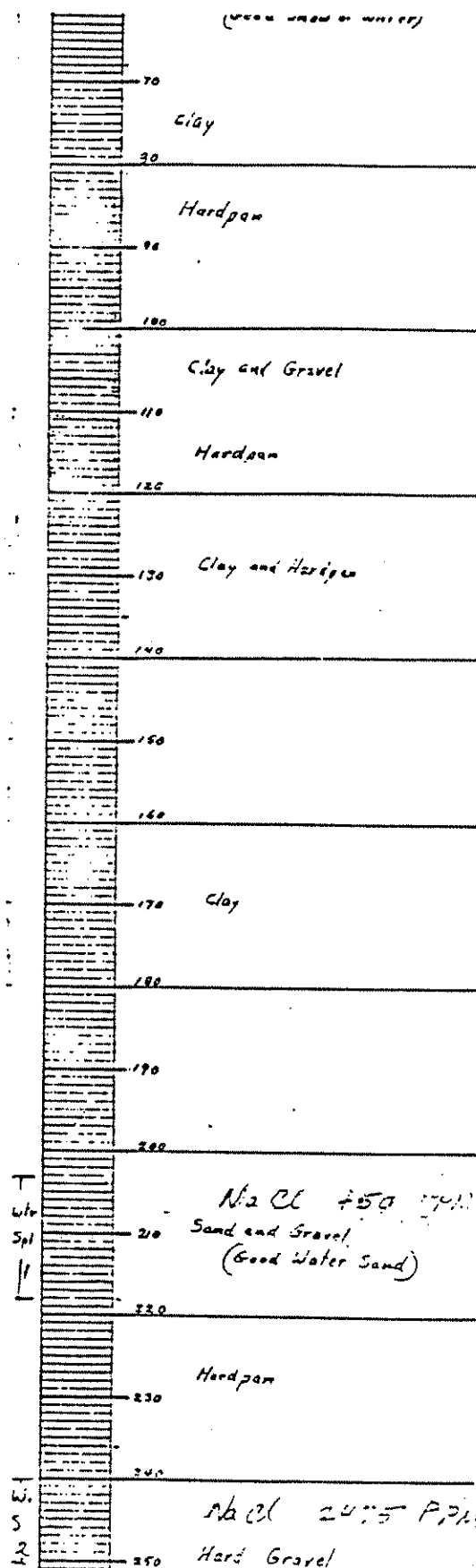
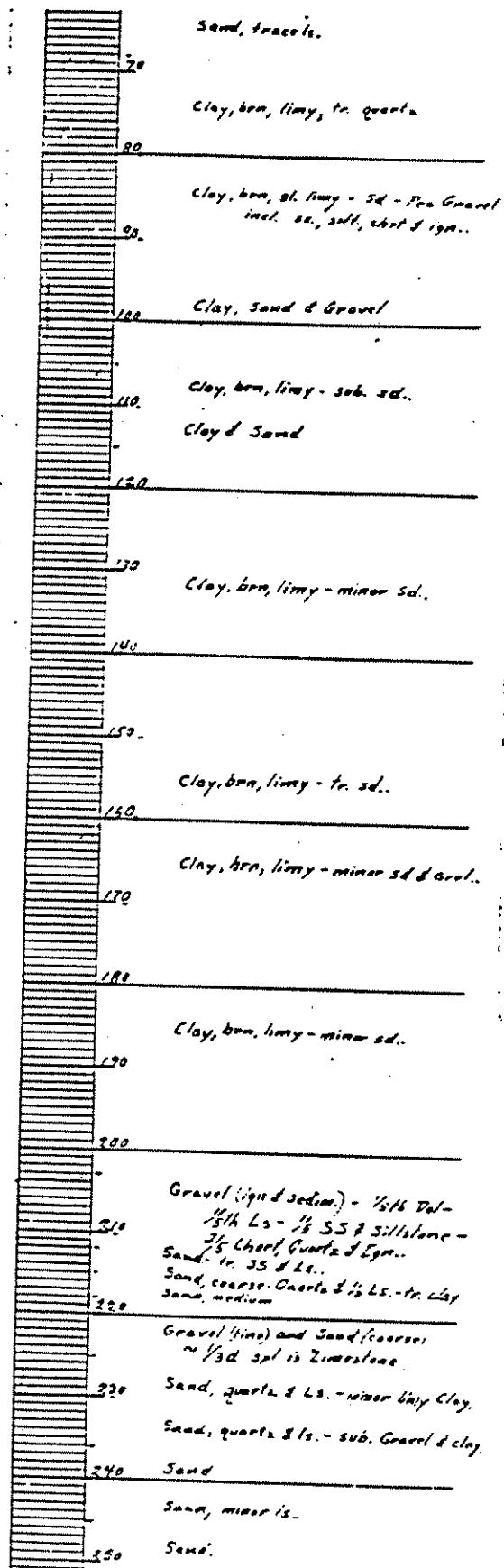
Sec 26

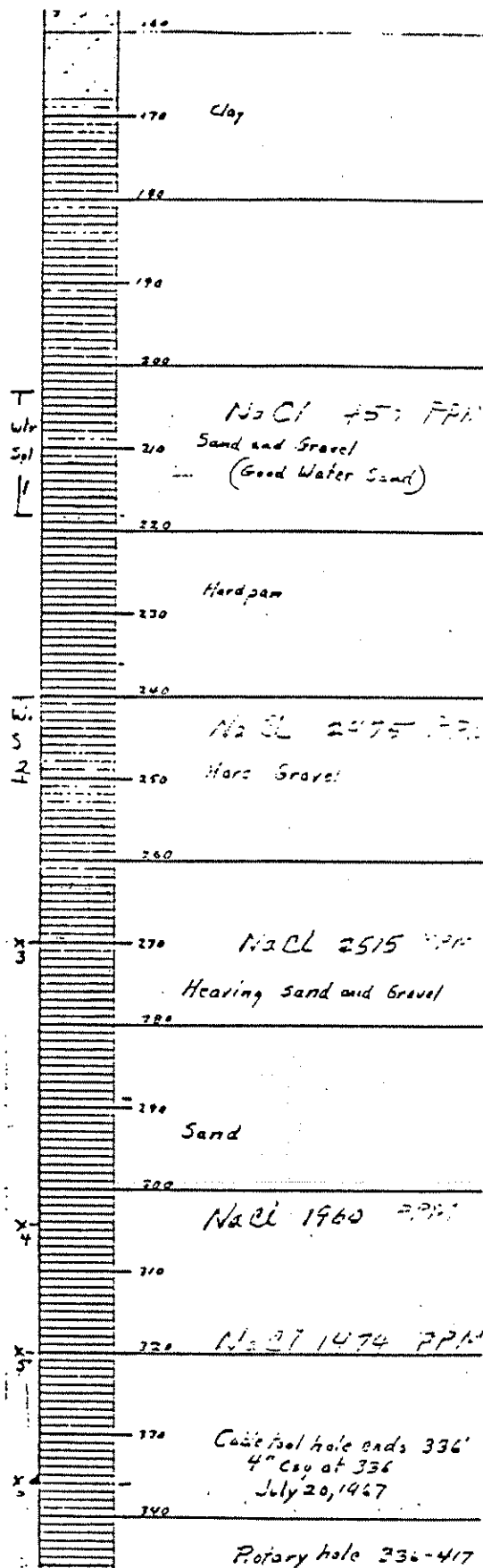
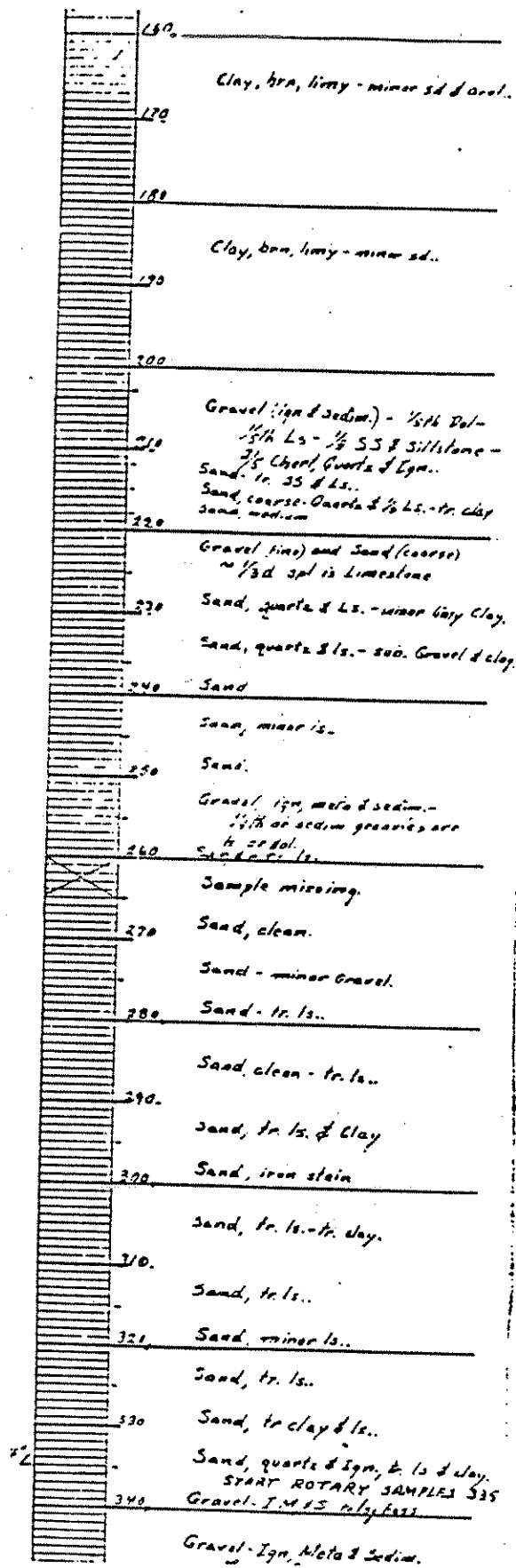
## Drillers Log

## Sample Log

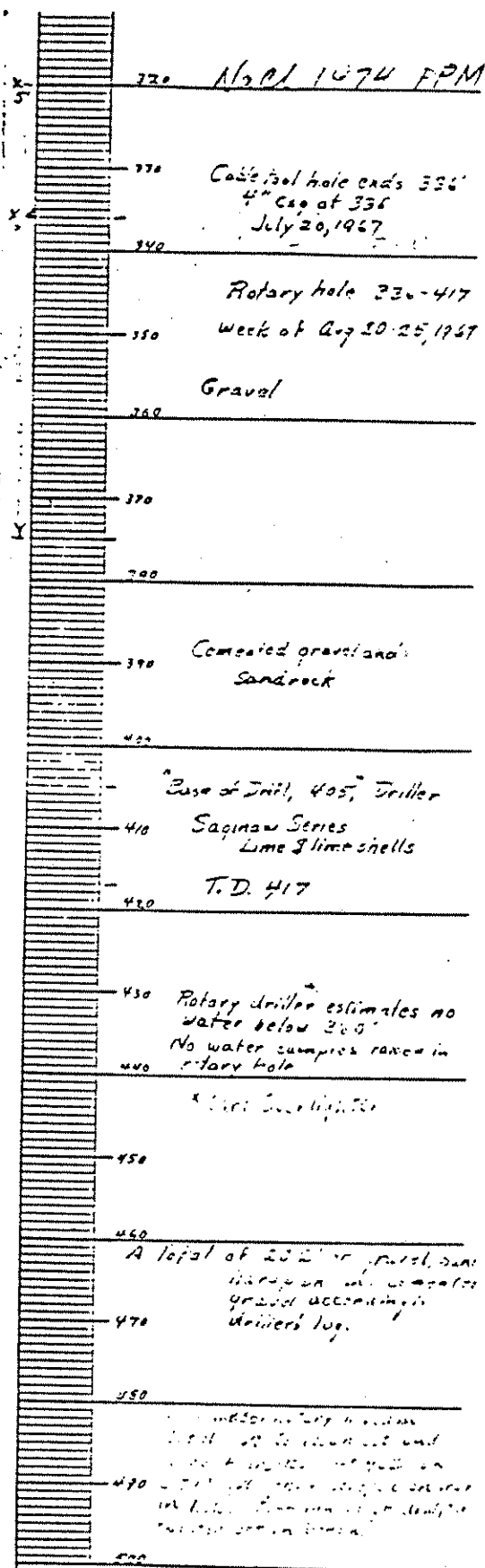
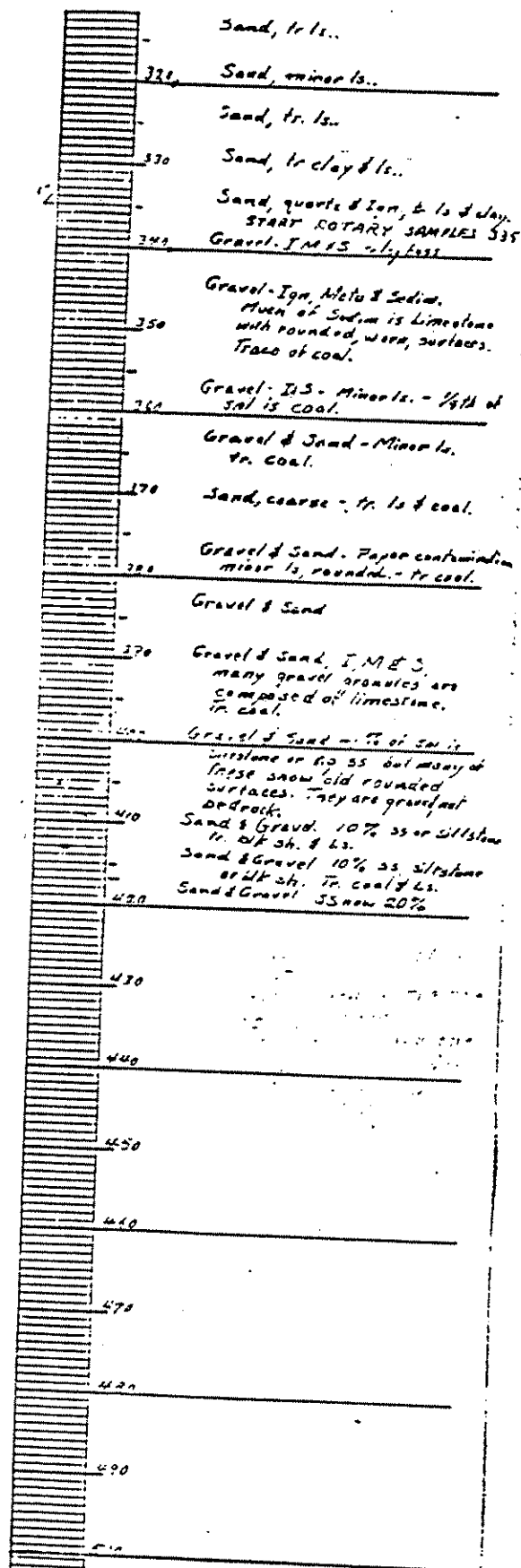


TEST 1





TEST 1



# LOG OF BORING NO. 3<sup>B</sup>-1

1778.67 ft. East and  
6262.21 ft. North

PROJECT DOW CORNING CORPORATION-MONITORING WELLS					SITE ACID SEWER NEUTRALIZATION						
BORING STARTED 11-2-82 COMPLETED 11-2-82					PROJECT NO. 82-212		SAMPLE TYPE S.S. _____ AUGER <u>X</u> SHELBY _____				
DEPTH IN FEET	LEGEND	SAMPLES	DESCRIPTION OF MATERIAL	SAMPLE NO.	STD. PENETRATION "N" BLOWS PER FOOT	UNIT NAT. WT. (lb./ft. <sup>3</sup> )	UNCONFINED COMPRESSIVE STRENGTH TONS/FT <sup>2</sup>				
							1	2	3	4	5
							PLASTIC LIMIT % X	WATER CONTENT % X	LIQUID LIMIT % △		
			SURFACE ELEVATION 618.3				10	20	30	40	50
0			Crushed gravel-10in. Clay-hard, brown, silty weathered with trace of sand & pebbles (CL)								
5			-less weathering at 5 ft.								
10			occasional sandy silt seams at 10 ft.								
15			End of Boring at 16'2"								
			2" SS #10 slot point set at 16'2". 2" schedule 80 riser pipe. Upper portion bentonite grouted, top concrete sealed.								
WATER LEVEL OBSERVATIONS							BAMTEST, INC. DRILLING & TESTING SERVICES				
W.L. None											
W.L.											

1790.0 ft. East and  
6265.0 ft. North

## LOG OF BORING NO. 3<sup>S</sup>-2

<b>PROJECT</b> DOW CORNING CORPORATION-MONITORING WELLS					<b>SITE</b> ACID SEWER NEUTRALIZATION						
<b>BORING</b> STARTED 11-2-82 COMPLETED 11-2-82					<b>PROJECT NO.</b> 82-212		<b>SAMPLE TYPE</b> S.S. _____ AUGER <u>X</u> SHELBY _____				
DEPTH IN FEET	LEGEND	SAMPLES	DESCRIPTION OF MATERIAL	SAMPLE NO.	STD. PENETRATION "N" BLOWS PER FOOT	UNIT MAT. WT. (lb./ft. <sup>3</sup> )	UNCONFINED COMPRESSIVE STRENGTH TONS/FT <sup>2</sup>				
							1	2	3	4	5
							<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: center;">             PLASTIC LIMIT % X           </div> <div style="text-align: center;">             WATER CONTENT % ⊗           </div> <div style="text-align: center;">             LIQUID LIMIT % △           </div> </div>				
			SURFACE ELEVATION 618.3'				10	20	30	40	50
0			Crushed gravel Clay-hard brown, silty, trace of sand & pebbles (CL)								
5			some weathering								
10			sandy silt seams near 10 ft., some seepage								
15											
20											
							2" SS #10 slot point set at 25'-6" below grade -2" schedule 80 PVC riser pipe -Upper section bentonite slurry sealed -Locking cap pipe concreted in place at top				
			Sand-medium compact, brown fine-wet								
25			Preconsolidated glacial till at 25'6"(End of Boring)								
<b>WATER LEVEL OBSERVATIONS</b>							<b>SAMTEST, INC.</b> DRILLING & TESTING SERVICES				
W.L. Initially at 20'6"											
W.L. Final level 16'6"											

## LOG OF BORING NO. SMN 6-1 (North West Side)

[illegible]



(LOWER S.W. SECTION OF  
LANDFILL)

[illegible]

# LOG OF BORING NO. SMW 7-1 (S.W. WELL)

<b>PROJECT</b> SHALLOW WELL MONITORING SYSTEMS HAZARDOUS WASTE LANDFILL				<b>SITE</b> DOW CORNING CORPORATION MIDLAND PLANT SITE			
<b>BORING</b>				<b>PROJECT NO.</b>		<b>SAMPLE TYPE</b>	
STARTED 1-7-83 COMPLETED 1-7-83				82-219		S.S. <u>X</u> AUGER <u>X</u> SHELBY	
DEPTH IN FEET	LEGEND	SAMPLES	DESCRIPTION OF MATERIAL	SAMPLE NO.	STD. PENETRATION "N" BLOWS PER FOOT	UNIT NAT. WT. LB./CU. FT.	UNCONFINED COMPRESSIVE STRENGTH TONS/FT <sup>2</sup>
							<div style="display: flex; justify-content: space-between;"> <span>1</span><span>2</span><span>3</span><span>4</span><span>5</span> </div> <div style="display: flex; justify-content: space-between;"> <span>PLASTIC LIMIT %</span><span>WATER CONTENT %</span><span>LIQUID LIMIT %</span> </div> <div style="display: flex; justify-content: space-between;"> <span>X</span><span>⊗</span><span>△</span> </div> <div style="display: flex; justify-content: space-between;"> <span>10</span><span>20</span><span>30</span><span>40</span><span>50</span> </div>
			SURFACE ELEVATION 625.0				
			Sand-brown, fine silty				
5			-gray, wet, water sand				
10			Clay-gray, silty, trace of sand & pebbles				
15			END OF BORING @ 12½ ft.				
			2 in. stainless steel screen set at El-612.6'				
<b>WATER LEVEL OBSERVATIONS</b>						SAMTEST, INC. DRILLING & TESTING SERVICES	
W.L. @ 620.1 ft.							
W.L.							

## LOG OF BORING NO. SMW 7-2 (Bottom-South East)

[illegible]

## LOG OF BORING NO. SMW 10-1 (N.E. WELL NEAR LINGLE DRAIN,

[illegible]

## LOG OF BORING NO. SMW 10-2 (S.E. WELL NEAR LINGLE DRAIN)

PROJECT		SHALLOW MONITORING WELL SYSTEMS HAZARDOUS WASTE LANDFILL		SITE		DOW CORNING CORPORATION MIDLAND PLANT SITE	
BORING				PROJECT NO.		SAMPLE TYPE	
STARTED 1-7-83 COMPLETED 1-7-83				82-219		S.S. <input checked="" type="checkbox"/> AUGER <input checked="" type="checkbox"/> SHELBY <input type="checkbox"/>	
DEPTH IN FEET	LEGEND	SAMPLES	DESCRIPTION OF MATERIAL	SAMPLE NO.	STB. PENETRATION IN BLOWS PER FOOT	UNIT WAT. WT. LB./CU. FT.	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. 2.
							1 2 3 4 5 PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT % 
			SURFACE ELEVATION 630.0				
			Sand-brown, fine silty				
			Clay-brown, silty with trace of sand & pebbles				
5			Topsoil-black				
			Clay-brown, silty with trace of sand & pebbles				
10							
			END OF BORING @ 12 ft.				
			2 in. stainless steel screen set at 618.0' El.				
WATER LEVEL OBSERVATIONS							S A M T E S T, I N C. DRILLING & TESTING SERVICES
W.L. @ 618.7 ft.							
W.L.							

# LOG OF BORING NO. 25<sup>n</sup>-1

2790.0' East and  
6375.0' North

PROJECT				SITE									
DOW CORNING CORPORATION-MONITORING WELLS				QUENCH POND MONITORING WELLS									
BORING			PROJECT NO.	SAMPLE TYPE									
STARTED 10-29-82 COMPLETED 10-29-82			82-212	S.S. _____ AUGER <input checked="" type="checkbox"/> SHELBY _____									
DEPTH IN FEET	LEGEND	SAMPLES	DESCRIPTION OF MATERIAL	SAMPLE NO.	STD. PENETRATION "N" BLOWS PER FOOT	UNIT WAT. WT. $\frac{lb}{ft^3}$	UNCONFINED COMPRESSIVE STRENGTH TONS/FT <sup>2</sup>						
							1	2	3	4	5		
			SURFACE ELEVATION — 619.6'										
			6" gravel with some clay										
			Clay-stiff, brown, silty, weathered (CL)										
5			-becoming darker										
10													
15													
20			End of Boring at 17 ft.										
			2" SS #10 slot gravel packed and set at 17 ft. 2" schedule 80 PVC pipe. Upper portion bentonite slurry sealed. Top concreted in place.										

WATER LEVEL OBSERVATIONS		S A M T E S T, I N C. DRILLING & TESTING SERVICES
W.L.	None	
W.L.		

# LOG OF BORING NO. 25<sup>n</sup>-2

2685.0' East and  
6177.0' North

PROJECT DOW CORNING CORPORATION-MONITORING WELLS					SITE QUENCH POND MONITORING WELLS						
BORING STARTED 11-2-82 COMPLETED 11-2-82					PROJECT NO. 82-212		SAMPLE TYPE S.S. _____ AUGER <u>X</u> SHELBY _____				
DEPTH IN FEET	LEGEND	SAMPLES	DESCRIPTION OF MATERIAL	SAMPLE NO.	STD. PENETRATION "N" BLOWS PER FOOT	UNIT NAT. WT. LB./FT. <sup>3</sup>	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. <sup>2</sup>				
							1	2	3	4	5
							PLASTIC LIMIT % X	WATER CONTENT % X	LIVID LIMIT % △		
			SURFACE ELEVATION 619.2'				10	20	30	40	50
			Gravel								
			Clay-stiff, brown, silty trace of sand & pebbles, some weathering								
5			-soft light brown, silty								
			-firm, light brown-wet								
10			-stiff, gray, silty, with sand & pebbles								
15											
20			Preconsolidated glacial till								
			End of Boring at 19'6"								
			2" SS #10 slot point, gravel packed. 2" schedule 80 PVC riser pipe bentonite grout sealed. Concrete anchor at top with 4" locking cap.								
WATER LEVEL OBSERVATIONS							SAMTEST, INC. DRILLING & TESTING SERVICES				
W.L. None encountered											
W.L.											

2495.0' East and  
6390.0' North

**SAMTEST, INC.**  
**DRILLING & TESTING SERVICES**



## LOG OF BORING NO. SMW 28-1 (Top-North West)

[illegible]

## LOG OF BORING NO. SMW 28-2 (Top-North East)

[illegible]

# Project: Dow Silicones Building 402 Cooling Tower

Project Location: The Dow Chemical Company

Project Number: 60623243

## Log of 400-258-19

Sheet 1 of 2

Date(s) Drilled	1-28-2020	Logged By	Victoria Wetzel	Checked By	V. Gautam
Drilling Method	Direct Push	Drill Bit Size/Type	3.5" OD	Total Depth of Borehole	40.0' bgs
Drill Rig Type	Geoprobe 8040DT	Drilling Contractor	Geoserv Inc.	Surface Elevation	619.00 ft above msl NAVD88
Borehole Backfill	Grout	Sampling Method(s)	Split Spoon	Hammer Data	DH101
Boring Location	N 8,164.9 E 1,800.0		Groundwater Level(s) ground water encountered at 14.5'		

Elevation, feet	Depth, feet	SAMPLES						Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER DETAILS
		Type	Number	Sampling Resist. Blows/6" OR CORE% RQD	Recovery, %	Pocket Pen, tsf				
0	0								618.0 loose, moist, light brown SAND (SW), with slag and gravel [FILL]	0.0
1	1									
2	2	SS-1		-	100	-			616.5 stiff, damp, brown with little gray mottling CLAY (CL), trace coarse sand, fractured	1.5
3	3	SS-2		-	100	-				
4	4									
5	5			5					613.0 becomes hard, with occasional pea sized gravel	5.0
6	6	SS-3		7	100	>4.5				
7	7			10						
8	8									
9	9	SS-4		5						
10	10			7	100	4.0				W%=15.3
11	11			10						
12	12									
13	13								606.0 becomes soft and moist	12.0
14	14	SS-5		3						
15	15			4	100	1.0			603.5 wet, brown SILT (ML), little fine sand	14.5
16	16			4					602.5 stiff, moist, brown CLAY (CL), with occasional pea sized gravel	15.5
17	17									
18	18									
19	19	SS-6			100	>4.5 at bottom				
20	20								598.0	20.0

Project: Dow Silicones Building 402 Cooling Tower

Project Location: The Dow Chemical Company

Project Number: 60623243

Log of 400-258-19

Sheet 2 of 2

Elevation, feet	Depth, feet	SAMPLES					Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER DETAILS
		Type	Number	Sampling Resist. Blows/6" OR CORE% ROD	Recovery, %	Pocket Pen, tsf			
20		SS-6			100			hard, damp, dark brown Clay (CL), with with some silt and fine sand, little coarse sand, trace pea sized gavel, occasional cobble [TILL]	W%=8.9
21									
22									
23									
24		SS-7		11 12 15	100	>4.5			
25									
26									
27									
28									
29		SS-8		16 22 27	100	>4.5			
30									
31									
32									
33									
34		SS-9		39 44 51	100	>4.5			
35									
36									
37									
38									
39		SS-10		12 24 51	100	>4.5			
40									
								End of Boring at 40' bgs	

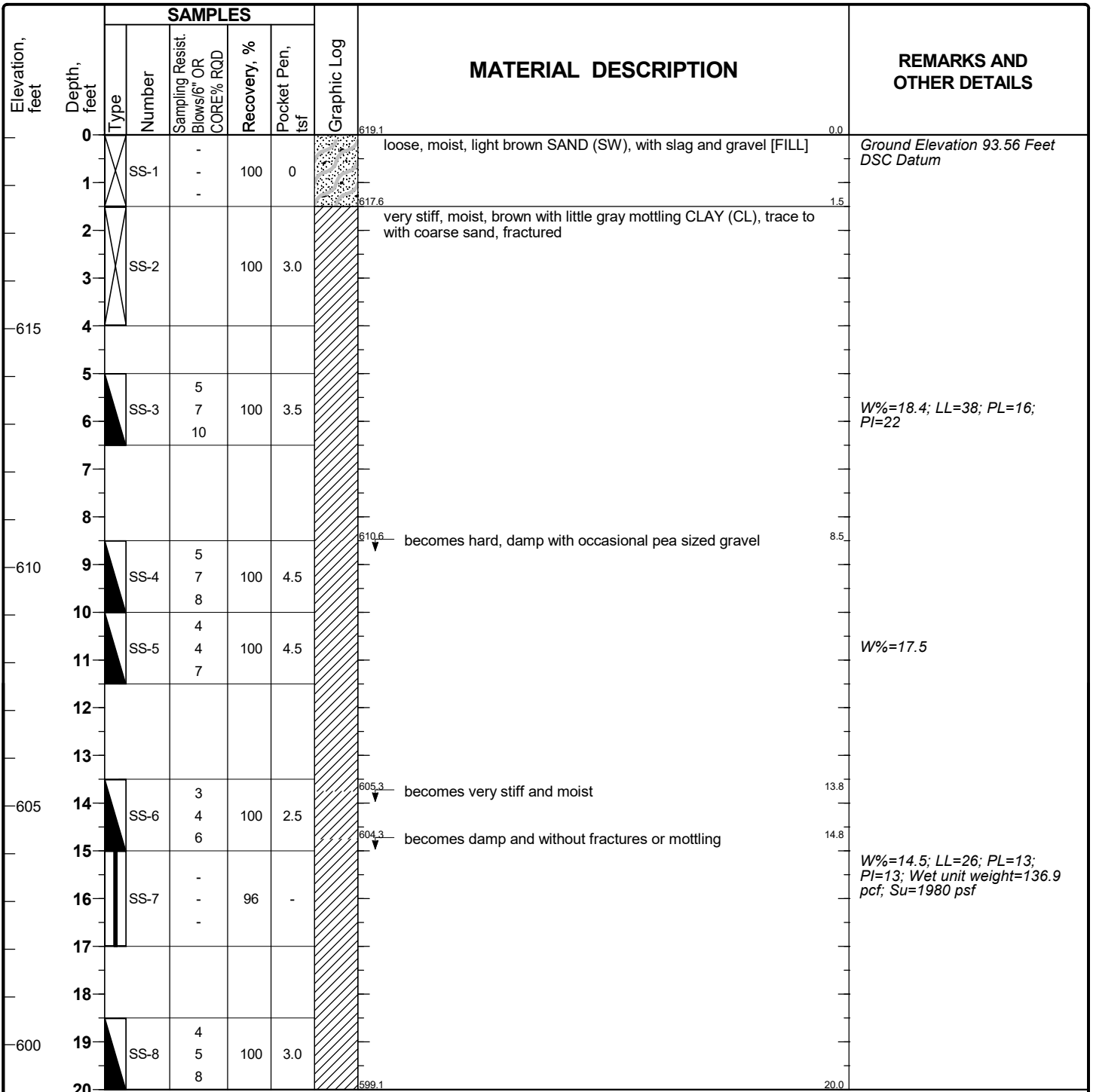
AECOM

**Project Number: 60623243**

## Log of 400-261-19


Sheet 1 of 2

Date(s) Drilled	1-28-2020	Logged By	Victoria Wetzel	Checked By	V. Gautam
Drilling Method	Direct Push	Drill Bit Size/Type	3.5" OD	Total Depth of Borehole	40.0' bgs
Drill Rig Type	Geoprobe 8040DT	Drilling Contractor	Geoserv Inc.	Surface Elevation	619.06 ft above msl NAVD88
Borehole Backfill	Grout	Sampling Method(s)	Split Spoon	Hammer Data	DH101
Boring Location	N 8,115.0 E 1,774.9	Groundwater Level(s)	None encountered		



Project Number: 60623243

Sheet 2 of 2

Elevation, feet	Depth, feet	SAMPLES					Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER DETAILS
		Type	Number	Sampling Resist. Blows/6" OR CORE% RQD	Recovery, %	Pocket Pen, tsf			
	20							hard, damp, dark brown Clay (CL), with with some silt and fine sand, little coarse sand, trace pea sized gavel, occasional cobble [TILL]	
	21								
	22								
	23								
595	24	SS-9	14 20 20	100	>4.5				
	25								
	26								
	27								
	28								
590	29	SS-10	68 for 2.5" - -	100	-				
	30								
	31								
	32								
	33								
585	34	SS-11	35 37 57	100	>4.5		W%=5.5		
	35								
	36								
	37								
	38								
580	39	SS-12	27 32 38	100	>4.5				
	40								

579.1

End of Boring at 40' bgs

40.0

**AECOM**

Project: 604 Building Soil Borings

Project Location: Dow Silicones-Midland, MI

Project Number: 60659450

# Log of 600NW-328-2021




Sheet 1 of 1

Date(s) Drilled	06/04/2021 - 06/04/2021	Logged By	Aaron Martin	Checked By	Todd Narlock
Drilling Method	Direct Push	Borehole Diameter	2.25"	Total Depth of Borehole	14.0' bgs
Drill Rig Type	Geoprobe 6620DT	Drilling Contractor	AECOM	Surface Elevation	Not Collected (FT)
Borehole Backfill	Portland Cement Grout with Barad 658	Sampling Method(s)	DT-22		
Boring Location	N 9,049.45 E 2,690.65			Groundwater Level(s)	Not Collected

Elevation, feet	Depth, feet	SAMPLES						MATERIAL DESCRIPTION	REMARKS AND OTHER DETAILS
		Type	Number	Recovery, %	Pocket Penetrometer, tsf	PID PPM	Graphic Log		
	0							Not Collected	0.0
								Poorly graded sand (SP) with gravel, fine grain, brown, loose, dry.	
	5							Poorly graded sand (SP), fine grain, tan to orange, dry, becomes moist 6.4' to 6.5'.	Borehole Grouted with Portland Cement with Barad 658 Additive
								Lean clay (CL), brown, firm.	
	10							Silt (ML), brown, dry.	Sample collected at 14.0'.
								Lean clay (CL), brown, firm.	Sample Name MH635-060421-SO-N-14
								End of Boring at 14' bgs	14.0

<b>Project: 604 Building Soil Borings</b> <b>Project Location: Dow Silicones-Midland, MI</b> <b>Project Number: 60659450</b>	<h2 style="margin: 0;">Log of 600NW-329-2021</h2> <p style="margin-top: 20px;">Sheet 1 of 1</p>
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Date(s) Drilled <b>06/04/2021 - 06/04/2021</b>	Logged By <b>Aaron Martin</b>	Checked By <b>Todd Narlock</b>
Drilling Method <b>Direct Push</b>	Borehole Diameter <b>2.25"</b>	Total Depth of Borehole <b>15.0' bgs</b>
Drill Rig Type <b>Geoprobe 6620DT</b>	Drilling Contractor <b>AECOM</b>	Surface Elevation <b>Not Collected (FT)</b>
Borehole Backfill <b>Portland Cement Grout with Barad 658</b>	Sampling Method(s) <b>DT-22</b>	
Boring Location <b>N 9,056.12 E 2,580.13</b>		Groundwater Level(s) <b>Not Collected</b>

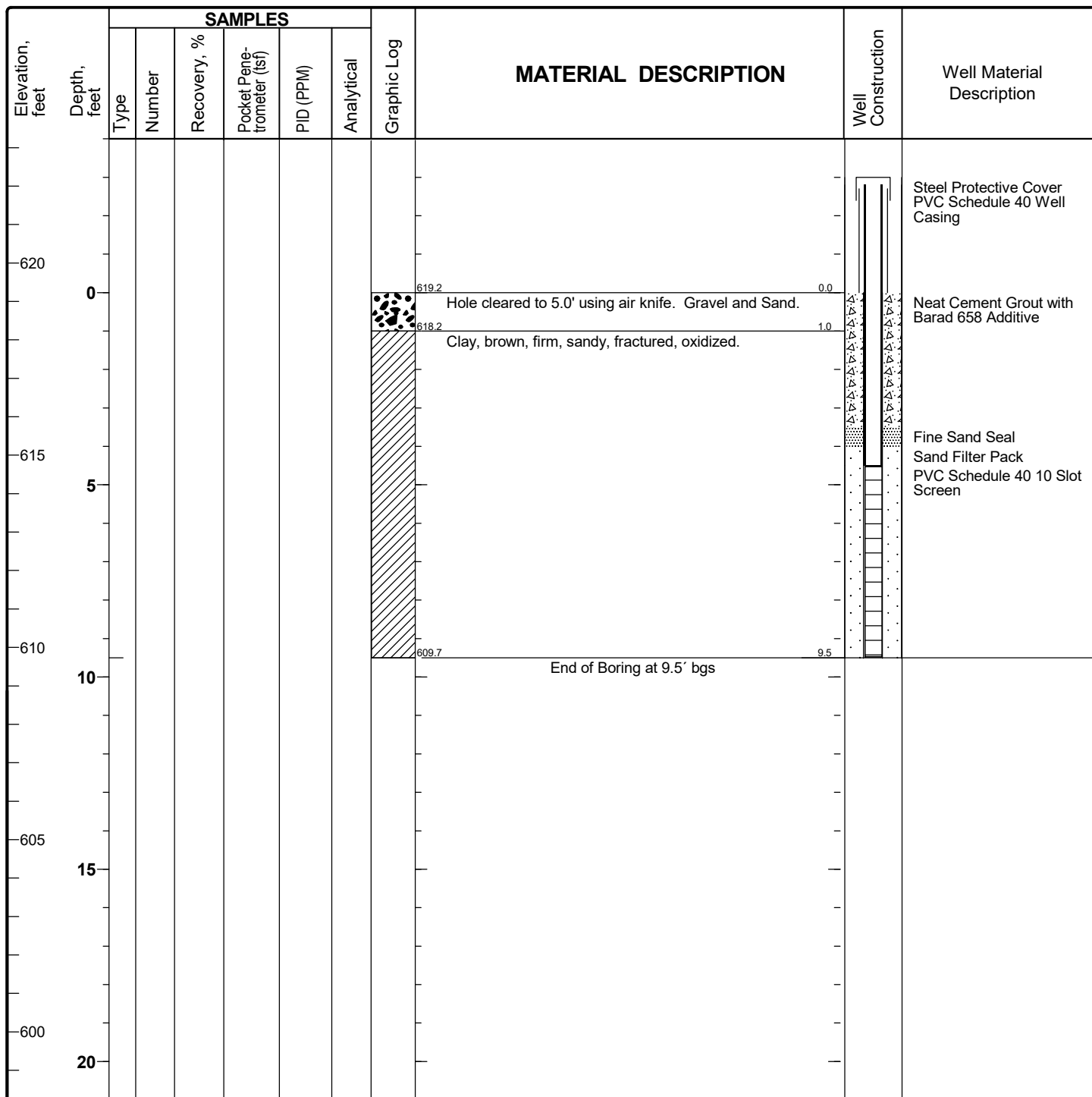
Elevation, feet	Depth, feet	SAMPLES						MATERIAL DESCRIPTION	REMARKS AND OTHER DETAILS
		Type	Number	Recovery, %	Pocket Penetrometer, tsf	PID PPM	Graphic Log		
	0							Not Collected 0.0	
								No Recovery, pushed rock with sampler.	
	5							Poorly graded sand (SP), fine grain, brown, loose, very wet.	Borehole Grouted with Portland Cement with Barad 658 Additive
	10							Lean clay (CL), brown, firm.	
								Lean clay (CL), brown, firm, chemical odor. PID reading of 5.0 PPM.	Sample collected at 10.0'. Sample Name MH613-060421-SO-N-10
									Sample collected at 14.0'. Sample Name MH613-060421-SO-N-14
	15							End of Boring at 15' bgs 15.0	



**Project: Dow Silicones Soil and Goundwater Investigation****Project Location: Dow Silicones - Midland, MI USA****Project Number: 60599506****Log of 2500-325-2020**

Sheet 1 of 1

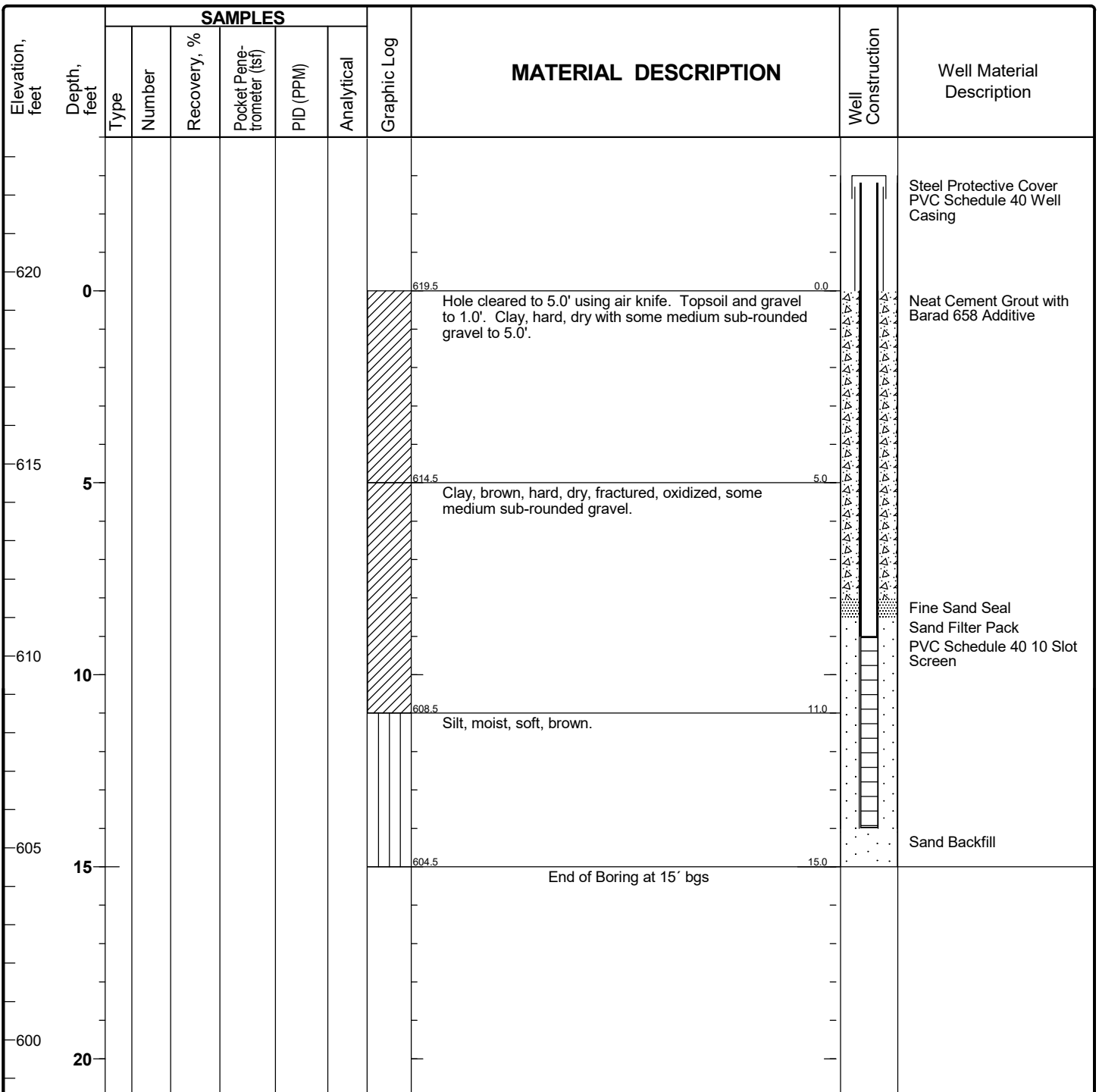
Date(s) Drilled	07/30/2020 - 07/30/2020	Logged By	Aaron Martin	Checked By	Elizabeth Plude
Drilling Method	Direct Push	Borehole Diameter	6"	Total Depth of Borehole	9.5'
Drill Rig Type	Geoprobe 8040	Drilling Contractor	Geoserv Inc	Surface Elevation	93.73 Dow East (FT)
Borehole Backfill	Neat Cement with Barad 658 Additive			Top of Casing	96.35 Dow East (FT)
Coordinate Location	N 6,798.72 E 2,770.56	Sampling Method(s)	Geoprobe DT60	Groundwater Level(s)	



**Project: Dow Silicones Soil and Goundwater Investigation****Project Location: Dow Silicones - Midland, MI USA****Project Number: 60599506****Log of 2500S-327-2020**

Sheet 1 of 1

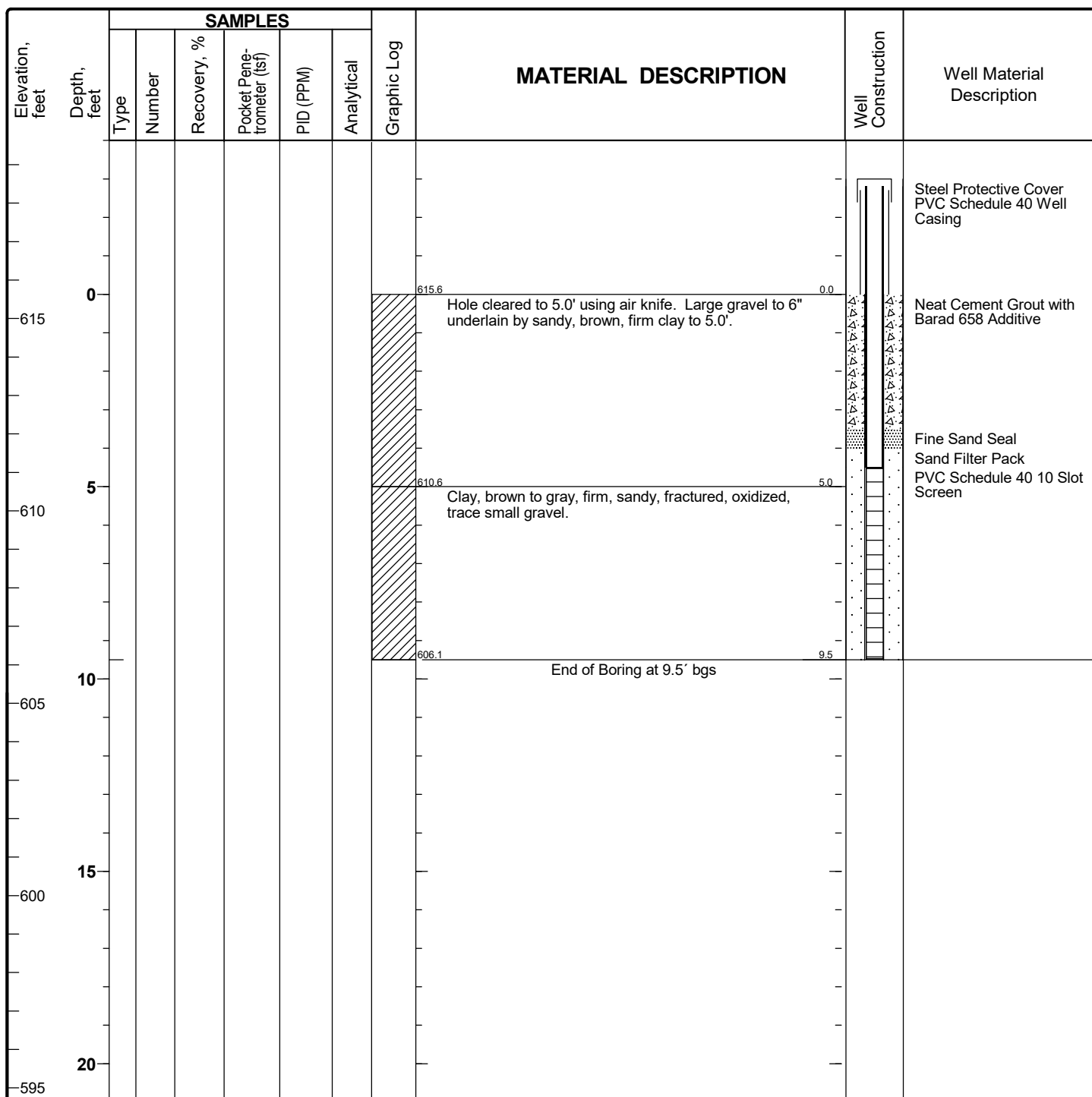
Date(s) Drilled	07/30/2020 - 07/30/2020	Logged By	Aaron Martin	Checked By	Elizabeth Plude
Drilling Method	Direct Push	Borehole Diameter	6"	Total Depth of Borehole	15.0 '
Drill Rig Type	Geoprobe 8040	Drilling Contractor	Geoserv Inc	Surface Elevation	94.01 Dow East (FT)
Borehole Backfill	Neat Cement with Barad 658 Additive			Top of Casing	96.55 Dow East (FT)
Coordinate Location	N 5,994.55 E 3,315.90	Sampling Method(s)	Geoprobe DT60	Groundwater Level(s)	



**Project: Dow Silicones Soil and Goundwater Investigation****Log of 300-322-2020****Project Location: Dow Silicones - Midland, MI USA****Project Number: 60599506**

Sheet 1 of 1

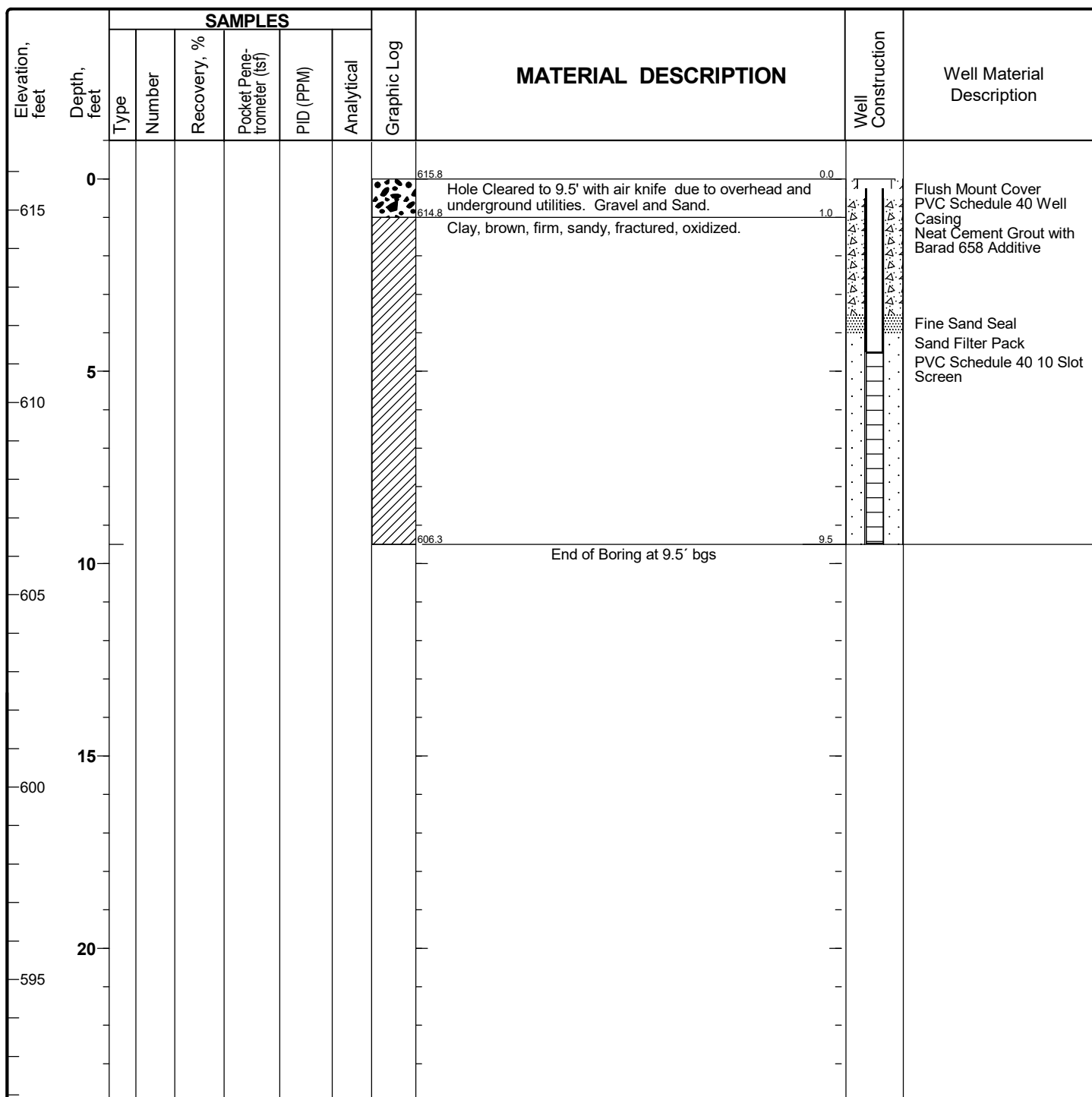
Date(s) Drilled	07/29/2020 - 07/29/2020	Logged By	Aaron Martin	Checked By	Elizabeth Plude
Drilling Method	Direct Push	Borehole Diameter	6"	Total Depth of Borehole	9.5'
Drill Rig Type	Geoprobe 8040	Drilling Contractor	Geoserv Inc	Surface Elevation	90.13 Dow East (FT)
Borehole Backfill	Neat Cement with Barad 658 Additive			Top of Casing	92.77 Dow East (FT)
Coordinate Location	N 7,333.30 E 1,650.80	Sampling Method(s)	Geoprobe DT60	Groundwater Level(s)	



**Project: Dow Silicones Soil and Goundwater Investigation****Project Location: Dow Silicones - Midland, MI USA****Project Number: 60599506****Log of 300-323-2020**

Sheet 1 of 1

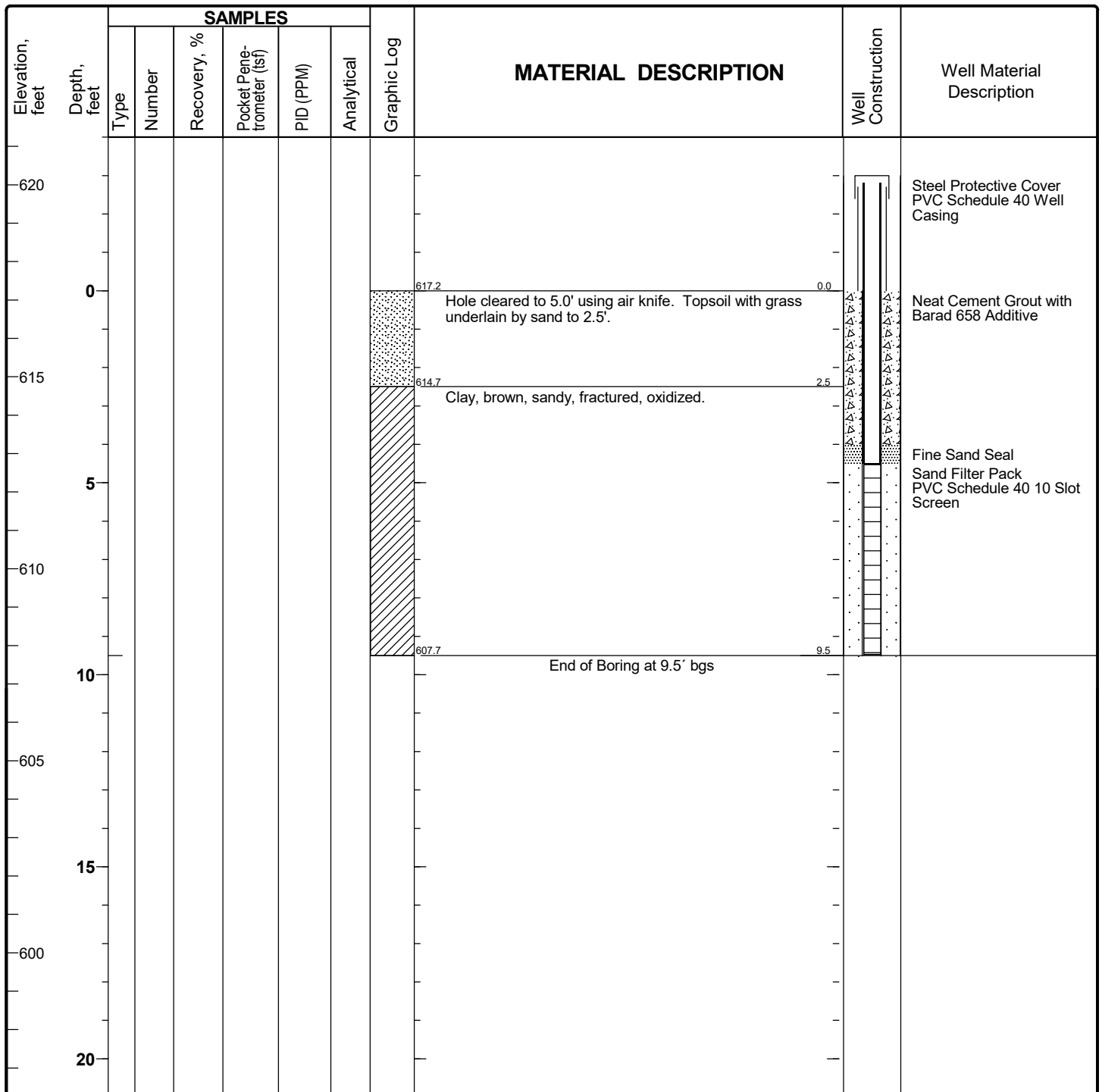
Date(s) Drilled	07/29/2020 - 07/29/2020	Logged By	Aaron Martin	Checked By	Elizabeth Plude
Drilling Method	Hand Auger	Borehole Diameter	6"	Total Depth of Borehole	9.5'
Drill Rig Type	Hand Auger/Air Knife	Drilling Contractor	Geoserv Inc	Surface Elevation	90.31 Dow East (FT)
Borehole Backfill	Neat Cement with Barad 658 Additive			Top of Casing	90.01 Dow East (FT)
Coordinate Location	N 7,300.67 E 1,965.16	Sampling Method(s)	Hand Auger	Groundwater Level(s)	



**Project: Dow Silicones Soil and Goundwater Investigation****Log of 300S-324-2020****Project Location: Dow Silicones - Midland, MI USA****Project Number: 60599506**

Sheet 1 of 1

Date(s) Drilled	07/28/2020 - 07/28/2020	Logged By	Aaron Martin	Checked By	Elizabeth Plude
Drilling Method	Direct Push	Borehole Diameter	6"	Total Depth of Borehole	9.5'
Drill Rig Type	Geoprobe 8040	Drilling Contractor	Geoserv Inc	Surface Elevation	91.74 Dow East (FT)
Borehole Backfill	Neat Cement with Barad 658 Additive			Top of Casing	94.01 Dow East (FT)
Coordinate Location	N 6,805.49 E 1,806.86	Sampling Method(s)	Geoprobe DT60	Groundwater Level(s)	



# Project: Dow Silicones Soil and Goundwater Investigation

Project Location: Dow Silicones - Midland, MI USA

Project Number: 60599506

## Log of 4700-326-2020

Sheet 1 of 1

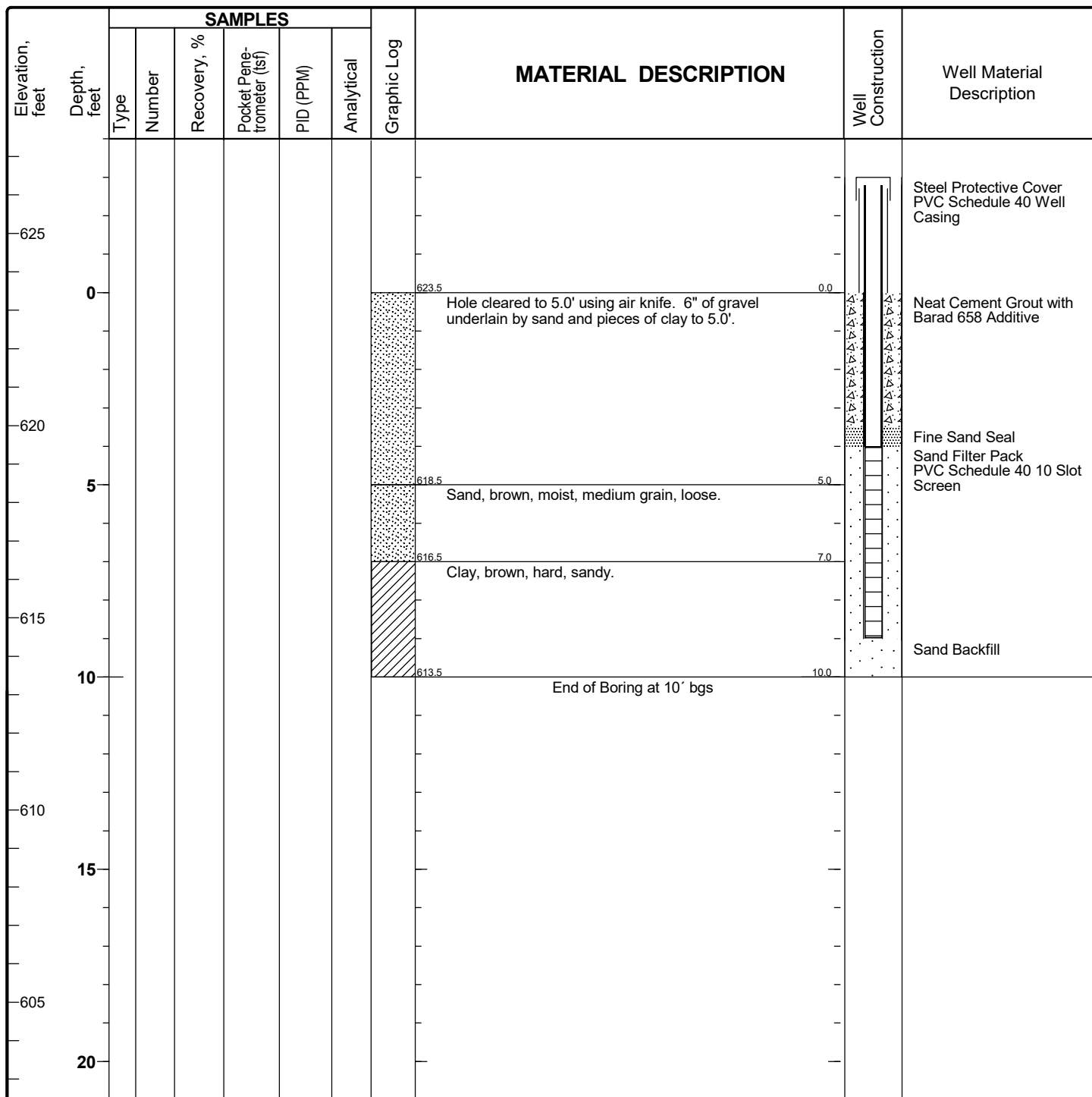
Date(s) Drilled	07/30/2020 - 07/30/2020	Logged By	Aaron Martin	Checked By	Elizabeth Plude
Drilling Method	Direct Push	Borehole Diameter	6"	Total Depth of Borehole	15.0'
Drill Rig Type	Geoprobe 8040	Drilling Contractor	Geoserv Inc	Surface Elevation	93.00 Dow East (FT)
Borehole Backfill	Neat Cement with Barad 658 Additive			Top of Casing	95.77 Dow East (FT)
Coordinate Location	N 6,013.28 E 2,617.79	Sampling Method(s)	Geoprobe DT60	Groundwater Level(s)	

Elevation, feet	Depth, feet	SAMPLES						Graphic Log	MATERIAL DESCRIPTION	Well Construction	Well Material Description
		Type	Number	Recovery, %	Pocket Penetrometer (tsf)	PID (PPM)	Analytical				
620	0										Steel Protective Cover PVC Schedule 40 Well Casing
								618.5	Hole cleared to 5.0' with air knife. Sand and gravel to 1.0'.		Neat Cement Grout with Barad 658 Additive
								617.5	Clay, brown, hard, dry, sandy with some medium sub-rounded gravel to 5.0'.		
615	5							613.5	Sand, medium grain, brown to orange, dry, loose.		
								610.5	Clay, brown, firm, fractured, oxidized, sandy.		Fine Sand Seal
610	10							609.5	Clay, brown, firm, fractured, oxidized, sandy to silty, large vertical fracture.		Sand Filter Pack
								604.5	Clay till, gray, sandy, hard, trace small to medium gravel.		PVC Schedule 40 10 Slot Screen
605	15							603.5	End of Boring at 15' bgs		Sand Backfill
600	20										

**Project: Dow Silicones Soil and Goundwater Investigation****Log of 600-319-2020****Project Location: Dow Silicones - Midland, MI USA****Project Number: 60599506**

Sheet 1 of 1

Date(s) Drilled	07/27/2020 - 07/27/2020	Logged By	Aaron Martin	Checked By	Elizabeth Plude
Drilling Method	Direct Push	Borehole Diameter	6"	Total Depth of Borehole	10.0 '
Drill Rig Type	Geoprobe 8040	Drilling Contractor	Geoserv Inc	Surface Elevation	97.96 Dow East (FT)
Borehole Backfill	Neat Cement with Barad 658 Additive			Top of Casing	100.96 Dow East (FT)
Coordinate Location	N 8,522.61 E 2,792.55	Sampling Method(s)	Geoprobe DT60	Groundwater Level(s)	



**Project: Dow Silicones Soil and Goundwater Investigation****Log of 600-320-2020****Project Location: Dow Silicones - Midland, MI USA****Project Number: 60599506**

Sheet 1 of 1

Date(s) Drilled	07/27/2020 - 07/27/2020	Logged By	Aaron Martin	Checked By	Elizabeth Plude
Drilling Method	Direct Push	Borehole Diameter	6"	Total Depth of Borehole	8.0'
Drill Rig Type	Geoprobe 8040	Drilling Contractor	Geoserv Inc	Surface Elevation	96.66 Dow East (FT)
Borehole Backfill	Neat Cement with Barad 658 Additive			Top of Casing	99.55 Dow East (FT)
Coordinate Location	N 8,071.76 E 2,872.17	Sampling Method(s)	Geoprobe DT60	Groundwater Level(s)	

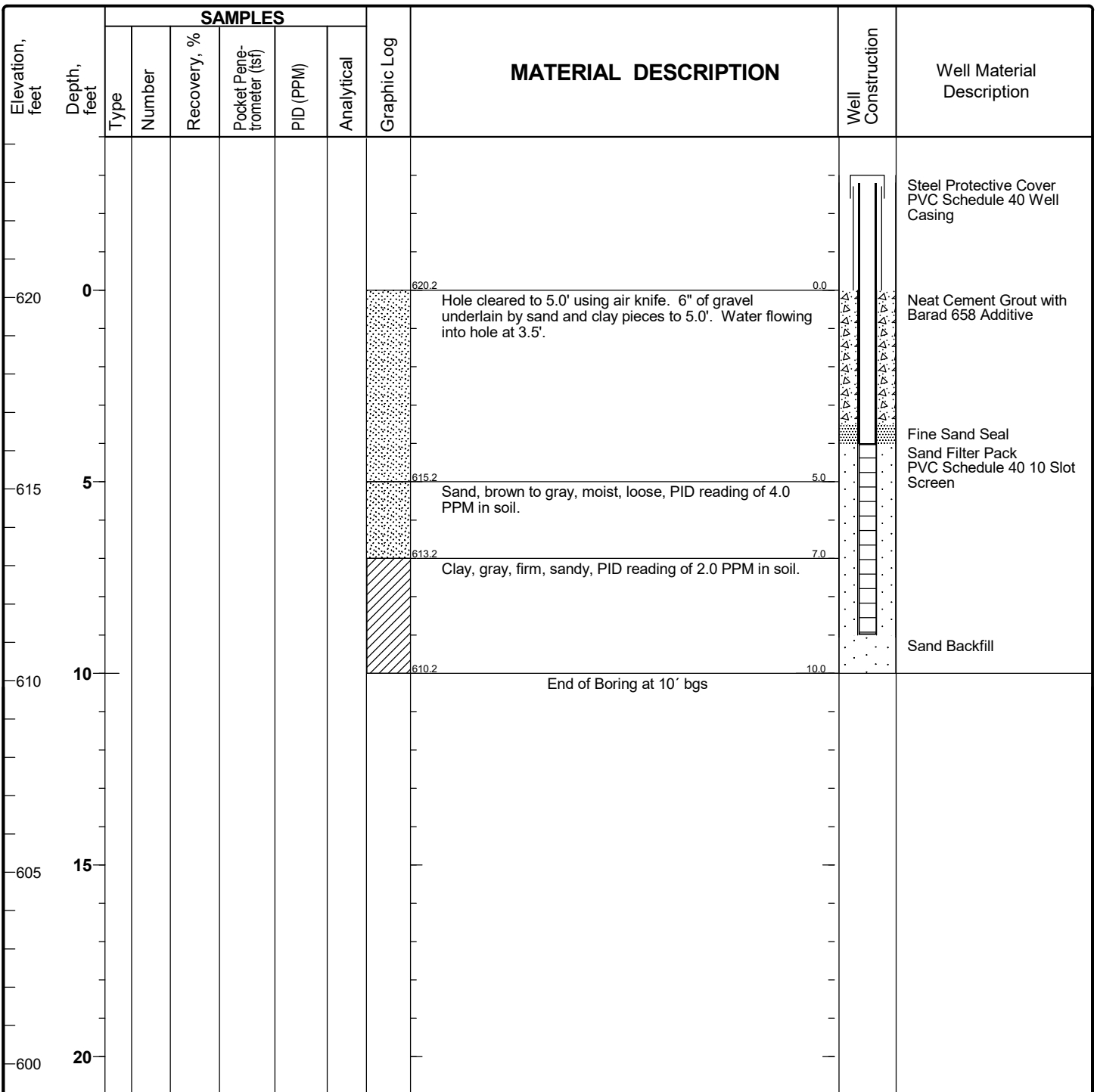
Elevation, feet	Depth, feet	SAMPLES						Graphic Log	MATERIAL DESCRIPTION	Well Construction	Well Material Description
		Type	Number	Recovery, %	Pocket Penetrometer (tsf)	PID (PPM)	Analytical				
625											Steel Protective Cover PVC Schedule 40 Well Casing
	0							622.2	Hole cleared to 5.0' using air knife. 6" of gravel underlain by sand and clay pieces to 5.0'.		Neat Cement Grout with Barad 658 Additive
620											Fine Sand Seal
	5							617.2	Sand, brown, moist, medium grain, loose.		Sand Filter Pack
								616.7	Clay, brown, hard, sandy.		PVC Schedule 40 10 Slot Screen
615								614.2	End of Boring at 8' bgs		
	10										
610											
	15										
605											
	20										



## Log of 600-321-2020

Sheet 1 of 1

Sheet 1 of 1



The Keck SR 3000 borehole logging system consists of two separate units, a standard chain drive cable reel assembly and the SR 3000 control console. The logging probes are attached to the 1,500 foot long cable using quick disconnect marsh-marine connectors. The connectors are capable of withstanding pressures up to 20,000 psi (approximately 8,000 feet below ground surface). Analog recording is accomplished with two potentiometric Servo chart recorders. Recorder gain settings vary from .1 to 10 and can be used to increase the instrument data resolution. The system operates on 12 volts DC.

The gamma ray scintillation probe detects the presence of gamma radiation emitted from a radioactive isotope of potassium ( $K^{40}$ ). The probe is 1.375 inches in diameter and 30 inches long and includes a low to high voltage converter, a photo multiplier tube, a sodium iodide crystal, and pulse processing circuitry.

The resistivity probe measures the average formation resistivity. The probe is 1.5 inches in diameter and 15 feet long. Electrodes are mounted at .25 feet, 2.5 feet, and 10 feet spacings. A four-electrode system known as the normal arrangement is used. Two of the electrodes, one current and one potential, are mounted within the logging probe. The other two electrodes are fixed on the ground surface near the borehole. Using this arrangement, an average resistivity for the formation between the downhole electrodes is calculated.

# GEOPHYSICAL LOG

Project No. 85553 Well or Boring No. 2366 (35-12) Date 11-27-79  
 Client DOW CHEMICAL COMPANY Tested by MEB

## LOCATION

State MICHIGAN County MIDLAND Township MIDLAND  
NE 1/4 NW 1/4 NE 1/4 Section 35 T 14 N R 3 E  
 Distance GRID COORDINATES - 62+77 S, 77+66 E

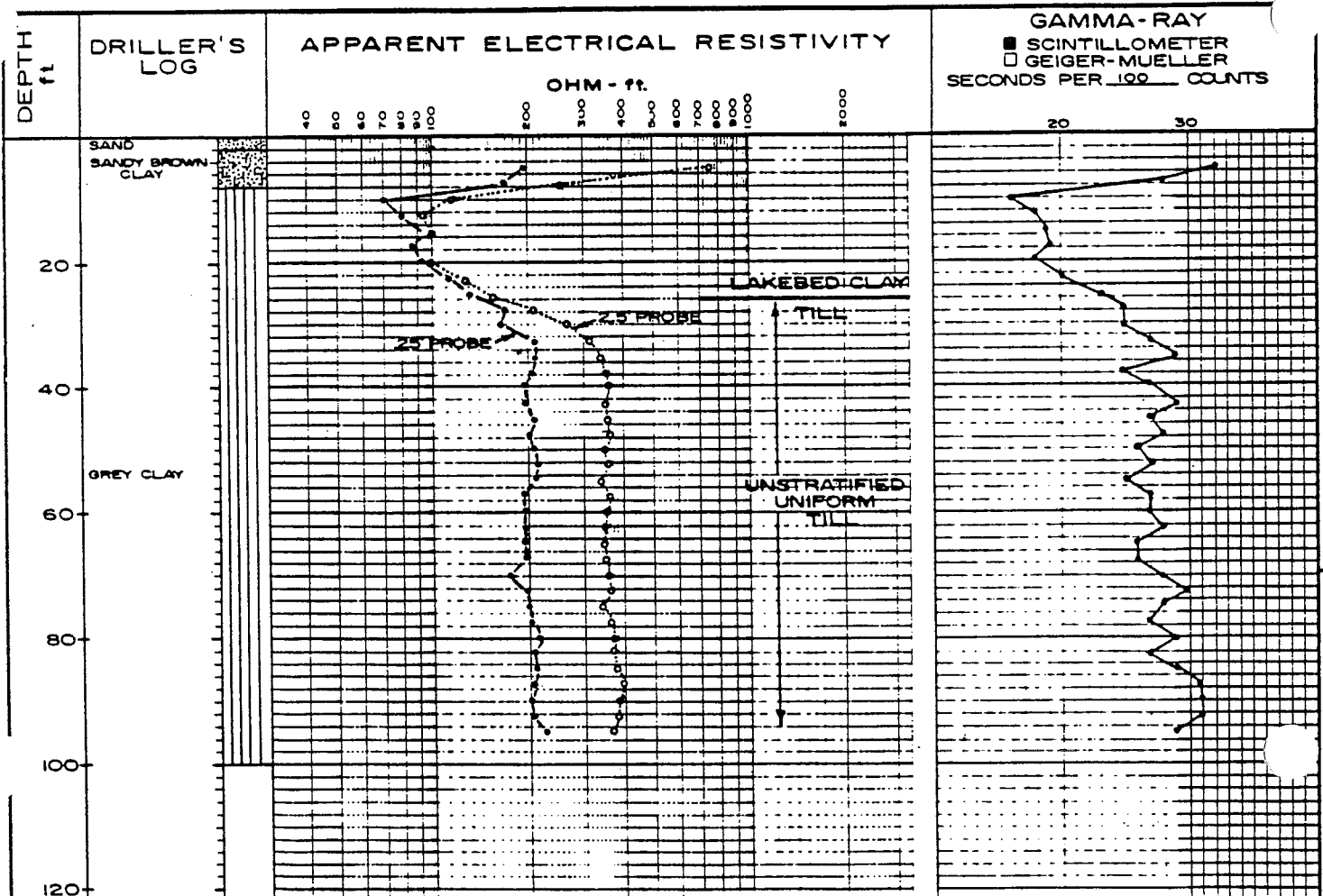
OWNER DOW CHEMICAL COMPANY Address MIDLAND, MICHIGAN  
 CONTRACTOR KLEINFELT DRILLING CO. Address CHARLOTTE, MICHIGAN

## WELL AND LOG DATA

Type of Well EXPLORATORY BORING Depth 100 ft. Diameter 6 1/4 in.

## ELEVATIONS

Land Surface 626.2 ft. <sup>ABOVE</sup> M.S.L. (~~Est'd, Rept'd~~, Meas'd)  
 Top of Casing \_\_\_\_\_ ft. <sup>ABOVE</sup> <sub>BELOW</sub> Land Surface  
 Log Datum LAND SURFACE  
 Water Table Depth 9 FEET



# GEOPHYSICAL LOG

Project No. 85553 Well or Boring No. 2373 (35-13) Date 11-28-79  
 Client DOW CHEMICAL COMPANY Tested by MEB

## LOCATION

State MICHIGAN County MIDLAND Township MIDLAND  
NE 1/4 NE 1/4 NW 1/4 Section 35 T 14 N R 2 E  
 Distance GRID COORDINATE- 66+17S, 63+56E

OWNER DOW CHEMICAL COMPANY Address MIDLAND, MICHIGAN  
 CONTRACTOR KLEINFELT DRILLING CO. Address CHARLOTTE, MICHIGAN

## WELL AND LOG DATA

Type of Well EXPLORATORY BORING Depth 100 ft. Diameter 6 1/4 in.

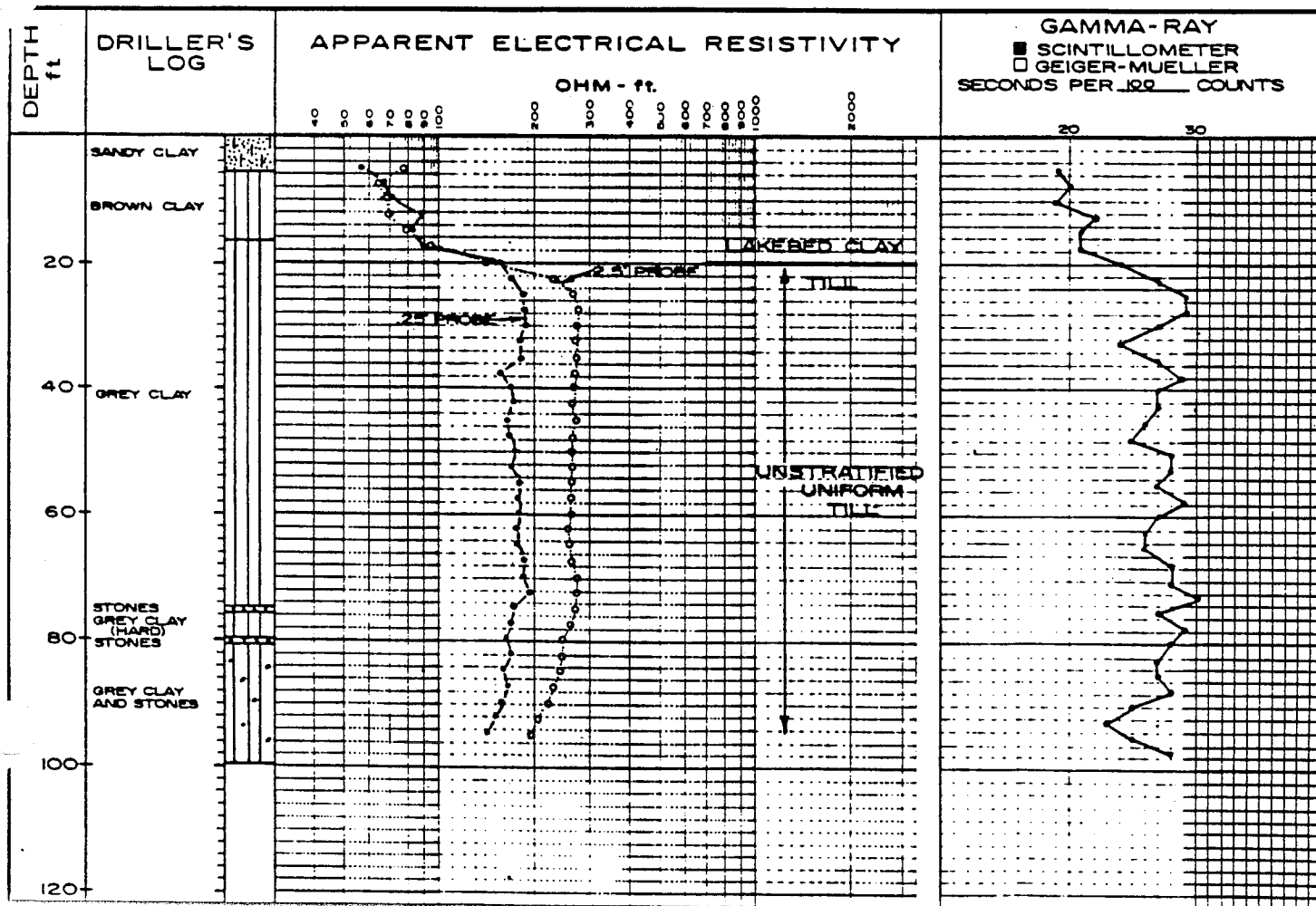
## ELEVATIONS

Land Surface 620.9 ft. <sup>ABOVE</sup> ~~MSL~~ M.S.L. (~~From Report~~, Meas'd)

Top of Casing \_\_\_\_\_ ft. <sup>ABOVE</sup> ~~BELOW~~ Land Surface

Log Datum LAND SURFACE

Water Table Depth < 5 FEET



# GEOPHYSICAL LOG

Project No. 85553 Well or Boring No. 2388 (35-11) Date 11-29-79  
 Client DOW CHEMICAL COMPANY Tested by MEB

## LOCATION

State MICHIGAN County MIDLAND Township MIDLAND  
SW 1/4 NE 1/4 NE 1/4 Section 35 T 14 N R 2 E  
 Distance GRID COORDINATES - 72+17 S, 84+06 E

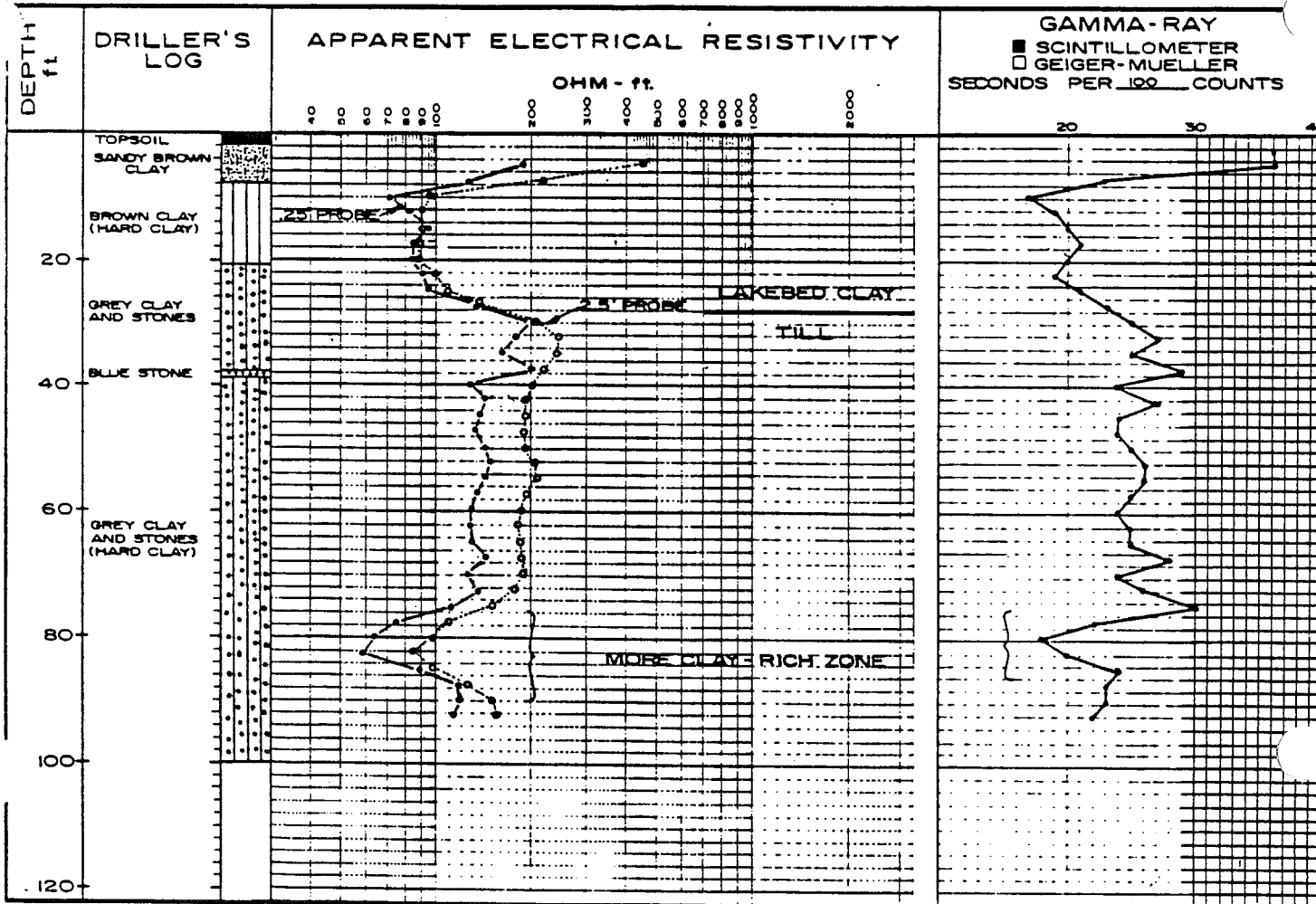
OWNER DOW CHEMICAL COMPANY Address MIDLAND, MICHIGAN  
 CONTRACTOR KLEINFELT DRILLING CO. Address CHARLOTTE, MICHIGAN

## WELL AND LOG DATA

Type of Well EXPLORATORY BORING Depth 100 ft. Diameter 6 1/4 in.

## ELEVATIONS

Land Surface 626.8 ft. <sup>ABOVE</sup> M.S.L. (~~Earth~~, ~~Rept'd~~, Meas'd)  
 Top of Casing \_\_\_\_\_ ft. <sup>ABOVE</sup> <sub>BELOW</sub> Land Surface  
 Log Datum LAND SURFACE  
 Water Table Depth APPROX. 9 FT.



# GEOPHYSICAL LOG

Project No. 85553 Well or Boring No. 2396 (35-10) Date 11-28-79  
Client DOW CHEMICAL COMPANY Tested by MEB

**LOCATION**

State MICHIGAN County MIDLAND Township MIDLAND  
NE 1/4 SW 1/4 NE 1/4 Section 35 T 14 N R 2 E  
 Distance GRID COORDINATES - 79+14 S, 74+98 E

OWNER DOW CHEMICAL COMPANY Address MIDLAND, MICHIGAN  
CONTRACTOR KLEINFELT DRILLING CO. Address CHARLOTTE, MICHIGAN

## WELL AND LOG DATA

Type of Well EXPLORATORY BORING Depth 100 ft. Diameter 6 1/4 in.

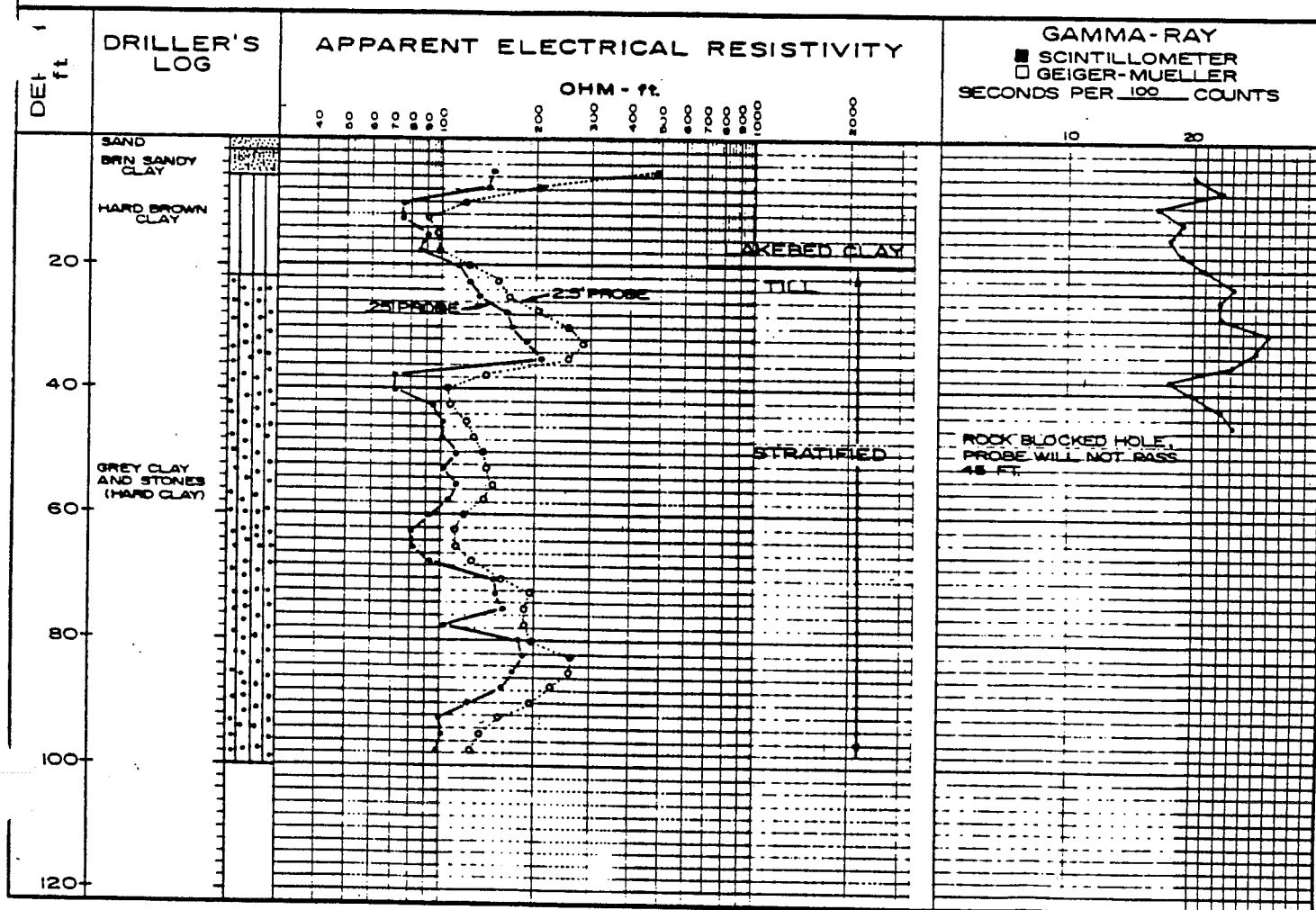
## ELEVATIONS

Land Surface 627.7 ft. <sup>ABOVE</sup> ~~SEAS~~ M.S.L. (~~Est'd, Rept'd, Meas'd~~)

Top of Casing \_\_\_\_\_ ft. ABOVE  
BELOW Land Surface

Log Datum LAND SURFACE

Water Table Depth APPROX. 11 FEET



# GEOPHYSICAL LOG

Project No. 85553 Well or Boring No. 2402 (35-9) Date 11-27-79

Client DOW CHEMICAL COMPANY Tested by MEB

## LOCATION

State MICHIGAN County MIDLAND Township MIDLAND

SE 1/4 SE 1/4 NE 1/4 Section 35 T 14 N R 2 E

Distance GRID COORDINATES-

OWNER DOW CHEMICAL COMPANY Address MIDLAND, MICHIGAN

CONTRACTOR KLEINFELT DRILLING CO Address CHARLOTTE, MICHIGAN

## WELL AND LOG DATA

Type of Well EXPLORATORY BORING Depth 100 ft. Diameter 6 1/4 in.

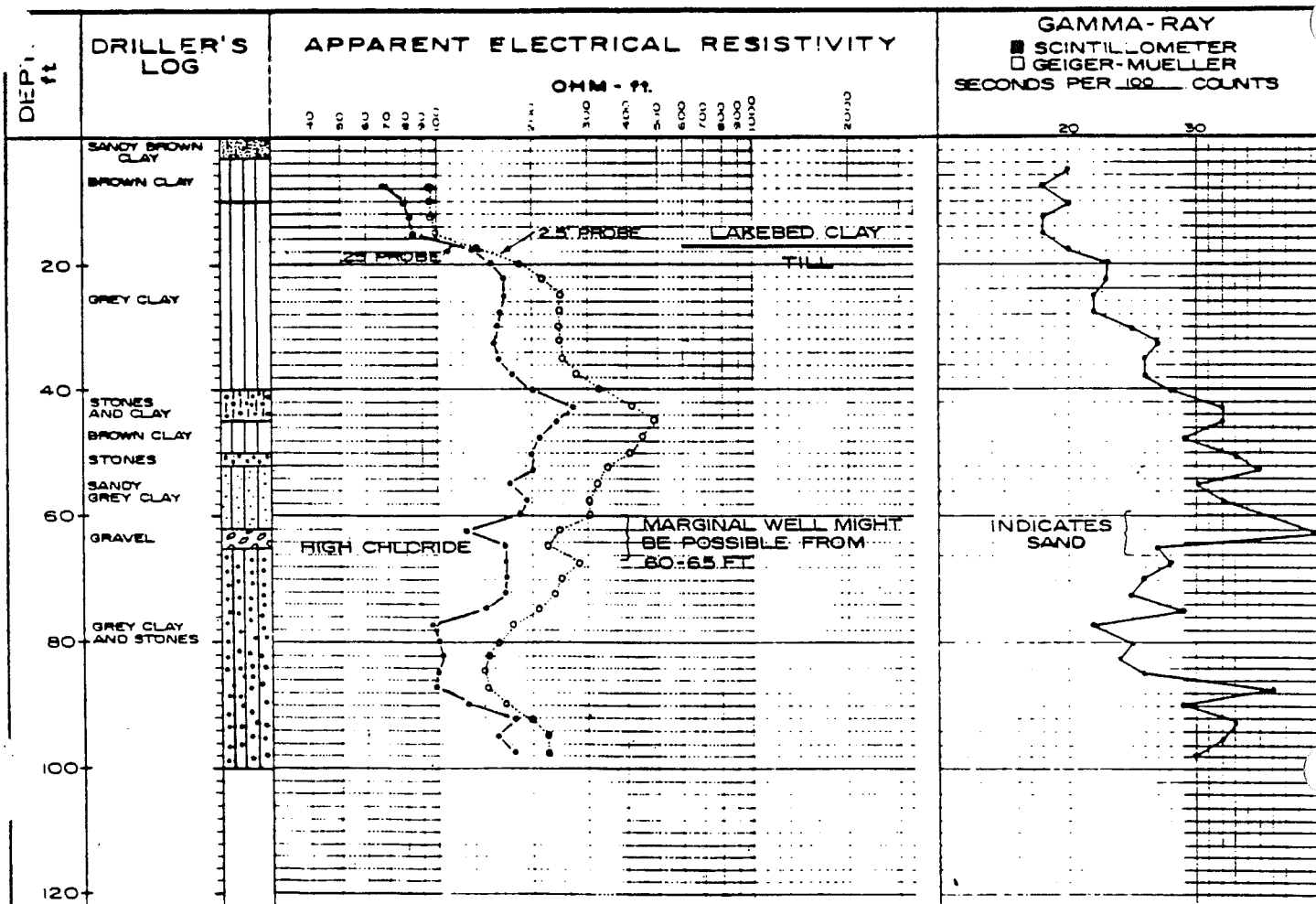
## ELEVATIONS

Land Surface 624.9 ft. ABOVE M.S.L. (~~Est'd, Rept'd~~, Meas'd)

Top of Casing \_\_\_\_\_ ft. ABOVE BELOW Land Surface

Log Datum LAND SURFACE

Water Table Depth < 8 FT



# GEOPHYSICAL LOG

Project No. 85553 Well or Boring No. 2396 (35-10) Date 11-28-79  
 Client DOW CHEMICAL COMPANY Tested by MEB

## LOCATION

State MICHIGAN County MIDLAND Township MIDLAND  
NE 1/4 SW 1/4 NE 1/4 Section 35 T 14 N R 2 E  
 Distance GRID COORDINATES - 79+14S, 74+98E

OWNER DOW CHEMICAL COMPANY Address MIDLAND, MICHIGAN  
 CONTRACTOR KLEINFELT DRILLING CO. Address CHARLOTTE, MICHIGAN

## WELL AND LOG DATA

Type of Well EXPLORATORY BORING Depth 100 ft. Diameter 6 1/4 in.

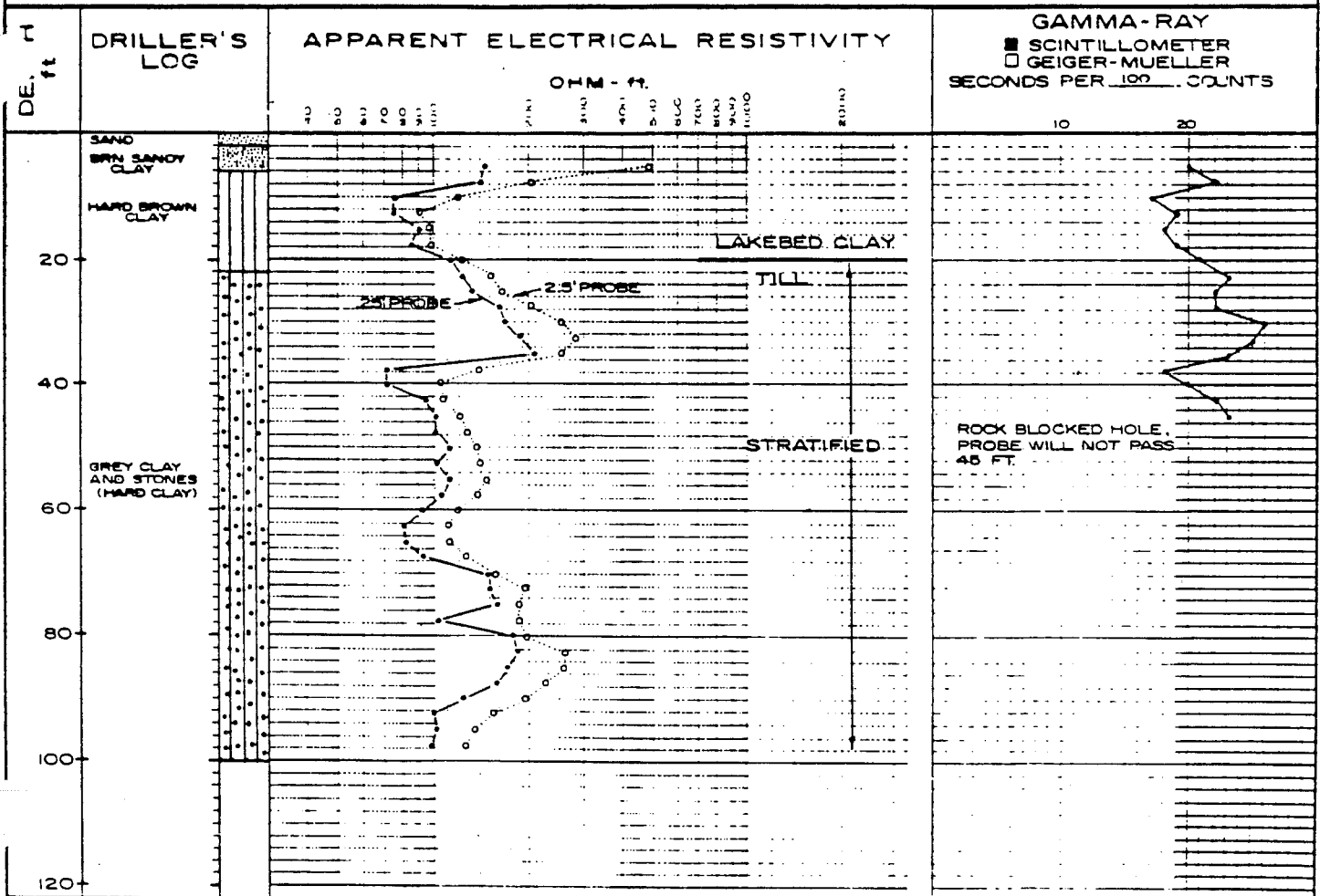
## ELEVATIONS

Land Surface 627.7 ft. ABOVE M.S.L. (EST'D, Rep'd, Meas'd)

Top of Casing \_\_\_\_\_ ft. ABOVE Land Surface

Log Datum LAND SURFACE

Water Table Depth APPROX. 11 FEET





# GEOPHYSICAL LOG

Project No. 85553 Well or Boring No. 2388 (35-11) Date 11-29-79  
 Client DOW CHEMICAL COMPANY Tested by MEB

## LOCATION

State MICHIGAN County MIDLAND Township MIDLAND  
SW 1/4 NE 1/4 NE 1/4 Section 35 T 14 N R 2 E  
 Distance GRID COORDINATES - 72+175, 84+06 E

OWNER DOW CHEMICAL COMPANY Address MIDLAND, MICHIGAN  
 CONTRACTOR KLEINFELT DRILLING CO. Address CHARLOTTE, MICHIGAN

## WELL AND LOG DATA

Type of Well EXPLORATORY BORING Depth 100 ft. Diameter 6 1/4 in.

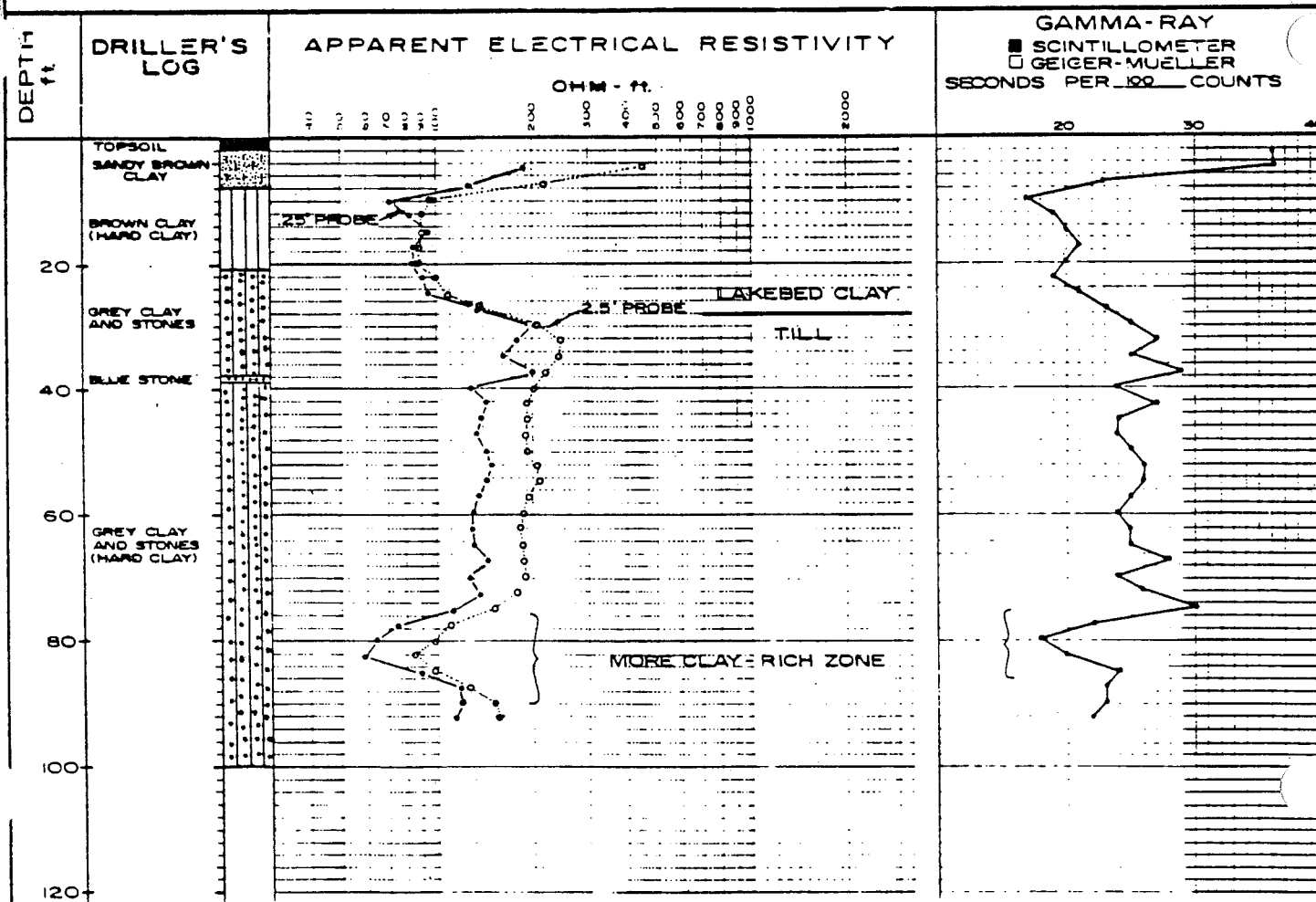
## ELEVATIONS

Land Surface 626.8 ft. <sup>ABOVE</sup> M.S.L. (~~Elev'd~~, ~~Rept'd~~, Meas'd)

Top of Casing \_\_\_\_\_ ft. <sup>ABOVE</sup> <sub>BELOW</sub> Land Surface

Log Datum LAND SURFACE

Water Table Depth APPROX. 9 FT.



# GEOPHYSICAL LOG

Project No. 85553 Well or Boring No. 2366 (35-12) Date 11-27-79  
 Client DOW CHEMICAL COMPANY Tested by MEB

## LOCATION

State MICHIGAN County MIDLAND Township MIDLAND  
NE 1/4 NW 1/4 NE 1/4 Section 35 T 14 N R 2 E  
 Distance GRID COORDINATES - 62+77 S, 77+66 E

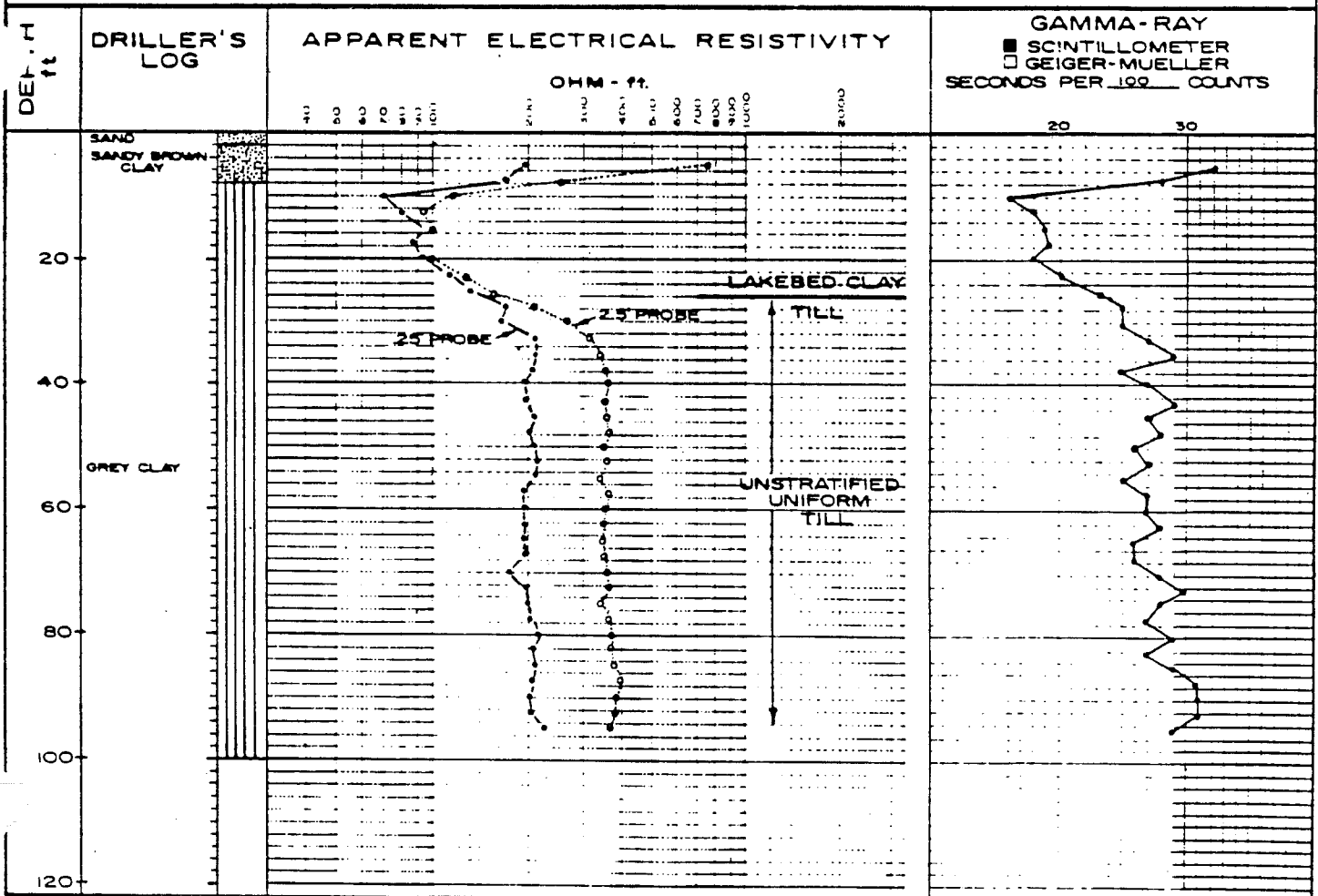
OWNER DOW CHEMICAL COMPANY Address MIDLAND, MICHIGAN  
 CONTRACTOR KLEINFELT DRILLING CO. Address CHARLOTTE, MICHIGAN

## WELL AND LOG DATA

Type of Well EXPLORATORY BORING Depth 100 ft. Diameter 6 1/4 in.

## ELEVATIONS

Land Surface 626.2 ft. <sup>ABOVE</sup> M.S.L. (~~EST'D, REPT'D~~, Meas'd)  
 Top of Casing          ft. <sup>ABOVE</sup> <sub>BELOW</sub> Land Surface  
 Log Datum LAND SURFACE  
 Water Table Depth 9 FEET



# GEOPHYSICAL LOG

Project No. 85553 Well or Boring No. 2373 (35-13) Date 11-28-79  
 Client DOW CHEMICAL COMPANY Tested by MEB

## LOCATION

State MICHIGAN County MIDLAND Township MIDLAND

NE 1/4 NE 1/4 NW 1/4 Section 35 T 14 N R 2 E

Distance GRID COORDINATE- 66+17S, 63+56E

OWNER DOW CHEMICAL COMPANY Address MIDLAND, MICHIGAN

CONTRACTOR KLEINFELT DRILLING CO. Address CHARLOTTE, MICHIGAN

## WELL AND LOG DATA

Type of Well EXPLORATORY BORING Depth 100 ft. Diameter 5 1/4 in.

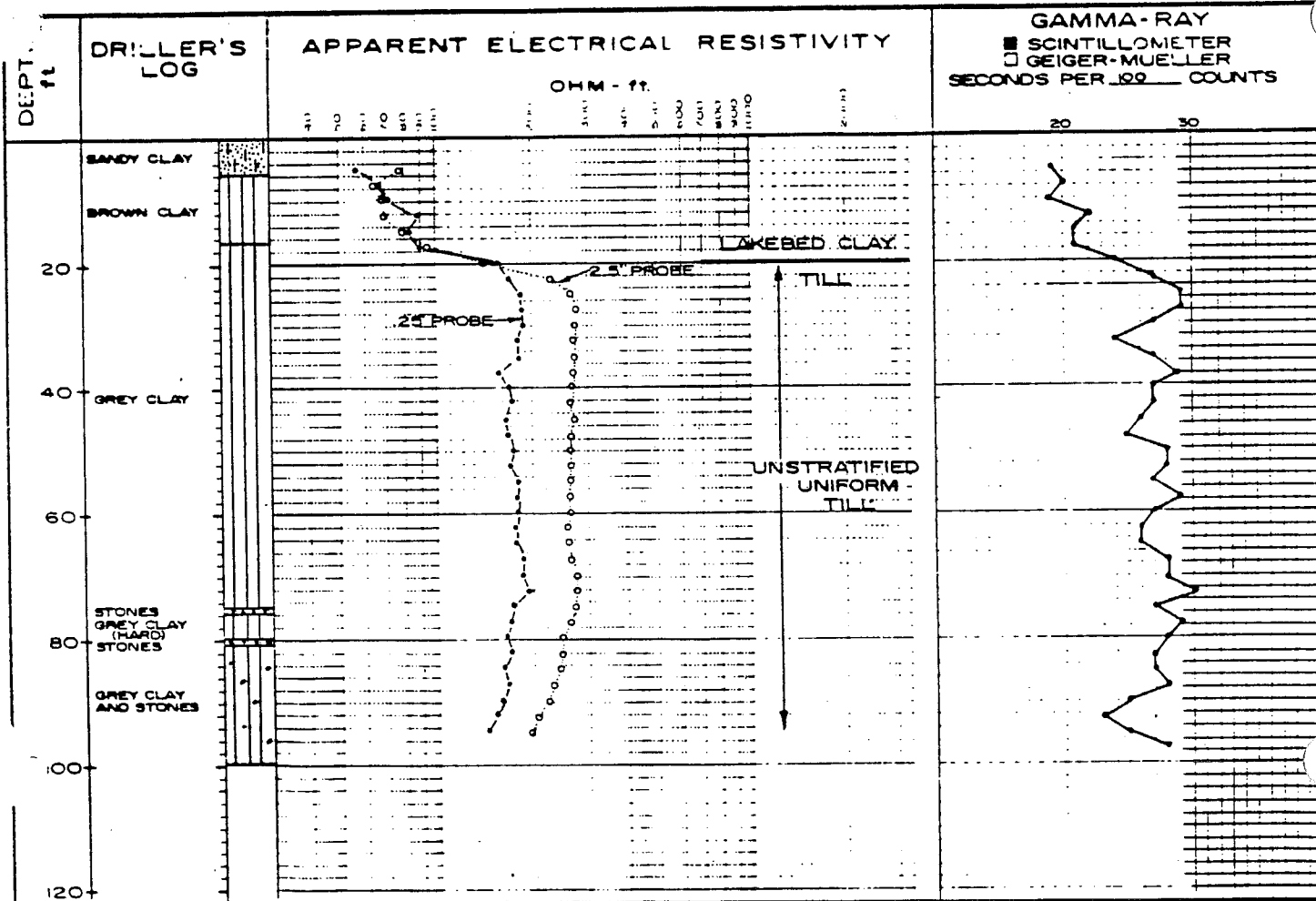
## ELEVATIONS

Land Surface 620.9 ft. ABOVE M.S.L. (620.9 ft. Meas'd)

Top of Casing \_\_\_\_\_ ft. ABOVE Land Surface

Log Datum LAND SURFACE

Water Table Depth < 5 FEET

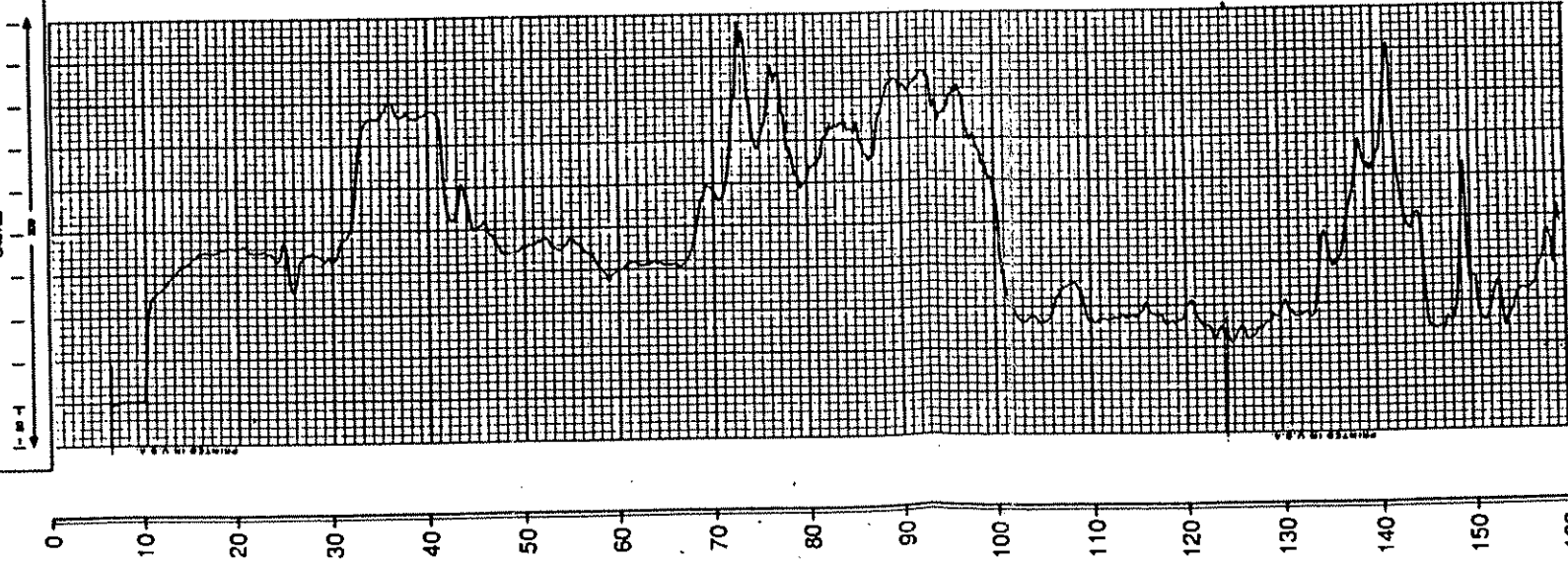


GEOPHYSICAL LOGS  
DOW CORNING FACILITY  
DMW 10

Resistivity Log

Wellbore No. DMW 10  
Client: Dow Corning  
Project No.: 10010  
Date: 10/1/88

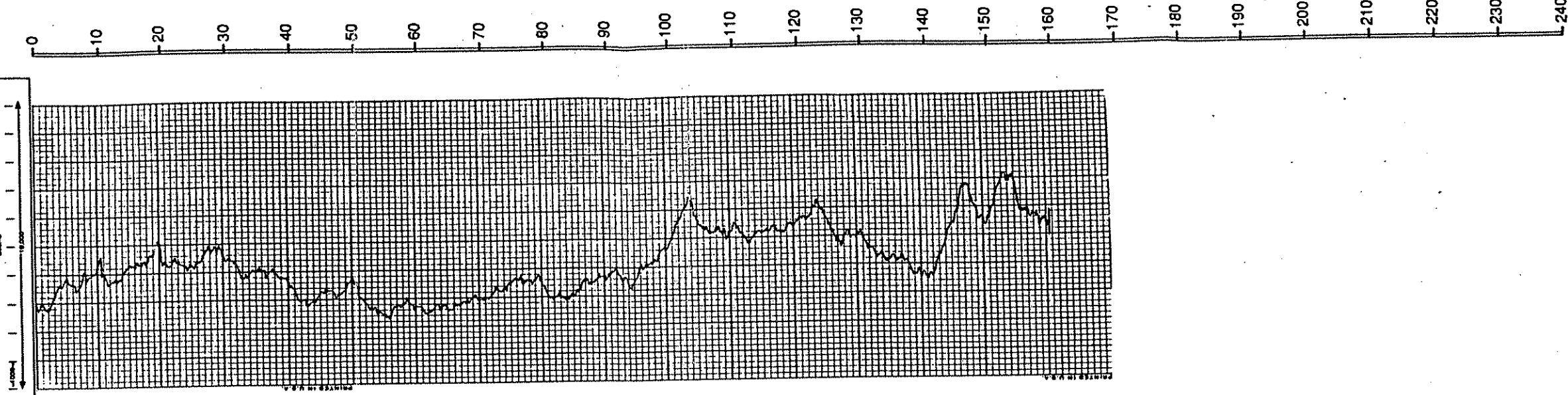
Location: State: Mich. County: Midland Township: Midland  
Section: 36 T. 13N R. 1E  
Contractor: Enterprise Drilling Co.  
Type of Hole: From 0 ft. to 133 ft. Dia 8 1/2"; Material Open Hole  
From 0 ft. to 0 ft. Dia 8 1/2"; Material  
Type of Fluid in Hole: Depth to Fluid: Type: MUD  
Log Output: Grayscale, 30/1000  
Interval Logged: From 0 ft. to 133 ft.  
Instrument: Johnson Knoll, Model 80-2000  
Recorder Sensitivity: 1  
Module Sensitivity: 100  
Time Constant: 10  
Pole: 50



Gamma Log

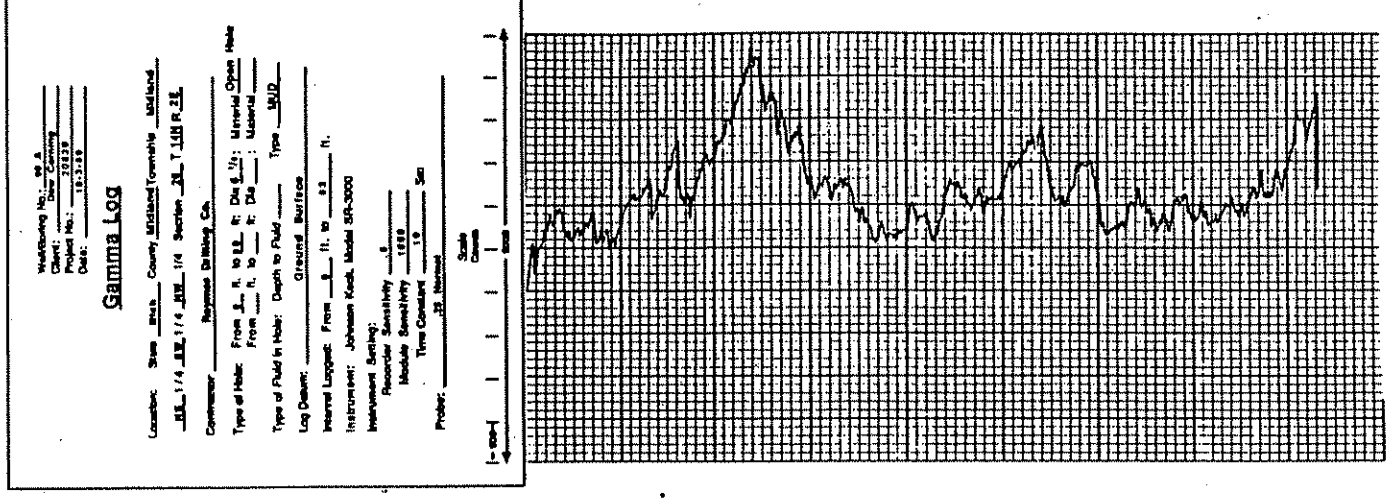
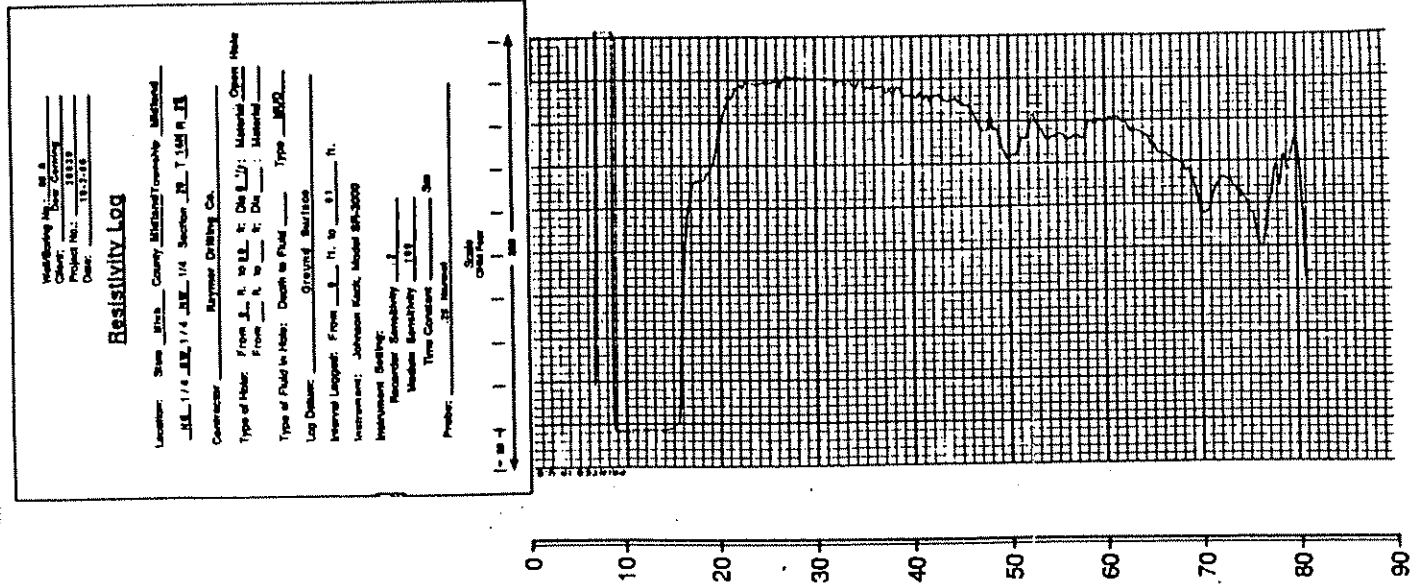
Wellbore No. DMW 10  
Client: Dow Corning  
Project No.: 10010  
Date: 10/1/88

Location: State: Mich. County: Midland Township: Midland  
Section: 36 T. 13N R. 1E  
Contractor: Enterprise Drilling Co.  
Type of Hole: From 0 ft. to 133 ft. Dia 8 1/2"; Material Open Hole  
From 0 ft. to 0 ft. Dia 8 1/2"; Material  
Type of Fluid in Hole: Depth to Fluid: Type: MUD  
Log Output: Grayscale, 30/1000  
Interval Logged: From 0 ft. to 133 ft.  
Instrument: Johnson Knoll, Model 80-2000  
Recorder Sensitivity: 1  
Module Sensitivity: 100  
Time Constant: 10  
Pole: 50

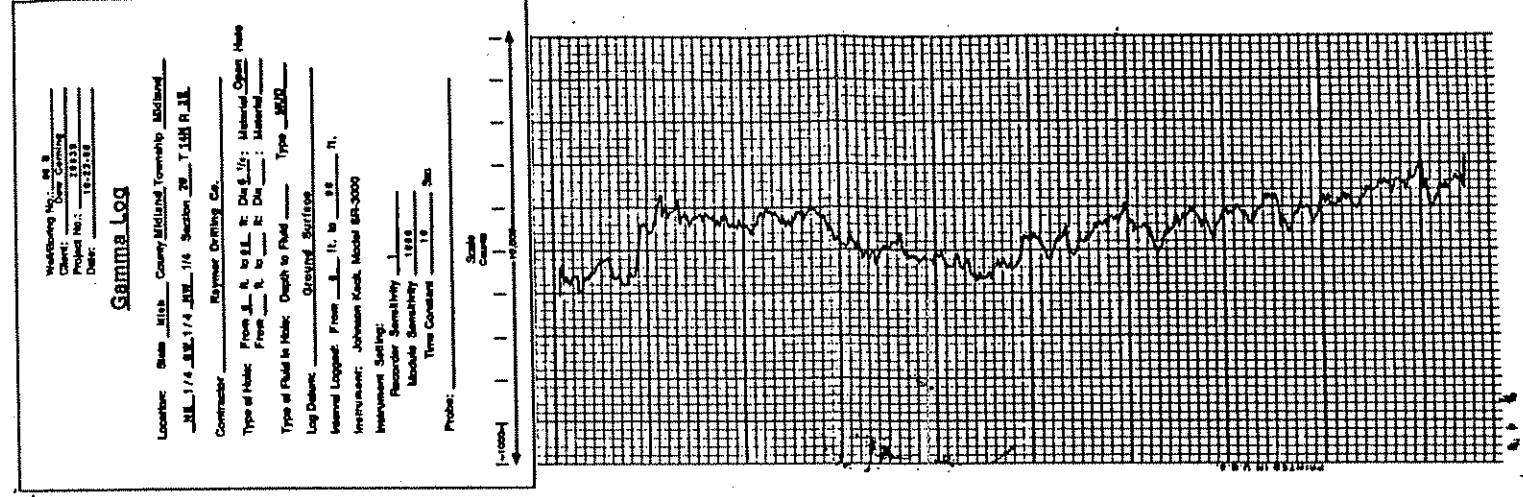
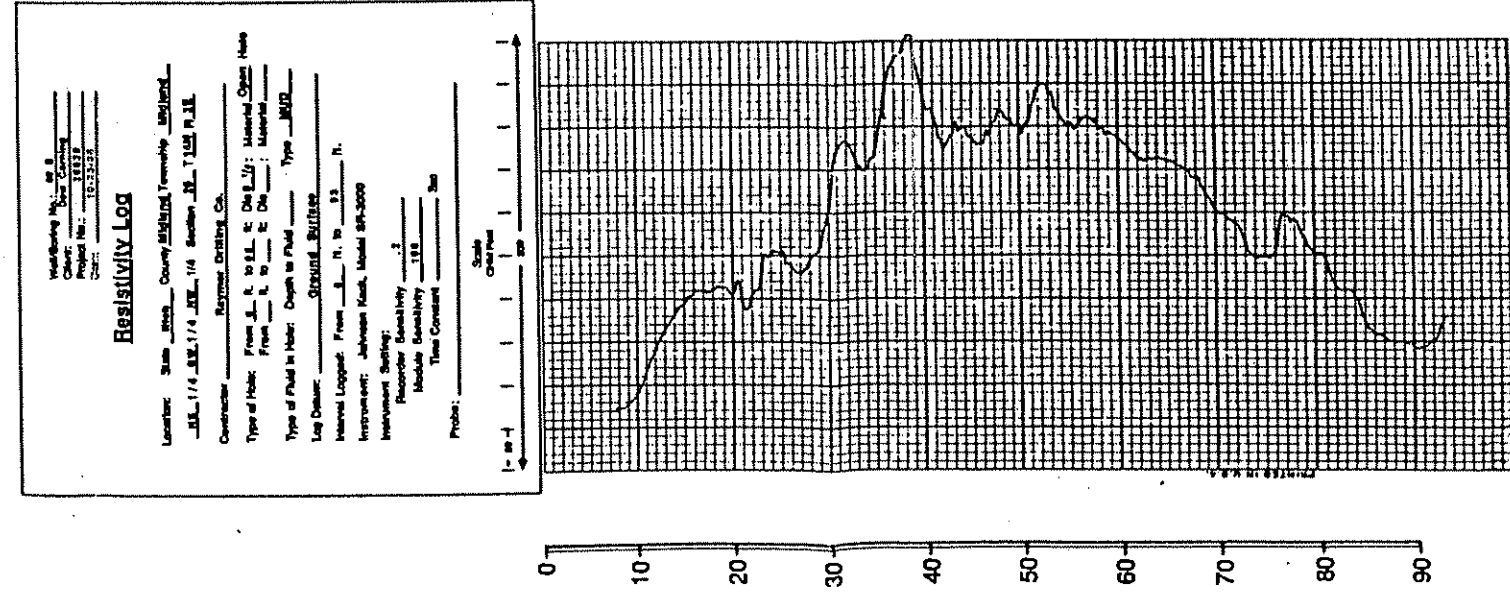


GEOPHYSICAL LOGS  
DOW CORNING FACILITY

86 A



86 B



# GEOPHYSICAL LOGS DOW CORNING FACILITY

86 D

## Resistivity Log

Wellbore No.: 86 D  
Client: Dow Corning  
Project No.: 10312  
Date: 10-12-88

Location: State MI County Midland Township Midland  
NE 1/4, NE 1/4, NE 1/4 Section 28 T14N R1E

Contractor: Raymer Drilling Co.

Type of Hole: From 0 ft. to 14 ft. Dia 8 1/2 in. Material Open Hole  
From 0 ft. to 0 ft. Dia 0 in. Material Material

Type of Fluid in Hole: Depth to Fluid 0 ft. Type MWD

Log Datum: Ground Surface

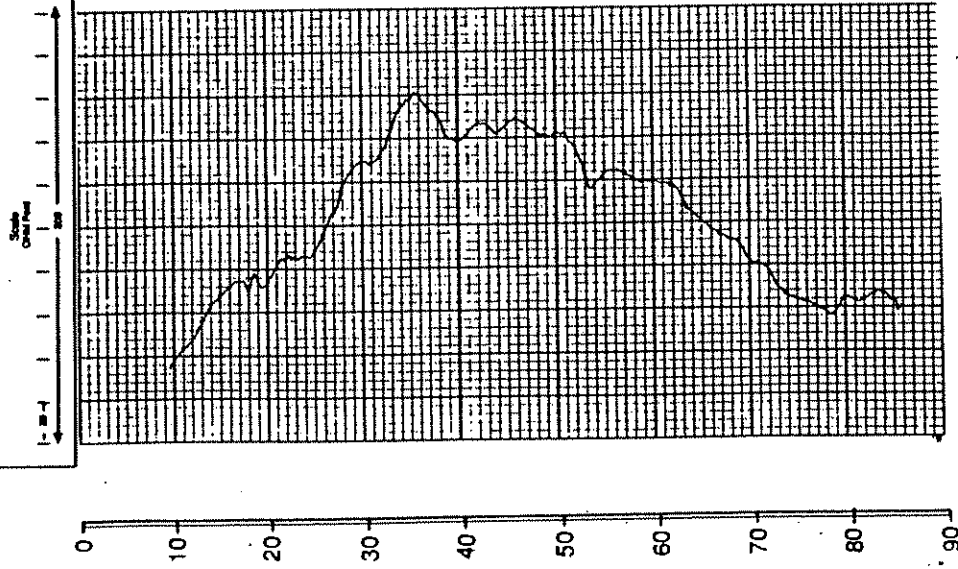
Interval Logged: From 0 ft. to 14 ft.

Instrument: Johnson Koch, Model SR-3000

Instrument Setting: Recorder Sensitivity 1  
Module Sensitivity 100

Time Constant: 25 Sec

Probe: 25 ft. Interval



## Gamma Log

Wellbore No.: 86 D  
Client: Dow Corning  
Project No.: 10312  
Date: 10-12-88

Location: State MI County Midland Township Midland  
NE 1/4, NE 1/4, NE 1/4 Section 28 T14N R1E

Contractor: Raymer Drilling Co.

Type of Hole: From 0 ft. to 14 ft. Dia 8 1/2 in. Material Open Hole  
From 0 ft. to 0 ft. Dia 0 in. Material Material

Type of Fluid in Hole: Depth to Fluid 0 ft. Type MWD

Log Datum: Ground Surface

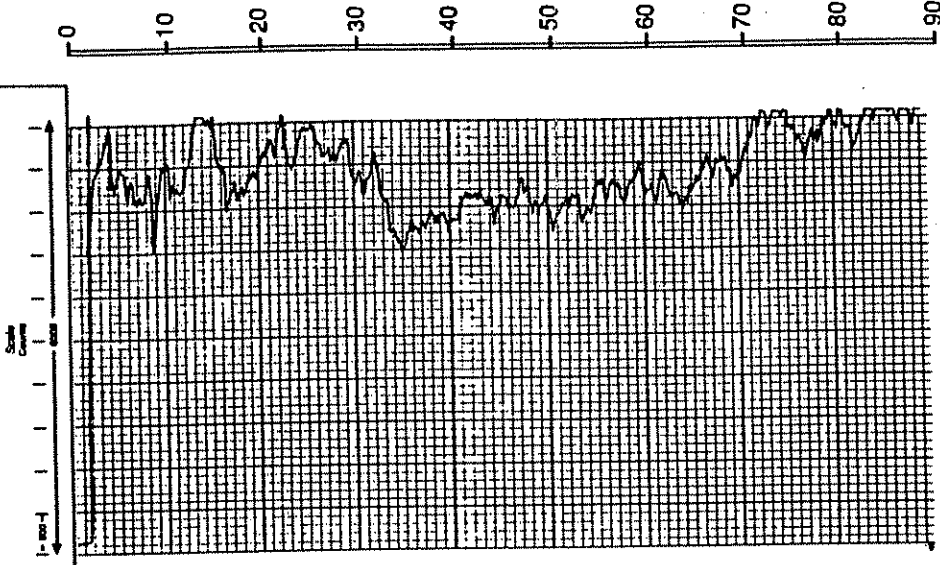
Interval Logged: From 0 ft. to 14 ft.

Instrument: Johnson Koch, Model SR-3000

Instrument Setting: Recorder Sensitivity 1  
Module Sensitivity 100

Time Constant: 25 Sec

Probe: 25 ft. Interval



## Resistivity Log

Wellbore No.: DMW 7  
Client: Dow Corning  
Project No.: 10312  
Date: 10-12-88

Location: State MI County Midland Township Midland  
NE 1/4, NE 1/4, NE 1/4 Section 28 T14N R1E

Contractor: Raymer Drilling Co.

Type of Hole: From 0 ft. to 14 ft. Dia 8 1/2 in. Material Open Hole  
From 0 ft. to 0 ft. Dia 0 in. Material Material

Type of Fluid in Hole: Depth to Fluid 0 ft. Type MWD

Log Datum: Ground Surface

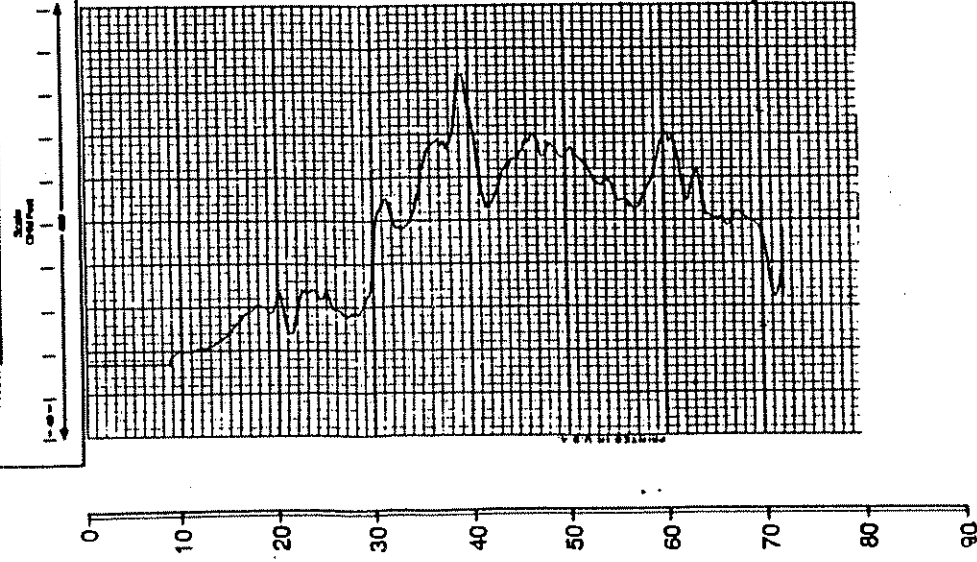
Interval Logged: From 0 ft. to 14 ft.

Instrument: Johnson Koch, Model SR-3000

Instrument Setting: Recorder Sensitivity 1  
Module Sensitivity 100

Time Constant: 25 Sec

Probe: 25 ft. Interval



## Gamma Log

Wellbore No.: DMW 7  
Client: Dow Corning  
Project No.: 10312  
Date: 10-12-88

Location: State MI County Midland Township Midland  
NE 1/4, NE 1/4, NE 1/4 Section 28 T14N R1E

Contractor: Raymer Drilling Co.

Type of Hole: From 0 ft. to 14 ft. Dia 8 1/2 in. Material Open Hole  
From 0 ft. to 0 ft. Dia 0 in. Material Material

Type of Fluid in Hole: Depth to Fluid 0 ft. Type MWD

Log Datum: Ground Surface

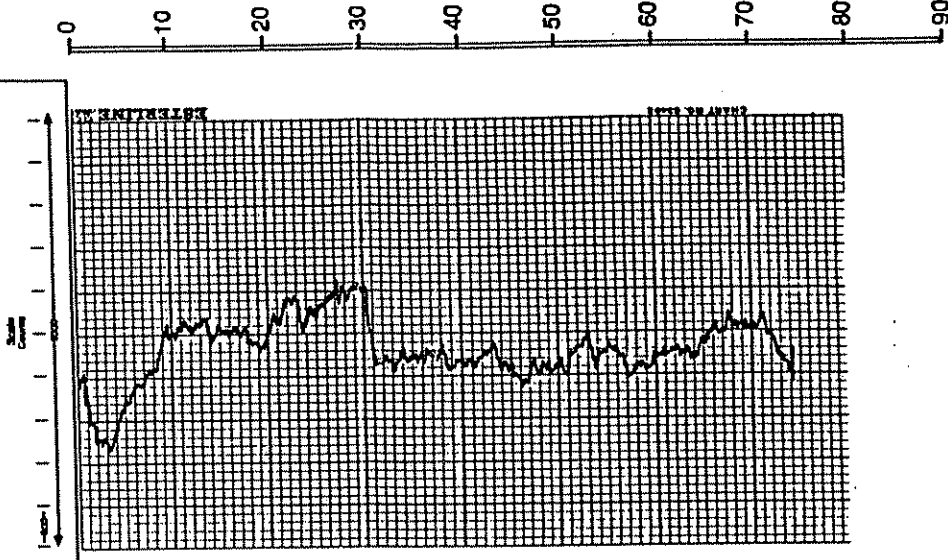
Interval Logged: From 0 ft. to 14 ft.

Instrument: Johnson Koch, Model SR-3000

Instrument Setting: Recorder Sensitivity 1  
Module Sensitivity 100

Time Constant: 25 Sec

Probe: 25 ft. Interval





GEOPHYSICAL LOGS  
DOW CORNING FACILITY  
DMW 9

Resistivity Log

Wellbore No. DMW 9 Date 11-15-83  
Client Dow Corning  
Project No. 11313  
Date 11-15-83

Location State MI County Macomb Township Midland  
J.E. 1/4, S.E. 1/4, S.W. 1/4, Section 28, T.15N, R.1E

Contractor Raymond Drilling Co.

Type of Hole: From 5 ft. to 115 ft. Dia 8 1/2 in. Material Open Hole  
From 5 ft. to 5 ft. Dia 8 1/2 in. Material Material

Type of Fluid in Hole: Depth to Fluid        Type MUD

Log Details: Ground Surface

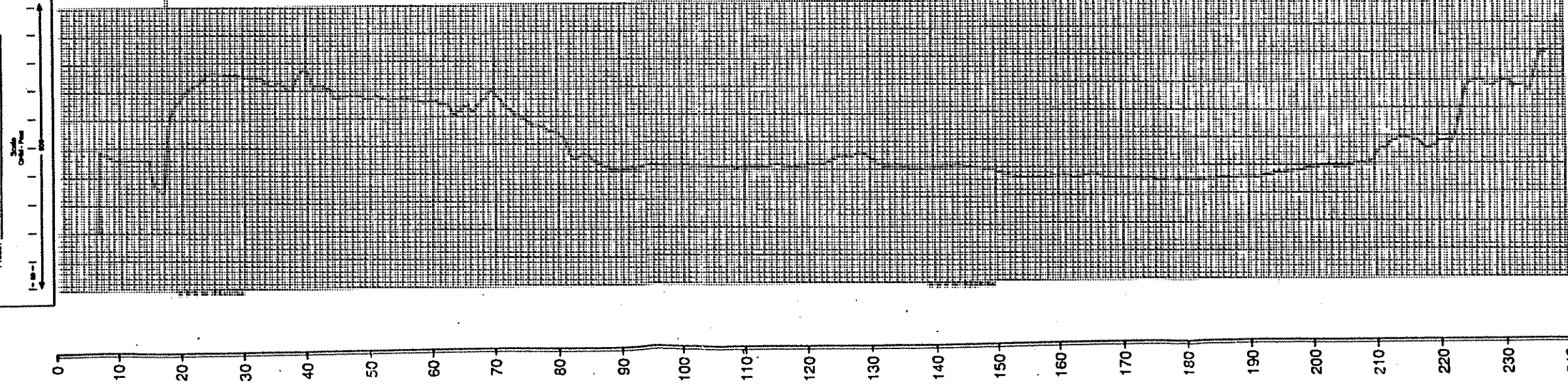
Interval Logged: From 5 ft. to 115 ft.

Instrument: Johnson Mark Model SP-3000

Instrument Setting: Resistivity Sensitivity 1  
Module Sensitivity 115

Time Constant 10 Sec

Probe: 2.5 Normal



Gamma Log

Wellbore No. DMW 9 Date 11-15-83  
Client Dow Corning  
Project No. 11313  
Date 11-15-83

Location State MI County Macomb Township Midland  
J.E. 1/4, S.E. 1/4, S.W. 1/4, Section 28, T.15N, R.1E

Contractor Raymond Drilling Co.

Type of Hole: From 5 ft. to 115 ft. Dia 8 1/2 in. Material Open Hole  
From 5 ft. to 5 ft. Dia 8 1/2 in. Material Material

Type of Fluid in Hole: Depth to Fluid        Type MUD

Log Details: Ground Surface

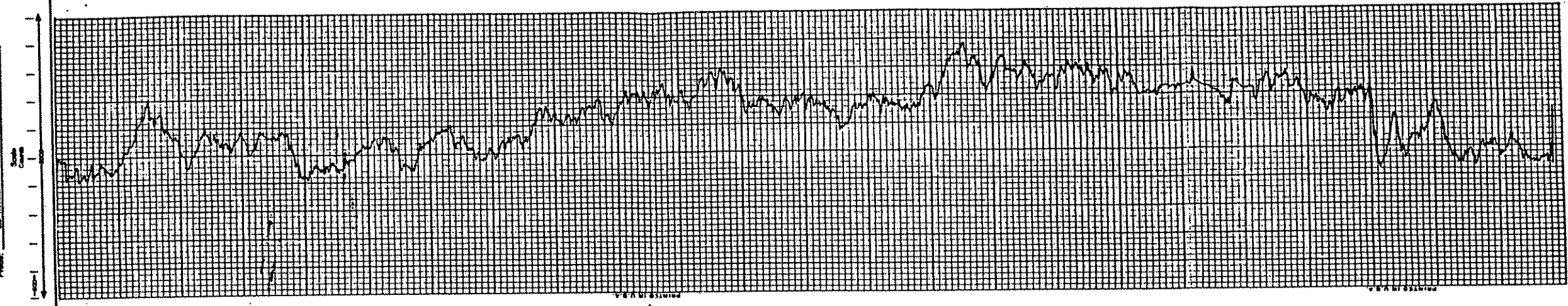
Interval Logged: From 5 ft. to 115 ft.

Instrument: Johnson Mark Model SP-3000

Instrument Setting: Resistivity Sensitivity 1  
Module Sensitivity 115

Time Constant 10 Sec

Probe: 2.5 Normal



GEOPHYSICAL LOGS  
DOW CORNING FACILITY

DMW 8

Fielding No. DMW 8  
Client Dow Corning  
Project No. 24335  
Date 12-1-78

**Resistivity Log**

Location: State Ill. County Madison Township 14th  
JBL 1/4 Section 14 T. 14N R. 14E

Contractor Madison Drilling Co.

Type of Hole: From 0 ft. to 212 ft. Date 1/79 Material Drill Mud  
From 0 ft. to 0 ft. Date      Material     

Type of Fluid in Hole: Depth to Fluid      Type MUD

Log Date:      Ground Surface     

Interval Logged: From 0 ft. to 212 ft.

Instrument: Johnson Model 88-5000

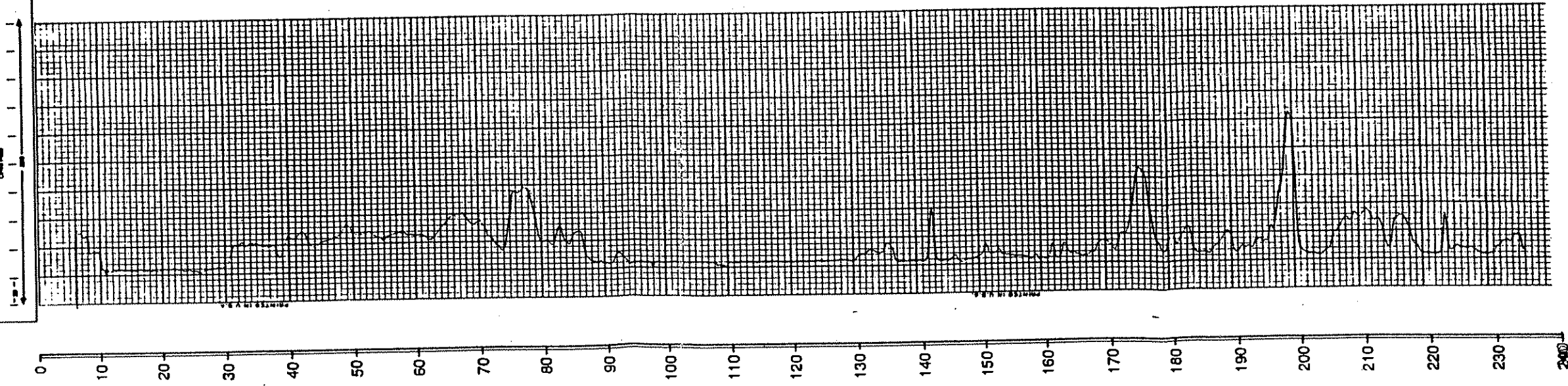
Instrument Setting:     

Resistivity Sensitivity 100

Module Sensitivity 100

Time Constant 10 Sec

Probe:      24 In. Interval



Fielding No. DMW 8  
Client Dow Corning  
Project No. 24335  
Date 12-1-78

**Gamma Log**

Location: State Ill. County Madison Township 14th  
JBL 1/4 Section 14 T. 14N R. 14E

Contractor Madison Drilling Co.

Type of Hole: From 0 ft. to 212 ft. Date 1/79 Material Drill Mud  
From 0 ft. to 0 ft. Date      Material     

Type of Fluid in Hole: Depth to Fluid      Type MUD

Log Date:      Ground Surface     

Interval Logged: From 0 ft. to 212 ft.

Instrument: Johnson Model 88-5000

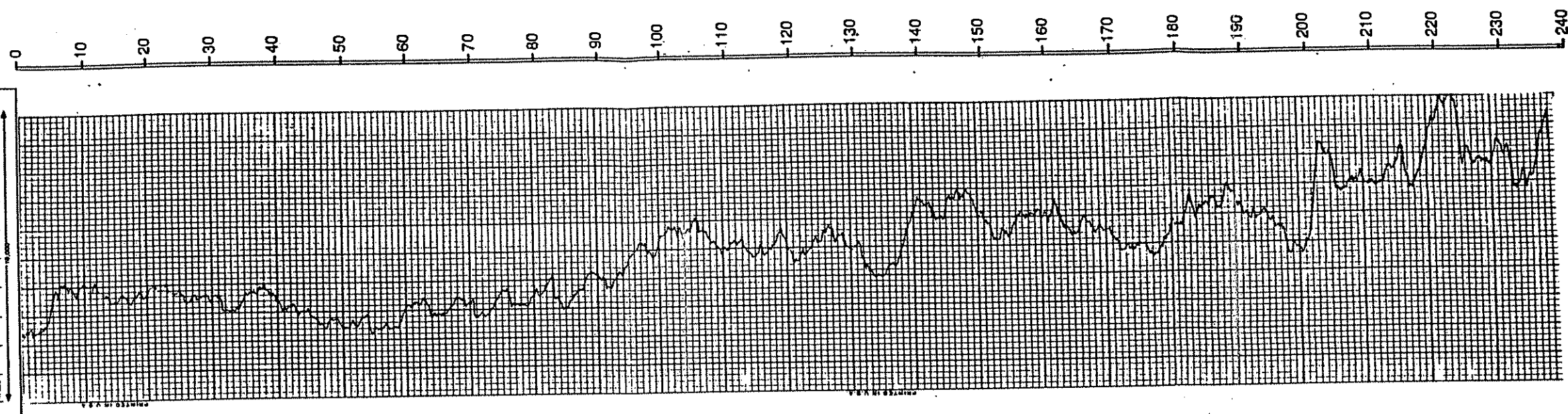
Instrument Setting:     

Resistivity Sensitivity 100

Module Sensitivity 100

Time Constant 10 Sec

Probe:      24 In. Interval





Project No: 20245  
Date: 3/27/84

Geophysical Log of Well

Location:  
Midland, Michigan  
Midland Township  
SE 1/4, NE 1/4, NE 1/4, Section 26  
T 14N, R 2E

Owner:  
Dow Chemical Co.,  
Midland, Midland Township

Contractor:  
Raymer Co.,  
Grand Rapids, Michigan

Well No: 3138 (26-16)

Type: Observation

Depth: 475 Feet

Diameter: 4 Inches

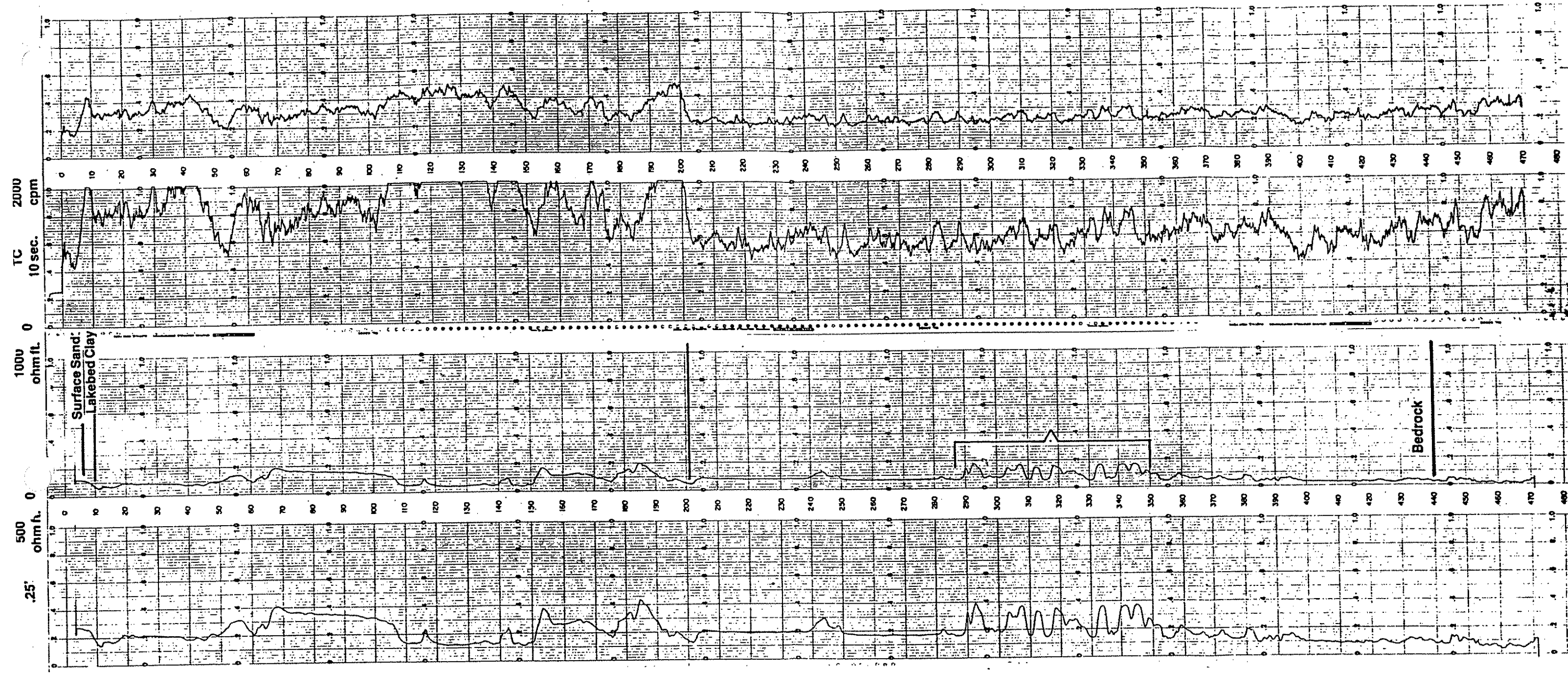
Elevations:  
Land Surface 639  
Top of Casing 641.92

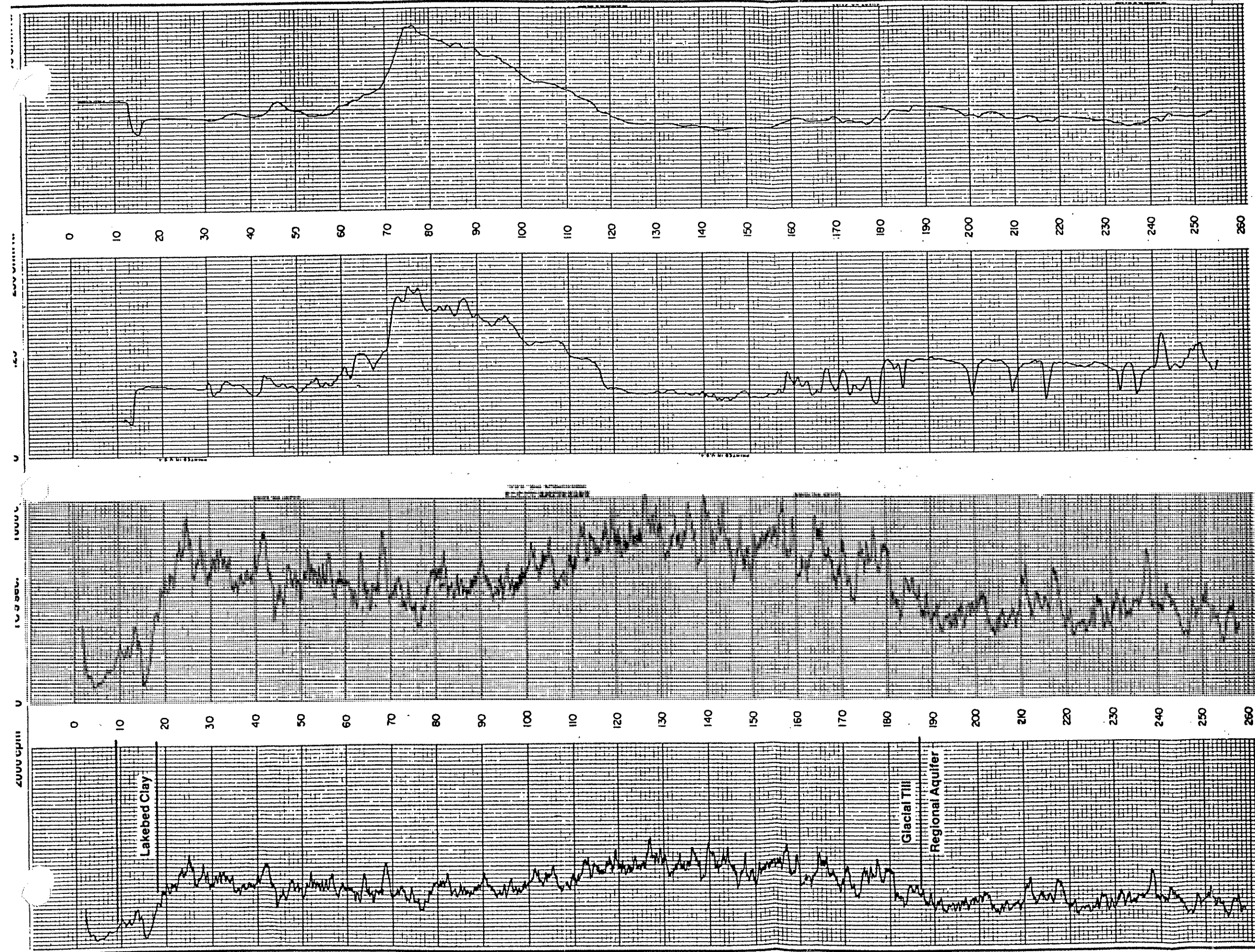
Log Datum:  
Land Surface, Field Data by JN

Water Table Depth:  
16 Feet Below Ground

Interval Logged:  
470 Feet to 6 Feet

Fluid: Aqua-Gel



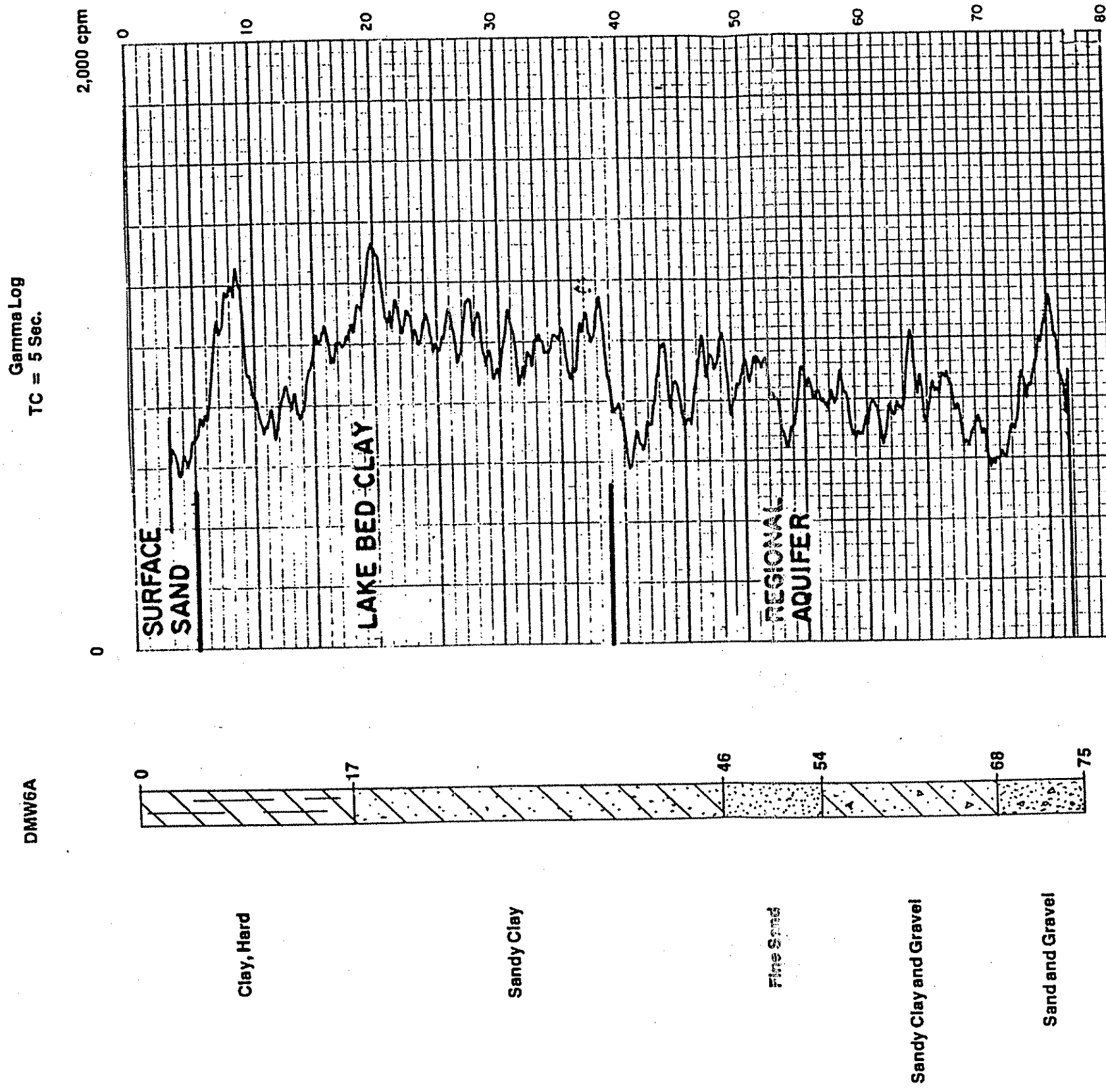


Project No: 20245 Date: 3/14/84

### Geophysical Log of Well

Location: Midland, Michigan, Midland Township SE 1/4, SW 1/4, NE 1/4, Section 22, T 14N, R 2E  
Owner: Dow Chemical Co., Midland, Midland Township Contractor: Raymer Co., Grand Rapids, Michigan  
Well No: 3137(22-3) Type: Observation Depth: 275 Feet Diameter: 4 Inches Elevations: Land Surface 628, Top of Casing 630.95  
Log Datum: Land Surface, Field Data Water Table Depth: 6 Feet Below Ground Interval Logged: 256 Feet to 15 Feet Fluid: Aqua-Gel

# DMW6A (26-11)



Project No: 20269

Date: 8/27/84

## Geophysical Log of Well

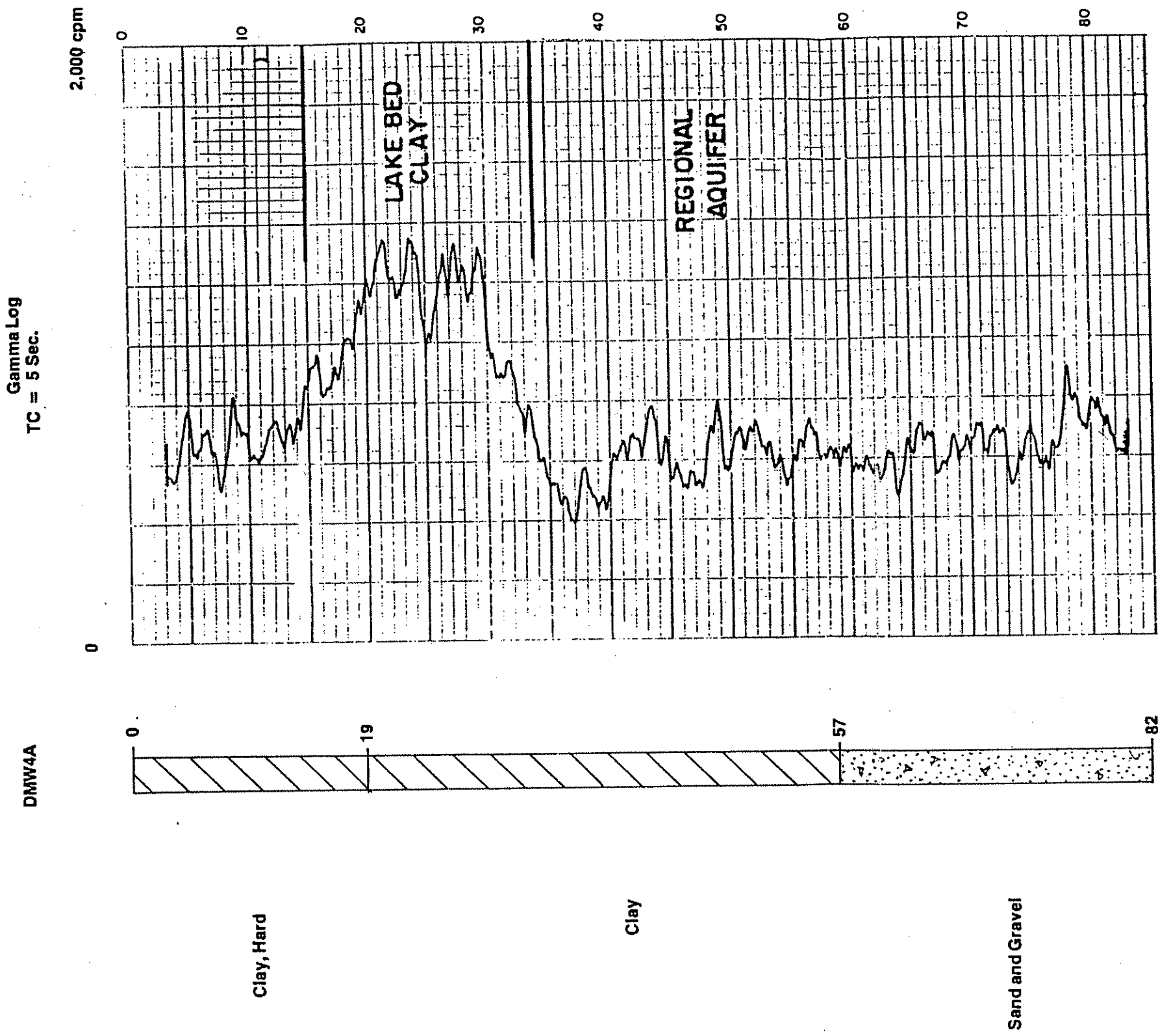
Location: Midland, Michigan, Midland Township, NW 1/4, SE 1/4, NW 1/4, Section 26, T 14N, R 2E

Owner: Dow Corning Corp., Midland, Midland Township

Contractor: Raymer Co., Grand Rapids, Michigan

Well No: DMW6A Type: Observation Depth: 77 Feet Diameter: 4 Inches Elevations: Land Surface 628, Top of Casing 630.98  
Log Datum: Land Surface, Field Data by TL Water Table Depth: 7 Feet Below Ground Interval Logged: 77 Feet to 3 Feet Fluid: Water





Project No: 20269

Date: 8/27/84

Geophysical Log of Well

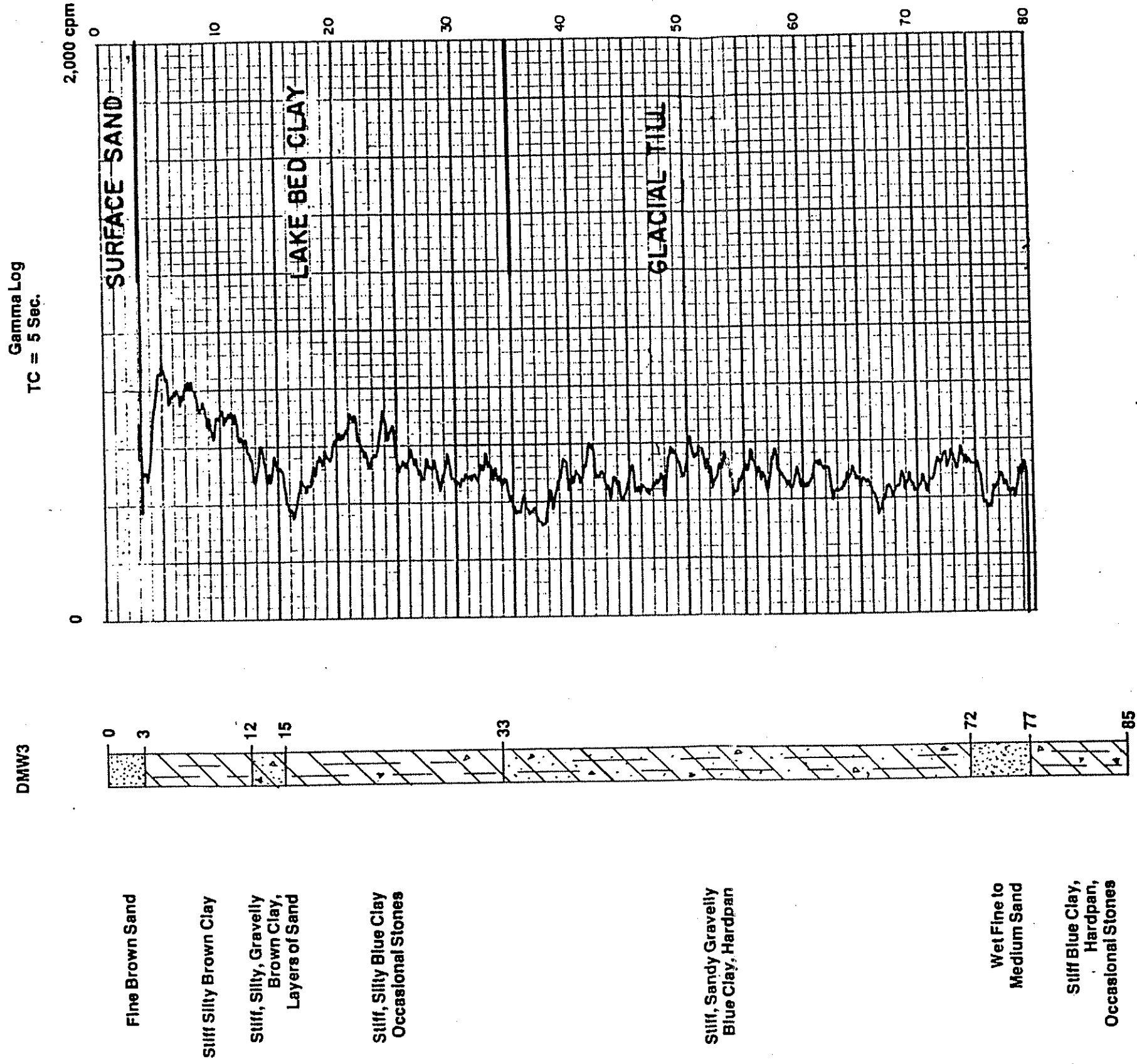
Location: Midland, Michigan, Midland Township, NE 1/4, SE 1/4, NW 1/4, Section 26, T 14N, R 2E

Owner: Dow Corning Corp., Midland, Midland Township

Contractor: Raymer Co., Grand Rapids, Michigan

Well No: DMW4A Type: Observation Depth: 83 Feet Diameter: 4 Inches Elevations: Land Surface 627, Top of Casing 630.30  
Log Datum: Land Surface, Field Data by TL Water Table Depth: 6 Feet Below Ground Interval Logged: 83 Feet to 3 Feet Fluid: Water

# DMW3 (26-8)



Project No: 20269

Date: 8/27/84

## Geophysical Log of Well

Location: Midland, Michigan, Midland Township, NW 1/4, SW 1/4, SW 1/4, Section 26, T 14N, R 2E

Owner: Dow Corning Corp., Midland, Midland Township

Contractor: McDowell & Associates, Ferndale, Michigan

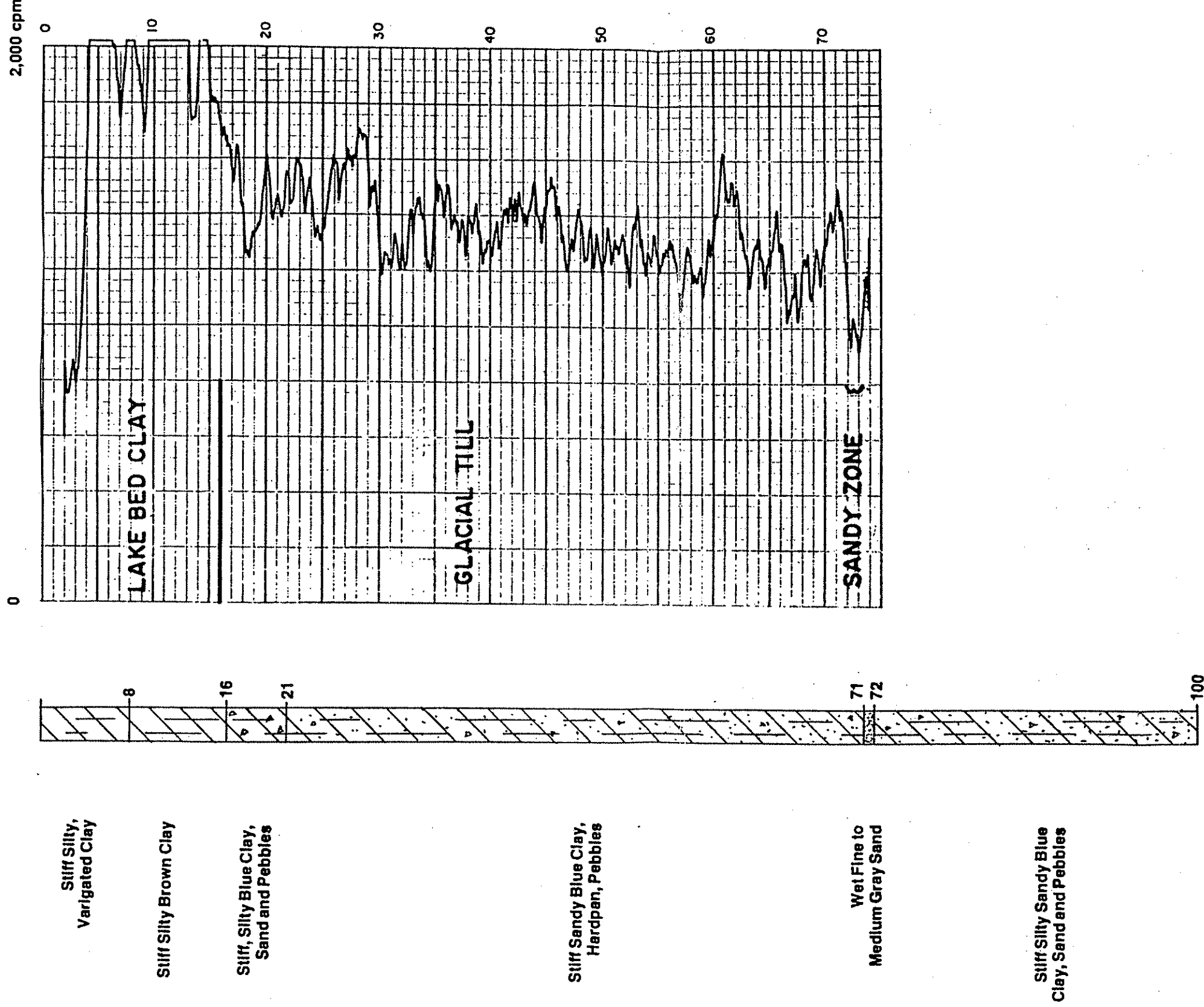
Well No: DMW3 Type: Observation Depth: 79 Feet Diameter: 2 Inches Elevations: Land Surface 617, Top of Casing 620.03

Log Datum: Land Surface, Field Data by TL Water Table Depth: 2 Feet Below Ground Interval Logged: 79 Feet to 3 Feet Fluid: Water

# DMW2 (26-7)

DMW2

Gamma Log  
TC = 5 Sec.



Project No: 20269

Date: 8/7/84

## Geophysical Log of Well

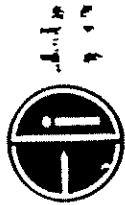
Location: Midland, Michigan, Midland Township, SW 1/4, SW 1/4, SE 1/4, Section 26, T 14N, R 2E

Owner: Dow Corning Corp., Midland, Midland Township

Contractor: McDowell & Associates, Ferndale, Michigan

Well No: DMW2 Type: Observation Depth: 74 Feet Diameter: 2 Inches Elevations: Land Surface 621, Top of Casing 621.84

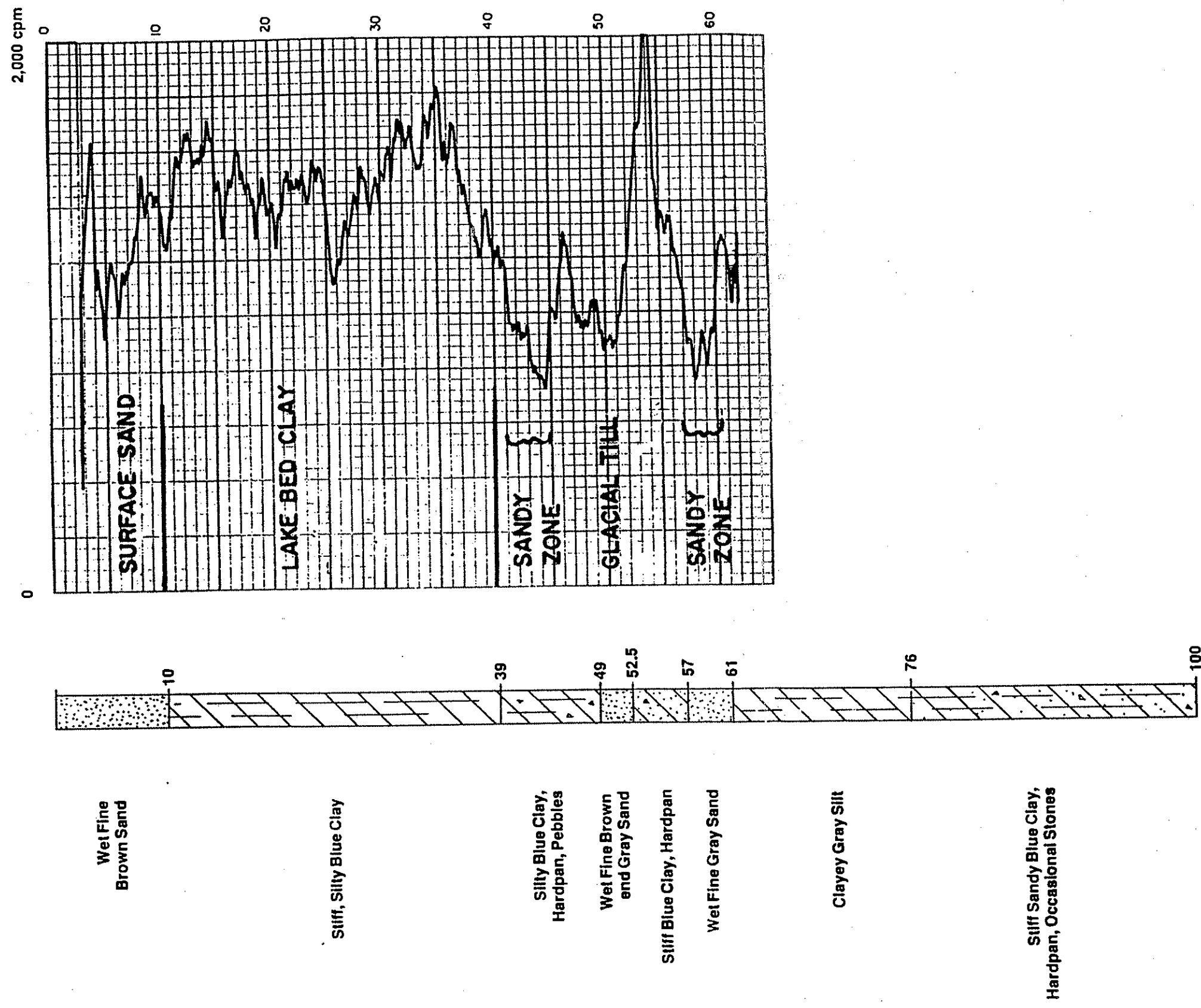
Log Datum: Land Surface, Field Data by TL Water Table Depth: 2 Feet Below Ground Interval Logged: 74 Feet to 2 Feet Fluid: Water



DMW1  
(26-6)

DMW1

Gamma Log  
TC = 5 Sec.

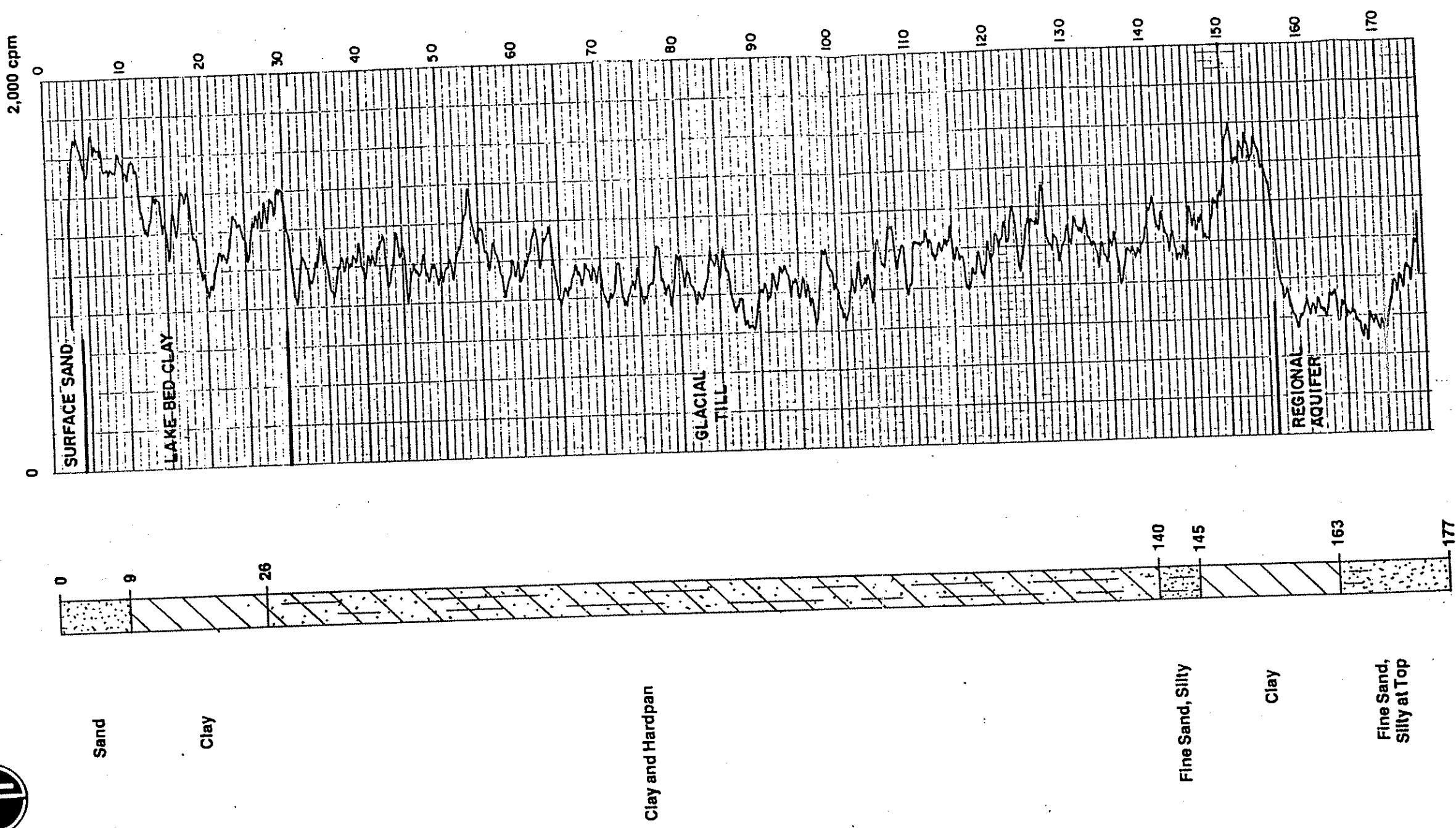


Project No: 20269

Date: 8/27/84

#### Geophysical Log of Well

Location: Midland, Michigan, Midland Township, NE 1/4, SE 1/4, NE 1/4, Section 26, T 14N, R 2E  
Owner: Dow Corning Corp., Midland, Midland Township  
Contractor: McDowell & Associates, Ferndale, Michigan  
Well No: DMW1 Type: Observation Depth: 62 Feet Diameter: 2 Inches Elevations: Land Surface 636, Top of Casing 641.32  
Log Datum: Land Surface, Field Data by TL Water Table Depth: 10 Feet Below Ground Interval Logged: 62 Feet to 3 Feet Fluid: Water



Project No: 20269

Date: 8/7/84

### Geophysical Log of Well

Location: Midland, Michigan, Midland Township, SE 1/4, SE 1/4, SW 1/4, Section 26, T 14N, R 2E

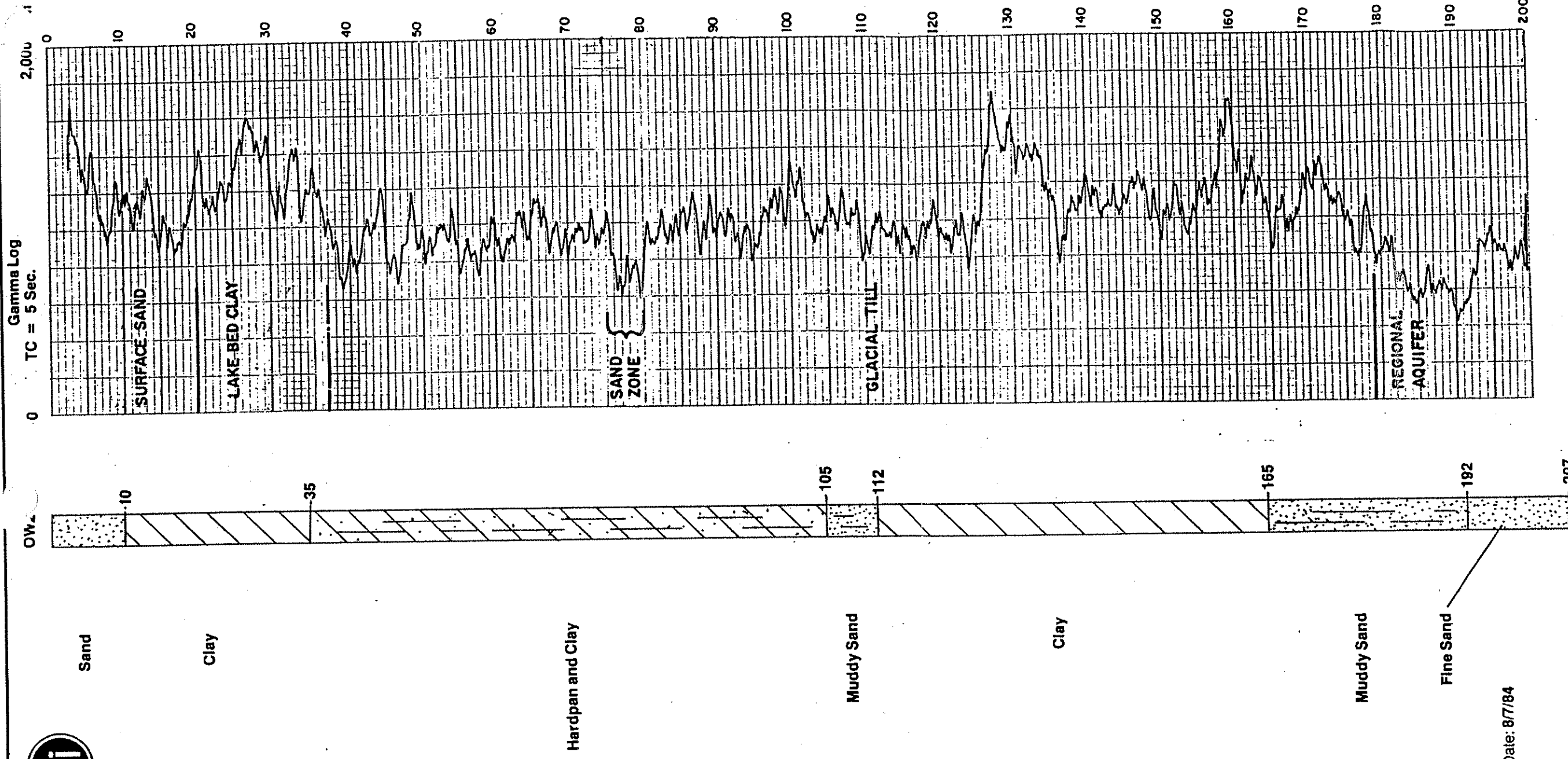
Owner: Dow Corning Corp., Midland, Midland Township

Contractor: Hugh Nelson, Farwell, Michigan

Well No: OW3 Type: Observation Depth: 174 Feet Diameter: 4 Inches Elevations: Land Surface 621, Top of Casing 623.29 Fluid: Water  
Log Datum: Land Surface, Field Data by TL Water Table Depth: 1 Foot Below Ground Interval Logged: 174 Feet to 3 Feet



# OW2 (26-13)



Project No: 20269

Date: 8/7/84

## Geophysical Log of Well

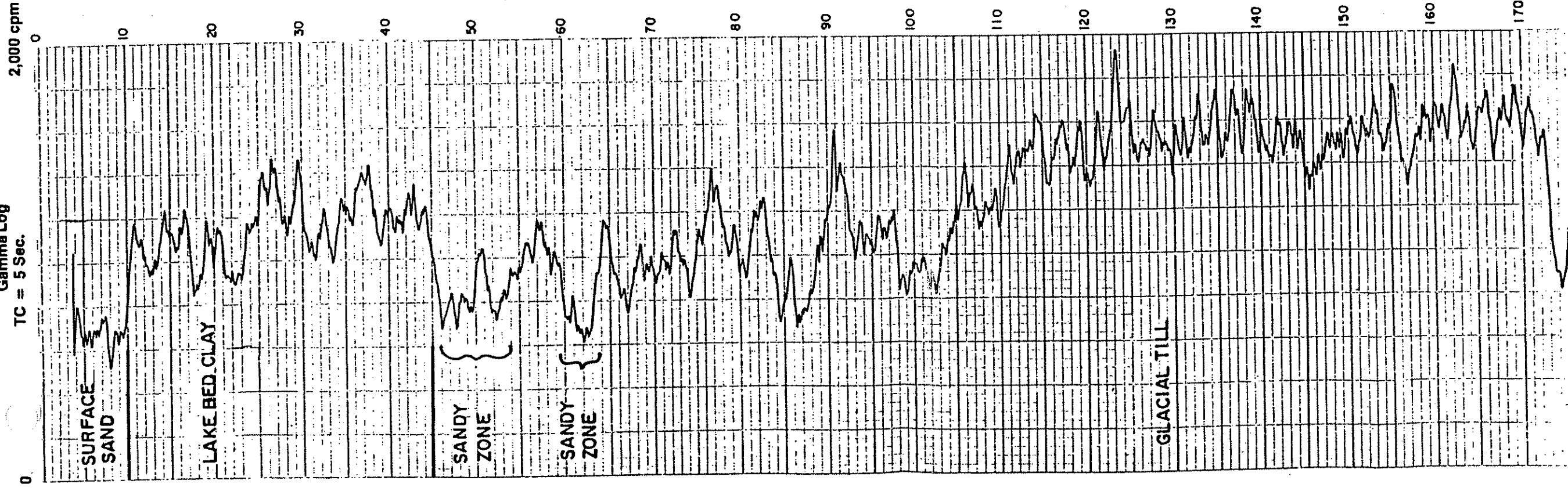
Location: Midland, Michigan, Midland Township, SE 1/4, SE 1/4, SE 1/4, Section 26, T 14N, R 2E

Owner: Dow Corning Corp., Midland, Midland Township

Contractor: Hugh Nelson, Farwell, Michigan

Well No: OW2 Type: Observation Depth: 199 Feet Diameter: 4 Inches Elevations: Land Surface 627, Top of Casing 628.76  
Log Datum: Land Surface, Field Data by TL Water Table Depth: 7 Feet Below Ground Interval Logged: 199 Feet to 3 Feet Fluid: Water

Gamma Log  
TC = 5 Sec.



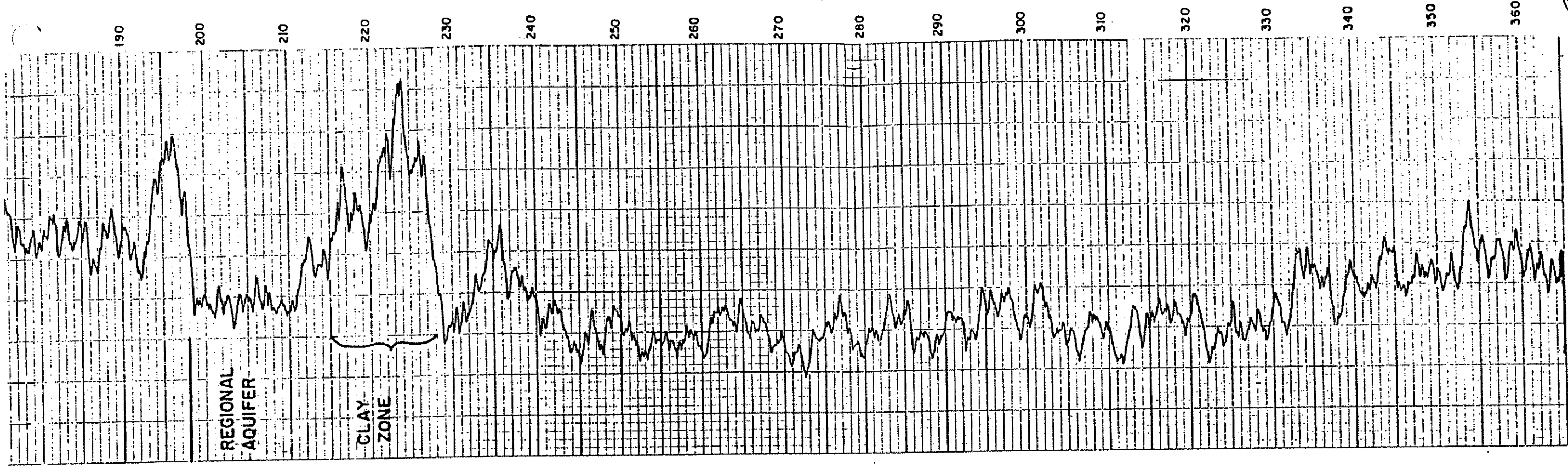
Project No: 20269

Date: 8/7/84

### Geophysical Log of Well

**OW1**  
(26-17)

Location: Midland, Michigan, Midland Township, NE 1/4, SE 1/4, NE 1/4, Section 26, T 14N, R 2E  
Owner: Dow Corning Corp., Midland, Midland Township  
Contractor: Unknown  
Well No: OW1 Type: Observation Depth: 365 Feet Diameter: 4 Inches Elevations: Land Surface 639.61  
Log Datum: Land Surface, Field Data by TL Water Table Depth: 18 Feet Below Ground Interval Logged: 365 Feet to 4 Feet Fluid: Water



**EDI ENGINEERING & SCIENCE**  
GEOPHYSICAL / GEOTECHNICAL / CHEMICAL  
IN CONSULTATION WITH ALL OTHER AGENCIES



PROJECT NO. 20245  
OWNERS WELL NO. 3066 (28-7)  
CLIENT DOW CHEMICAL  
DATE 12/7/83  
FIELD DATA BY G.S.

## GEOPHYSICAL LOG OF WELL

LOCATION: STATE MICHIGAN COUNTY MIDLAND TOWNSHIP MIDLAND  
S.E. 1/4 N.W. 1/4 S.W. 1/4 SECTION 28 T.14N R.2E

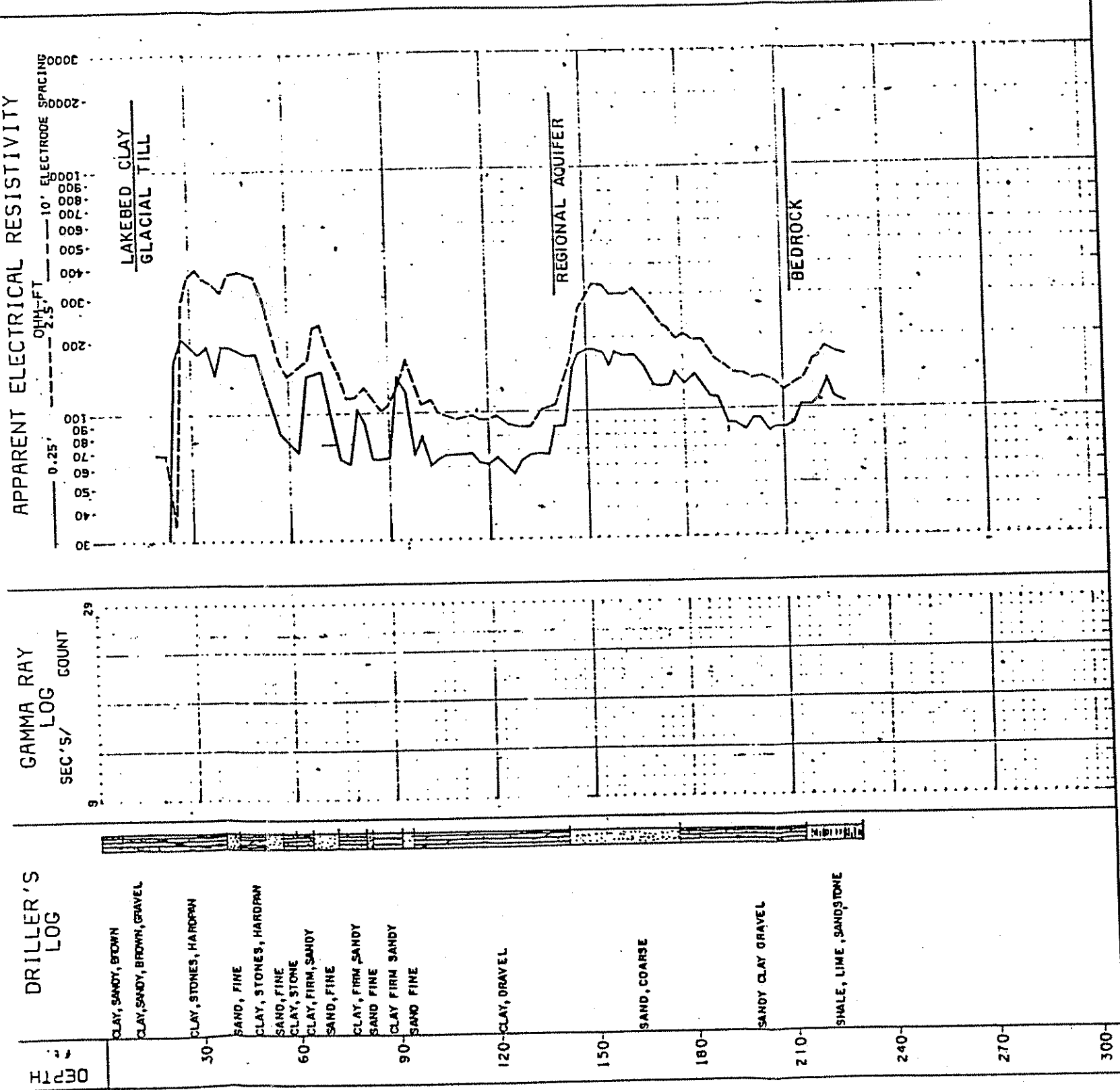
DISTANCE  
OWNER: DOW CHEMICAL CO. ADDRESS MIDLAND MICHIGAN  
CONTRACTOR: RAYMER CO. ADDRESS GRAND RAPIDS MICHIGAN

WELL & LOG DATA: TYPE OF WELL OBSERVATION DEPTH 230 FT. DIA. 4 IN.  
ELEVATIONS: LAND SURFACE 614 FT. ABOVE M.S.L. (EST'D, REPT'D, MEAS'D)  
TOP OF CASING 610.05 FT. ABOVE LAND SURFACE  
LOG DATUM LAND SURFACE

INSTRUMENT DATA: E-LOGGER KECK VB-63 GAMMA LOGGER MAKE MODEL

PROBE:

WATER TABLE DEPTH  
UNCONSOLIDATED SOILS  
FLOWING FT. BELOW GROUND  
CONSOLIDATED SOILS  
FT. BELOW GROUND  
INTERVAL LOGGED: 230 FT. TO 20 FT. BELOW LAND SURFACE  
FLUID LEVEL: UNCONSOLIDATED SOILS FT. BELOW LAND SURFACE  
CONSOLIDATED SOILS FT. BELOW LAND SURFACE  
TYPE OF FLUID: UNCONSOLIDATED SOILS AQUA - GEL  
CONSOLIDATED SOILS





PROJECT NO. 20245  
OWNERS WELL NO. 3065 (27-22)  
CLIENT DOW CHEMICAL  
DATE 11/9/83  
FIELD DATA BY G.S.

## GEOPHYSICAL LOG OF WELL

LOCATION: STATE MICHIGAN COUNTY MIDLAND TOWNSHIP MIDLAND  
NW 1/4 NW 1/4 SW 1/4 SECTION 27 T 14N R 2E

DISTANCE \_\_\_\_\_  
OWNER: DOW CHEMICAL COMPANY ADDRESS MIDLAND, MICHIGAN  
CONTRACTOR: RAYMER CO. ADDRESS GRAND RAPIDS, MICHIGAN

WELL & LOG DATA: TYPE OF WELL OBSERVATION DEPTH 310 FT. DIA. 4 IN.  
ELEVATIONS: LAND SURFACE 598 FT. ABOVE M.S.L. (MEAS'D)  
TOP OF CASING 601.64 FT. ABOVE LAND SURFACE  
LOG DATUM LAND SURFACE

INSTRUMENT DATA: E-LOGGER KECK VB-63 GAMMA LOGGER \_\_\_\_\_  
MAKE \_\_\_\_\_ MODEL \_\_\_\_\_

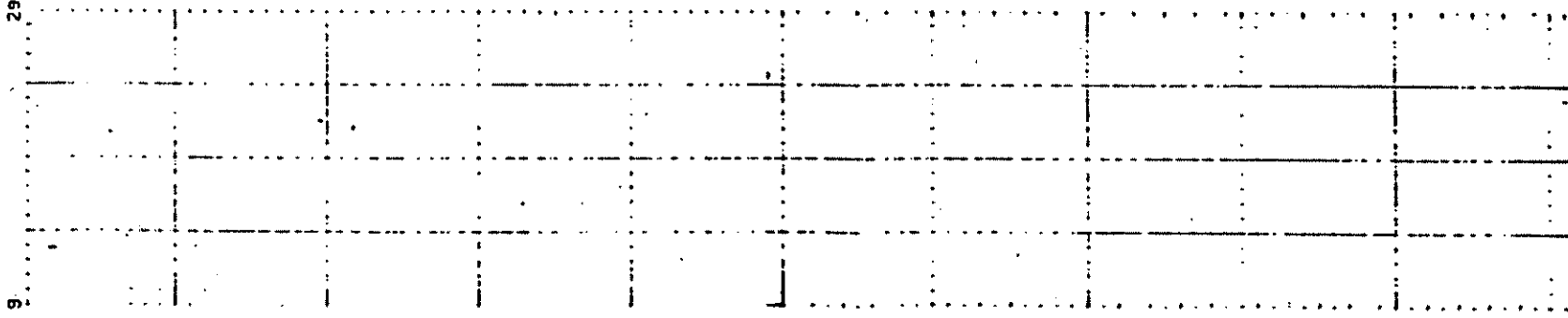
PROBE: LATERAL LOG

WATER TABLE DEPTH \_\_\_\_\_  
UNCONSOLIDATED SOILS \_\_\_\_\_  
FLOWING FT. BELOW GROUND \_\_\_\_\_  
CONSOLIDATED SOILS \_\_\_\_\_  
\_\_\_\_\_ FT. BELOW GROUND \_\_\_\_\_  
INTERVAL LOGGED: 310.0 FT. TO 1.5 FT. BELOW LAND SURFACE  
FLUID LEVEL: UNCONSOLIDATED SOILS 1 FT. BELOW LAND SURFACE  
CONSOLIDATED SOILS \_\_\_\_\_ FT. BELOW LAND SURFACE  
TYPE OF FLUID: UNCONSOLIDATED SOILS AQUA-GEL  
CONSOLIDATED SOILS \_\_\_\_\_

DRILLER'S  
LOG

CLAY, BROWN, SOFT, SILTY  
CLAY, GRAY, BROWN, SOFT,  
LOT OF PLANT, WOOD & SHELL  
DEBRIS, SOME SILT  
CLAY, GRAY, PLASTIC, FIRM  
SAND-COARSE & SANDY CLAY  
CLAY, GRAY  
SAND  
GRAVEL & SAND  
CLAY & GRAVEL  
SAND  
CLAY, SANDY, GRAVEL  
CLAY, SANDY  
CLAY, GRAVEL  
SHALE, LIMESTONE &  
GYPSUM

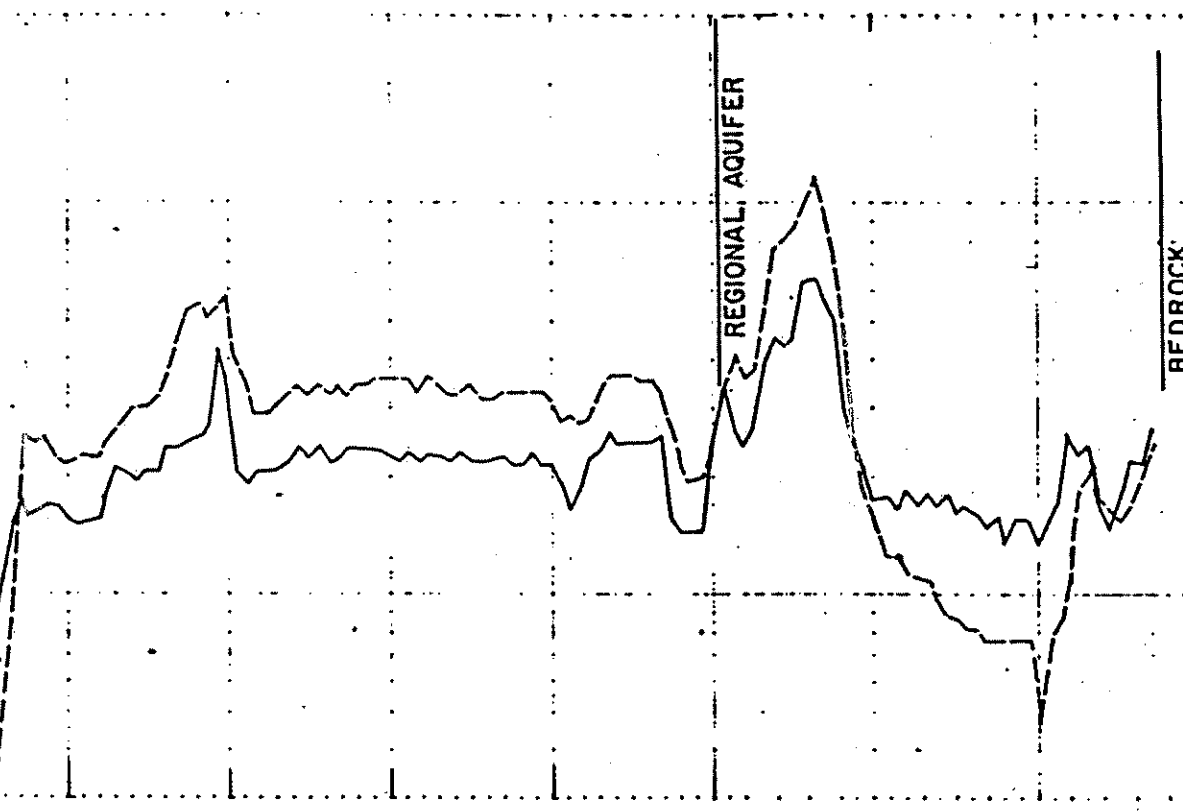
GAMMA RAY  
LOG  
COUNT  
SEC'S/



APPARENT ELECTRICAL RESISTIVITY

0.25' OHM-FT 10' ELECTRODE SPACING

LAKEBED CLAY  
GLACIAL TILL





OWNERS WELL NO. 3013 (35-8)  
CLIENT DOW CHEMICAL CO.  
DATE 10/6/83  
FIELD DATA BY G.S.

## GEOPHYSICAL LOG OF WELL

LOCATION: STATE MICHIGAN COUNTY MIDLAND TOWNSHIP MIDLAND  
NE 1/4 NW 1/4 NW 1/4 SECTION 35 T.14N R 2E

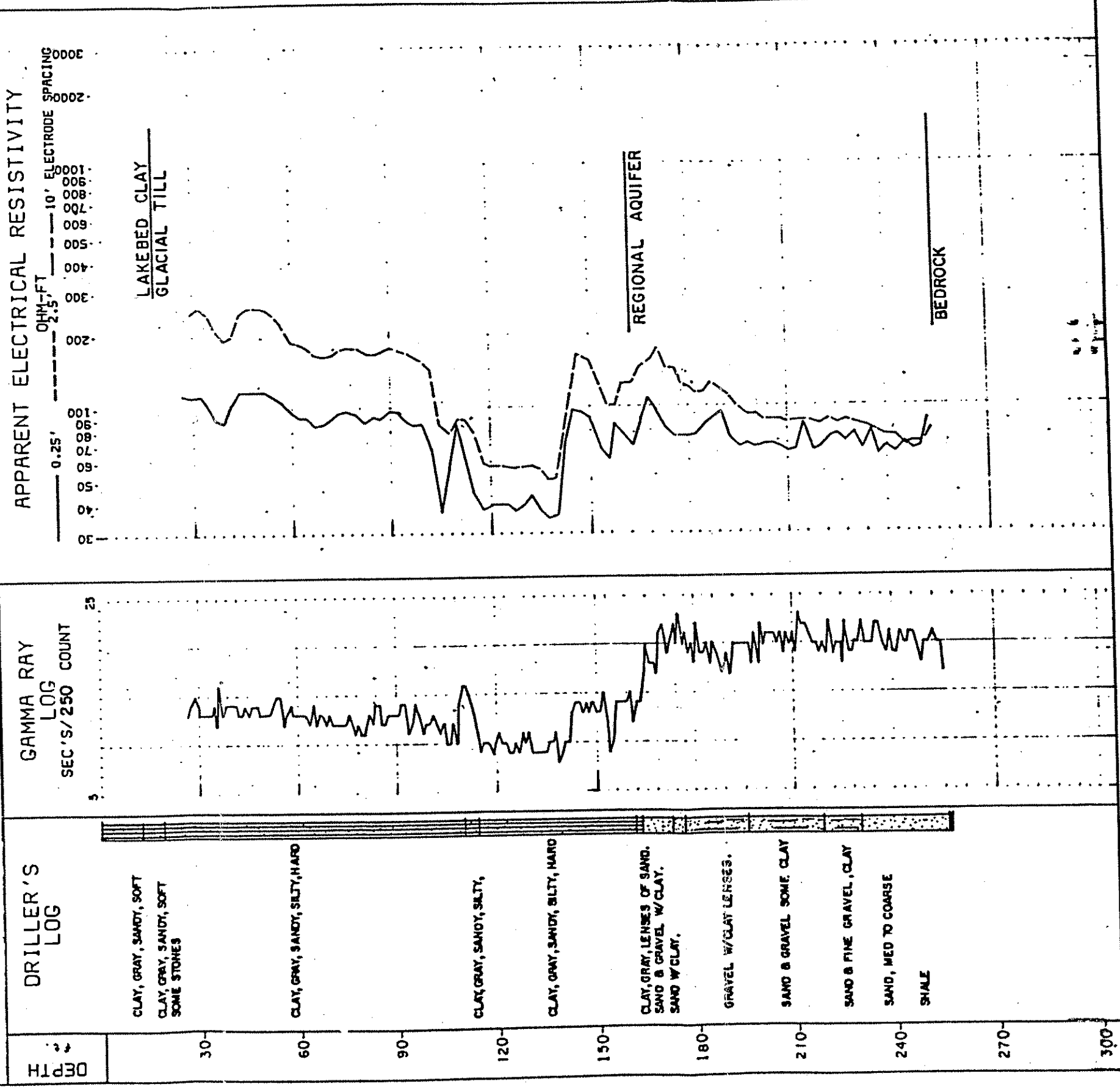
DISTANCE \_\_\_\_\_  
OWNER: DOW CHEMICAL CO. ADDRESS MIDLAND, MICHIGAN  
CONTRACTOR: RAYMER CO. ADDRESS GRAND RAPIDS, MICHIGAN

WELL & LOG DATA: TYPE OF WELL OBSERVATION DEPTH 256 FT. DIA. 4 IN.  
ELEVATIONS: LAND SURFACE 615.6 FT. ABOVE M.S.L. (MEAS'D.)  
TOP OF CASING 616.45 FT. ABOVE LAND SURFACE  
LOG DATUM LAND SURFACE

INSTRUMENT DATA: E-LOGGER KECK VB-63 GAMMA LOGGER KECK GR-73  
MAKE MODEL

PROBE:

WATER TABLE DEPTH \_\_\_\_\_  
UNCONSOLIDATED SOILS \_\_\_\_\_  
FLOWING FT. BELOW GROUND \_\_\_\_\_  
CONSOLIDATED SOILS \_\_\_\_\_  
\_\_\_\_\_ FT. BELOW GROUND \_\_\_\_\_  
INTERVAL LOGGED: 254 FT. TO 26 FT. BELOW LAND SURFACE  
FLUID LEVEL: UNCONSOLIDATED SOILS \_\_\_\_\_ FT. BELOW LAND SURFACE  
CONSOLIDATED SOILS \_\_\_\_\_ FT. BELOW LAND SURFACE  
TYPE OF FLUID: UNCONSOLIDATED SOILS AQUA-GEL  
CONSOLIDATED SOILS \_\_\_\_\_





PROJECT NO. 20237  
OWNERS WELL NO. 3012 (35-7)  
CLIENT DOW CHEMICAL  
DATE 10/3/83  
FIELD DATA BY G.S.

## GEOPHYSICAL LOG OF WELL

LOCATION: STATE MICHIGAN COUNTY MIDLAND TOWNSHIP MIDLAND  
SW. 1/4 NE 1/4 NE 1/4 SECTION 35 T 14 N R 2E

DISTANCE \_\_\_\_\_  
OWNER: DOW CHEMICAL CO. ADDRESS MIDLAND, MICHIGAN  
CONTRACTOR: RAYMER CO. ADDRESS GRAND RAPIDS, MICHIGAN

WELL & LOG DATA: TYPE OF WELL BORING DEPTH 162 FT. DIA. 6 1/4 IN.  
ELEVATIONS: LAND SURFACE 611 FT. ABOVE M.S.L. (MEAS'D.)  
TOP OF CASING \_\_\_\_\_ FT. ABOVE LAND SURFACE  
LOG DATUM LAND SURFACE

INSTRUMENT DATA: E-LOGGER KECK V.B.-63 GAMMA LOGGER KECK G.P.-73  
MAKE \_\_\_\_\_ MODEL \_\_\_\_\_

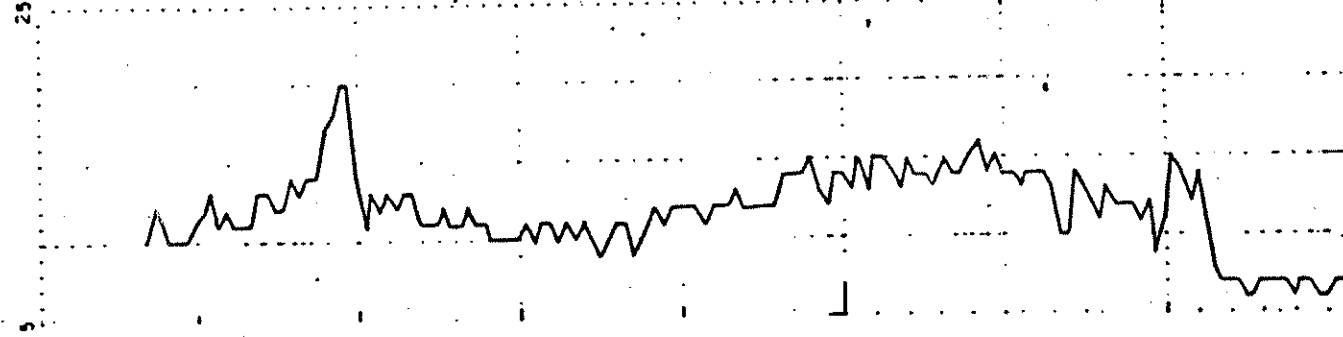
PROBE:

WATER TABLE DEPTH \_\_\_\_\_  
UNCONSOLIDATED SOILS \_\_\_\_\_ FT. BELOW SURFACE  
CONSOLIDATED SOILS \_\_\_\_\_ FT. BELOW GROUND  
UNCONSOLIDATED SOILS \_\_\_\_\_ FT. BELOW SURFACE  
CONSOLIDATED SOILS \_\_\_\_\_ FT. BELOW GROUND

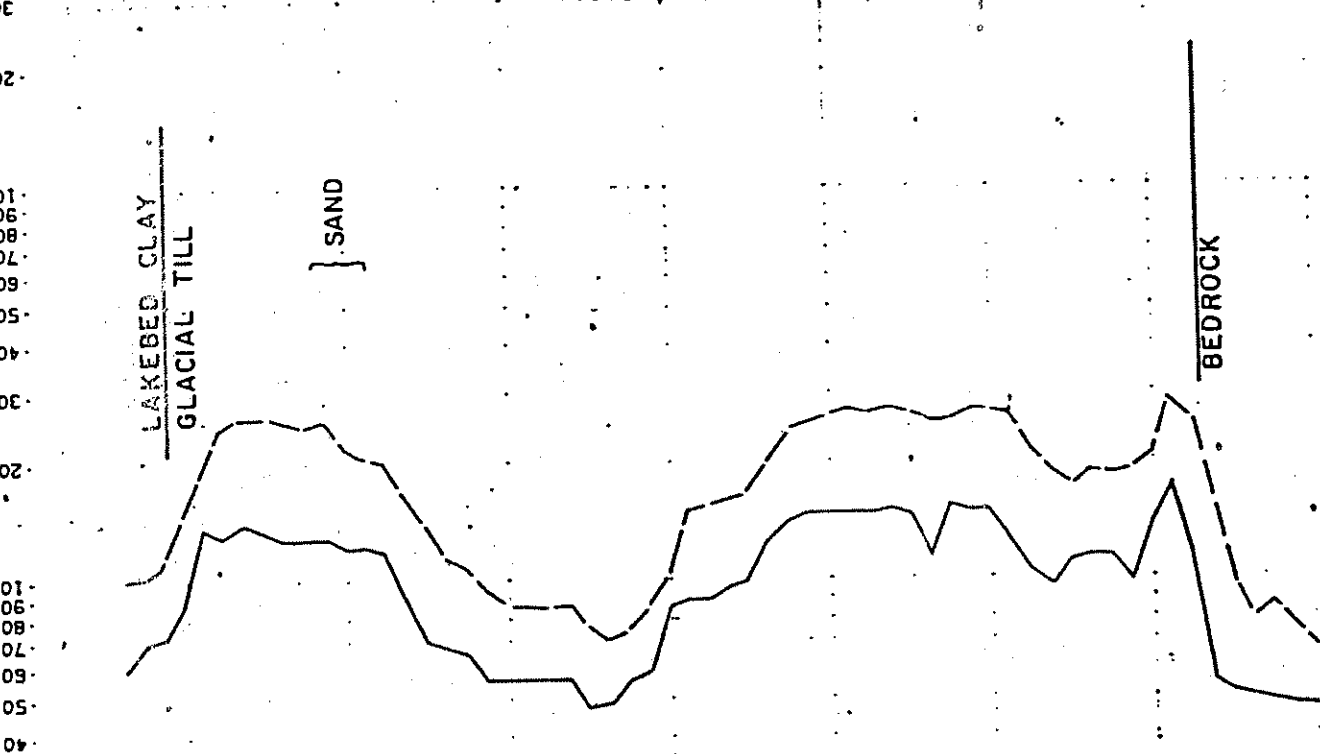
DRILLER'S LOG  
DEPTH  
20  
40  
60  
80  
100  
120  
140  
160  
180  
200

SAND, FINE TO MED.  
CLAY, GREY TO BROWN, SILTY  
MOIST  
CLAY, GRAY, SANDY, SILTY, MOIST  
CLAY, GRAY, SANDY, GRAVELLY, GRAY  
CLAY, GRAY, SANDY, SILTY, HARD  
CLAY, GRAY, SANDY, SILTY, SOME  
STONE  
40-SAND, MED. TO COARSE, GRAVEL  
CLAY, GRAY, SILTY SANDY,  
OCC. STONE  
LENS OF GRAVEL  
CLAY  
SHALE, GRAY TO BLUE, OCC  
LIMESTONE CHIP

GAMMA RAY  
LOG  
SEC'S/250 COUNT



APPARENT ELECTRICAL RESISTIVITY  
OHM-FT  
0.25  
2.5  
25  
250  
1000  
5000  
10000



BEDROCK



PROJECT NO. 20237  
OWNERS WELL NO. 3011 (35-6)  
CLIENT DOW CHEMICAL  
DATE 9/28/84  
FIELD DATA BY G.S.

## GEOPHYSICAL LOG OF WELL

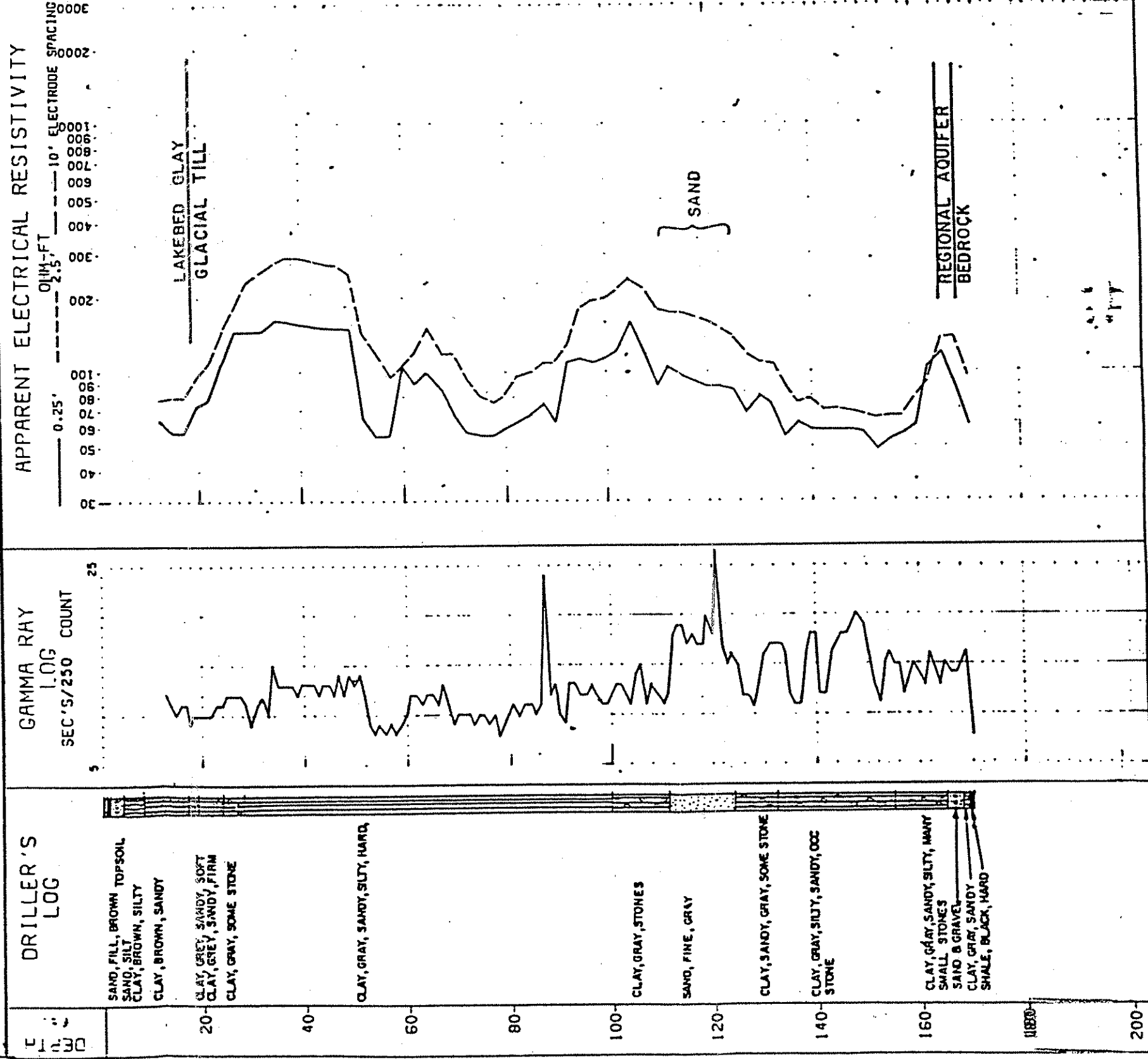
LOCATION: STATE MICHIGAN COUNTY MIDLAND TOWNSHIP MIDLAND  
NE 1/4 NE 1/4 NE 1/4 SECTION 35 T14N R 2E  
DISTANCE \_\_\_\_\_  
OWNER: DOW CHEMICAL ADDRESS MIDLAND, MICHIGAN  
CONTRACTOR: RAYMER CO. ADDRESS GRAND RAPIDS MICHIGAN

WELL A LOG DATA: TYPE OF WELL OBSERVATION DEPTH 170 FT. DIA. 4 IN.  
ELEVATIONS: LAND SURFACE 624.4 FT. ABOVE M.S.L. (MEAS'D.)  
TOP OF CASING 627.39 FT. ABOVE LAND SURFACE  
LOG DATUM LAND SURFACE

INSTRUMENT DATA: E-LOGGER KECK VB-63 GAMMA LOGGER KECK GB-73  
MAKE MODEL MAKE MODEL

PROBE:

WATER TABLE DEPTH \_\_\_\_\_  
INTERVAL LOGGED: 170 FT. TO 125 FT. BELOW LAND SURFACE  
UNCONSOLIDATED SOILS \_\_\_\_\_ FT. BELOW LAND SURFACE  
\_\_\_\_\_ FT. BELOW GROUND  
CONSOLIDATED SOILS \_\_\_\_\_ FT. BELOW LAND SURFACE  
\_\_\_\_\_ FT. BELOW GROUND  
TYPE OF FLUID: UNCONSOLIDATED SOILS AQUA-GEL  
CONSOLIDATED SOILS \_\_\_\_\_







PROJECT NO. 20245  
OWNERS WELL NO. 3010 (35-2)  
CLIENT DOW CHEMICAL  
DATE 9/21/83  
FIELD DATA BY DJG, GS

## GEOPHYSICAL LOG OF WELL

LOCATION: STATE MICHIGAN COUNTY MIDLAND TOWNSHIP MIDLAND  
SE 1/4 SE 1/4 NE 1/4 SECTION 36 T 14N R 2E  
DISTANCE  
OWNER: DOW CHEMICAL CO. ADDRESS MIDLAND, MICHIGAN  
CONTRACTOR: RAYMER CO. ADDRESS GRAND RAPIDS, MICHIGAN

WELL & LOG DATA: TYPE OF WELL OBSERVATION DEPTH 142 FT. DIA. 4 IN.  
ELEVATIONS: LAND SURFACE 624.9 FT. ABOVE M.S.L. (MEAS'D.)  
TOP OF CASING 625.59 FT. ABOVE LAND SURFACE  
LOG DATUM LAND SURFACE

INSTRUMENT DATA: E-LOGGER KECK VB-63 GAMMA LOGGER KECK GR-73  
MAKE MODEL

PROBE:

WATER TABLE DEPTH  
UNCONSOLIDATED SOILS  
18 FT. BELOW GROUND  
CONSOLIDATED SOILS  
FT. BELOW GROUND  
INTERVAL LOGGED: 137 FT. TO 12 FT. BELOW LAND SURFACE  
FLUID LEVEL: UNCONSOLIDATED SOILS FT. BELOW LAND SURFACE  
CONSOLIDATED SOILS FT. BELOW LAND SURFACE  
TYPE OF FLUID: UNCONSOLIDATED SOILS AQUA-GEL  
CONSOLIDATED SOILS

### DRILLER'S LOG

DEPTH  
20  
40  
60  
80  
100  
120  
140  
160  
180  
200

SAND  
CLAY, PLASTIC, BROWN GREY  
CLAY, FIRM, SOME GRAVEL, GREY  
CLAY, HARD, SOME GRAVEL  
GRAVEL, SOME CLAY  
CLAY, SOME GRAVEL  
CLAY, SANDY, SOME GRAVEL  
SAND, FINE  
CLAY, GRAVEL  
ROCKS  
CLAY, GRAVEL  
BEDROCK, SHALE

### GAMMA RAY LOG

SEC'S/250 COUNT

5 25

### APPARENT ELECTRICAL RESISTIVITY

OHM-FT. 0.25' 10' ELECTRODE SPACING

LAKEBED CLAY  
GLACIAL TILL

BEDROCK





PROJECT NO. 20245  
OWNERS WELL NO. 3009 (35-5)  
CLIENT DOW CHEMICAL CO  
DATE 9/27/83  
FIELD DATA BY G.S.

## GEOPHYSICAL LOG OF WELL

LOCATION: STATE MICHIGAN COUNTY MIDLAND TOWNSHIP MIDLAND  
NE 1/4 SE 1/4 NE 1/4 SECTION 35 T 14N R 2E  
DISTANCE  
OWNER: DOW CHEMICAL CO. ADDRESS MIDLAND, MICHIGAN  
CONTRACTOR: RAYMER CO. ADDRESS GRAND RAPIDS, MICHIGAN

WELL & LOG DATA: TYPE OF WELL OBSERVATION WELL DEPTH 166 FT. DIA. 4 IN.  
ELEVATIONS: LAND SURFACE 628 FT. ABOVE M.S.L. (MEAS'D.)  
TOP OF CASING 630.74 FT. ABOVE LAND SURFACE  
LOG DATUM LAND SURFACE

INSTRUMENT DATA: E-LOGGER KECK VB-63 GAMMA LOGGER KECK GR-73  
MAKE MODEL MAKE MODEL

### PROBE:

WATER TABLE DEPTH INTERVAL LOGGED: 160 FT. TO 15 FT. BELOW LAND SURFACE  
UNCONSOLIDATED SOILS FLUID LEVEL: UNCONSOLIDATED SOILS FT. BELOW LAND SURFACE  
15 FT. BELOW GROUND CONSOLIDATED SOILS FT. BELOW LAND SURFACE  
CONSOLIDATED SOILS TYPE OF FLUID: UNCONSOLIDATED SOILS AQUA-GEL  
FT. BELOW GROUND CONSOLIDATED SOILS

### DRILLER'S LOG

SAND  
CLAY, PLASTIC, SOFT, GRAY  
OC. STONES  
CLAY, HARD, GRAY  
CLAY & GRAVEL, HARD  
CLAY, VERY GRAVELLY  
CLAY, SOME GRAVEL  
CLAY, VERY GRAVELLY  
CLAY, GRAVELLY  
SAND, VERY FINE  
CLAY, GRAVELLY  
BEDROCK, SHALE, BLUE  
BEDROCK, SHALE BLK.

### GAMMA RAY LOG

SEC'S/250 COUNT

25

### APPARENT ELECTRICAL RESISTIVITY

0.25' 10' ELECTRODE SPACING

LAKE BED CLAY  
GLACIAL TILL

SAND  
BEDROCK



WILLIAMS & WORKS  
DESIGNERS/SURVEYORS/LOGGERS/GEOPHYSICISTS

511 CHURCH STREET, SUITE 200, ANN ARBOR, MI 48106-1001

PHONE: 313.963.1111 FAX: 313.963.1112

OWNERS WELL NO. 2708(35-14)

CLIENT DOH CHEMICAL

DATE 10/21/81

FIELD DATA BY G.S.

## GEOPHYSICAL LOG OF WELL

LOCATION: STATE MICHIGAN COUNTY MIDLAND TOWNSHIP MIDLAND  
NE 1/4 NE 1/4 NW 1/4 SECTION 35 T14N R 2E

DISTANCE                     

OWNER: DOH CHEMICAL ADDRESS MIDLAND, MI.

CONTRACTOR: KLIENFELT DRILLING ADDRESS CHARLOTTE, MI.

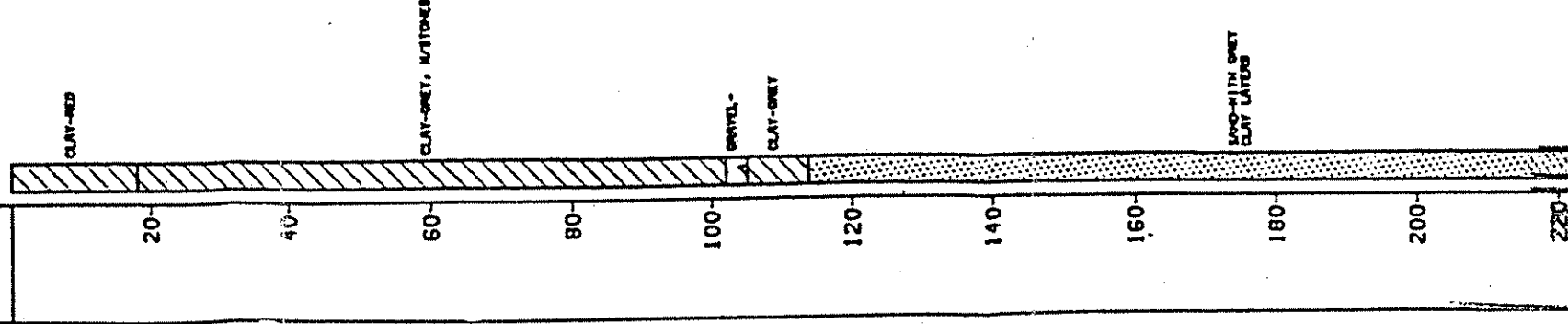
WELL & LOG DATA: TYPE OF WELL EXPLO/DRILLER DEPTH 235 FT. DIA. 4 IN.  
ELEVATIONS: LAND SURFACE 620 FT. ABOVE M.S.L.(MEASURED)  
TOP OF CASING 621.53 FT.  
LOG DATUM GROUND SURFACE

INSTRUMENT DATA: E-LOGGER KECK VB-63 GAMMA LOGGER KECK GR-73  
MAKE                      MODEL                     

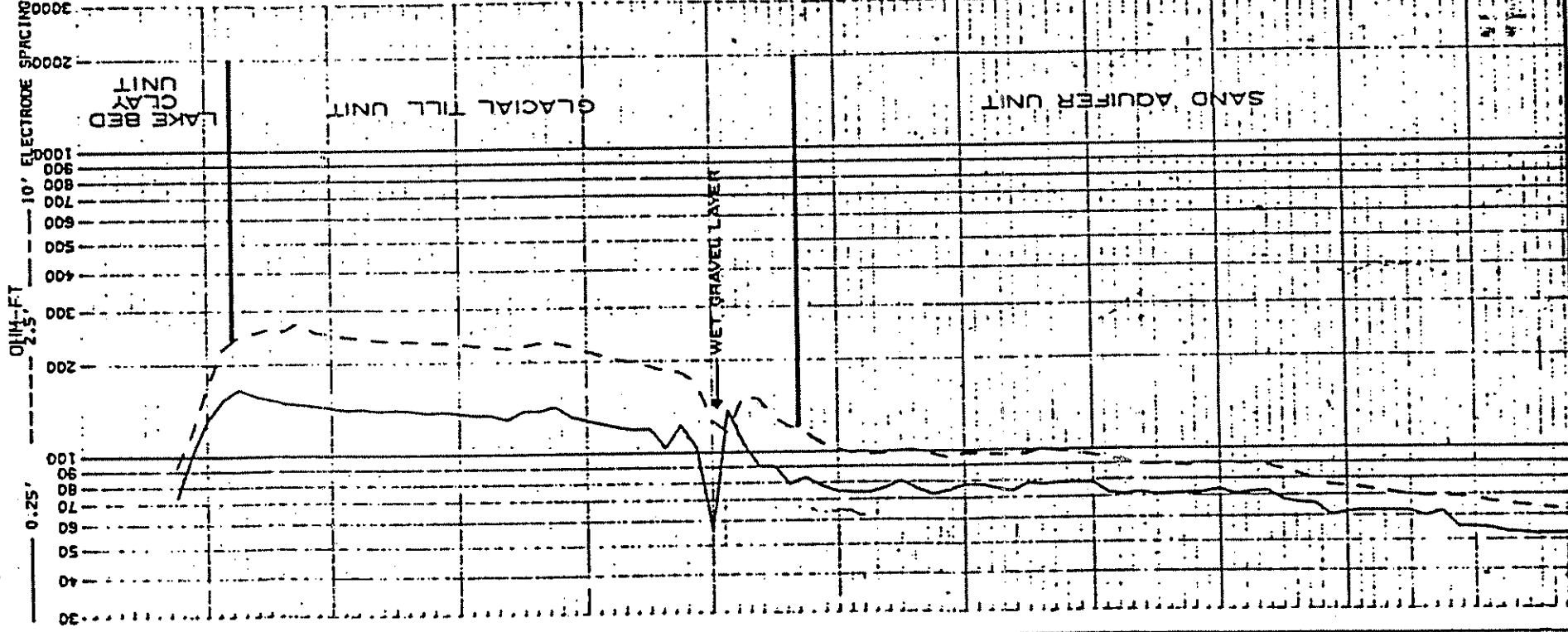
PROBE:

WATER TABLE DEPTH                      INTERVAL LOGGED: 232.5 FT. TO 15 FT. BELOW LAND SURFACE  
UNCONSOLIDATED SOILS                      FLUID LEVEL: UNCONSOLIDATED SOILS 1 FT. BELOW LAND SURFACE  
FLOWING FT. BELOW GROUND                      CONSOLIDATED SOILS                      FT. BELOW LAND SURFACE  
CONSOLIDATED SOILS                      TYPE OF FLUID: UNCONSOLIDATED SOILS AQUA-GEL  
                     FT. BELOW GROUND                      CONSOLIDATED SOILS                     

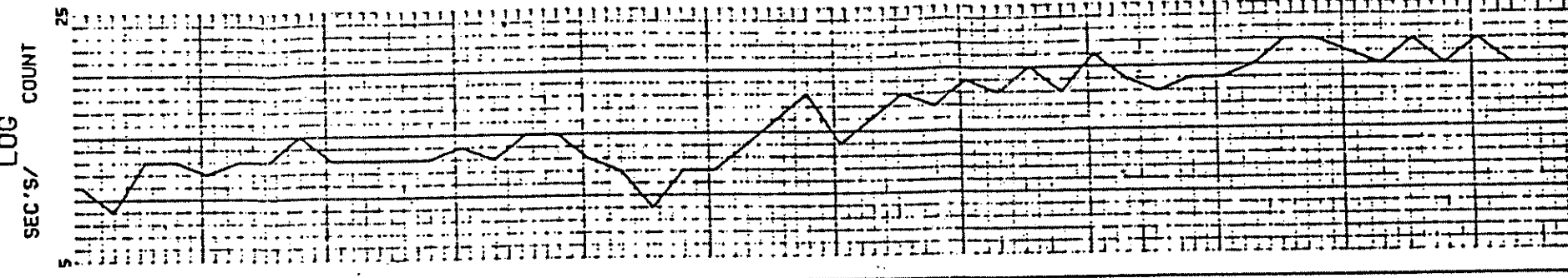
DRILLER'S LOG



APPARENT ELECTRICAL RESISTIVITY



GAMMA RAY





PROJECT NO. 20126  
OWNERS WELL NO. 2707(28-1)  
CLIENT DOM CHEMICAL  
DATE 2/16/82  
FIELD DATA BY G.S. & D.P.

## GEOPHYSICAL LOG OF WELL

LOCATION: STATE MICHIGAN COUNTY MIDLAND TOWNSHIP MIDLAND

NW 1/4 NW 1/4 SE 1/4 SECTION T 14N R 2E

DISTANCE \_\_\_\_\_

OWNER: DOM CHEMICAL ADDRESS MIDLAND, MICHIGAN

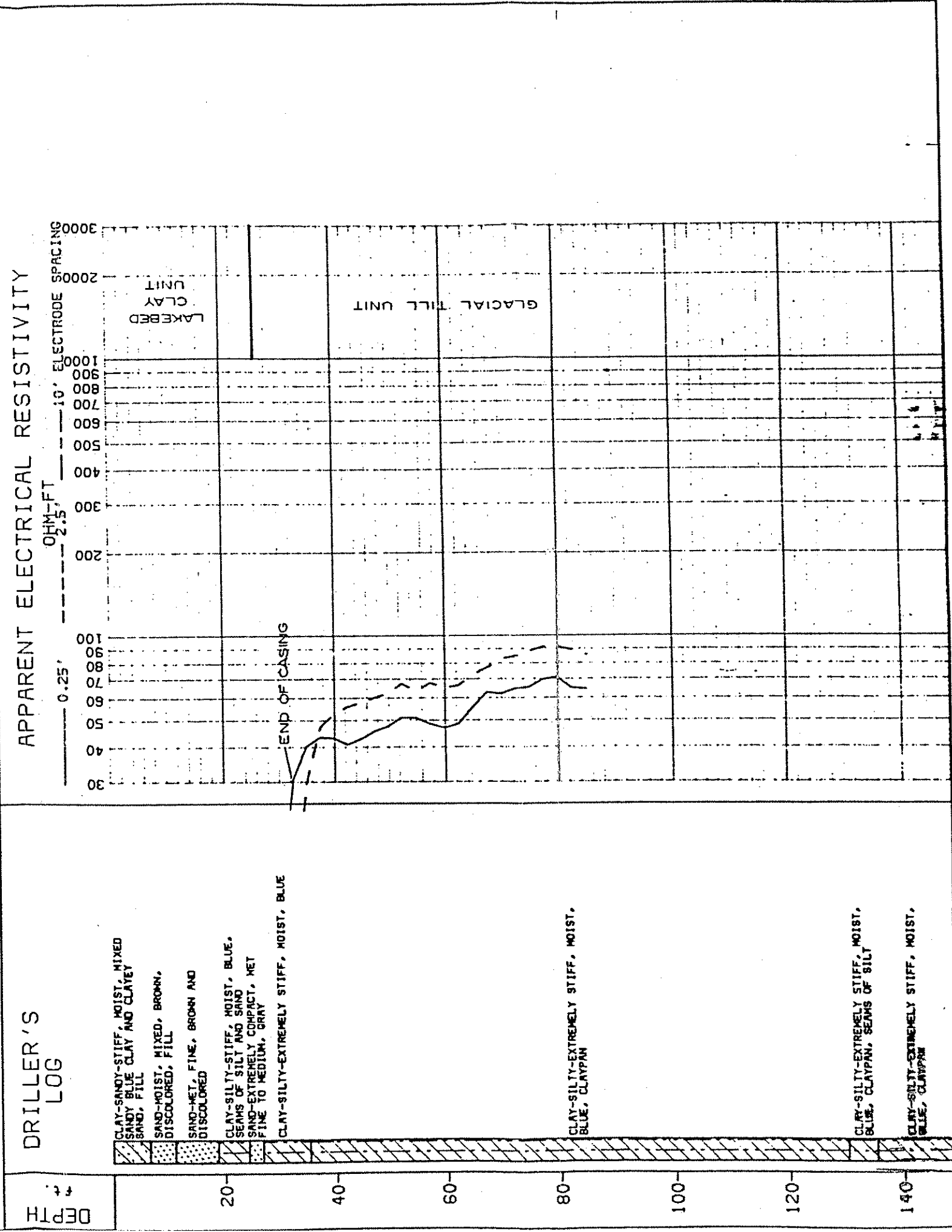
CONTRACTOR: MC DOWELL ASSOCIATES ADDRESS FERNDALE, MICHIGAN

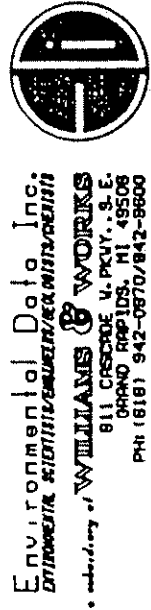
WELL & LOG DATA: TYPE OF WELL EXPLQ/OBSER DEPTH 148.5 FT. DIA. 4 IN.  
ELEVATIONS: LAND SURFACE 604.9 FT. ABOVE M.S.L. (EST'D, REPT'D, MEAS'D)  
TOP OF CASING NA FT. ABOVE LAND SURFACE  
LOG DATUM GROUND SURFACE

INSTRUMENT DATA: E-LOGGER KECK VB-63 GAMMA LOGGER \_\_\_\_\_  
MAKE \_\_\_\_\_ MODEL \_\_\_\_\_

PROBE: NA

WATER TABLE DEPTH \_\_\_\_\_  
UNCONSOLIDATED SOILS \_\_\_\_\_  
NA FT. BELOW GROUND \_\_\_\_\_  
CONSOLIDATED SOILS \_\_\_\_\_  
NA FT. BELOW GROUND \_\_\_\_\_  
INTERVAL LOGGED: 27.5 FT. TO 85 FT. BELOW LAND SURFACE  
FLUID LEVEL: UNCONSOLIDATED SOILS 2 FT. BELOW LAND SURFACE  
CONSOLIDATED SOILS NA FT. BELOW LAND SURFACE  
TYPE OF FLUID: UNCONSOLIDATED SOILS NA  
CONSOLIDATED SOILS NA





Environmental Data, Inc.  
Environmental Scientific Services/Environmental Geology  
a subsidiary of WILLIAMS & WORKS  
911 CEDROE V. PKWY., S.E.  
GRAND RAPIDS, MI 49508  
PHI (616) 942-0870/842-8600

PROJECT NO. 20126  
OWNERS WELL NO. 2704 (20-1)  
CLIENT DOW CHEMICAL  
DATE 2/16/82  
FIELD DATA BY G.S. & D.P.

## GEOPHYSICAL LOG OF WELL

LOCATION: STATE MICHIGAN COUNTY MIDLAND TOWNSHIP MIDLAND  
SE 1/4 NE 1/4 SE 1/4 SECTION T 14N R 2E

DISTANCE \_\_\_\_\_

OWNER: DOW CHEMICAL ADDRESS MIDLAND, MICHIGAN

CONTRACTOR: MC DOWELL ASSOCIATES ADDRESS FERNDALDE, MICHIGAN

WELL & LOG DATA: TYPE OF WELL EXPLO/OBSER DEPTH 116 FT. DIA. 4 IN.

ELEVATIONS: LAND SURFACE 604.9 FT. ABOVE M.S.L. (EST'D. REPT'D. MEAS'D)

TOP OF CASING NA FT. ABOVE LAND SURFACE

LOG DATUM GROUND SURFACE

INSTRUMENT DATA: E-LOGGER KECK VB-63 GAMMA LOGGER \_\_\_\_\_  
MAKE \_\_\_\_\_ MODEL \_\_\_\_\_

PROBE: NA

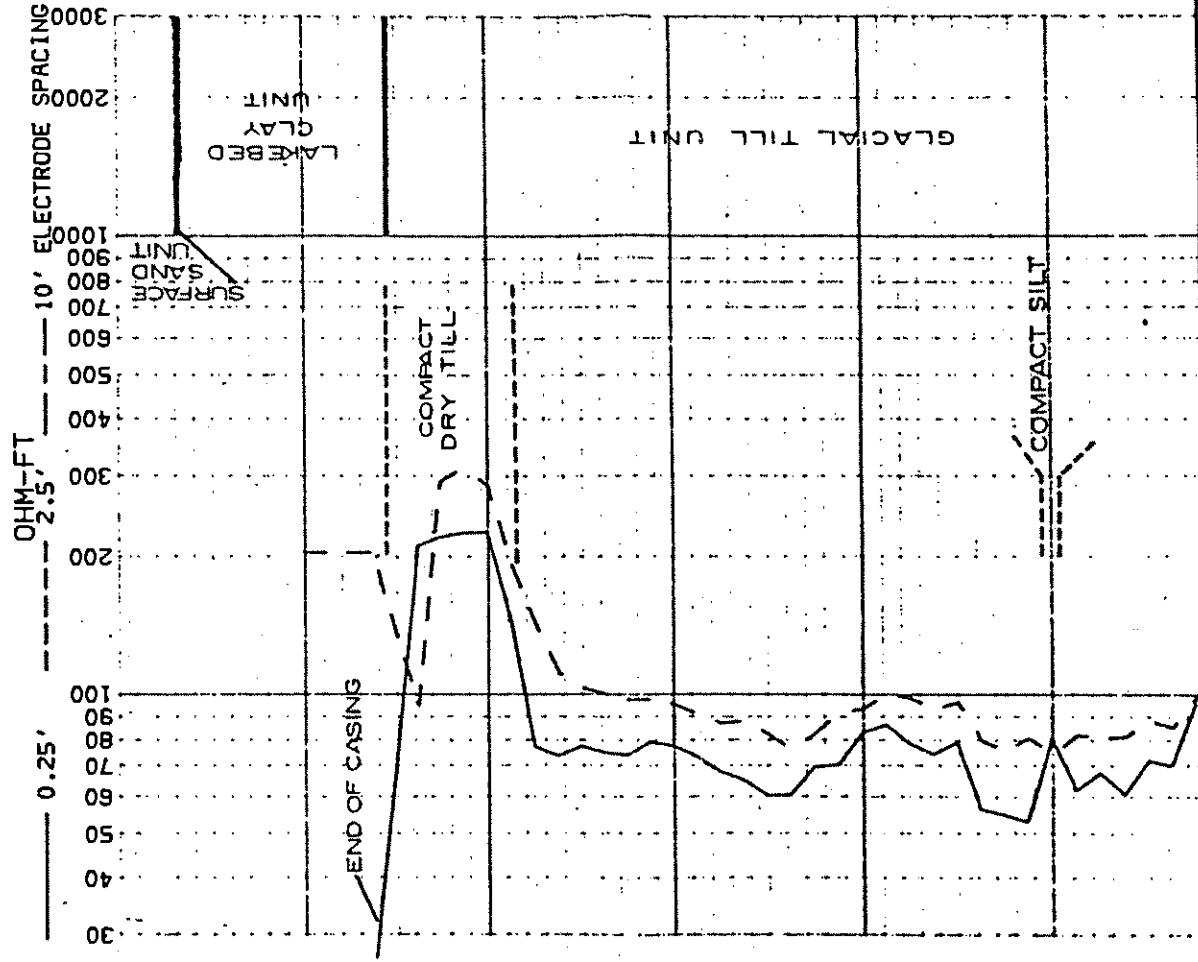
WATER TABLE DEPTH \_\_\_\_\_  
UNCONSOLIDATED SOILS \_\_\_\_\_  
NA FT. BELOW GROUND \_\_\_\_\_  
CONSOLIDATED SOILS \_\_\_\_\_  
NA FT. BELOW GROUND \_\_\_\_\_

INTERVAL LOGGED: 20 FT. TO 115 FT. BELOW LAND SURFACE  
FLUID LEVEL: UNCONSOLIDATED SOILS 2 FT. BELOW LAND SURFACE  
CONSOLIDATED SOILS NA FT. BELOW LAND SURFACE  
TYPE OF FLUID: UNCONSOLIDATED SOILS NA  
CONSOLIDATED SOILS NA

### DRILLER'S LOG

TOP SOIL - FIRM, MOIST, SANDY, BROWN  
SAND-COMPACT, MOIST, FINE  
OXIDIZED BROWN SAND AND SILT  
SAND-COMPACT, MOIST TO MET,  
FINE TO MEDIUM, BROWN  
CLAY-SILTY-EXTREMELY STIFF, MOIST, BLUE,  
SEAMS OF SILT, SAND AND PEBBLES  
SAND-EXTREMELY COMPACT, MET. FINE,  
BROWN, SEAMS OF GRAVEL  
CLAY-SANDY, GRAVELLY,  
EXTREMELY STIFF, BLUE  
CLAY-SILTY-EXTREMELY STIFF, MOIST, BLUE,  
SAND AND PEBBLES  
SILT-CLAYEY-EXTREMELY COMPACT, MOIST, GRAY  
CLAY-SILTY-EXTREMELY STIFF, MOIST, BLUE,  
OCCASIONAL SEAMS OF SILT

### APPARENT ELECTRICAL RESISTIVITY





Environmental Data, Inc.  
ENGINEERING SURVEILLANCE/GEOPHYSICS  
a subsidiary of WILLIAMS & WORKS  
611 CASCADE V. PKY., S.E.  
GRAND RAPIDS, MI 49508  
PH (616) 842-0870/842-8800

PROJECT NO. 20126  
OWNERS WELL NO. 2703 (22-1)  
CLIENT DOW CHEMICAL  
DATE 2/17/82  
FIELD DATA BY G.S. & D.P.

## GEOPHYSICAL LOG OF WELL

LOCATION: STATE MICHIGAN COUNTY MIDLAND TOWNSHIP MIDLAND  
NE 1/4 NW 1/4 SW 1/4 SECTION T 14N R 2E

DISTANCE \_\_\_\_\_  
OWNER: DOW CHEMICAL ADDRESS MIDLAND, MICHIGAN  
CONTRACTOR: MC DOWELL ASSOCIATES ADDRESS FERDALE, MICHIGAN

WELL & LOG DATA: TYPE OF WELL EXPLO/OSBER DEPTH 148 FT. DIA. 4 IN.  
ELEVATIONS: LAND SURFACE 632.54 FT. ABOVE M.S.L. (EST'D, REPT'D, MEAS'D)  
TOP OF CASING NA FT. ABOVE LAND SURFACE  
LOG DATUM GROUND SURFACE

INSTRUMENT DATA: E-LOGGER KECK VB-63 GAMMA LOGGER \_\_\_\_\_  
MAKE \_\_\_\_\_ MODEL \_\_\_\_\_

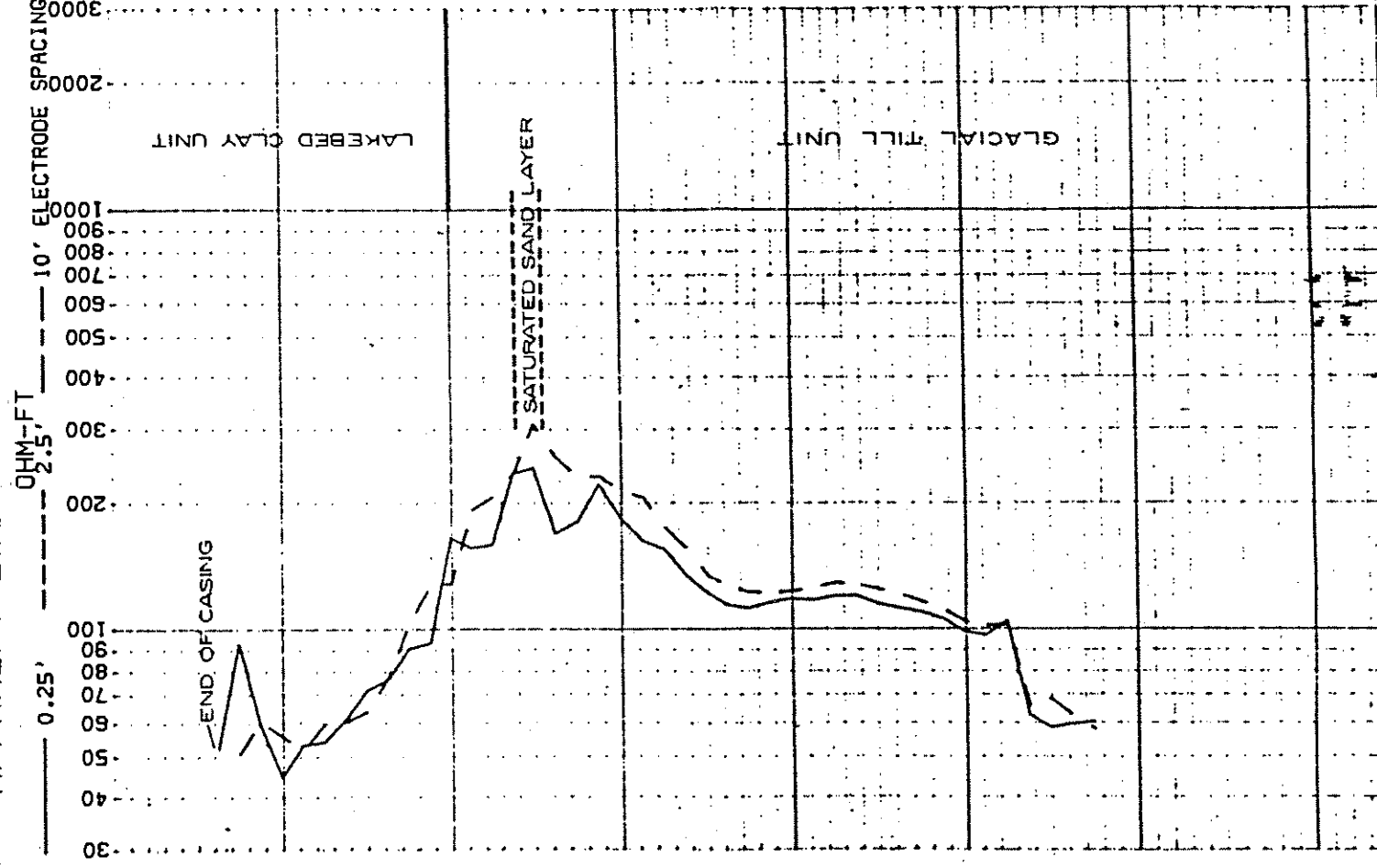
PROBE: NA

WATER TABLE DEPTH \_\_\_\_\_  
INTERVAL LOGGED: 7.5 FT. TO 115 FT. BELOW LAND SURFACE  
UNCONSOLIDATED SOILS \_\_\_\_\_  
FLUID LEVEL: UNCONSOLIDATED SOILS 2 FT. BELOW LAND SURFACE  
NA FT. BELOW GROUND CONSOLIDATED SOILS NA FT. BELOW LAND SURFACE  
CONSOLIDATED SOILS \_\_\_\_\_  
TYPE OF FLUID: UNCONSOLIDATED SOILS NA  
NA FT. BELOW GROUND CONSOLIDATED SOILS NA

### DRILLER'S LOG

TOP SOIL - COMPACT, MOIST, BROWN, SANDY  
SAND - COMPACT, MOIST, FINE,  
MED. ORGANIC, BROWN  
SAND - COMPACT, MOIST TO MED,  
FINE, BROWN  
CLAY - SILTY - STIFF, BLUE, MOIST  
SEAMS OF SILT  
CLAY - SILTY - MOIST, BLUE,  
LAYERS OF SILT  
CLAY - EXTREMELY STIFF, MOIST,  
BLUE, HARDPAN, HIGH SAND AND  
PEBBLE CONTENT  
SAND - EXTREMELY COMPACT,  
MET. FINE, GRAY  
CLAY - SILTY - EXTREMELY STIFF, MOIST, BLUE  
LAYERS OF SAND AND SILT  
CLAY - EXTREMELY STIFF, MOIST, BLUE,  
HARDPAN, HIGH SAND AND PEBBLE CONTENT  
CLAY - SILTY - EXTREMELY STIFF, MOIST,  
BLUE, HARDPAN, OCCASIONAL  
SAND AND PEBBLES

### APPARENT ELECTRICAL RESISTIVITY



MICHIGAN DRILLING DIVISION  
MICHIGAN TESTING ENGINEERS, INC.  
16801 WYOMING AVENUE  
DETROIT, MICHIGAN 48221

DATE: \_\_\_\_\_ JOB NO: 74-220

PROJECT: PROPOSED BUILDINGS & STRUCTURES

LOCATION: MIDLAND, MICHIGAN

## SIEVE ANALYSES OF GRANULAR SAMPLES

SAMPLE NO.	NO. 40 SIEVE		NO. 200 SIEVE	
	% RETAINED	% PASSING	% RETAINED	% PASSING
400-56-74-A	15.8	84.2	95.2	4.8
B	4.2	95.8	93.5	6.5
600-82-74-A	2.4	97.6	88.5	11.5
600-83-74-A	1.3	98.7	91.4	8.6
600-84-74-A	0.7	99.3	89.6	10.4
B	1.0	99.0	93.6	6.4
700-58-54-A	1.1	98.9	90.2	9.8
B	1.0	99.0	85.0	15.0
C	1.0	99.0	93.6	6.4
700-61-74-C	2.0	98.0	89.0	11.0
D	0.0	100.0	78.1	21.9
700-64-74-A	0.0	100.0	78.1	21.9
B	2.2	97.8	79.6	20.4
700-65-74-A	0.0	100.0	91.8	7.2
B	2.1	97.9	90.9	9.1

MICHIGAN DRILLING DIVISION  
MICHIGAN TESTING ENGINEERS, INC.  
16801 WYOMING AVENUE  
DETROIT, MICHIGAN 48221

DATE: \_\_\_\_\_ JOB NO: 74-220

PROJECT: PROPOSED BUILDINGS

LOCATION: MIDLAND, MICHIGAN

SIEVE ANALYSES OF GRANULAR SAMPLES

SAMPLE NO.	NO. 40 SIEVE		NO. 200 SIEVE	
	% RETAINED	% PASSING	% RETAINED	% PASSING
700-60-74C	25.7	74.3	83.0	17.0
700-62-74A	1.5	98.5	84.0	16.0
700-63-74A	0.2	99.8	89.0	11.0
700-66-74B	0.2	99.8	79.5	20.5
c	0.2	99.8	88.9	11.1
2700-69-74A	4.0	96.0	84.8	15.2
2700-70-74A	2.2	97.8	95.8	4.2
B	0.7	99.3	93.7	6.3
2700-71-74A	1.8	98.2	80.2	19.8
B	1.3	98.7	92.4	7.6
H	26.0	74.0	80.7	19.3
2700-72-74A	1.4	98.6	84.5	15.5
B	2.6	97.4	88.0	12.0

LOCATION: MIDLAND, MICHIGAN

[illegible]





**LOCATION:** DOW CORNING COMPANY

## SIEVE ANALYSES OF GRANULAR SAMPLES

[illegible]

Date: 2-16-79Sheet number: 10LIQUID AND PLASTIC LIMIT  
DETERMINATIONS  
DATA AND COMPUTATION SHEETJob # B1245  
Sample # 10

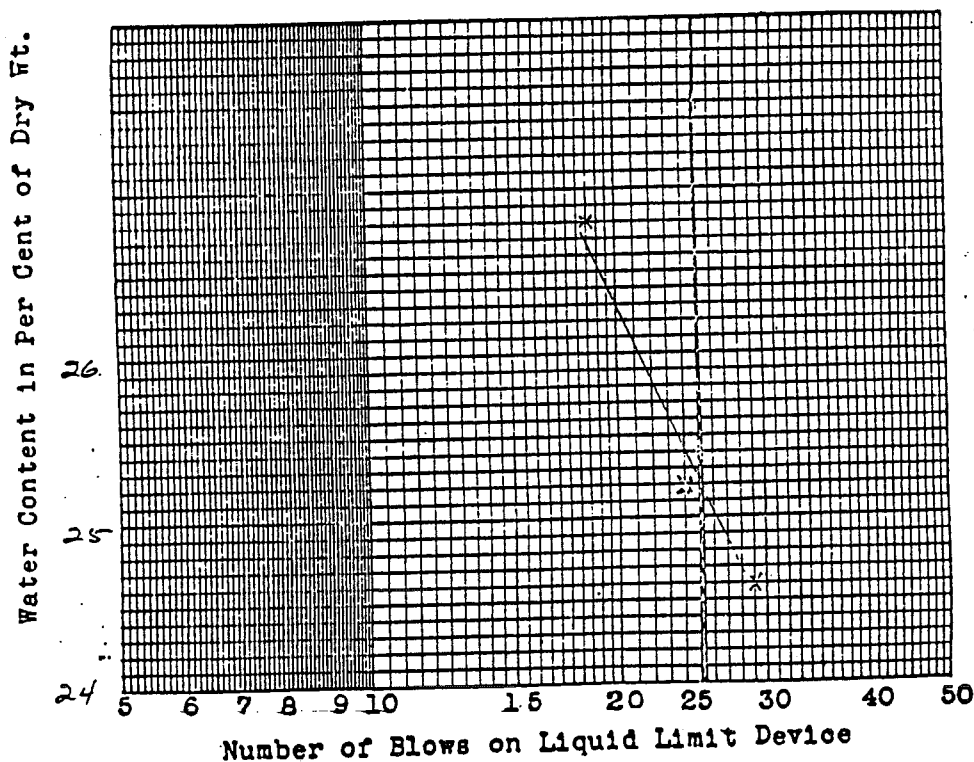
LL = Liquid Limit Test

PL = Plastic Limit Test

Type of Test		LL	LL	LL	LL	LL
Container Number		5	31	51	16	
Number of Blows	<del>X</del>	29	29	24	17	
Wt. Sample + Tare Wet		5.37	5.35	5.44	5.72	
Wt. Sample + Tare Dry		4.58	4.57	4.62	4.80	
Wt. of Water		.79	.78	.82	.92	
Tare		1.57	1.37	1.37	1.70	
Wt. of Dry Soil		3.21	3.20	3.25	3.43	
Water Content		24.6	24.4	25.2	26.8	

Type of Test		PL	PL	PL	
Container Number		104	32	34	4
Number of Blows	<del>X</del>	<del>X</del>	<del>X</del>	<del>X</del>	
Wt. Sample + Tare Wet		3.41	4.1	4.1	3.1
Wt. Sample + Tare Dry		3.07	3.75	3.7	
Wt. of Water		.34	.49	.45	
Tare		1.37	1.27	1.27	
Wt. of Dry Soil		1.70	2.38	2.21	
Water Content		2.0	2.06	2.03	

## FLOW CURVE



## RESULTS

Liquid Limit = 25.2(DAL) 24.4%  
Plastic Limit = 2.0Plasticity Index = 23.2

Flow Index = \_\_\_\_\_

Toughness Index = \_\_\_\_\_

Remarks: \_\_\_\_\_

**Addendum to Appendix PA 4**  
**Laboratory Results of Sediment Analyses**

Sediment analyses results for borings 1000-105, -106, -107 are presented in this appendix. Particle size, Atterberg Limits, unified soil classification, and permeability were measured for these borings. This appendix also contains a listing of particle size analyses performed for 36 borings located on the Dow Corning facility. Blow counts, percent moisture, natural weight, and unconsolidated compressional strength were measured in most of the soil borings shown on Figure P2. The physical characteristics of these borings are also contained in the drilling logs presented in Appendix PA2.

## TEST DATA SUMMARY

J# B1245

Sample B1245, Boring 100-105-79 - D

## 1. Particle Size Analysis of Soils ASTM D422-63

Sieve No.	Percent Finer
3/8 in.	100
#4	100
10	99.7
40	99.3
200	97.9
Particle diam.	
0.041 mm	91.4
0.029	87.3
0.019	81.2
0.014	67.7
0.0082	53.5
0.0064	40.2
0.0046	31.9
0.0033	25.5
0.0014	15.7

## 2. Atterberg Limits

Liquid Limit 25.2%  
Plastic Limit ~~2.04%~~ 20.4% (DAL)  
Plasticity Index 23.2

3. Unified classification clayey-silt, grey, trace of sand

ML

4. Permeability  $1.2 \times 10^{-7}$  cm./sec.

SAMTEST J# B:  
Dow Corning J# 6901-P



CLIENT: Dow Corning Corporation  
Test: Particle Size Analysis of Soils      ASTM D422-63

SAMEST,  
P.O.Box 1444  
Midland, MI 48640

517 - 496-3610

# HYDROMETER ANALYSIS OF CLAY FINES

Job No. B1245

Date 2-17-77

Sample Wt. 50.0 gm.; Hydrometer No. \_\_\_\_\_

Start Time 1:30 pm

k Factor 0.997

Time	Hydrometer	T°C	H <sub>c</sub>	Correct Hydrom	particle diameter d	k <sub>d</sub>	d <sub>c</sub>	% passing 50gm	% passing Total
1min	1.0326	21.4	.00405	1.02855	0.057	.72	0.041	91.7	91.4
2	1.0313	21.4		1.02725	0.040	.73	0.029	87.5	87.3
5	1.0294	21.2		1.02535	0.026	.75	0.019	81.4	81.2
10	1.0252	20.8	.0043	1.02115	0.018	.78	0.014	67.9	67.7
30	1.0210	20.8		1.01670	0.010	.82	0.0082	53.6	53.5
1hr	1.0168	21.0	.00425	1.01255	0.0074	.86	0.0064	42.3	40.2
2	1.0142	21.0		1.00996	0.0052	.90	0.0047	32.0	31.9
4	1.0122	20.8		1.00795	0.0037	.90	0.0033	25.5	25.5
<u>24</u>	<u>1.0093</u>	<u>20.4</u>	<u>0.0044</u>	<u>1.00490</u>	<u>0.0015</u>	<u>.93</u>	<u>0.0014</u>	<u>15.7</u>	<u>15.7</u>
—									
—									

Wash Sample	Wt 50.0 gms.	correction Factor k				
sieve no.	accum	uncombined individual	percent	on	pass	total pass
40	0.2	0.2	0.4	0.4	99.6	99.3
200	0.9	0.7	1.4	1.8	98.2	97.9
pan						
total	50.0					

## SAMPLE COMPOSITION:

clayey-silt-gray, trace  
of sample

unified classification:

ML

Gravel	0.0
Sand	2.1
Silt	80.7
Clay ( u )	<u>17.2</u>
Total %	100.0

## PERMEABILITY APPARATUS

The constant head apparatus consists of a pressure tank, the permeameter and burette with the appropriate inter-connecting plastic tubing and valves. A rubber bladder in the pressure tank isolates the deaired water from the constant air pressure head.

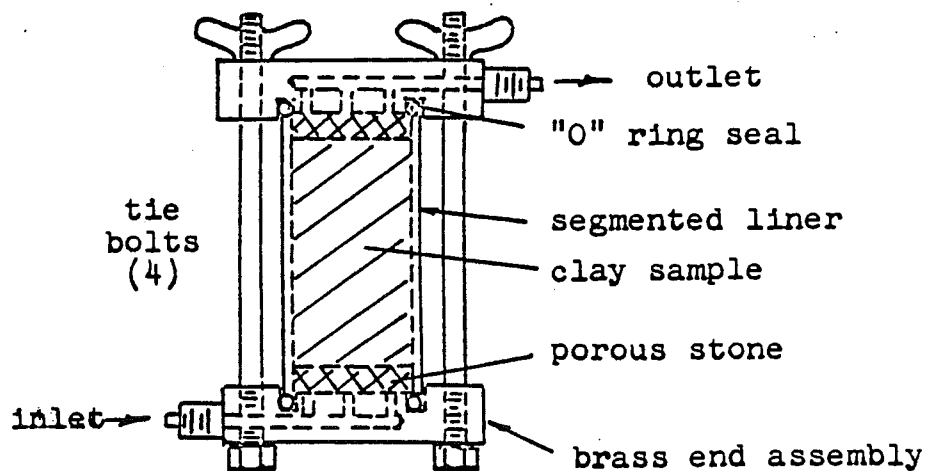
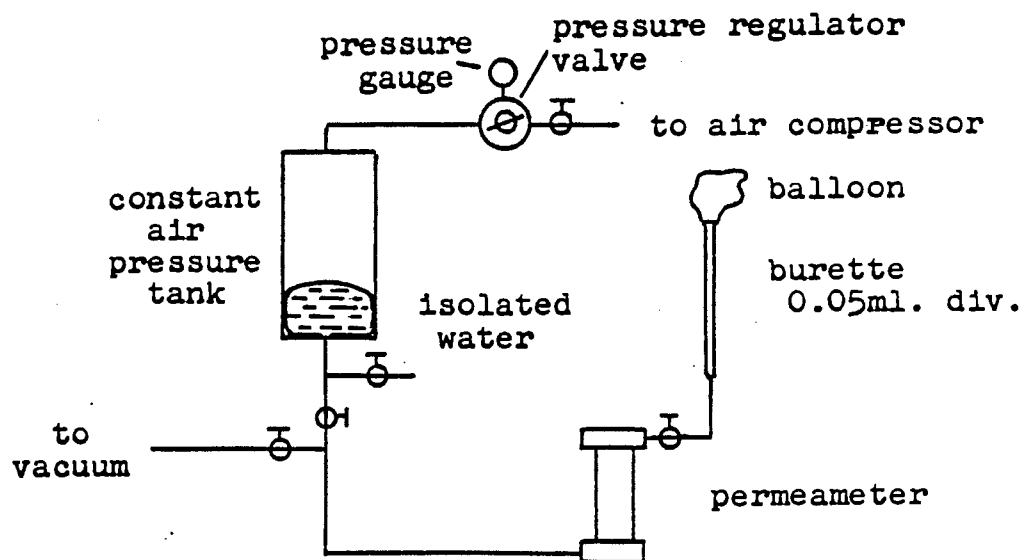
The permeameter consists of a single three inch (3") segmented liner containing the soil sample. To insure good edge seal, the clay is gently compressed in a hydraulic press to mold the plastic clay against the inside of the liner. The ends are trimmed to permit insertion of a one quarter inch (1/4") porous stone, one in each end. The top and bottom sections are then bolted onto the liner. "O" rings in each end provide a seal against the liner edge. After pressure checking for leaks the cell is ready to attach to the permeability apparatus.

Initially the soil sample is evacuated and then the valve to the pressurized water source is opened introducing the water into the permeameter. The soil is then allowed to saturate until water appears at the exit opening of the cell assembly. A burette is then connected and readings of water volume versus time are recorded until the values are consistent. These water volumes and corresponding times, as recorded by a lapse timer, are used in the permeability calculations. The imposed head pressure is maintained by a two stage pressure regulator. Water temperature is recorded and the permeability corrected for viscosity to standard conditions (20°C).



# PERMEABILITY APPARATUS

## Constant Head Type



PERMEAMETER ASSEMBLY

SAMTEST, INC.  
P.O.Box 1444  
Midland, MI 48640

PERMEABILITY DETERMINATION Job # B1245  
FOR GRANULAR SOILS Date 2-22-79  
COHESIVE Technician WC

Cell Type Seg liner Diameter 3.493 cm. Area 9.580 cm<sup>2</sup>

$$k = \frac{Q L}{t h A}$$

Q=vol. of water  
L=length of soil bed (CM)  
t=lapsed time sec.  
h=constant head water cm.  
A=area of sample bed cm<sup>2</sup>

$$k = \frac{\mu_{20}}{\mu} k_{20}$$

$\mu$  = viscosity at:  
T temp of F  
20°C

Permeability Value:

Sample No.	Sample Length	Water Temp °C	t sec	Head Water	Permeability at T°C cm/sec	Value $\mu$ corr. at 20°C	Value $\mu$ corr. at 20°C
	in/cm		100-ml	in/cm	$k_{20C}$	$\mu$ CORR	$k_{20C}$
100-105 -79 25 ft	2.50 6.35	20.5	0.15 ml 1140 sec	26 psig 719.4	$1.2 \times 10^{-7}$	~1	$1.2 \times 10^{-7}$

Void Determination:

Sample No.	sample + ring wt.	ring wt.	wet soil	tare wt.	dry wt.	soil wt.	void e	Soil Description
	271.8	121.8	149.3		moisture	19.3%		clayey-silt gray, tr. ss
	nat. unit wt.		128 pcf					



### List of Tests

In-place soil density - as determined using the  
rubber balloon method -- ASTM D2167-72

Moisture content of fine grained soils -- D2216-71

Particle size distribution -- D422-63

Liquid limits -- D423-66

Plastic Limits -- D424-59

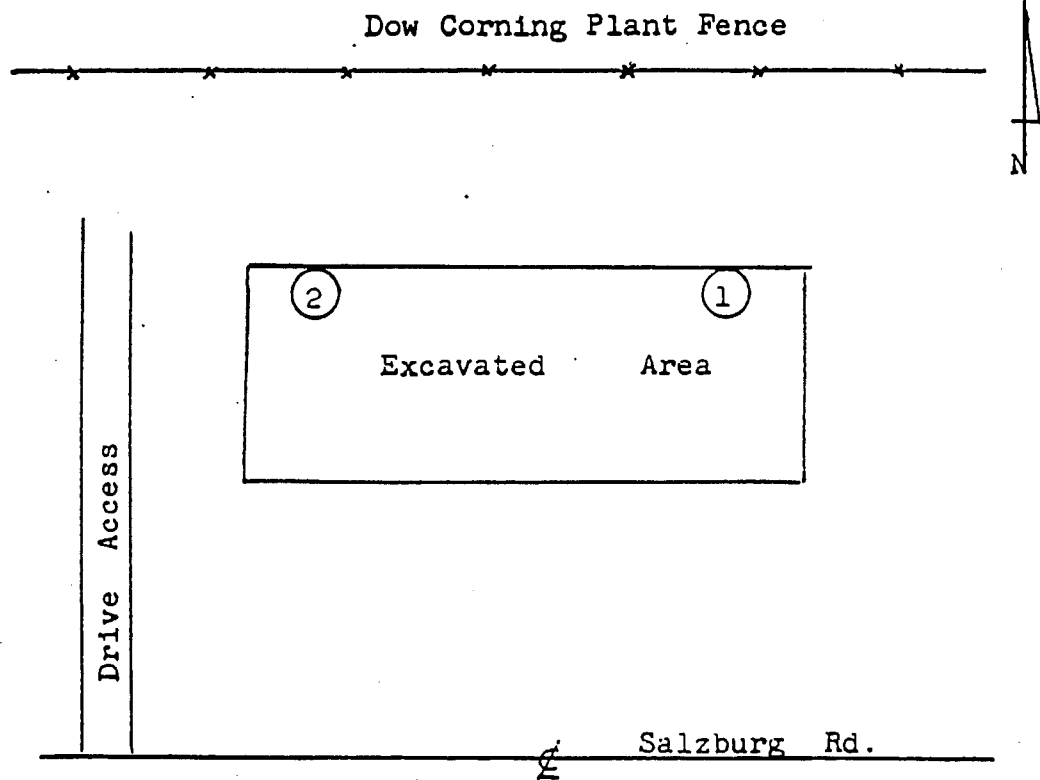
Moisture density of soils -- D1557

Permeability of fine grained soils

TEST LOCATION DIAGRAM

1356

Borrow Pit Clay  
Evaluation



No Site Scale

○ Indicates test location

# SAMTEST, INC.

Client Dow Corning Corporation

P.O. Box 1444

MIDLAND, MICHIGAN 48640

Phone 496-3610

Job No. 1356

Date 1-29-79

Project Salzburg Road Borrow Pit

## MOISTURE AND DENSITY DETERMINATION OF SOILS

Test No.	Sample Volume Cu. Ft.	Sample Weight Lbs.	Moisture Content %	Wet Density lb./ft. <sup>3</sup>	Dry Density lb./ft. <sup>3</sup>	Maximum Density lb./ft. <sup>3</sup>	% Compaction	Test Location
1	.01825	2.056	26.3	112.6	89.2	117.2	76.2	1. 2 1/2' below existing N. side E. end
2	.02000	2.274	22.5	113.7	92.8	111.2	83.5	2. 2 1/2' below existing N. side W. end
3								
4								
5								
6								
7								
8								
9								
10								

$$\text{Dry Density} = \frac{\text{Wet Density}}{1 + \% \text{ Moisture}}$$

Remarks Compactions compared with D1557 Modified Proctor for the brown mottled with gray clay, with a maximum dry density of 117.1 pcf at 15.2% moisture  
111.2 pcf at 17.0% moisture

**SAMTEST, INC.**  
**DRILLING & TESTING SERVICES**

P.O. Box 1444  
 Midland, Mich. 48640  
 1-517-496-3610

JOB NO 1356

DATE 2-7-79

**MOISTURE-DENSITY RELATIONSHIP**  
**(PROCTOR)**

CLIENT Dow Corning Corp., Midland Location

PROJECT Borrow pit clay evaluation

LOCATION Salzburg Rd, Midland, MI

TEST X T100 MODIFIED (ASTM-D1557) T99 STANDARD (ASTM-D698)

           MICHIGAN CONE

Sample #1

Sample #2

RESULTS      MAXIMUM DRY DENSITY 117.1 LB/FT<sup>3</sup>

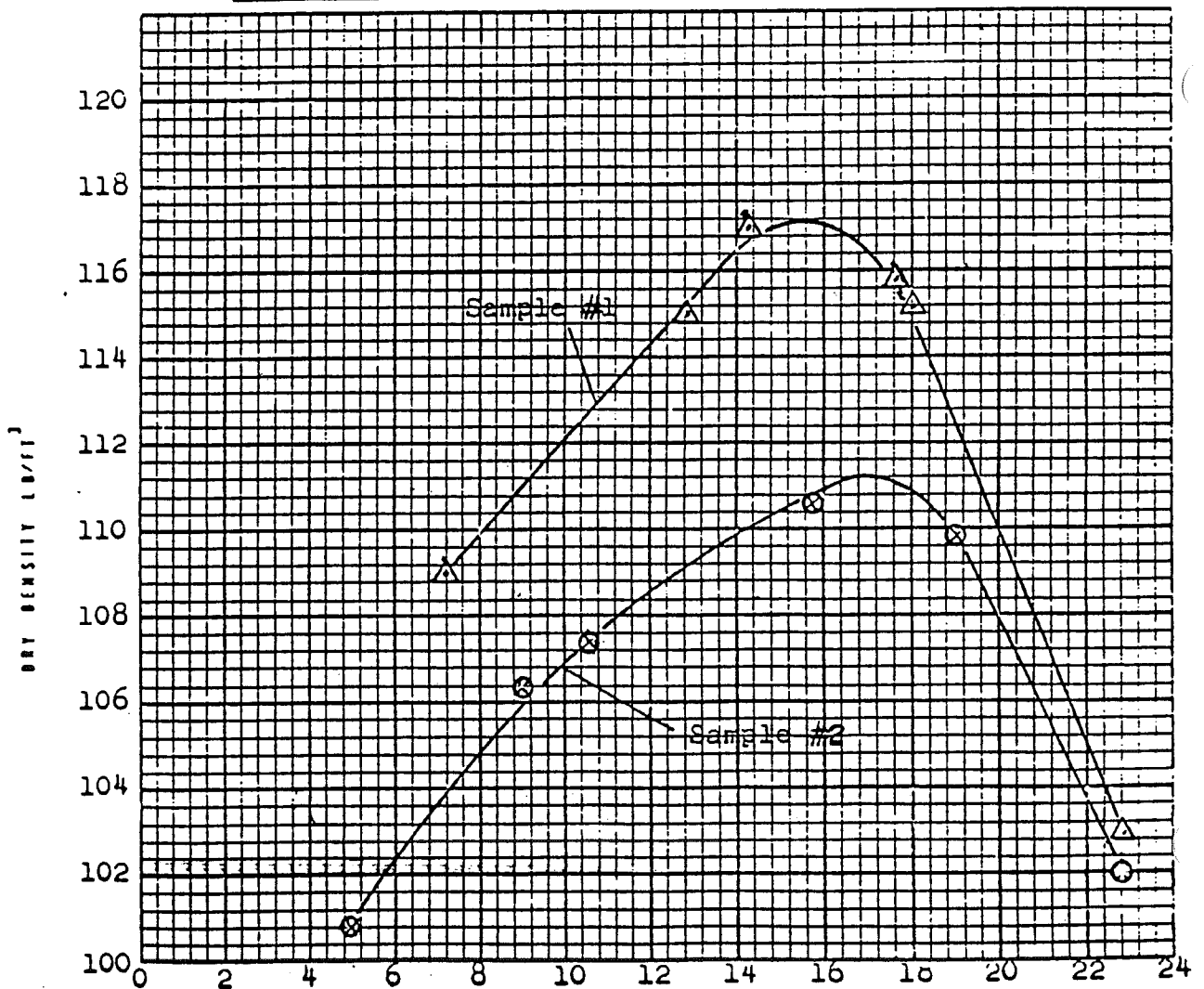
111.2 pcf

OPTIMUM MOISTURE 15.2 %

17.0 %

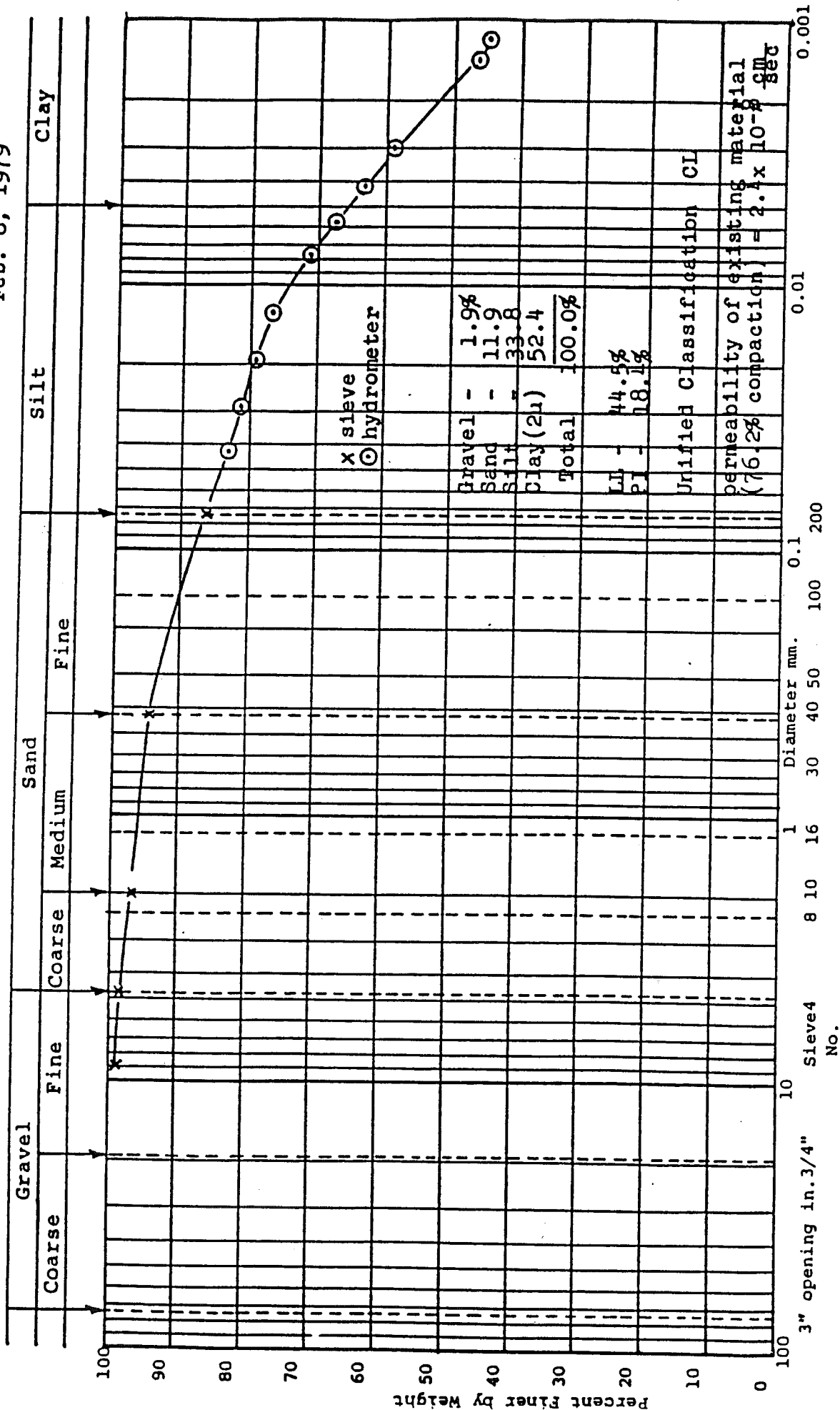
MATERIAL clay- brown, silty, tr.sand & gr CLASSIFICATION CL

SOURCE Salzburg Rd. Borrow Pit



# SOIL CLASSIFICATION

Job # 1356  
Feb. 8, 1979

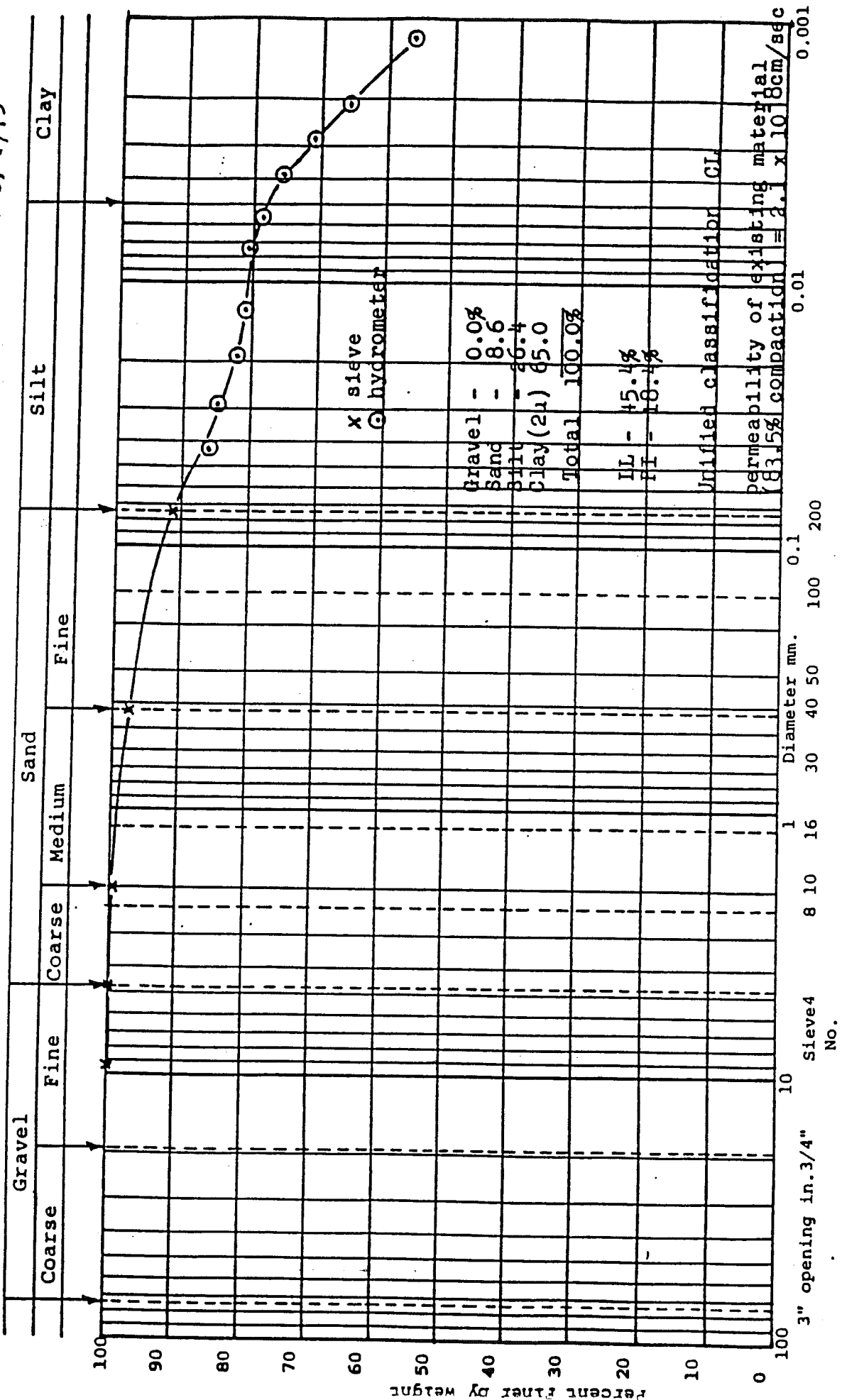


S A M T E S T Soil and Materials Testing - P. O. Box 1444 Midland, Michigan 48640  
Client: Dow Corning Corp.  
Project: Salzburg Rd. Borrow Pit evaluation - sample # 1, 2 1/2 ft. below surrounding grade  
N side, east end



# UNIFIED CLASSIFICATION

Job # 1356  
Feb. 8, 1979



S A M T E S T Soil and Materials Testing - P. O. Box 1444 Midland, Michigan 48640  
 Client: Dow Corning Corp.  
 Project: Salzburg Rd. Borrow Pit Evaluation - sample # 2, 21 1/2 ft. below surrounding grade  
 N side, west end

# Permeabilities \*

<u>Sample No.</u>	<u>% Compaction</u>	<u>Permeability</u>
#1	76 (in place)	$2.4 \times 10^{-8}$ cm/sec.
	85 remolded	$1.0 \times 10^{-8}$
	90 "	$1.2 \times 10^{-8}$
	95 "	$0.40 \times 10^{-8}$
#2	84 (in place)	$2.1 \times 10^{-8}$ cm/sec.
	85 remolded	$1.6 \times 10^{-8}$
	90 "	$0.7 \times 10^{-8}$
	95 "	$0.22 \times 10^{-8}$

\* Per Modified Proctor Test (D1557)



## **FINDINGS AND CONCLUSIONS**

### III. FINDINGS

All recorded water level data is presented in Table 2. All data presented in Table 2 is recorded as feet above mean sea level (U.S.G.S.). Graphical representation of the data is displayed in time drawdown plots in Figures 1, 2, 3 and 4. Figures 1, 2, and 3 display the response of the individual monitoring wells whereas Figure 4 displays the recorded water level in the pumping well DMW-4A.

The aquifer test evaluation yielded useful information in determining the hydraulic properties of the Regional Aquifer. Table 3 displays each monitoring well's response to the pumping of DMW-4A. All monitoring wells with the exception of DMW-7 responded to the pumping of DMW-4A. The water level data indicate that the Regional Aquifer under the landfill is connected to the deeper portion of the Regional Aquifer to the southwest and that the sand subunit at DMW-7 is not connected to the Regional Aquifer.

The lack of response in monitoring well DMW-7 indicates that this well is screened in a Till Sand that has very little or no hydraulic connection to the Regional Aquifer (Figure 1). An additional graph which compares the measured water levels in DMW-7 with the response of DMW-11 is presented in Figure 4. This comparison clearly displays the difference between a non-responding well screened in a Till Sand (DMW-7) and a responding well screened in the Regional Aquifer (DMW-11). This water level data confirms geologic cross section F-F' (Figure P4) and the interpretation presented in Section P2 (Geological Setting).

With the exception of monitoring well DMW-7, all other wells displayed a response to pumping conditions. The pumped well, DMW-4A, recorded a total drawdown of approximately 36 feet (Figure 4). The static water elevation prior to pumping in DMW-4A was 622.66 feet. Upon pump start-up the water level dropped to an elevation of 592 feet. The water level decreased an additional 4 feet to 588 feet 24 hours after pump start-up. Throughout the duration of pumping, the water level in the pumping well continued to fall at a slower rate. On Friday, October 9, approximately 72 hours after pumping began, the pump rate was decreased to approximately 58 gpm. The pumping was decreased in part due to the observed falling head and the up-coming weekend. The decrease in pumping rate was to assure that the pump did not break lift in the well during the weekend hours when no field personnel were present on-site.

Wells near DMW-4A on the north and west side of the landfill displayed the greatest amount of drawdown ranging from 6 to 7 feet (Figure 1). This includes DMW-6A, DMW-8, DMW-10, and DMW-12. DMW-11, located on the south side of the landfill, displayed a drawdown of approximately 0.54 feet (Figures 1 and 3). Well DMW-9, located one-quarter mile southwest of DMW-4A, displayed a drawdown of approximately 0.3 feet (Figure 2).

Daily fluctuations in the recorded water levels were observed in the monitoring wells displayed in Figure 1. These recorded fluctuations occurred daily between about 10 AM and 6 PM. The recorded fluctuations can be explained by Hermit data loggers and pressure transducers used to collect the water level data. The Hermit data loggers record water levels by measuring the pressure exerted on the pressure transducer. The pressure is converted to a height of the water column above the transducer, which can then be measured from the surveyed top of casing for a U.S.G.S. elevation reading. The elevation of the piezometric surface was calculated based on the reference level established prior to performing the test. Because the piezometric surface is actually a pressure head, the sharp fluctuations in reported water levels are most likely the result of surface activities which create shock waves that travel through the subsurface. This interpretation is supported by the fact that the fluctuations occur almost instantaneously throughout the Regional Aquifer. While the recorded fluctuations occur at the same times, the magnitude of the fluctuations vary. For example, Figure 5 displays the water level response between monitoring wells DMW-9 and DMW-11. The different magnitude of daily fluctuation can be directly observed between these two wells that are screened within the Regional Aquifer.

To define the hydraulic characteristics of the Regional Aquifer in the vicinity of the landfill, water level responses from DMW-8 and DMW-10 were analyzed using the Theis (1935) method. This method determines an aquifer's transmissivity and storage capacity using the following assumptions:

1. Aquifer is homogeneous and isotropic.
2. Aquifer has infinite areal extent.
3. Aquifer has constant thickness.
4. Aquifer is confined between impermeable formations on top and bottom.
5. Discharged water is released instantaneously from storage.
6. All pumping and monitoring wells fully penetrate the confined aquifer, and water flows horizontally toward the screen over its entire length.

The results of the Theis method of data analysis for wells DMW-8 and DMW-10 are presented below. The results of the data analyses using these two wells are similar. Hence, the average of the two results, 9840 gallons per day per foot (gpd/ft), would be a representative value for the shallow Regional Aquifer beneath the landfill.

<u>WELL NUMBER</u>	<u>TRANSMISSIVITY</u>	<u>STORAGE COEFFICIENT</u>
DMW-8	9718 gpd/ft	0.00008
DMW-10	9962 gpd/ft	0.00003
Average	9840	0.000055

Analysis of water level data from wells further away from the pumped well proved to be inconclusive due to the fact that the Regional Aquifer does not fulfill the assumptions of the Theis method. In particular, the thickness of the Regional Aquifer is not constant but varies from 34 feet thick as observed in monitoring well DMW-10 to over 200 feet thick as observed in monitoring well test 1 (26-15). In addition, the Regional Aquifer is not isotropic and homogeneous over the area between DMW-4A and DMW-9.

#### IV. Conclusions

The Regional Aquifer under the landfill was determined to be hydraulically connected to the Regional Aquifer southwest of the facility. The recorded response of DMW-9 to pumping of DMW-4A indicates that the two wells are hydraulically connected. The hydraulic connection supports the geologic interpretation of the Regional Aquifer as presented in Section P2 and cross section F-F' (Figure P4). Because monitoring well DMW-9 is hydraulically connected and located upgradient of the Dow Corning facility, it can be used to monitor background ground water quality of the Regional Aquifer.

The monitoring wells immediately surrounding the landfill (DMW-6A, DMW-8, DMW-10, DMW-11 and DMW-12) and the pumping well (DMW-4A) are all located in the Regional Aquifer that spans the bedrock high immediately under the landfill.

The Till Sand at monitoring well DMW-7 is hydraulically separated from the Regional Aquifer. This confirms the geologic interpretation presented in cross-section F-F' (Figure P4).





# **MONITORING WELL TABLES**

**TABLE 1**

**MONITORING WELLS**

**USED FOR**

**AQUIFER TEST DATA COLLECTION**

<u>WELL NUMBER</u>	<u>DISTANCE FROM PUMPING WELL (FT)</u>	<u>METHOD OF WATER LEVEL MEASUREMENT</u>
DMW-6A	400	steel tape and chalk
DMW-7	1370	"Hermit" data logger
DMW-8	510	"Hermit" data logger
DMW-9	3870	"Hermit" data logger
DMW-10	840	"Hermit" data logger
DMW-11	1280	"Hermit" data logger
DMW-12	530	steel tape
DMW-4A	(pumping well)	steel tape

TABLE 2  
Water Level Data

DATE	TIME	DMW-8 (USGS)	DMW-10 (USGS)	DMW-11 (USGS)	DMW-7 (USGS)	DMW-9 (USGS)	DMW-4A (USGS)	DMW-6A (USGS)	DMW-12 (USGS)
10/03/88	18:37	621.40	621.37						622.64
10/03/88	18:47	621.42	621.41	621.66	620.76				
10/03/88	18:57	621.40	621.42	621.66	620.71				
10/03/88	19:07	621.40	621.42	621.67	620.69				
10/03/88	19:17	621.40	621.42	621.64	620.67	624.06			
10/03/88	19:27	621.40	621.42	621.64	620.67	624.06		622.69	
10/03/88	19:37	621.40	621.42	621.63	620.66	624.07	622.64		
10/03/88	19:47	621.42	621.42	621.62	620.66	624.07			
10/03/88	19:57	621.40	621.42	621.61	620.66	624.08			
10/03/88	20:07	621.40	621.42	621.61	620.66	624.08			
10/03/88	20:17	621.42	621.42	621.60	620.66	624.08			
10/03/88	20:27	621.42	621.42	621.60	620.66	624.09			
10/03/88	20:37	621.40	621.42	621.60	620.66	624.09			
10/03/88	20:47	621.42	621.42	621.60	620.66	624.09			
10/03/88	20:57	621.42	621.42	621.59	620.66	624.09			
10/03/88	21:07	621.42	621.42	621.59	620.66	624.09			
10/03/88	21:17	621.42	621.42	621.59	620.66	624.09			
10/03/88	21:27	621.42	621.42	621.58	620.66	624.09			
10/03/88	21:37	621.42	621.42	621.59	620.66	624.10			
10/03/88	21:47	621.42	621.42	621.58	620.66	624.10			
10/03/88	21:57	621.42	621.42	621.58	620.66	624.10			
10/03/88	22:07	621.40	621.42	621.59	620.66	624.10			
10/03/88	22:17	621.40	621.42	621.58	620.66	624.10			
10/03/88	22:27	621.40	621.42	621.59	620.66	624.10			
10/03/88	22:37	621.40	621.41	621.58	620.66	624.10			
10/03/88	22:47	621.40	621.42	621.57	620.65	624.10			
10/03/88	22:57	621.40	621.41	621.57	620.65	624.10			
10/03/88	23:07	621.40	621.42	621.57	620.65	624.10			
10/03/88	23:17	621.40	621.41	621.57	620.66	624.10			
10/03/88	23:27	621.40	621.41	621.57	620.66	624.10			
10/03/88	23:37	621.40	621.41	621.57	620.66	624.10			
10/03/88	23:47	621.40	621.41	621.57	620.66	624.10			
10/03/88	23:57	621.40	621.41	621.57	620.65	624.10			
10/04/88	00:07	621.42	621.41	621.57	620.65	624.09			
10/04/88	00:17	621.40	621.41	621.57	620.65	624.09			
10/04/88	00:27	621.42	621.41	621.57	620.65	624.10			
10/04/88	00:37	621.40	621.41	621.58	620.65	624.10			
10/04/88	00:47	621.40	621.41	621.58	620.65	624.10			
10/04/88	00:57	621.40	621.41	621.58	620.65	624.10			
10/04/88	01:07	621.42	621.41	621.58	620.65	624.10			
10/04/88	01:17	621.42	621.41	621.58	620.65	624.10			
10/04/88	01:27	621.42	621.41	621.58	620.65	624.10			
10/04/88	01:37	621.42	621.41	621.58	620.65	624.10			
10/04/88	01:47	621.42	621.41	621.58	620.65	624.10			

TABLE 2  
Water Level Data

DATE	TIME	DMW-8 (USGS)	DMW-10 (USGS)	DMW-11 (USGS)	DMW-7 (USGS)	DMW-9 (USGS)	DMW-4A (USGS)	DMW-6A (USGS)	DMW-12 (USGS)
10/04/88	01:57	621.42	621.41	621.58	620.65	624.10			
10/04/88	02:07	621.44	621.41	621.59	620.65	624.10			
10/04/88	02:17	621.42	621.41	621.60	620.66	624.10			
10/04/88	02:27	621.42	621.41	621.58	620.66	624.10			
10/04/88	02:37	621.44	621.41	621.58	620.66	624.10			
10/04/88	02:47	621.44	621.41	621.57	620.65	624.10			
10/04/88	02:57	621.44	621.42	621.59	620.66	624.11			
10/04/88	03:07	621.44	621.41	621.59	620.66	624.11			
10/04/88	03:17	621.44	621.42	621.59	620.66	624.11			
10/04/88	03:27	621.44	621.41	621.59	620.66	624.11			
10/04/88	03:37	621.44	621.41	621.58	620.65	624.11			
10/04/88	03:47	621.44	621.41	621.58	620.66	624.11			
10/04/88	03:57	621.44	621.42	621.59	620.66	624.11			
10/04/88	04:07	621.44	621.42	621.59	620.66	624.11			
10/04/88	04:17	621.44	621.42	621.59	620.65	624.11			
10/04/88	04:27	621.44	621.42	621.59	620.65	624.11			
10/04/88	04:37	621.44	621.42	621.59	620.65	624.11			
10/04/88	04:47	621.44	621.41	621.59	620.65	624.11			
10/04/88	04:57	621.45	621.42	621.59	620.65	624.11			
10/04/88	05:07	621.44	621.42	621.58	620.65	624.11			
10/04/88	05:17	621.45	621.42	621.58	620.65	624.11			
10/04/88	05:27	621.44	621.42	621.59	620.66	624.11			
10/04/88	05:37	621.44	621.42	621.58	620.65	624.11			
10/04/88	05:47	621.44	621.42	621.57	620.65	624.11			
10/04/88	05:57	621.45	621.42	621.57	620.65	624.11			
10/04/88	06:07	621.45	621.42	621.57	620.65	624.11			
10/04/88	06:17	621.45	621.42	621.57	620.65	624.11			
10/04/88	06:27	621.44	621.42	621.58	620.65	624.11			
10/04/88	06:37	621.44	621.42	621.57	620.65	624.11			
10/04/88	06:47	621.45	621.42	621.57	620.65	624.11			
10/04/88	06:57	621.45	621.42	621.59	620.65	624.11			
10/04/88	07:07	621.45	621.42	621.58	620.65	624.11			
10/04/88	07:17	621.45	621.42	621.58	620.65	624.11			
10/04/88	07:27	621.44	621.42	621.58	620.65	624.11			
10/04/88	07:37	621.45	621.42	621.58	620.65	624.11			
10/04/88	07:47	621.45	621.42	621.59	620.65	624.11			
10/04/88	07:57	621.45	621.42	621.58	620.65	624.11			
10/04/88	08:07	621.45	621.42	621.58	620.64	624.11			
10/04/88	08:17	621.45	621.42	621.58	620.64	624.11	622.66		
10/04/88	08:27	621.45	621.42	621.57	620.64	624.10		622.71	
10/04/88	08:37	621.45	621.42	621.56	620.64	624.11			622.66
10/04/88	08:47	621.45	621.42	621.56	620.64	624.10			
10/04/88	08:57	621.44	621.42	621.55	620.64	624.10			
10/04/88	09:07	621.45	621.41	621.56	620.64	624.10			

TABLE 2  
Water Level Data

DATE	TIME	DMW-8 (USGS)	DMW-10 (USGS)	DMW-11 (USGS)	DMW-7 (USGS)	DMW-9 (USGS)	DMW-4A (USGS)	DMW-6A (USGS)	DMW-12 (USGS)
10/04/88	09:17	621.44	621.42	621.56	620.64	624.10			
10/04/88	09:27	621.44	621.42	621.57	620.64	624.09			
10/04/88	09:37	621.45	621.42	621.56	620.64	624.10			
10/04/88	09:47	621.44	621.42	621.55	620.64	624.09			
10/04/88	09:57	621.44	621.42	621.54	620.64	624.09			
10/04/88	10:07	621.44	621.42	621.54	620.64	624.09			
10/04/88	10:17	621.44	621.42	621.54	620.64	624.09			
10/04/88	10:27	621.44	621.42	621.54	620.64	624.09			
10/04/88	10:37	621.45	621.42	621.62	620.64	624.09			
10/04/88	10:47	621.44	621.42	621.53	620.64	624.09			
10/04/88	10:57	621.45	621.42	621.52	620.64	624.11			
10/04/88	11:07	621.45	621.42	621.51	620.64	624.09			
10/04/88	11:17	621.44	621.42	621.52	620.64	624.09			
10/04/88	11:27	621.48	621.45	621.47	620.64	624.10			
10/04/88	11:37	621.45	621.42	621.44	620.64	624.09			
10/04/88	11:47	621.45	621.42	621.52	620.64	624.09			
10/04/88	11:57	621.48	621.45	621.49	620.64	624.11			
10/04/88	12:07	621.50	621.47	621.53	620.64	624.10			
10/04/88	12:17	621.50	621.45	621.50	620.64	624.10			
10/04/88	12:27	621.44	621.41	621.49	620.64	624.11			
10/04/88	12:37	621.44	621.45	621.68	620.65	624.12			
10/04/88	12:47	621.45	621.44	621.60	620.64	624.13			
10/04/88	12:57	621.45	621.42	621.58	620.64	624.13			

PUMP START UP

PUMP START UP

10/04/88	13:07	621.52	621.49	621.59	620.64	624.14			
10/04/88	13:17	621.47	621.45	621.58	620.64	624.14			
10/04/88	13:27	621.45	621.45	621.56	620.64	624.14			
10/04/88	13:37	621.40	621.44	621.43	620.64	624.14			
10/04/88	13:47	621.26	621.33	621.54	620.64	624.14	591.98		
10/04/88	13:57	621.17	621.23	621.60	620.64	624.16			622.18
10/04/88	14:07	621.07	621.14	621.60	620.65	624.16			
10/04/88	14:17	621.02	621.07	621.60	620.65	624.16		622.09	
10/04/88	14:27	620.95	621.01	621.58	620.65	624.17			622.03
10/04/88	14:37	620.85	620.93	621.58	620.65	624.16			
10/04/88	14:47	620.79	620.87	621.61	620.65	624.18			
10/04/88	14:57	620.72	620.79	621.56	620.65	624.17			
10/04/88	15:07	620.66	620.72	621.51	620.64	624.18			
10/04/88	15:17	620.60	620.68	621.51	620.64	624.18			
10/04/88	15:27	620.53	620.61	621.50	620.64	624.18			
10/04/88	15:37	620.45	620.52	621.54	620.65	624.18			
10/04/88	15:47	620.42	620.50	621.67	620.66	624.18			
10/04/88	15:57	620.37	620.44	621.62	620.65	624.19			

TABLE 2  
Water Level Data

DATE	TIME	DMW-8 (USGS)	DMW-10 (USGS)	DMW-11 (USGS)	DMW-7 (USGS)	DMW-9 (USGS)	DMW-4A (USGS)	DMW-6A (USGS)	DMW-12 (USGS)
10/04/88	16:07	620.33	620.39	621.66	620.66	624.19			
10/04/88	16:17	620.30	620.34	621.59	620.65	624.18			
10/04/88	16:27	620.23	620.31	621.52	620.65	624.19			
10/04/88	16:37	620.17	620.26	621.61	620.65	624.18			
10/04/88	16:47	620.12	620.22	621.62	620.65	624.18			
10/04/88	16:57	620.06	620.15	621.63	620.65	624.19			
10/04/88	17:07	619.99	620.09	621.63	620.65	624.19			
10/04/88	17:17	619.98	620.06	621.60	620.65	624.19			
10/04/88	17:27	619.95	620.03	621.59	620.65	624.18			
10/04/88	17:37	619.88	619.98	621.60	620.65	624.18			
10/04/88	17:47	619.85	619.95	621.59	620.65	624.18			
10/04/88	17:57	619.79	619.88	621.58	620.65	624.18			
10/04/88	18:07	619.77	619.85	621.60	620.65	624.18			
10/04/88	18:17	619.71	619.80	621.59	620.65	624.18			
10/04/88	18:27	619.68	619.77	621.60	620.65	624.17			
10/04/88	18:37	619.63	619.73	621.60	620.65	624.17			
10/04/88	18:47	619.60	619.71	621.60	620.65	624.17			
10/04/88	18:57	619.55	619.66	621.59	620.65	624.17			
10/04/88	19:07	619.52	619.61	621.58	620.64	624.17			
10/04/88	19:17	619.47	619.58	621.58	620.64	624.16			
10/04/88	19:27	619.44	619.53	621.57	620.64	624.16	590.20		620.50
10/04/88	19:37	619.39	619.50	621.57	620.64	624.16		620.51	
10/04/88	19:47	619.36	619.47	621.56	620.64	624.16			
10/04/88	19:57	619.33	619.44	621.57	620.64	624.15			
10/04/88	20:07	619.28	619.39	621.57	620.64	624.15			
10/04/88	20:17	619.25	619.36	621.56	620.64	624.15			
10/04/88	20:27	619.22	619.33	621.56	620.64	624.15			
10/04/88	20:37	619.19	619.30	621.56	620.64	624.14			
10/04/88	20:47	619.14	619.25	621.56	620.64	624.14			
10/04/88	20:57	619.12	619.23	621.56	620.64	624.14			
10/04/88	21:07	619.08	619.20	621.55	620.64	624.13			
10/04/88	21:17	619.04	619.15	621.54	620.64	624.13			
10/04/88	21:27	619.01	619.14	621.55	620.64	624.13			
10/04/88	21:37	618.98	619.11	621.54	620.64	624.13			
10/04/88	21:47	618.95	619.06	621.54	620.64	624.12			
10/04/88	21:57	618.92	619.04	621.53	620.64	624.12			
10/04/88	22:07	618.89	619.01	621.53	620.63	624.12			
10/04/88	22:17	618.85	618.98	621.53	620.63	624.11			
10/04/88	22:27	618.82	618.95	621.53	620.63	624.11			
10/04/88	22:37	618.79	618.92	621.52	620.63	624.11			
10/04/88	22:47	618.76	618.88	621.52	620.63	624.11			
10/04/88	22:57	618.73	618.85	621.52	620.63	624.11			
10/04/88	23:07	618.70	618.82	621.51	620.63	624.11			
10/04/88	23:17	618.68	618.81	621.51	620.63	624.11			

TABLE 2  
Water Level Data

DATE	TIME	DMW-8 (USGS)	DMW-10 (USGS)	DMW-11 (USGS)	DMW-7 (USGS)	DMW-9 (USGS)	DMW-4A (USGS)	DMW-6A (USGS)	DMW-12 (USGS)
10/04/88	23:27	618.65	618.77	621.51	620.63	624.10			
10/04/88	23:37	618.62	618.74	621.51	620.63	624.10			
10/04/88	23:47	618.58	618.73	621.52	620.63	624.10			
10/04/88	23:57	618.57	618.69	621.51	620.63	624.10			
10/05/88	00:07	618.54	618.66	621.50	620.63	624.10			
10/05/88	00:17	618.51	618.65	621.51	620.63	624.10			
10/05/88	00:27	618.47	618.61	621.50	620.63	624.10			
10/05/88	00:37	618.46	618.58	621.50	620.63	624.09			
10/05/88	00:47	618.43	618.57	621.50	620.63	624.09			
10/05/88	00:57	618.39	618.55	621.49	620.63	624.09			
10/05/88	01:07	618.38	618.52	621.49	620.63	624.09			
10/05/88	01:17	618.35	618.49	621.49	620.63	624.09			
10/05/88	01:27	618.31	618.47	621.49	620.63	624.09			
10/05/88	01:37	618.30	618.44	621.49	620.63	624.09			
10/05/88	01:47	618.27	618.42	621.49	620.63	624.09			
10/05/88	01:57	618.25	618.41	621.48	620.63	624.09			
10/05/88	02:07	618.22	618.38	621.48	620.63	624.09			
10/05/88	02:17	618.20	618.35	621.48	620.63	624.08			
10/05/88	02:27	618.17	618.33	621.48	620.63	624.08			
10/05/88	02:37	618.16	618.31	621.48	620.63	624.08			
10/05/88	02:47	618.12	618.28	621.47	620.63	624.08			
10/05/88	02:57	618.11	618.27	621.47	620.63	624.08			
10/05/88	03:07	618.08	618.23	621.47	620.63	624.08			
10/05/88	03:17	618.06	618.22	621.47	620.63	624.08			
10/05/88	03:27	618.05	618.19	621.47	620.63	624.08			
10/05/88	03:37	618.01	618.17	621.47	620.63	624.08			
10/05/88	03:47	618.00	618.14	621.46	620.63	624.07			
10/05/88	03:57	617.98	618.12	621.46	620.63	624.07			
10/05/88	04:07	617.95	618.09	621.46	620.63	624.07			
10/05/88	04:17	617.93	618.08	621.45	620.63	624.07			
10/05/88	04:27	617.90	618.06	621.45	620.63	624.07			
10/05/88	04:37	617.89	618.04	621.45	620.63	624.07			
10/05/88	04:47	617.87	618.03	621.45	620.63	624.06			
10/05/88	04:57	617.84	618.01	621.45	620.63	624.06			
10/05/88	05:07	617.82	617.98	621.44	620.63	624.06			
10/05/88	05:17	617.79	617.96	621.44	620.63	624.06			
10/05/88	05:27	617.78	617.95	621.44	620.63	624.06			
10/05/88	05:37	617.76	617.93	621.44	620.63	624.06			
10/05/88	05:47	617.74	617.90	621.43	620.63	624.06			
10/05/88	05:57	617.73	617.89	621.43	620.62	624.05			
10/05/88	06:07	617.70	617.87	621.43	620.63	624.05			
10/05/88	06:17	617.68	617.85	621.43	620.62	624.05			
10/05/88	06:27	617.67	617.82	621.43	620.62	624.05			
10/05/88	06:37	617.63	617.81	621.42	620.62	624.05			

TABLE 2  
Water Level Data

DATE	TIME	DMW-8 (USGS)	DMW-10 (USGS)	DMW-11 (USGS)	DMW-7 (USGS)	DMW-9 (USGS)	DMW-4A (USGS)	DMW-6A (USGS)	DMW-12 (USGS)
10/05/88	06:47	617.62	617.79	621.42	620.62	624.04			
10/05/88	06:57	617.60	617.77	621.42	620.62	624.04			
10/05/88	07:07	617.59	617.76	621.42	620.62	624.04			
10/05/88	07:17	617.55	617.74	621.41	620.62	624.04			
10/05/88	07:27	617.54	617.71	621.41	620.62	624.04			
10/05/88	07:37	617.52	617.69	621.41	620.62	624.04			
10/05/88	07:47	617.51	617.68	621.40	620.62	624.03			
10/05/88	07:57	617.49	617.66	621.40	620.62	624.03	588.49		618.61
10/05/88	08:07	617.48	617.65	621.40	620.62	624.03		618.46	
10/05/88	08:17	617.46	617.63	621.39	620.62	624.03			
10/05/88	08:27	617.43	617.62	621.38	620.62	624.02			
10/05/88	08:37	617.41	617.60	621.38	620.61	624.02			
10/05/88	08:47	617.40	617.58	621.37	620.62	624.02			
10/05/88	08:57	617.38	617.57	621.37	620.61	624.02			
10/05/88	09:07	617.36	617.55	621.37	620.61	624.01			
10/05/88	09:17	617.35	617.52	621.36	620.61	624.01			
10/05/88	09:27	617.33	617.50	621.36	620.61	624.01			
10/05/88	09:37	617.32	617.49	621.36	620.61	624.00			
10/05/88	09:47	617.30	617.47	621.35	620.61	624.00			
10/05/88	09:57	617.28	617.46	621.34	620.61	624.00			
10/05/88	10:07	617.27	617.44	621.34	620.61	624.00			
10/05/88	10:17	617.25	617.43	621.33	620.61	623.99			
10/05/88	10:27	617.22	617.41	621.32	620.61	624.00			
10/05/88	10:37	617.22	617.39	621.34	620.61	623.99			
10/05/88	10:47	617.21	617.39	621.33	620.61	623.99			
10/05/88	10:57	617.19	617.36	621.34	620.61	623.99			
10/05/88	11:07	617.16	617.35	621.33	620.61	623.99			
10/05/88	11:17	617.14	617.33	621.31	620.61	623.99			
10/05/88	11:27	617.14	617.33	621.32	620.61	623.98			
10/05/88	11:37	617.11	617.30	621.31	620.61	623.99			
10/05/88	11:47	617.11	617.30	621.34	620.61	623.99			
10/05/88	11:57	617.09	617.28	621.32	620.61	623.99			
10/05/88	12:07	617.06	617.27	621.38	620.61	623.99			
10/05/88	12:17	617.06	617.25	621.32	620.61	623.99			
10/05/88	12:27	617.03	617.24	621.40	620.61	623.99			
10/05/88	12:37	617.03	617.22	621.28	620.60	623.99			
10/05/88	12:47	617.00	617.22	621.27	620.60	624.01			
10/05/88	12:57	617.00	617.20	621.24	620.61	624.02	588.14		618.16
10/05/88	13:07	617.05	617.22	621.38	620.61	624.02		618.19	
10/05/88	13:17	617.03	617.20	621.30	620.61	624.03			
10/05/88	13:27	617.00	617.19	621.43	620.62	624.00			
10/05/88	13:37	616.92	617.12	621.43	620.62	624.01			
10/05/88	13:47	616.92	617.12	621.28	620.61	624.00			
10/05/88	13:57	616.92	617.12	621.42	620.62	624.02			



TABLE 2  
Water Level Data

DATE	TIME	DMW-8 (USGS)	DMW-10 (USGS)	DMW-11 (USGS)	DMW-7 (USGS)	DMW-9 (USGS)	DMW-4A (USGS)	DMW-6A (USGS)	DMW-12 (USGS)
10/05/88	14:07	616.87	617.09	621.26	620.61	624.01			
10/05/88	14:17	616.86	617.09	621.32	620.61	624.03			
10/05/88	14:27	616.92	617.09	621.40	620.62	624.03			
10/05/88	14:37	616.83	617.06	621.38	620.62	624.04			
10/05/88	14:47	616.87	617.06	621.36	620.62	624.04			
10/05/88	14:57	616.86	617.08	621.34	620.62	624.04			
10/05/88	15:07	616.84	617.06	621.36	620.62	624.05			
10/05/88	15:17	616.83	617.03	621.40	620.62	624.05			
10/05/88	15:27	616.79	617.01	621.32	620.62	624.06			
10/05/88	15:37	616.81	617.01	621.38	620.62	624.06			
10/05/88	15:47	616.76	616.95	621.35	620.62	624.05			617.91
10/05/88	15:57	616.75	616.97	621.33	620.62	624.05	587.89	617.96	
10/05/88	16:07	616.81	617.01	621.34	620.62	624.04			
10/05/88	16:17	616.75	616.97	621.33	620.62	624.05			
10/05/88	16:27	616.73	616.95	621.32	620.62	624.05			
10/05/88	16:37	616.73	616.93	621.31	620.62	624.05			
10/05/88	16:47	616.71	616.92	621.32	620.62	624.05			
10/05/88	16:57	616.71	616.92	621.40	620.62	624.05			
10/05/88	17:07	616.70	616.92	621.32	620.62	624.05			
10/05/88	17:17	616.67	616.89	621.36	620.62	624.05			
10/05/88	17:27	616.64	616.87	621.35	620.62	624.06			
10/05/88	17:37	616.67	616.89	621.35	620.62	624.05			
10/05/88	17:47	616.64	616.85	621.31	620.62	624.05			
10/05/88	17:57	616.64	616.85	621.35	620.62	624.05			
10/05/88	18:07	616.62	616.84	621.35	620.62	624.05			
10/05/88	18:17	616.62	616.82	621.35	620.62	624.05			
10/05/88	18:27	616.60	616.82	621.35	620.62	624.05			
10/05/88	18:37	616.59	616.81	621.35	620.62	624.05			
10/05/88	18:47	616.57	616.81	621.35	620.62	624.05			
10/05/88	18:57	616.57	616.79	621.35	620.62	624.05			
10/05/88	19:07	616.56	616.78	621.36	620.62	624.05			
10/05/88	19:17	616.56	616.78	621.35	620.62	624.05			
10/05/88	19:27	616.54	616.76	621.35	620.62	624.05			
10/05/88	19:37	616.52	616.76	621.35	620.62	624.05			
10/05/88	19:47	616.52	616.74	621.36	620.62	624.04			
10/05/88	19:57	616.51	616.74	621.32	620.62	624.04			
10/05/88	20:07	616.49	616.73	621.35	620.62	624.04			
10/05/88	20:17	616.48	616.71	621.35	620.62	624.04			
10/05/88	20:27	616.48	616.71	621.31	620.62	624.04			
10/05/88	20:37	616.46	616.70	621.32	620.62	624.04			
10/05/88	20:47	616.46	616.68	621.32	620.62	624.03			
10/05/88	20:57	616.45	616.66	621.32	620.62	624.03			
10/05/88	21:07	616.43	616.66	621.32	620.62	624.03			
10/05/88	21:17	616.43	616.65	621.32	620.62	624.03			

TABLE 2  
Water Level Data

DATE	TIME	DMW-8 (USGS)	DMW-10 (USGS)	DMW-11 (USGS)	DMW-7 (USGS)	DMW-9 (USGS)	DMW-4A (USGS)	DMW-6A (USGS)	DMW-12 (USGS)
10/05/88	21:27	616.41	616.63	621.32	620.61	624.03			
10/05/88	21:37	616.40	616.63	621.31	620.62	624.03			
10/05/88	21:47	616.40	616.62	621.31	620.61	624.02			
10/05/88	21:57	616.38	616.60	621.32	620.61	624.02			
10/05/88	22:07	616.37	616.60	621.31	620.61	624.02			
10/05/88	22:17	616.37	616.58	621.31	620.61	624.02			
10/05/88	22:27	616.35	616.58	621.32	620.61	624.02			
10/05/88	22:37	616.33	616.57	621.31	620.61	624.02			
10/05/88	22:47	616.33	616.57	621.32	620.61	624.01			
10/05/88	22:57	616.32	616.55	621.30	620.61	624.01			
10/05/88	23:07	616.32	616.54	621.29	620.61	624.01			
10/05/88	23:17	616.30	616.54	621.29	620.61	624.01			
10/05/88	23:27	616.30	616.52	621.30	620.61	624.01			
10/05/88	23:37	616.29	616.52	621.30	620.61	624.01			
10/05/88	23:47	616.29	616.51	621.29	620.61	624.01			
10/05/88	23:57	616.27	616.51	621.29	620.61	624.00			
10/06/88	00:07	616.26	616.49	621.29	620.61	624.00			
10/06/88	00:17	616.26	616.49	621.29	620.61	624.00			
10/06/88	00:27	616.24	616.47	621.29	620.61	624.00			
10/06/88	00:37	616.24	616.46	621.29	620.61	624.00			
10/06/88	00:47	616.22	616.46	621.29	620.61	624.00			
10/06/88	00:57	616.22	616.44	621.29	620.61	624.00			
10/06/88	01:07	616.21	616.44	621.29	620.61	623.99			
10/06/88	01:17	616.21	616.43	621.29	620.61	623.99			
10/06/88	01:27	616.19	616.43	621.29	620.61	623.99			
10/06/88	01:37	616.19	616.41	621.27	620.61	623.98			
10/06/88	01:47	616.18	616.41	621.27	620.61	623.98			
10/06/88	01:57	616.18	616.41	621.28	620.61	623.98			
10/06/88	02:07	616.16	616.39	621.28	620.61	623.98			
10/06/88	02:17	616.14	616.38	621.26	620.61	623.97			
10/06/88	02:27	616.14	616.38	621.27	620.61	623.97			
10/06/88	02:37	616.14	616.36	621.27	620.61	623.97			
10/06/88	02:47	616.13	616.36	621.26	620.61	623.97			
10/06/88	02:57	616.11	616.35	621.27	620.61	623.96			
10/06/88	03:07	616.11	616.35	621.27	620.61	623.96			
10/06/88	03:17	616.10	616.33	621.27	620.62	623.96			
10/06/88	03:27	616.10	616.33	621.27	620.61	623.96			
10/06/88	03:37	616.10	616.33	621.26	620.62	623.95			
10/06/88	03:47	616.08	616.32	621.26	620.62	623.95			
10/06/88	03:57	616.06	616.30	621.26	620.62	623.95			
10/06/88	04:07	616.06	616.30	621.26	620.62	623.95			
10/06/88	04:17	616.06	616.28	621.26	620.62	623.95			
10/06/88	04:27	616.05	616.28	621.26	620.62	623.94			
10/06/88	04:37	616.03	616.28	621.26	620.62	623.94			

TABLE 2  
Water Level Data

DATE	TIME	DMW-8 (USGS)	DMW-10 (USGS)	DMW-11 (USGS)	DMW-7 (USGS)	DMW-9 (USGS)	DMW-4A (USGS)	DMW-6A (USGS)	DMW-12 (USGS)
10/06/88	04:47	616.03	616.27	621.26	620.62	623.94			
10/06/88	04:57	616.03	616.27	621.26	620.62	623.94			
10/06/88	05:07	616.02	616.25	621.25	620.62	623.94			
10/06/88	05:17	616.02	616.25	621.25	620.62	623.94			
10/06/88	05:27	616.00	616.24	621.25	620.62	623.93			
10/06/88	05:37	616.00	616.24	621.25	620.62	623.93			
10/06/88	05:47	615.99	616.22	621.25	620.62	623.93			
10/06/88	05:57	615.99	616.22	621.25	620.62	623.93			
10/06/88	06:07	615.97	616.20	621.25	620.62	623.93			
10/06/88	06:17	615.97	616.20	621.25	620.62	623.92			
10/06/88	06:27	615.95	616.19	621.24	620.62	623.92			
10/06/88	06:37	615.95	616.19	621.22	620.62	623.92			
10/06/88	06:47	615.94	616.17	621.23	620.62	623.92			
10/06/88	06:57	615.94	616.17	621.23	620.62	623.91			
10/06/88	07:07	615.92	616.17	621.22	620.62	623.91			
10/06/88	07:17	615.92	616.16	621.21	620.62	623.91			
10/06/88	07:27	615.91	616.14	621.22	620.62	623.91			
10/06/88	07:37	615.91	616.14	621.21	620.61	623.91			
10/06/88	07:47	615.89	616.14	621.20	620.61	623.90			
10/06/88	07:57	615.89	616.12	621.20	620.61	623.90			
10/06/88	08:07	615.87	616.12	621.20	620.61	623.90			617.02
10/06/88	08:17	615.87	616.11	621.20	620.61	623.90	586.93	617.10	
10/06/88	08:27	615.86	616.11	621.19	620.61	623.89			
10/06/88	08:37	615.86	616.09	621.19	620.61	623.89			
10/06/88	08:47	615.84	616.08	621.19	620.61	623.89			
10/06/88	08:57	615.84	616.08	621.18	620.61	623.89			
10/06/88	09:07	615.83	616.08	621.18	620.61	623.88			
10/06/88	09:17	615.83	616.06	621.19	620.61	623.88			
10/06/88	09:27	615.81	616.05	621.17	620.61	623.88			
10/06/88	09:37	615.81	616.05	621.17	620.61	623.88			
10/06/88	09:47	615.80	616.03	621.16	620.61	623.87			
10/06/88	09:57	615.80	616.03	621.15	620.60	623.87			
10/06/88	10:07	615.78	616.01	621.15	620.60	623.87			
10/06/88	10:17	615.78	616.01	621.16	620.60	623.87			
10/06/88	10:27	615.78	616.00	621.15	620.60	623.87			
10/06/88	10:37	615.76	616.00	621.16	620.61	623.87			
10/06/88	10:47	615.75	615.98	621.13	620.60	623.87			
10/06/88	10:57	615.75	615.98	621.14	620.60	623.87			
10/06/88	11:07	615.75	615.98	621.16	620.60	623.86			
10/06/88	11:17	615.73	615.97	621.15	620.60	623.86			
10/06/88	11:27	615.72	615.95	621.14	620.60	623.87			
10/06/88	11:37	615.70	615.95	621.14	620.60	623.87			
10/06/88	11:47	615.72	615.95	621.10	620.60	623.86			
10/06/88	11:57	615.70	615.93	621.02	620.60	623.86			

TABLE 2  
Water Level Data

DATE	TIME	DMW-8 (USGS)	DMW-10 (USGS)	DMW-11 (USGS)	DMW-7 (USGS)	DMW-9 (USGS)	DMW-4A (USGS)	DMW-6A (USGS)	DMW-12 (USGS)
10/06/88	12:07	615.70	615.93	621.12	620.60	623.87			
10/06/88	12:17	615.68	615.93	621.16	620.61	623.87			
10/06/88	12:27	615.68	615.92	621.16	620.61	623.87			616.85
10/06/88	12:37	615.68	615.92	621.14	620.61	623.88	586.99	616.90	
10/06/88	12:47	615.68	615.92	621.16	620.61	623.88			
10/06/88	12:57	615.67	615.92	621.14	620.60	623.88			
10/06/88	13:07	615.67	615.90	621.15	620.61	623.88			
10/06/88	13:17	615.64	615.89	621.17	620.61	623.89			
10/06/88	13:27	615.64	615.87	621.18	620.61	623.88			
10/06/88	13:37	615.65	615.89	621.17	620.61	623.89			
10/06/88	13:47	615.67	615.89	621.06	620.61	623.89			
10/06/88	13:57	615.62	615.87	621.19	620.62	623.89			
10/06/88	14:07	615.64	615.87	621.19	620.62	623.90			
10/06/88	14:17	615.62	615.87	621.18	620.62	623.90			
10/06/88	14:27	615.64	615.87	621.20	620.62	623.91			
10/06/88	14:37	615.64	615.87	621.11	620.62	623.91			
10/06/88	14:47	615.61	615.86	621.20	620.62	623.91			
10/06/88	14:57	615.62	615.86	621.16	620.62	623.92			
10/06/88	15:07	615.61	615.86	621.20	620.62	623.92			
10/06/88	15:17	615.61	615.84	621.18	620.62	623.92			
10/06/88	15:27	615.59	615.84	621.17	620.62	623.92			
10/06/88	15:37	615.61	615.84	621.17	620.62	623.92			
10/06/88	15:47	615.59	615.82	621.18	620.63	623.93	586.79		616.74
10/06/88	15:57	615.57	615.82	621.18	620.63	623.93		616.80	
10/06/88	16:07	615.57	615.81	621.18	620.63	623.93			
10/06/88	16:17	615.57	615.79	621.18	620.63	623.93			
10/06/88	16:27	615.57	615.81	621.14	620.63	623.93			
10/06/88	16:37	615.56	615.81	621.20	620.63	623.93			
10/06/88	16:47	615.56	615.79	621.20	620.63	623.93			
10/06/88	16:57	615.56	615.81	621.20	620.63	623.94			
10/06/88	17:07	615.54	615.78	621.21	620.63	623.93			
10/06/88	17:17	615.54	615.79	621.20	620.63	623.94			
10/06/88	17:27	615.54	615.78	621.20	620.64	623.93			
10/06/88	17:37	615.53	615.78	621.19	620.63	623.93			
10/06/88	17:47	615.53	615.78	621.19	620.64	623.93			
10/06/88	17:57	615.51	615.76	621.19	620.64	623.93			
10/06/88	18:07	615.51	615.76	621.19	620.64	623.93			
10/06/88	18:17	615.51	615.76	621.19	620.64	623.93			
10/06/88	18:27	615.49	615.76	621.19	620.64	623.93			
10/06/88	18:37	615.49	615.74	621.19	620.64	623.93			
10/06/88	18:47	615.49	615.74	621.19	620.64	623.93			
10/06/88	18:57	615.49	615.74	621.20	620.64	623.92			
10/06/88	19:07	615.48	615.73	621.20	620.64	623.92			
10/06/88	19:17	615.48	615.73	621.19	620.64	623.92			

TABLE 2  
Water Level Data

DATE	TIME	DMW-8 (USGS)	DMW-10 (USGS)	DMW-11 (USGS)	DMW-7 (USGS)	DMW-9 (USGS)	DMW-4A (USGS)	DMW-6A (USGS)	DMW-12 (USGS)
10/06/88	19:27	615.48	615.73	621.20	620.64	623.92			
10/06/88	19:37	615.48	615.71	621.20	620.64	623.92			
10/06/88	19:47	615.46	615.71	621.19	620.64	623.92			
10/06/88	19:57	615.46	615.71	621.21	620.64	623.91			
10/06/88	20:07	615.45	615.71	621.19	620.64	623.91			
10/06/88	20:17	615.45	615.70	621.17	620.64	623.91			
10/06/88	20:27	615.45	615.70	621.17	620.64	623.91			
10/06/88	20:37	615.45	615.70	621.17	620.64	623.90			
10/06/88	20:47	615.43	615.68	621.17	620.64	623.90			
10/06/88	20:57	615.43	615.68	621.16	620.64	623.90			
10/06/88	21:07	615.42	615.66	621.16	620.64	623.90			
10/06/88	21:17	615.42	615.66	621.17	620.64	623.90			
10/06/88	21:27	615.42	615.66	621.17	620.64	623.89			
10/06/88	21:37	615.42	615.66	621.18	620.64	623.89			
10/06/88	21:47	615.40	615.65	621.18	620.64	623.89			
10/06/88	21:57	615.40	615.65	621.16	620.64	623.89			
10/06/88	22:07	615.40	615.65	621.15	620.64	623.89			
10/06/88	22:17	615.40	615.63	621.18	620.64	623.89			
10/06/88	22:27	615.38	615.63	621.18	620.64	623.89			
10/06/88	22:37	615.38	615.63	621.14	620.64	623.89			
10/06/88	22:47	615.38	615.63	621.16	620.64	623.89			
10/06/88	22:57	615.37	615.63	621.15	620.63	623.89			
10/06/88	23:07	615.37	615.62	621.16	620.64	623.88			
10/06/88	23:17	615.35	615.62	621.18	620.64	623.88			
10/06/88	23:27	615.35	615.60	621.15	620.63	623.88			
10/06/88	23:37	615.37	615.60	621.15	620.63	623.88			
10/06/88	23:47	615.35	615.60	621.15	620.64	623.88			
10/06/88	23:57	615.35	615.60	621.15	620.64	623.87			
10/07/88	00:07	615.34	615.59	621.14	620.63	623.87			
10/07/88	00:17	615.34	615.59	621.15	620.63	623.87			
10/07/88	00:27	615.34	615.57	621.15	620.63	623.87			
10/07/88	00:37	615.32	615.59	621.14	620.63	623.87			
10/07/88	00:47	615.32	615.57	621.15	620.63	623.87			
10/07/88	00:57	615.32	615.57	621.15	620.63	623.87			
10/07/88	01:07	615.32	615.57	621.15	620.63	623.87			
10/07/88	01:17	615.30	615.55	621.15	620.64	623.87			
10/07/88	01:27	615.30	615.55	621.15	620.64	623.87			
10/07/88	01:37	615.30	615.55	621.14	620.64	623.87			
10/07/88	01:47	615.30	615.55	621.15	620.64	623.87			
10/07/88	01:57	615.29	615.54	621.14	620.64	623.87			
10/07/88	02:07	615.29	615.54	621.14	620.64	623.86			
10/07/88	02:17	615.29	615.54	621.12	620.64	623.86			
10/07/88	02:27	615.29	615.54	621.14	620.64	623.86			
10/07/88	02:37	615.27	615.52	621.13	620.64	623.86			

TABLE 2  
Water Level Data

DATE	TIME	DMW-8 (USGS)	DMW-10 (USGS)	DMW-11 (USGS)	DMW-7 (USGS)	DMW-9 (USGS)	DMW-4A (USGS)	DMW-6A (USGS)	DMW-12 (USGS)
10/07/88	02:47	615.27	615.52	621.14	620.64	623.86			
10/07/88	02:57	615.27	615.52	621.13	620.64	623.86			
10/07/88	03:07	615.26	615.51	621.13	620.64	623.86			
10/07/88	03:17	615.26	615.51	621.13	620.64	623.86			
10/07/88	03:27	615.26	615.51	621.13	620.64	623.86			
10/07/88	03:37	615.26	615.51	621.13	620.64	623.86			
10/07/88	03:47	615.26	615.51	621.13	620.64	623.86			
10/07/88	03:57	615.26	615.51	621.13	620.64	623.86			
10/07/88	04:07	615.24	615.49	621.13	620.64	623.86			
10/07/88	04:17	615.24	615.49	621.12	620.64	623.86			
10/07/88	04:27	615.24	615.47	621.12	620.64	623.86			
10/07/88	04:37	615.24	615.47	621.13	620.64	623.86			
10/07/88	04:47	615.23	615.47	621.13	620.65	623.86			
10/07/88	04:57	615.23	615.47	621.15	620.65	623.86			
10/07/88	05:07	615.23	615.47	621.12	620.65	623.86			
10/07/88	05:17	615.23	615.47	621.13	620.65	623.86			
10/07/88	05:27	615.21	615.46	621.13	620.65	623.86			
10/07/88	05:37	615.21	615.46	621.13	620.65	623.86			
10/07/88	05:47	615.21	615.46	621.13	620.65	623.86			
10/07/88	05:57	615.21	615.44	621.15	620.65	623.86			
10/07/88	06:07	615.19	615.44	621.14	620.65	623.86			
10/07/88	06:17	615.19	615.44	621.13	620.65	623.86			
10/07/88	06:27	615.19	615.44	621.13	620.65	623.86			
10/07/88	06:37	615.19	615.44	621.12	620.65	623.86			
10/07/88	06:47	615.18	615.44	621.12	620.65	623.86			
10/07/88	06:57	615.18	615.43	621.13	620.65	623.86			
10/07/88	07:07	615.18	615.43	621.12	620.65	623.86			
10/07/88	07:17	615.18	615.43	621.12	620.65	623.86			
10/07/88	07:27	615.18	615.43	621.12	620.65	623.85			
10/07/88	07:37	615.16	615.41	621.11	620.65	623.85			
10/07/88	07:47	615.16	615.41	621.12	620.65	623.85			
10/07/88	07:57	615.16	615.41	621.10	620.65	623.85			
10/07/88	08:07	615.16	615.41	621.11	620.65	623.85			
10/07/88	08:17	615.15	615.40	621.09	620.65	623.85			
10/07/88	08:27	615.15	615.40	621.10	620.65	623.85			
10/07/88	08:37	615.15	615.40	621.09	620.65	623.85			
10/07/88	08:47	615.13	615.38	621.09	620.64	623.84			
10/07/88	08:57	615.13	615.38	621.08	620.65	623.84			
10/07/88	09:07	615.13	615.38	621.07	620.64	623.84			
10/07/88	09:17	615.11	615.36	621.05	620.64	623.84			
10/07/88	09:27	615.11	615.36	621.08	620.64	623.84			
10/07/88	09:37	615.11	615.36	621.07	620.64	623.84			
10/07/88	09:47	615.10	615.35	621.08	620.64	623.84	586.27		616.28
10/07/88	09:57	615.11	615.35	621.07	620.64	623.83		616.36	

## **OCTOBER, 1988 AQUIFER TEST EVALUATION**

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## **OCTOBER, 1988 AQUIFER TEST EVALUATION**

### **I. PURPOSE**

A constant rate aquifer test was performed at the Dow Corning facility, Midland, Michigan, in October, 1988. The test was performed by EDI Engineering & Science to confirm geologic interpretation of the Regional Aquifer presented in Section P2 of The Act 64 permit application. Specifically, this test had two objectives:

- 1) Determine if there is hydraulic connection between the Regional Aquifer on the bedrock high in the vicinity of the landfill, and the Regional Aquifer in the bedrock valley southwest of the landfill.
- 2) Determine if hydraulic communication exists between locally observed till sands and the Regional Aquifer.

### **II. PROCEDURE**

A constant discharge rate aquifer test involves the pumping of a control well at a constant rate for an extended period of time. Water levels are measured in the control well and observation wells located at various distances away from the control well. The water level response in the observation wells is then used to determine the aquifer's hydraulic properties.

The response of wells within the same aquifer as the control well can be used to evaluate that aquifer's properties if certain assumptions can be made about the aquifer geometry. Observation wells screened in aquifers other than the one in which the control well is screened can be useful for evaluating the hydraulic connection between aquifers.

In a previous pump test, performed in September of 1988 (Section P3.5), the hydraulic connection was documented between the Regional Aquifer on the bedrock high under the landfill and the Regional Aquifer southeast and east of the landfill. During this previous pump test monitoring wells OW-1 (26-17) and OW-2 (26-13) located east and southeast of the landfill, responded to the pumping of DMW-4A (Section P3.6, page 24).



The drawdown observed in these two wells (OW-1 and OW-2) during pumping was between 0.7 and 0.8 feet. The observed drawdown established the hydraulic communication between the Regional Aquifer on the bedrock high under the landfill and the deeper portion of the Regional Aquifer southeast (OW-2) and east (OW-1) of the landfill. Cross section J-J (Figure P8) displays the stratigraphic connection between the Regional Aquifer under the landfill and the Regional Aquifer in the area east of the landfill.

Figure P11A, attached to this document, displays all deep monitoring well locations. The figure is also enclosed in the original submittal of the permit application.

In this study, the hydraulic connection between the Regional Aquifer underlying the landfill on the bedrock high and the deeper Regional Aquifer to the southwest of the landfill was determined. While pumping a control well screened in the Regional Aquifer near the landfill, water levels were measured in wells in this same portion of the Regional Aquifer and in the deeper portion of the Regional Aquifer to the southwest to determine if a good hydraulic communication exists. This constant rate aquifer test was performed from October 3 through October 10, 1988.

Existing monitoring well DMW-4A (see Figure P11A) was used as the control well for the aquifer test. Prior to the aquifer test start-up, the dedicated 1/2 h.p. sampling pump located within the monitoring well was removed, covered with plastic, and stored near the well head for the duration of the pump test. A 5 h.p. pump was then lowered into the well and installed 74 feet below the top of the casing. The pump ran continuously for approximately 5.3 days after initial start-up. A discharge rate of approximately 60 gpm was maintained for the duration of the test. A discharge line was connected to the well head and extended to Lingle Drain 600 feet east of pumping well DMW-4A. Upon completion of the test, the 5 h.p. submersible pump was removed and the sampling pump was reinstalled.

Water level data were collected from a total of seven monitoring wells and the pumping well prior to, during, and after the pumping. Table 1 lists the well identification number, distance away from the pumping well (in feet), and type of water level recorder used. Electronic "Hermit" data loggers linked to pressure transducers recorded water level measurements on continuous 10-minute intervals. Steel tape and chalk measurements were made three times daily excluding weekends. Water level measurements were collected for 18 hours prior to pump start-up. The

TABLE 2  
Water Level Data

DATE	TIME	DMW-8 (USGS)	DMW-10 (USGS)	DMW-11 (USGS)	DMW-7 (USGS)	DMW-9 (USGS)	DMW-4A (USGS)	DMW-6A (USGS)	DMW-12 (USGS)
10/07/88	10:07	615.10	615.35	621.07	620.64	623.83			
10/07/88	10:17	615.10	615.33	621.06	620.64	623.83			
10/07/88	10:27	615.10	615.35	621.01	620.64	623.83			
10/07/88	10:37	615.11	615.35	621.07	620.64	623.83			
10/07/88	10:47	615.11	615.36	621.07	620.64	623.83			
10/07/88	10:57	615.13	615.36	621.07	620.64	623.83			
10/07/88	11:07	615.13	615.36	621.06	620.64	623.83			
10/07/88	11:17	615.13	615.38	621.00	620.64	623.83			
10/07/88	11:27	615.15	615.38	621.06	620.64	623.83			
10/07/88	11:37	615.15	615.38	621.02	620.64	623.83			
10/07/88	11:47	615.15	615.38	621.02	620.64	623.82			
10/07/88	11:57	615.11	615.36	621.03	620.64	623.82			
10/07/88	12:07	615.15	615.38	621.02	620.64	623.82			
10/07/88	12:17	615.16	615.40	621.06	620.64	623.82			
10/07/88	12:27	615.16	615.40	621.05	620.64	623.83			
10/07/88	12:37	615.16	615.41	621.05	620.64	623.84			
10/07/88	12:47	615.19	615.41	621.02	620.64	623.82			
10/07/88	12:57	615.18	615.41	621.12	620.65	623.84			
10/07/88	13:07	615.18	615.43	620.97	620.64	623.85			
10/07/88	13:17	615.19	615.43	621.11	620.65	623.83			
10/07/88	13:27	615.18	615.43	621.03	620.65	623.84			
10/07/88	13:37	615.18	615.41	621.17	620.66	623.84			
10/07/88	13:47	615.21	615.44	620.99	620.65	623.84	590.83		616.39
10/07/88	13:57	615.16	615.41	621.17	620.66	623.86		616.47	
10/07/88	14:07	615.26	615.46	621.09	620.65	623.84			
10/07/88	14:17	615.23	615.46	621.14	620.66	623.84			
10/07/88	14:27	615.19	615.43	621.09	620.65	623.87			
10/07/88	14:37	615.23	615.47	621.14	620.66	623.87			
10/07/88	14:47	615.19	615.46	621.05	620.66	623.87			
10/07/88	14:57	615.23	615.47	621.12	620.66	623.87			
10/07/88	15:07	615.19	615.41	621.10	620.66	623.88			
10/07/88	15:17	615.23	615.47	621.09	620.66	623.87			
10/07/88	15:27	615.24	615.47	621.12	620.66	623.88			
10/07/88	15:37	615.23	615.47	621.12	620.66	623.88			
10/07/88	15:47	615.24	615.47	621.13	620.67	623.88			
10/07/88	15:57	615.24	615.49	621.12	620.67	623.88			
10/07/88	16:07	615.24	615.49	621.12	620.67	623.89			
10/07/88	16:17	615.24	615.49	621.11	620.67	623.89			
10/07/88	16:27	615.24	615.49	621.11	620.67	623.89			
10/07/88	16:37	615.24	615.49	621.12	620.67	623.89			616.41
10/07/88	16:47	615.24	615.49	621.12	620.67	623.89	616.50		
10/07/88	16:57	615.24	615.49	621.11	620.67	623.89			
10/07/88	17:07	615.24	615.49	621.16	620.68	623.89			
10/07/88	17:17	615.24	615.49	621.14	620.67	623.89			

TABLE 2  
Water Level Data

DATE	TIME	DMW-8 (USGS)	DMW-10 (USGS)	DMW-11 (USGS)	DMW-7 (USGS)	DMW-9 (USGS)	DMW-4A (USGS)	DMW-6A (USGS)	DMW-12 (USGS)
10/07/88	17:27	615.24	615.49	621.13	620.68	623.89			
10/07/88	17:37	615.24	615.47	621.09	620.67	623.89			
10/07/88	17:47	615.26	615.51	621.14	620.68	623.89			
10/07/88	17:57	615.26	615.51	621.13	620.68	623.89			
10/07/88	18:07	615.26	615.49	621.12	620.68	623.89			
10/07/88	18:17	615.26	615.51	621.13	620.68	623.89			
10/07/88	18:27	615.24	615.49	621.13	620.68	623.89			
10/07/88	18:37	615.26	615.51	621.14	620.68	623.89			
10/07/88	18:47	615.26	615.51	621.14	620.68	623.89			
10/07/88	18:57	615.26	615.49	621.15	620.68	623.89			
10/07/88	19:07	615.26	615.51	621.15	620.68	623.89			
10/07/88	19:17	615.26	615.51	621.13	620.68	623.89			
10/07/88	19:27	615.26	615.51	621.14	620.68	623.89			
10/07/88	19:37	615.26	615.51	621.13	620.68	623.89			
10/07/88	19:47	615.26	615.51	621.12	620.68	623.88			
10/07/88	19:57	615.26	615.49	621.13	620.68	623.88			
10/07/88	20:07	615.26	615.51	621.13	620.68	623.88			
10/07/88	20:17	615.26	615.51	621.12	620.68	623.88			
10/07/88	20:27	615.26	615.51	621.13	620.68	623.88			
10/07/88	20:37	615.26	615.51	621.13	620.67	623.88			
10/07/88	20:47	615.26	615.51	621.12	620.68	623.87			
10/07/88	20:57	615.26	615.51	621.12	620.68	623.87			
10/07/88	21:07	615.26	615.51	621.12	620.67	623.87			
10/07/88	21:17	615.26	615.51	621.11	620.67	623.87			
10/07/88	21:27	615.26	615.51	621.11	620.68	623.87			
10/07/88	21:37	615.26	615.49	621.12	620.67	623.86			
10/07/88	21:47	615.26	615.51	621.11	620.67	623.86			
10/07/88	21:57	615.26	615.49	621.11	620.67	623.86			
10/07/88	22:07	615.26	615.49	621.10	620.67	623.86			
10/07/88	22:17	615.26	615.49	621.10	620.67	623.86			
10/07/88	22:27	615.26	615.51	621.11	620.67	623.86			
10/07/88	22:37	615.26	615.51	621.10	620.67	623.86			
10/07/88	22:47	615.26	615.49	621.10	620.67	623.86			
10/07/88	22:57	615.26	615.51	621.11	620.67	623.85			
10/07/88	23:07	615.26	615.51	621.11	620.67	623.85			
10/07/88	23:17	615.26	615.51	621.14	620.67	623.85			
10/07/88	23:27	615.24	615.51	621.13	620.67	623.85			
10/07/88	23:37	615.24	615.51	621.12	620.67	623.85			
10/07/88	23:47	615.26	615.51	621.11	620.67	623.85			
10/07/88	23:57	615.26	615.51	621.09	620.67	623.85			
10/08/88	00:07	615.26	615.51	621.10	620.67	623.85			
10/08/88	00:17	615.26	615.51	621.09	620.67	623.84			
10/08/88	00:27	615.26	615.49	621.09	620.67	623.84			
10/08/88	00:37	615.24	615.49	621.09	620.67	623.85			

TABLE 2  
Water Level Data

DATE	TIME	DMW-8 (USGS)	DMW-10 (USGS)	DMW-11 (USGS)	DMW-7 (USGS)	DMW-9 (USGS)	DMW-4A (USGS)	DMW-6A (USGS)	DMW-12 (USGS)
10/08/88	00:47	615.26	615.49	621.09	620.67	623.85			
10/08/88	00:57	615.26	615.49	621.09	620.67	623.84			
10/08/88	01:07	615.26	615.49	621.09	620.67	623.84			
10/08/88	01:17	615.26	615.49	621.09	620.68	623.84			
10/08/88	01:27	615.26	615.49	621.09	620.68	623.85			
10/08/88	01:37	615.26	615.49	621.09	620.68	623.85			
10/08/88	01:47	615.26	615.49	621.09	620.68	623.84			
10/08/88	01:57	615.26	615.49	621.09	620.68	623.84			
10/08/88	02:07	615.26	615.49	621.09	620.68	623.84			
10/08/88	02:17	615.26	615.49	621.10	620.68	623.85			
10/08/88	02:27	615.26	615.49	621.10	620.68	623.85			
10/08/88	02:37	615.26	615.49	621.10	620.68	623.85			
10/08/88	02:47	615.26	615.49	621.10	620.68	623.85			
10/08/88	02:57	615.26	615.49	621.10	620.68	623.85			
10/08/88	03:07	615.26	615.49	621.10	620.68	623.85			
10/08/88	03:17	615.26	615.49	621.11	620.69	623.85			
10/08/88	03:27	615.26	615.51	621.11	620.69	623.85			
10/08/88	03:37	615.26	615.51	621.11	620.69	623.85			
10/08/88	03:47	615.26	615.49	621.12	620.69	623.85			
10/08/88	03:57	615.26	615.49	621.12	620.69	623.85			
10/08/88	04:07	615.26	615.51	621.13	620.69	623.86			
10/08/88	04:17	615.26	615.51	621.11	620.69	623.86			
10/08/88	04:27	615.26	615.51	621.12	620.69	623.86			
10/08/88	04:37	615.26	615.51	621.11	620.70	623.86			
10/08/88	04:47	615.26	615.51	621.11	620.70	623.86			
10/08/88	04:57	615.26	615.51	621.10	620.70	623.86			
10/08/88	05:07	615.26	615.51	621.09	620.70	623.86			
10/08/88	05:17	615.26	615.51	621.09	620.70	623.86			
10/08/88	05:27	615.26	615.51	621.10	620.70	623.86			
10/08/88	05:37	615.26	615.49	621.09	620.70	623.86			
10/08/88	05:47	615.26	615.49	621.11	620.70	623.86			
10/08/88	05:57	615.26	615.49	621.11	620.70	623.86			
10/08/88	06:07	615.26	615.51	621.10	620.70	623.86			
10/08/88	06:17	615.26	615.51	621.11	620.70	623.86			
10/08/88	06:27	615.26	615.51	621.10	620.70	623.86			
10/08/88	06:37	615.26	615.51	621.10	620.70	623.85			
10/08/88	06:47	615.26	615.49	621.12	620.70	623.86			
10/08/88	06:57	615.26	615.51	621.11	620.70	623.86			
10/08/88	07:07	615.26	615.49	621.10	620.70	623.85			
10/08/88	07:17	615.26	615.51	621.09	620.70	623.85			
10/08/88	07:27	615.26	615.51	621.09	620.70	623.85			
10/08/88	07:37	615.24	615.49	621.10	620.70	623.85			
10/08/88	07:47	615.24	615.49	621.10	620.70	623.85			
10/08/88	07:57	615.26	615.49	621.09	620.70	623.85			

TABLE 2  
Water Level Data

DATE	TIME	DMW-8 (USGS)	DMW-10 (USGS)	DMW-11 (USGS)	DMW-7 (USGS)	DMW-9 (USGS)	DMW-4A (USGS)	DMW-6A (USGS)	DMW-12 (USGS)
10/08/88	08:07	615.24	615.49	621.09	620.70	623.85			
10/08/88	08:17	615.24	615.49	621.08	620.70	623.85			
10/08/88	08:27	615.24	615.49	621.08	620.70	623.85			
10/08/88	08:37	615.24	615.49	621.08	620.70	623.85			
10/08/88	08:47	615.24	615.49	621.08	620.70	623.85			
10/08/88	08:57	615.24	615.49	621.08	620.70	623.84			
10/08/88	09:07	615.24	615.49	621.08	620.70	623.84			
10/08/88	09:17	615.24	615.49	621.08	620.70	623.84			
10/08/88	09:27	615.24	615.49	621.07	620.70	623.84			
10/08/88	09:37	615.24	615.47	621.07	620.70	623.84			
10/08/88	09:47	615.24	615.47	621.07	620.70	623.84			
10/08/88	09:57	615.23	615.47	621.07	620.70	623.84			
10/08/88	10:07	615.23	615.47	621.07	620.70	623.84			
10/08/88	10:17	615.23	615.47	621.05	620.69	623.83			
10/08/88	10:27	615.23	615.47	620.98	620.70	623.83			
10/08/88	10:37	615.23	615.47	621.00	620.69	623.82			
10/08/88	10:47	615.19	615.46	621.03	620.69	623.83			
10/08/88	10:57	615.21	615.46	621.08	620.69	623.83			
10/08/88	11:07	615.19	615.46	621.06	620.69	623.81			
10/08/88	11:17	615.21	615.44	621.00	620.69	623.82			
10/08/88	11:27	615.23	615.46	621.08	620.69	623.81			
10/08/88	11:37	615.19	615.44	621.01	620.69	623.82			
10/08/88	11:47	615.21	615.46	621.09	620.69	623.82			
10/08/88	11:57	615.23	615.46	621.11	620.70	623.82			
10/08/88	12:07	615.21	615.44	621.09	620.69	623.82			
10/08/88	12:17	615.21	615.46	621.04	620.69	623.82			
10/08/88	12:27	615.23	615.46	621.03	620.70	623.82			
10/08/88	12:37	615.23	615.46	621.09	620.70	623.83			
10/08/88	12:47	615.21	615.44	621.09	620.70	623.83			
10/08/88	12:57	615.19	615.44	621.09	620.70	623.83			
10/08/88	13:07	615.21	615.44	620.96	620.69	623.83			
10/08/88	13:17	615.23	615.46	621.12	620.70	623.81			
10/08/88	13:27	615.21	615.46	621.00	620.69	623.83			
10/08/88	13:37	615.19	615.44	621.02	620.70	623.83			
10/08/88	13:47	615.21	615.44	620.96	620.70	623.83			
10/08/88	13:57	615.21	615.44	621.11	620.70	623.82			
10/08/88	14:07	615.21	615.44	621.10	620.70	623.83			
10/08/88	14:17	615.18	615.44	621.10	620.70	623.83			
10/08/88	14:27	615.23	615.47	621.01	620.70	623.84			
10/08/88	14:37	615.19	615.43	621.10	620.70	623.84			
10/08/88	14:47	615.21	615.46	621.09	620.70	623.84			
10/08/88	14:57	615.21	615.46	620.98	620.70	623.84			
10/08/88	15:07	615.21	615.46	621.03	620.70	623.84			
10/08/88	15:17	615.23	615.46	621.10	620.71	623.84			

TABLE 2  
Water Level Data

DATE	TIME	DMW-8 (USGS)	DMW-10 (USGS)	DMW-11 (USGS)	DMW-7 (USGS)	DMW-9 (USGS)	DMW-4A (USGS)	DMW-6A (USGS)	DMW-12 (USGS)
10/08/88	15:27	615.21	615.46	621.13	620.71	623.84			
10/08/88	15:37	615.19	615.43	621.14	620.71	623.84			
10/08/88	15:47	615.19	615.43	621.03	620.71	623.85			
10/08/88	15:57	615.21	615.44	621.14	620.71	623.85			
10/08/88	16:07	615.19	615.44	621.12	620.71	623.85			
10/08/88	16:17	615.23	615.46	621.12	620.71	623.85			
10/08/88	16:27	615.23	615.46	621.11	620.71	623.85			
10/08/88	16:37	615.21	615.46	621.10	620.72	623.85			
10/08/88	16:47	615.21	615.46	621.12	620.72	623.86			
10/08/88	16:57	615.21	615.46	621.12	620.72	623.86			
10/08/88	17:07	615.21	615.46	621.11	620.72	623.86			
10/08/88	17:17	615.21	615.46	621.11	620.72	623.86			
10/08/88	17:27	615.21	615.46	621.11	620.72	623.86			
10/08/88	17:37	615.21	615.46	621.11	620.72	623.86			
10/08/88	17:47	615.21	615.46	621.11	620.72	623.86			
10/08/88	17:57	615.21	615.46	621.11	620.72	623.86			
10/08/88	18:07	615.21	615.44	621.11	620.72	623.86			
10/08/88	18:17	615.21	615.44	621.11	620.72	623.86			
10/08/88	18:27	615.21	615.44	621.11	620.72	623.86			
10/08/88	18:37	615.21	615.46	621.11	620.72	623.86			
10/08/88	18:47	615.19	615.44	621.11	620.72	623.86			
10/08/88	18:57	615.18	615.43	621.11	620.72	623.86			
10/08/88	19:07	615.15	615.41	621.11	620.72	623.86			
10/08/88	19:17	615.13	615.40	621.11	620.72	623.86			
10/08/88	19:27	615.11	615.38	621.11	620.72	623.86			
10/08/88	19:37	615.10	615.36	621.11	620.72	623.86			
10/08/88	19:47	615.10	615.35	621.10	620.72	623.86			
10/08/88	19:57	615.08	615.33	621.10	620.72	623.86			
10/08/88	20:07	615.07	615.32	621.11	620.72	623.86			
10/08/88	20:17	615.05	615.32	621.10	620.72	623.86			
10/08/88	20:27	615.04	615.30	621.10	620.72	623.86			
10/08/88	20:37	615.04	615.28	621.10	620.72	623.86			
10/08/88	20:47	615.02	615.28	621.10	620.72	623.85			
10/08/88	20:57	615.00	615.25	621.09	620.72	623.85			
10/08/88	21:07	615.00	615.25	621.09	620.72	623.85			
10/08/88	21:17	614.99	615.25	621.09	620.72	623.85			
10/08/88	21:27	614.97	615.22	621.08	620.72	623.85			
10/08/88	21:37	614.96	615.22	621.08	620.72	623.85			
10/08/88	21:47	614.96	615.20	621.08	620.72	623.85			
10/08/88	21:57	614.94	615.20	621.08	620.72	623.85			
10/08/88	22:07	614.94	615.19	621.08	620.72	623.85			
10/08/88	22:17	614.92	615.19	621.08	620.72	623.84			
10/08/88	22:27	614.91	615.17	621.08	620.72	623.84			
10/08/88	22:37	614.91	615.16	621.08	620.71	623.84			

TABLE 2  
Water Level Data

DATE	TIME	DMW-8 (USGS)	DMW-10 (USGS)	DMW-11 (USGS)	DMW-7 (USGS)	DMW-9 (USGS)	DMW-4A (USGS)	DMW-6A (USGS)	DMW-12 (USGS)
10/08/88	22:47	614.89	615.16	621.08	620.71	623.84			
10/08/88	22:57	614.89	615.14	621.08	620.71	623.84			
10/08/88	23:07	614.88	615.14	621.08	620.72	623.84			
10/08/88	23:17	614.88	615.13	621.07	620.71	623.84			
10/08/88	23:27	614.86	615.13	621.08	620.72	623.84			
10/08/88	23:37	614.86	615.11	621.08	620.71	623.84			
10/08/88	23:47	614.84	615.11	621.07	620.71	623.84			
10/08/88	23:57	614.84	615.09	621.08	620.71	623.84			
10/09/88	00:07	614.83	615.09	621.08	620.71	623.84			
10/09/88	00:17	614.83	615.09	621.08	620.71	623.84			
10/09/88	00:27	614.81	615.08	621.07	620.71	623.84			
10/09/88	00:37	614.81	615.06	621.07	620.72	623.84			
10/09/88	00:47	614.81	615.06	621.07	620.71	623.84			
10/09/88	00:57	614.80	615.06	621.07	620.72	623.84			
10/09/88	01:07	614.80	615.05	621.08	620.71	623.84			
10/09/88	01:17	614.78	615.05	621.08	620.72	623.84			
10/09/88	01:27	614.78	615.05	621.08	620.72	623.84			
10/09/88	01:37	614.78	615.03	621.09	620.72	623.85			
10/09/88	01:47	614.78	615.03	621.07	620.72	623.84			
10/09/88	01:57	614.77	615.03	621.07	620.72	623.84			
10/09/88	02:07	614.77	615.03	621.06	620.72	623.84			
10/09/88	02:17	614.77	615.03	621.06	620.72	623.84			
10/09/88	02:27	614.75	615.01	621.07	620.72	623.85			
10/09/88	02:37	614.75	615.01	621.08	620.72	623.85			
10/09/88	02:47	614.75	615.00	621.07	620.72	623.85			
10/09/88	02:57	614.75	615.00	621.07	620.72	623.85			
10/09/88	03:07	614.73	615.00	621.07	620.72	623.85			
10/09/88	03:17	614.73	614.98	621.07	620.72	623.86			
10/09/88	03:27	614.72	614.98	621.07	620.73	623.85			
10/09/88	03:37	614.73	614.98	621.07	620.73	623.85			
10/09/88	03:47	614.72	614.98	621.08	620.73	623.85			
10/09/88	03:57	614.72	614.97	621.09	620.73	623.85			
10/09/88	04:07	614.72	614.97	621.07	620.73	623.85			
10/09/88	04:17	614.70	614.97	621.09	620.73	623.85			
10/09/88	04:27	614.70	614.97	621.10	620.73	623.86			
10/09/88	04:37	614.70	614.97	621.11	620.73	623.86			
10/09/88	04:47	614.69	614.95	621.09	620.73	623.86			
10/09/88	04:57	614.70	614.95	621.08	620.73	623.86			
10/09/88	05:07	614.69	614.95	621.09	620.74	623.86			
10/09/88	05:17	614.69	614.95	621.09	620.74	623.86			
10/09/88	05:27	614.69	614.94	621.10	620.74	623.86			
10/09/88	05:37	614.67	614.94	621.09	620.74	623.86			
10/09/88	05:47	614.67	614.94	621.07	620.74	623.86			
10/09/88	05:57	614.67	614.94	621.06	620.74	623.86			

TABLE 2  
Water Level Data

DATE	TIME	DMW-8 (USGS)	DMW-10 (USGS)	DMW-11 (USGS)	DMW-7 (USGS)	DMW-9 (USGS)	DMW-4A (USGS)	DMW-6A (USGS)	DMW-12 (USGS)
10/09/88	06:07	614.67	614.92	621.09	620.74	623.86			
10/09/88	06:17	614.65	614.92	621.08	620.74	623.86			
10/09/88	06:27	614.65	614.92	621.05	620.74	623.86			
10/09/88	06:37	614.65	614.90	621.08	620.74	623.86			
10/09/88	06:47	614.64	614.90	621.09	620.74	623.86			
10/09/88	06:57	614.64	614.90	621.09	620.74	623.86			
10/09/88	07:07	614.64	614.90	621.09	620.74	623.86			
10/09/88	07:17	614.64	614.89	621.09	620.74	623.86			
10/09/88	07:27	614.62	614.89	621.06	620.74	623.86			
10/09/88	07:37	614.62	614.89	621.06	620.74	623.85			
10/09/88	07:47	614.62	614.89	621.08	620.74	623.85			
10/09/88	07:57	614.62	614.87	621.05	620.74	623.85			
10/09/88	08:07	614.61	614.87	621.05	620.74	623.85			
10/09/88	08:17	614.61	614.87	621.05	620.74	623.85			
10/09/88	08:27	614.61	614.86	621.05	620.74	623.85			
10/09/88	08:37	614.59	614.86	621.05	620.74	623.85			
10/09/88	08:47	614.59	614.86	621.05	620.74	623.84			
10/09/88	08:57	614.59	614.84	621.05	620.74	623.84			
10/09/88	09:07	614.58	614.84	621.04	620.73	623.84			
10/09/88	09:17	614.58	614.84	621.04	620.73	623.84			
10/09/88	09:27	614.58	614.82	621.04	620.73	623.84			
10/09/88	09:37	614.58	614.82	621.05	620.73	623.84			
10/09/88	09:47	614.56	614.82	621.05	620.73	623.84			
10/09/88	09:57	614.56	614.81	621.05	620.73	623.84			
10/09/88	10:07	614.56	614.81	621.03	620.73	623.83			
10/09/88	10:17	614.56	614.81	621.04	620.73	623.83			
10/09/88	10:27	614.56	614.81	621.05	620.73	623.83			
10/09/88	10:37	614.54	614.79	621.06	620.73	623.83			
10/09/88	10:47	614.54	614.79	621.04	620.73	623.83			
10/09/88	10:57	614.53	614.79	621.03	620.73	623.83			
10/09/88	11:07	614.53	614.79	621.06	620.73	623.83			
10/09/88	11:17	614.53	614.79	621.03	620.73	623.83			
10/09/88	11:27	614.51	614.78	621.03	620.73	623.83			
10/09/88	11:37	614.53	614.78	621.03	620.73	623.83			
10/09/88	11:47	614.51	614.78	621.06	620.73	623.82			
10/09/88	11:57	614.51	614.76	621.03	620.73	623.82			
10/09/88	12:07	614.51	614.76	621.04	620.73	623.82			
10/09/88	12:17	614.50	614.76	621.05	620.73	623.83			
10/09/88	12:27	614.50	614.74	621.00	620.73	623.81			
10/09/88	12:37	614.46	614.73	620.97	620.72	623.83			
10/09/88	12:47	614.46	614.73	620.99	620.72	623.82			
10/09/88	12:57	614.48	614.74	621.00	620.73	623.81			
10/09/88	13:07	614.50	614.74	621.06	620.73	623.81			
10/09/88	13:17	614.50	614.74	620.98	620.72	623.82			



TABLE 2  
Water Level Data

DATE	TIME	DMW-8 (USGS)	DMW-10 (USGS)	DMW-11 (USGS)	DMW-7 (USGS)	DMW-9 (USGS)	DMW-4A (USGS)	DMW-6A (USGS)	DMW-12 (USGS)
10/09/88	13:27	614.46	614.71	621.11	620.73	623.81			
10/09/88	13:37	614.51	614.76	620.97	620.73	623.81			
10/09/88	13:47	614.53	614.74	621.14	620.73	623.83			
10/09/88	13:57	614.43	614.71	621.01	620.73	623.83			
10/09/88	14:07	614.51	614.76	621.08	620.74	623.83			
10/09/88	14:17	614.45	614.70	621.06	620.74	623.83			
10/09/88	14:27	614.43	614.70	621.03	620.73	623.82			
10/09/88	14:37	614.48	614.71	621.03	620.74	623.83			
10/09/88	14:47	614.48	614.74	620.98	620.73	623.84			
10/09/88	14:57	614.46	614.71	621.11	620.74	623.82			
10/09/88	15:07	614.50	614.73	621.00	620.74	623.83			
10/09/88	15:17	614.46	614.73	621.02	620.74	623.84			
10/09/88	15:27	614.43	614.68	621.00	620.74	623.83			
10/09/88	15:37	614.45	614.71	621.02	620.74	623.84			
10/09/88	15:47	614.45	614.70	621.14	620.74	623.84			
10/09/88	15:57	614.46	614.73	621.16	620.75	623.84			
10/09/88	16:07	614.43	614.68	621.05	620.75	623.85			
10/09/88	16:17	614.43	614.68	621.10	620.75	623.84			
10/09/88	16:27	614.42	614.70	621.07	620.75	623.84			
10/09/88	16:37	614.46	614.71	621.03	620.75	623.84			
10/09/88	16:47	614.45	614.71	621.04	620.75	623.84			
10/09/88	16:57	614.43	614.70	621.09	620.75	623.85			
10/09/88	17:07	614.43	614.70	621.08	620.75	623.85			
10/09/88	17:17	614.45	614.70	621.08	620.75	623.85			
10/09/88	17:27	614.43	614.70	621.07	620.75	623.85			
10/09/88	17:37	614.42	614.68	621.08	620.75	623.85			
10/09/88	17:47	614.43	614.68	621.08	620.75	623.85			
10/09/88	17:57	614.42	614.68	621.09	620.75	623.85			
10/09/88	18:07	614.42	614.68	621.09	620.75	623.85			
10/09/88	18:17	614.42	614.68	621.09	620.75	623.85			
10/09/88	18:27	614.42	614.68	621.09	620.75	623.85			
10/09/88	18:37	614.42	614.68	621.09	620.75	623.85			
10/09/88	18:47	614.40	614.67	621.09	620.76	623.86			
10/09/88	18:57	614.42	614.67	621.09	620.76	623.85			
10/09/88	19:07	614.40	614.67	621.08	620.76	623.86			
10/09/88	19:17	614.40	614.67	621.08	620.76	623.86			
10/09/88	19:27	614.40	614.67	621.09	620.76	623.85			
10/09/88	19:37	614.40	614.67	621.08	620.76	623.85			
10/09/88	19:47	614.40	614.67	621.08	620.76	623.86			
10/09/88	19:57	614.40	614.67	621.07	620.76	623.86			
10/09/88	20:07	614.40	614.65	621.08	620.76	623.86			
10/09/88	20:17	614.39	614.65	621.05	620.76	623.85			
10/09/88	20:27	614.39	614.65	621.07	620.76	623.85			
10/09/88	20:37	614.39	614.65	621.08	620.76	623.85			

TABLE 2  
Water Level Data

DATE	TIME	DMW-8 (USGS)	DMW-10 (USGS)	DMW-11 (USGS)	DMW-7 (USGS)	DMW-9 (USGS)	DMW-4A (USGS)	DMW-6A (USGS)	DMW-12 (USGS)
10/09/88	20:47	614.39	614.65	621.06	620.76	623.85			
10/09/88	20:57	614.40	614.65	621.06	620.76	623.85			
10/09/88	21:07	614.54	614.74	621.07	620.76	623.85			
10/09/88	21:17	614.64	614.84	621.06	620.76	623.85			
10/09/88	21:27	614.73	614.92	621.06	620.76	623.85			
10/09/88	21:37	614.81	615.01	621.08	620.76	623.85			
10/09/88	21:47	614.89	615.09	621.05	620.76	623.85			
10/09/88	21:57	614.97	615.16	621.06	620.76	623.85			
10/09/88	22:07	615.04	615.24	621.07	620.76	623.85			
10/09/88	22:17	615.11	615.30	621.07	620.76	623.85			
PUMP SHUT OFF									
10/09/88	22:27	615.16	615.36	621.05	620.76	623.85			
10/09/88	22:37	615.23	615.41	621.06	620.76	623.85			
10/09/88	22:47	615.30	615.47	621.05	620.76	623.85			
10/09/88	22:57	615.35	615.54	621.06	620.76	623.85			
10/09/88	23:07	615.42	615.59	621.07	620.76	623.85			
10/09/88	23:17	615.46	615.65	621.07	620.76	623.85			
10/09/88	23:27	615.51	615.70	621.08	620.76	623.85			
10/09/88	23:37	615.57	615.74	621.08	620.76	623.85			
10/09/88	23:47	615.62	615.81	621.06	620.76	623.85			
10/09/88	23:57	615.67	615.86	621.07	620.76	623.85			
10/10/88	00:07	615.72	615.90	621.08	620.76	623.85			
10/10/88	00:17	615.76	615.95	621.07	620.76	623.85			
10/10/88	00:27	615.81	616.00	621.07	620.76	623.85			
10/10/88	00:37	615.86	616.05	621.08	620.76	623.86			
10/10/88	00:47	615.91	616.08	621.08	620.77	623.86			
10/10/88	00:57	615.95	616.12	621.07	620.77	623.86			
10/10/88	01:07	615.99	616.17	621.08	620.77	623.86			
10/10/88	01:17	616.03	616.22	621.07	620.77	623.86			
10/10/88	01:27	616.08	616.25	621.08	620.77	623.86			
10/10/88	01:37	616.11	616.30	621.09	620.77	623.86			
10/10/88	01:47	616.16	616.33	621.09	620.77	623.87			
10/10/88	01:57	616.21	616.38	621.08	620.77	623.87			
10/10/88	02:07	616.24	616.43	621.09	620.78	623.87			
10/10/88	02:17	616.29	616.46	621.09	620.78	623.87			
10/10/88	02:27	616.32	616.49	621.10	620.78	623.87			
10/10/88	02:37	616.37	616.54	621.10	620.78	623.87			
10/10/88	02:47	616.40	616.57	621.09	620.78	623.87			
10/10/88	02:57	616.45	616.62	621.11	620.79	623.88			
10/10/88	03:07	616.48	616.65	621.11	620.79	623.88			
10/10/88	03:17	616.51	616.68	621.11	620.79	623.88			
10/10/88	03:27	616.56	616.71	621.12	620.79	623.89			

TABLE 2  
Water Level Data

DATE	TIME	DMW-8 (USGS)	DMW-10 (USGS)	DMW-11 (USGS)	DMW-7 (USGS)	DMW-9 (USGS)	DMW-4A (USGS)	DMW-6A (USGS)	DMW-12 (USGS)
10/10/88	03:37	616.59	616.76	621.12	620.79	623.89			
10/10/88	03:47	616.62	616.79	621.12	620.79	623.89			
10/10/88	03:57	616.65	616.82	621.13	620.80	623.89			
10/10/88	04:07	616.68	616.85	621.13	620.80	623.89			
10/10/88	04:17	616.71	616.89	621.14	620.80	623.89			
10/10/88	04:27	616.76	616.93	621.14	620.80	623.90			
10/10/88	04:37	616.79	616.97	621.14	620.81	623.90			
10/10/88	04:47	616.83	616.98	621.15	620.81	623.91			
10/10/88	04:57	616.86	617.03	621.15	620.81	623.91			
10/10/88	05:07	616.89	617.06	621.15	620.81	623.91			
10/10/88	05:17	616.92	617.09	621.15	620.82	623.91			
10/10/88	05:27	616.95	617.12	621.16	620.82	623.92			
10/10/88	05:37	616.98	617.16	621.16	620.82	623.92			
10/10/88	05:47	617.02	617.17	621.16	620.82	623.92			
10/10/88	05:57	617.05	617.20	621.16	620.82	623.93			
10/10/88	06:07	617.08	617.25	621.17	620.83	623.92			
10/10/88	06:17	617.09	617.27	621.17	620.83	623.93			
10/10/88	06:27	617.13	617.30	621.18	620.83	623.93			
10/10/88	06:37	617.16	617.33	621.18	620.83	623.93			
10/10/88	06:47	617.19	617.36	621.18	620.83	623.94			
10/10/88	06:57	617.22	617.38	621.19	620.84	623.94			
10/10/88	07:07	617.24	617.41	621.19	620.84	623.94			
10/10/88	07:17	617.27	617.44	621.19	620.84	623.94			
10/10/88	07:27	617.30	617.46	621.20	620.84	623.94			
10/10/88	07:37	617.33	617.49	621.20	620.84	623.94			
10/10/88	07:47	617.35	617.52	621.20	620.84	623.94			
10/10/88	07:57	617.38	617.55	621.20	620.84	623.94			
10/10/88	08:07	617.40	617.57	621.20	620.84	623.95			
10/10/88	08:17	617.43	617.58	621.21	620.84	623.95			
10/10/88	08:27	617.46	617.62	621.20	620.84	623.95			
10/10/88	08:37	617.48	617.65	621.20	620.84	623.94			
10/10/88	08:47	617.51	617.66	621.21	620.84	623.95			
10/10/88	08:57	617.52	617.68	621.22	620.84	623.95			
10/10/88	09:07	617.55	617.71	621.22	620.84	623.95			
10/10/88	09:17	617.57	617.73	621.22	620.85	623.95			
10/10/88	09:27	617.60	617.76	621.22	620.85	623.95			
10/10/88	09:37	617.62	617.79	621.21	620.85	623.95	618.87		618.87
10/10/88	09:47	617.65	617.81	621.22	620.85	623.95			
10/10/88	09:57	617.67	617.82	621.21	620.85	623.95			
10/10/88	10:07	617.68	617.84	621.20	620.85	623.95		618.98	
10/10/88	10:17	617.70	617.85	621.21	620.85	623.95			
10/10/88	10:27	617.73	617.89	621.19	620.85	623.95			
10/10/88	10:37	617.74	617.90	621.19	620.85	623.94			
10/10/88	10:47	617.76	617.92	621.20	620.85	623.94			

### Water Level Data

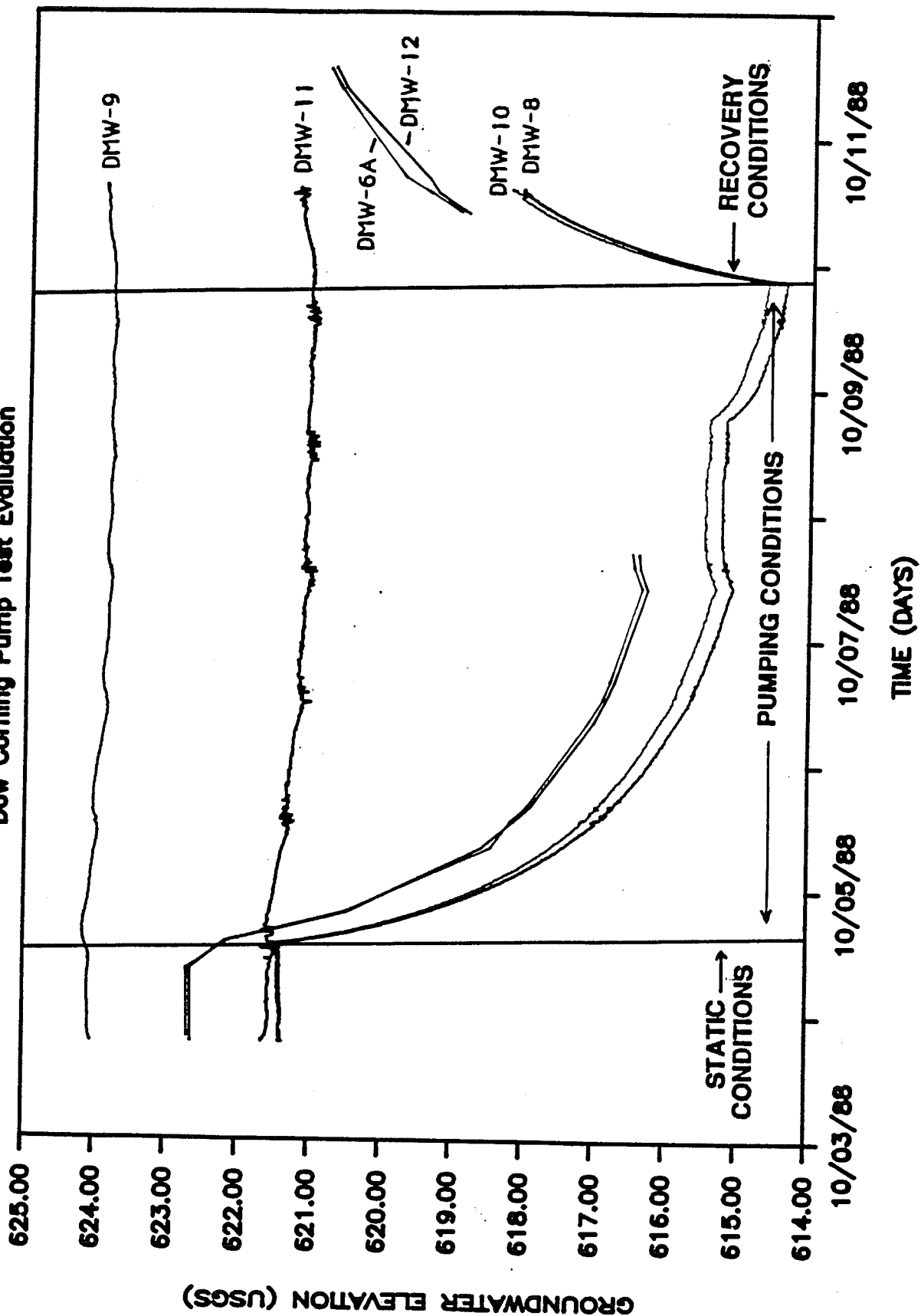
[illegible]

TABLE 3

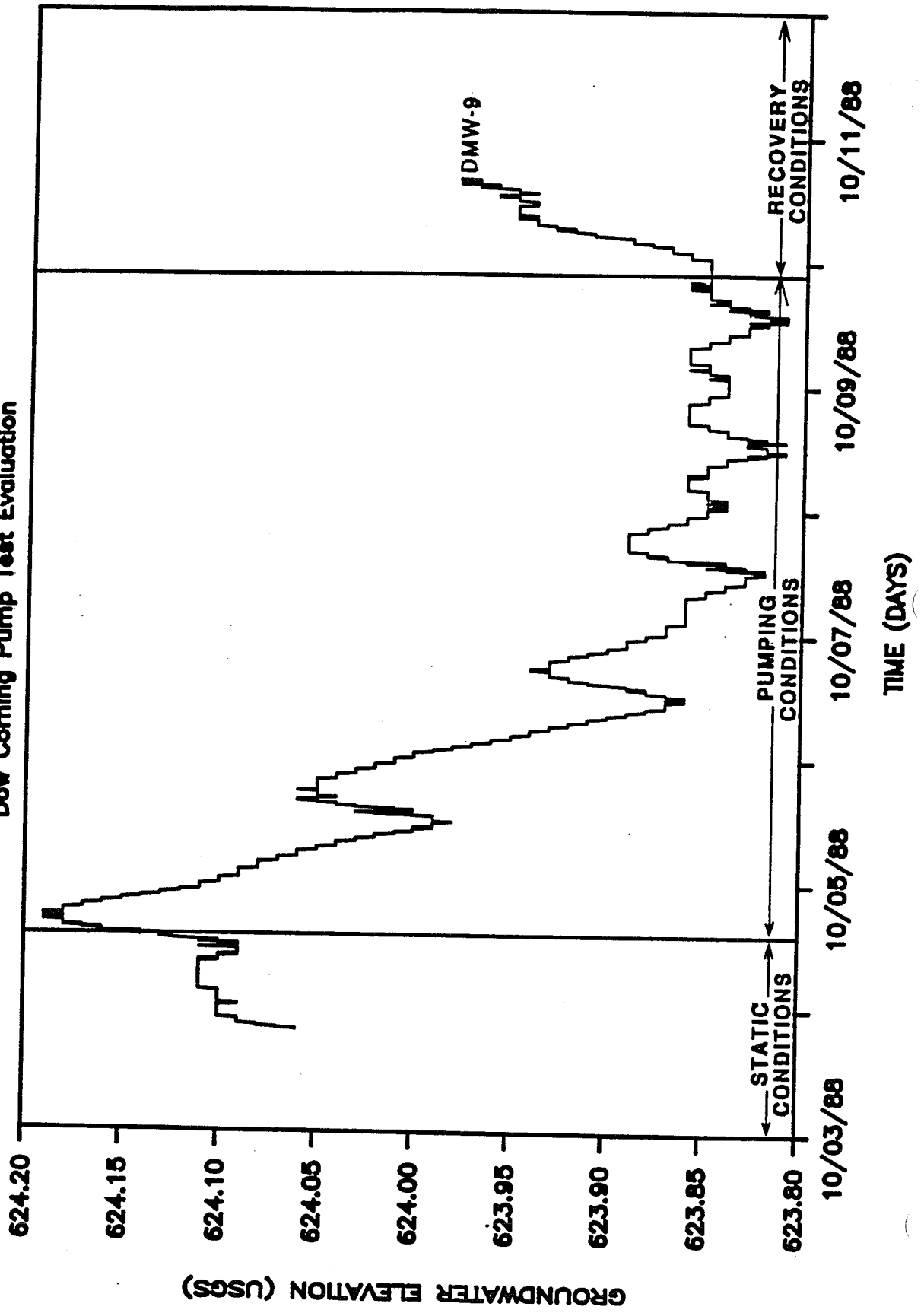
MONITORING WELL RESPONSE TO  
PUMPING OF REGIONAL AQUIFER WELL DMW-4A

<i><u>WELL</u></i> <i><u>NUMBER</u></i>	<i><u>SCREENED</u></i> <i><u>FORMATION</u></i>	<i><u>MAXIMUM</u></i> <i><u>DRAWDOWN (FT)</u></i>
DMW-6A	Regional Aquifer	6.21
DMW-7	Till Sand	0
DMW-8	Regional Aquifer	7.06
DMW-9	Regional Aquifer	0.30
DMW-10	Regional Aquifer	6.84
DMW-11	Regional Aquifer	0.54
DMW-12	Regional Aquifer	6.25

**FIGURE 1**  
Dow Coming Pump Test Evaluation

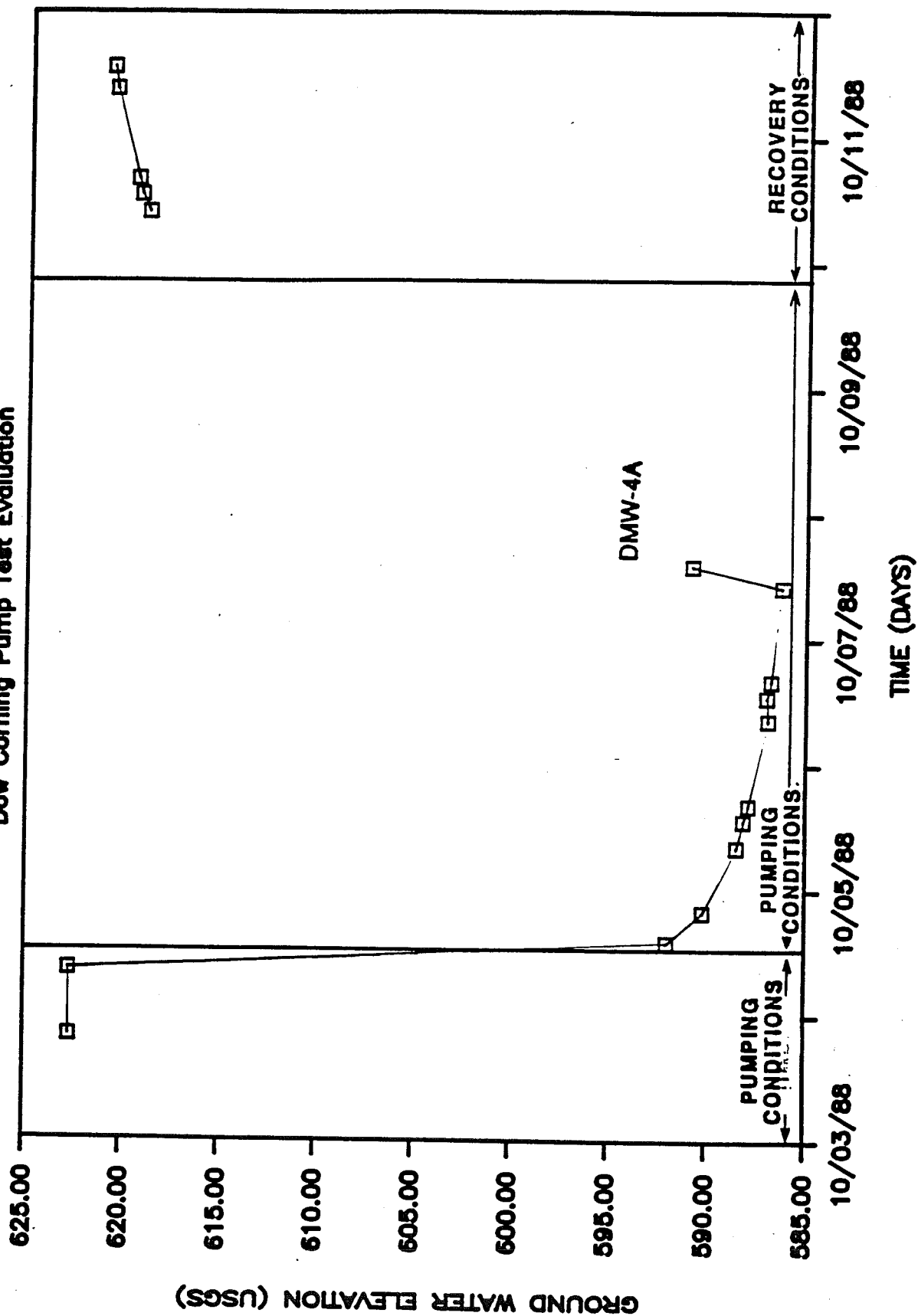


**FIGURE 2**  
**Dow Corning Pump Test Evaluation**



# FIGURE 3

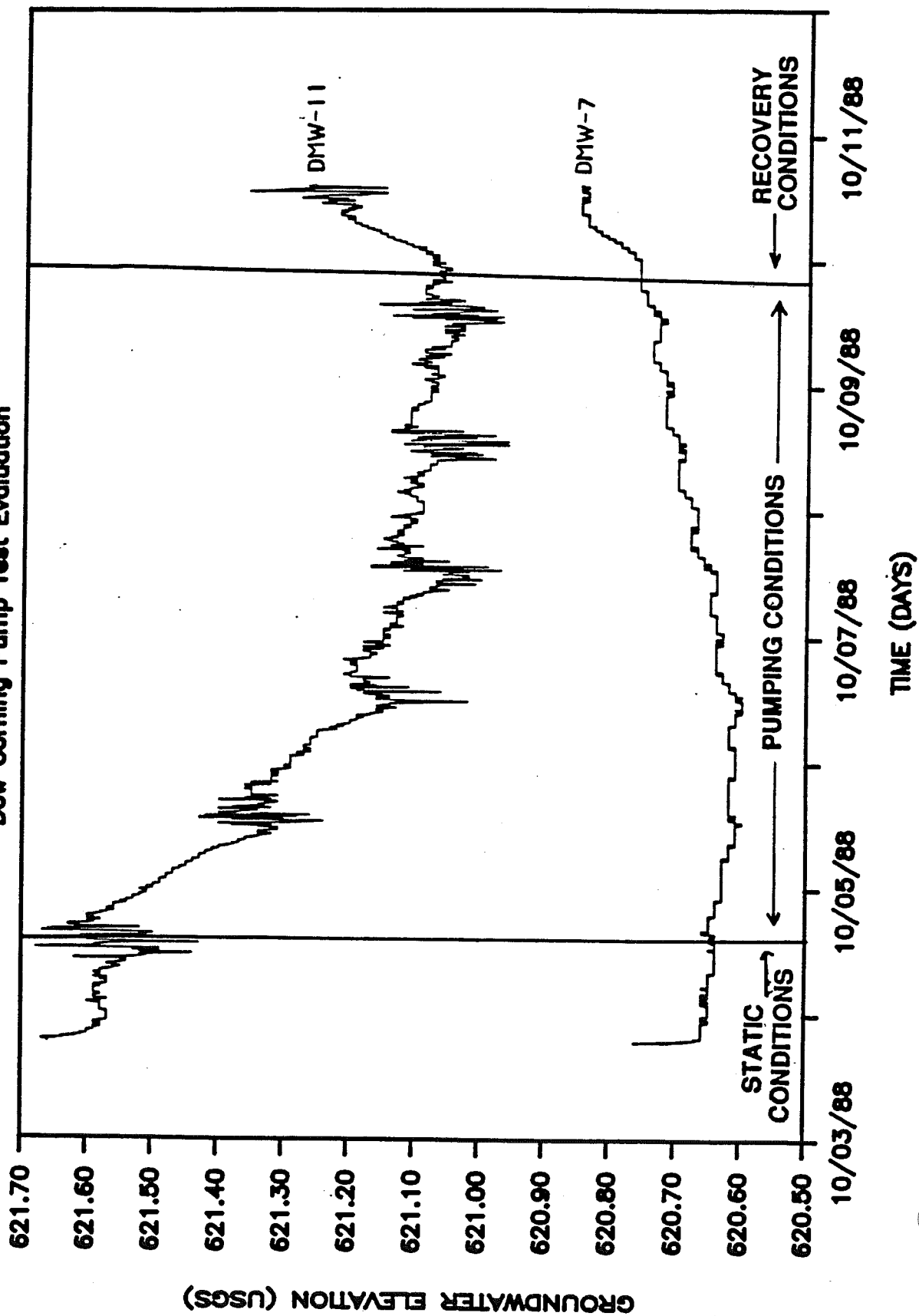
Dow Corning Pump Test Evaluation





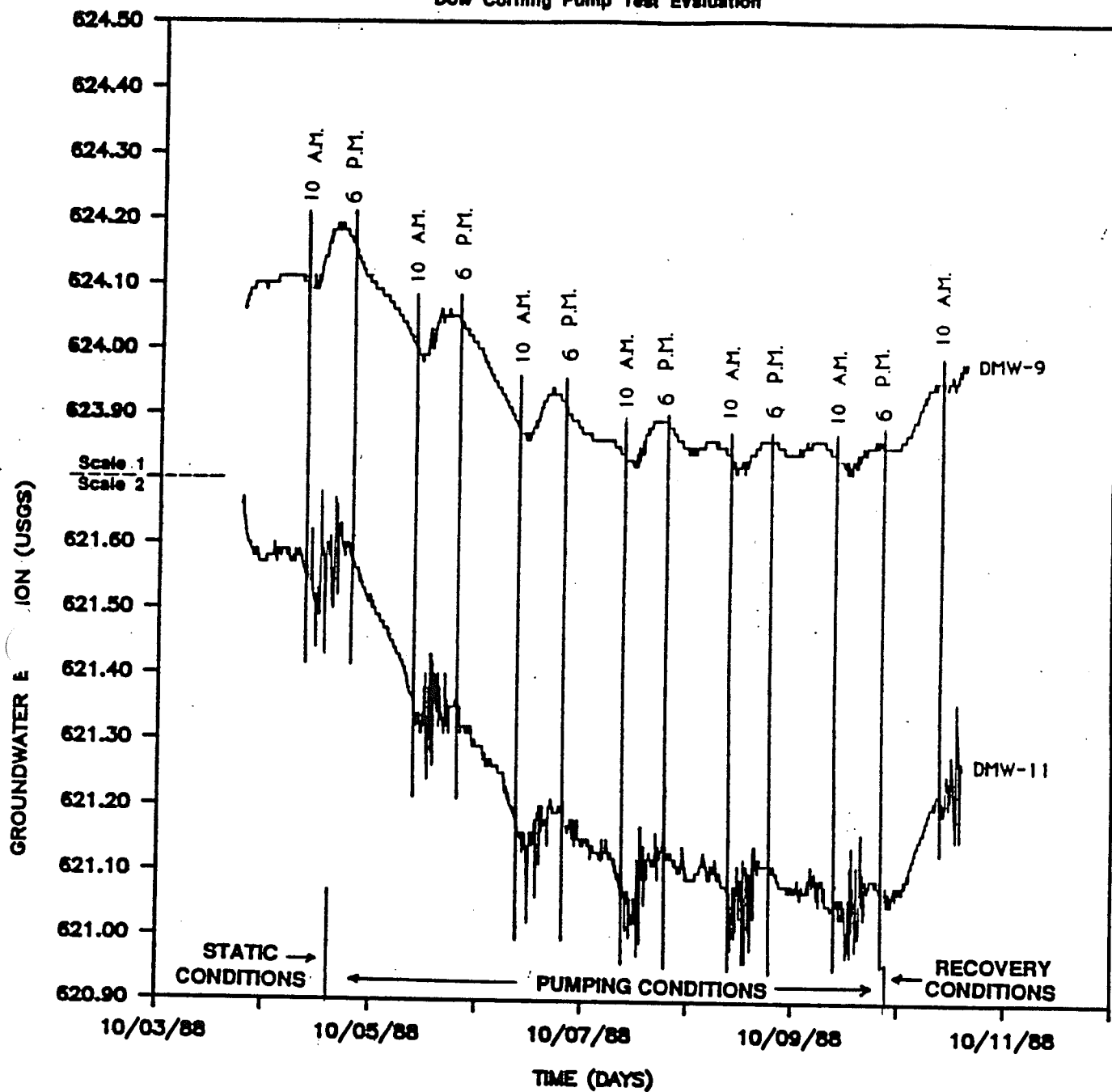
# FIGURE 4

Dow Corning Pump Test Evaluation



# FIGURE 5

Dow Corning Pump Test Evaluation





**Appendix B3-6a**  
**Deep Monitoring Well Groundwater Data Summary**  
**Dow Corning Corporation, Midland Michigan**  
**SMW 6-1**

Site ID:	Date Sampled:	pH S.U.	Specific conductance mmhos/cm	Calcium, dissolved ug/L	Sodium, dissolved ug/L	Magnesium, dissolved ug/L	Potassium, dissolved ug/L	Chloride ug/L	Sulfate ug/L	Bicarbonate, alkalinity ug/L	Carbonate, alkalinity ug/L	Lead, dissolved ug/L	Phenol, total ug/L	Benzene ug/L	Ethylbenzen e ug/L	Toluene ug/L	Chlorobenzene ug/L	
6-1	5/16/1990	6.99	7.408	880,000	190,000	290,000	6,400	2,440,000	8,700	64,000	<	2000	<	50	<	250	1	
6-1	5/16/1990	7.01	7.240	920,000	190,000	310,000	6,800	2,580,000	9,300	56,000	<	2000	<	50	<	250	1	
6-1	5/16/1990	7.04	7.056	1,400,000	180,000	430,000	6,800	2,470,000	11,000	72,000	<	2000	<	50	<	100	1	
6-1	10/9/1990	7.31	6.374	863,000	149,000	291,000	7,300	2,440,000	8,400	80,000	<	2000	<	50	<	100	1	
6-1	10/9/1990	7.42	6.570	801,000	145,000	269,000	6,500	2,440,000	7,500	89,000	<	2000	<	50	<	100	1	
6-1	10/9/1990	7.47	6.425	935,000	150,000	309,000	7,800	2,450,000	7,600	80,000	<	2000	<	50	<	100	1	
6-1	4/23/1991	6.31	7.504	854,000	187,000	286,000	5,400	2,520,000	7,600	54,000	<	2000	<	50	<	50	1	
6-1	4/23/1991	6.20	7.263	930,000	182,000	307,000	5,800	2,600,000	8,600	56,000	<	2000	<	50	<	50	1	
6-1	4/23/1991	6.38	7.134	1,210,000	183,000	390,000	6,400	2,510,000	9,200	55,000	<	2000	<	50	<	50	1	
6-1	10/23/1991	6.75	6.977	837,000	171,000	272,000	6,300	2,240,000	6,600	61,000	<	2000	<	50	<	10	1	
6-1	10/23/1991	7.66	6.789	912,000	174,000	293,000	6,900	2,240,000	7,400	62,000	<	2000	<	50	<	10	1	
6-1	10/23/1991	7.72	6.850	957,000	172,000	309,000	6,900	2,130,000	7,400	62,000	<	2000	<	50	<	10	1	
6-1	4/21/1992	7.30	7.920	819,000	185,000	279,000	4,900	2,580,000	<	16,000	65,000	<	2000	<	50	<	10	1
6-1	4/21/1992	7.32	7.710	798,000	188,000	278,000	5,000	2,650,000	2,400	68,000	<	2000	<	50	<	10	1	
6-1	4/21/1992	7.21	7.680	858,000	187,000	296,000	5,500	2,900,000	3,000	67,000	<	2000	<	50	<	10	1	
6-1	10/27/1992	7.66	7.710	937,000	176,000	297,000	7,600	2,540,000	7,800	81,000	<	2000		14	<	10	1	
6-1	10/27/1992	7.79	6.920	878,000	179,000	290,000	7,000	2,520,000	7,000	67,000	<	2000	<	1	<	10	1	
6-1	10/27/1992	7.87	5.280	909,000	178,000	309,000	7,800	2,560,000	7,600	81,000	<	2000		12	<	10	1	
6-1	4/27/1993	7.76	4.750	934,000	177,000	303,000	5,500	2,520,000	7,800	65,000	<	2000		6.7	<	10	1	
6-1	4/27/1993	7.65	4.700	889,000	178,000	291,000	4,900	2,480,000	5,200	58,000	<	2000		5.8	<	10	1	
6-1	4/27/1993	7.72	4.730	1,180,000	182,000	354,000	5,400	2,420,000	5,600	68,000	<	2000		2.3	<	10	1	
6-1	10/26/1993	7.43	7.000	937,000	190,000	293,000	7,000	2,470,000	4,700	83,000	<	2000		9.2	<	10	1	
6-1	10/26/1																	

















Appendix B3-6a  
Deep Monitoring Well Groundwater Data Summary  
Dow Corning Corporation, Midland Michigan  
SMW 10-1

Site ID:	Date Sampled:	pH	Specific conductance	Calcium, dissolved	Sodium, dissolved	Magnesium, dissolved	Potassium, dissolved	Chloride	Sulfate	Bicarbonate, alkalinity	Carbonate, alkalinity	Lead, dissolved	Phenol, total	Benzene	Ethylbenzene	Toluene	Chlorobenzene
		S.U.	mmhos/cm	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
10-1	4/28/1994	7.06	1.681	305,000	24,000	74,000	8,900	-	-	-	-	6 <	10	130 <	10 <	10	260
10-1	4/28/1994	7.06	1.689	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10-1	12/6/1994	6.54	1.940	288,000	37,000	74,000	9,600	416,000	110,000	430,000	<	2000	1.9	20	280 <	10 <	10
10-1	12/6/1994	6.60	2.150	-	-	-	-	534,000	109,000	430,000	<	2000	-	-	870 <	20 <	20
10-1	4/27/1995	7.27	1.409	275,000	19,000	65,000	7,500	134,000	70,000	553,000	<	2000	9.9	10	19 <	1 <	1
10-1	10/18/1995	7.17	1.254	-	-	-	-	452,000	22,000	275,000	<	2000	-	-	740 <	20 <	20
10-1	4/23/1996	6.77	1.292	230,000	14,000	54,000	4,500	144,000	197,000	526,000	<	2000 <	1	10	12 <	2 <	2
10-1	10/29/1996	6.65	0.989	275,000	25,000	63,000	7,900	242,000	240,000	474,000	<	2000	2.9	10	91 <	5 <	5
10-1	4/30/1997	6.98	1.121	259,000	27,000	60,000	7,100	260,000	132,000	437,000	<	2000	1.3 <	10	100 <	5 <	5
10-1	4/16/1998	7.08	1.237	-	-	-	-	-	-	-	-	-	-	18 <	1 <	1	16
10-1	4/18/2001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10-1	4/2/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10-1	4/21/2003	-	-	345,000	28,000	73,000	11,000	-	-	-	-	1.3	- <	1 <	1 <	1 <	1
10-1	4/26/2004	-	-	-	-	-	-	-	-	-	-	-	- <	1 <	1 <	1 <	1
10-1	4/27/2005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10-1	5/2/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10-1	10/30/2001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10-1	10/1/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10-1	10/23/2003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10-1	10/19/2004	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10-1	10/12/2005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10-1	10/19/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10-1	4/23/2007	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10-1	4/15/2008	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10-1	4/13/2009	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Maximum		7.27	5.00	4400000.00	330000.00	3200000.00	15000.00	1400000.00	240000.00	880000.00	2000.00	140.00	100.00	27000.00	630.00	2100.00	4900.00
Minimum		6.54	0.99	160000.00	14000.00	54000.00	4500.00	134000.00	22000.00	275000.00	2000.00	1.00	10.00	1.00	1.00	1.00	1.00
Average		6.91	2.35	974678.57	64285.71	299321.43	9636.84	549095.24	138857.14	476523.81	2000.00	33.99	23.89	4075.87	99.64	93.91	1000.60
Standard Deviation		0.2	0.98	1110896.47	61118.50	603326.34	2433.84	323235.66	55910.00	119378.65	0.00	29.79	23.04	5916.66	133.57	339.25	1116.35



Appendix B3-6a  
Deep Monitoring Well Groundwater Data Summary  
Dow Corning Corporation, Midland Michigan  
SMW 10-2

Site ID:	Date Sampled:	pH S.U.	Specific conductance mmhos/cm	Total organic carbon ug/L	Calcium, dissolved ug/L	Sodium, dissolved ug/L	Magnesium, dissolved ug/L	Potassium, dissolved ug/L	Chloride ug/L	Sulfate ug/L	Bicarbonate, alkalinity ug/L	Carbonate, alkalinity ug/L	Lead, dissolved ug/L	Phenol, total ug/L	Benzene ug/L	Ethylbenzene ug/L	Toluene ug/L	Chlorobenzene ug/L
10-2	12/6/1994	6.61	1.349		285,000	13,000	61,000	4,500	122,000	83,000	592,000 <	2000	3.3 <	10 <	1 <	1 <	1 <	1
10-2	12/6/1994	6.71	1.376		367,000	14,000	68,000	4,900	123,000	93,000	600,000 <	2000	4.1 <	10 <	1 <	1 <	1 <	1
10-2	4/27/1995	7.47	1.355		222,000	10,000	44,000	5,200	177,000	68,000	327,000 <	2000	3.3 <	10 <	1 <	1 <	1 <	1
10-2	10/18/1995	6.99	1.287		785,000	19,000	134,000	6,800	135,000	77,000	617,000 <	2000 <	1 <	10 <	1 <	1 <	1 <	1
10-2	4/23/1996	6.82	1.083		166,000	9,500	35,000	3,500	130,000	64,000	349,000 <	2000 DI	1.1	10 <	1 <	1 <	1 <	1
10-2	10/29/1996	6.87	0.791		188,000	9,300	37,000	4,900	99,000	77,000	486,000 <	2000	3.1	10 <	1 <	1 <	1 <	1
10-2	4/30/1997	7.12	0.840		178,000	8,500	36,000	3,300	94,000	65,000	422,000 <	2000 <	1 <	10 <	1 <	1 <	1 <	1
10-2	4/26/1999	6.48	0.727		554,000	14,000	129,000	55,000	45,000	49,000	490,000 <	2000	30 <	10 <	1 <	1 <	1 <	1
10-2	4/12/2000	6.96	0.692		234,000	7,400	46,000	8,100	69,000	48,000	379,000 <	2000	5.7 <	10 <	1 <	1 <	1 <	1
10-2	4/18/2001	6.74	0.921		-	-	-	-	-	-	-	-	-	<	1 <	1 <	1 <	1
10-2	4/2/2002	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
10-2	4/21/2003	6.73	0.917		154,000	6,500	29,000	2,800	51,000	50,000	380,000 <	2000 <	1 <	10 <	1 <	1 <	1 <	1
10-2	4/26/2004	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
10-2	4/27/2005	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
10-2	5/2/2006	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
10-2	10/30/2001	6.9	1.111		264,000	9,200	56,000	6,100	71,000	83,000	465,000 <	2000	9.1 <	10 <	1 <	1 <	1 <	1
10-2	10/1/2002	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
10-2	10/23/2003	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
10-2	10/19/2004	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
10-2	10/12/2005	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
10-2	10/19/2006	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
10-2	4/23/2007	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
10-2	4/15/2008	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
10-2	4/13/2009	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Maximum		7.62	2.15		1300000.00	91000.00	480000.00	55000.00	247000.00	218000.00	761000.00	2000.00	50.00	50.00	10.00	13.00	5.00	5.00
Minimum		6.48	0.69		154000.00	6500.00	29000.00	2000.00	45000.00	48000.00	327000.00	2000.00	1.00	4.00	1.00	1.00	1.00	1.00
Average		6.94	1.45		442340.43	21036.17	103042.55	6548.72	152195.12	127048.78	569536.59	2000.00	26.93	18.61	1.48	1.63	1.19	1.1
Standard Deviation		0.25	0.39		252854.77	13437.19	81552.05	8384.13	51820.47	56399.45	121332.41	0.00	22.50	16.88	1.51	1.91	0.85	1.1









Appendix B3-6a  
Deep Monitoring Well Groundwater Data Summary  
Dow Corning Corporation, Midland Michigan  
SMW 28-2

Site ID:	Date Sampled:	Ph S.U.	Specific conductance mmhos/cm	Calcium, dissolved ug/L	Sodium, dissolved ug/L	Magnesium, dissolved ug/L	Potassium, dissolved ug/L	Chloride ug/L	Sulfate ug/L	Bicarbonate, alkalinity ug/L	Carbonate, alkalinity ug/L	Lead, dissolved ug/L	Phenol, total ug/L	Benzene ug/L	Ethylbenzene ug/L	Toluene ug/L	Chlorobenzene ug/L
28-2	10/31/1989	6.94	1.050	-	-	-	-	114,000	27,000	410,000	< 2000	-	< 50	5	< 1	< 1	1
28-2	10/31/1989	6.97	1.080	-	-	-	-	122,000	24,000	452,000	< 2000	-	< 50	5	< 1	< 1	1
28-2	10/31/1989	6.91	1.080	-	-	-	-	132,000	22,000	460,000	< 2000	-	< 50	5	< 1	< 1	1
28-2	5/16/1990	7.21	0.885	160,000	11,000	44,000	1,200	91,000	22,000	392,000	< 2000	50	< 50	3	< 1	< 1	1
28-2	5/16/1990	7.25	0.936	160,000	11,000	44,000	1,300	80,000	24,000	368,000	< 2000	50	< 50	2	< 1	< 1	1
28-2	5/16/1990	7.25	0.891	160,000	10,000	46,000	1,700	84,000	24,000	380,000	< 2000	50	< 50	2	< 1	< 1	1
28-2	10/9/1990	7.02	0.810	129,000	6,700	33,000	1,600	68,000	20,000	372,000	< 2000	50	< 50	2	< 1	1	7
28-2	10/9/1990	7.01	0.819	128,000	6,800	33,000	1,600	59,000	24,000	353,000	< 2000	50	< 50	3	< 1	< 1	1
28-2	10/9/1990	7.06	0.799	135,000	7,600	35,000	1,500	76,000	28,000	391,000	< 2000	50	< 50	3	< 1	< 1	1
28-2	4/23/1991	6.75	0.689	100,000	5,400	25,000	1,000	29,000	22,000	265,000	< 2000	50	< 50	2	< 1	< 1	1
28-2	4/23/1991	6.75	0.713	106,000	6,000	28,000	990	36,000	23,000	285,000	< 2000	50	< 50	1	< 1	< 1	20
28-2	4/23/1991	6.85	0.789	122,000	7,900	35,000	2,200	52,000	25,000	321,000	< 2000	50	< 50	2	< 1	< 1	20
28-2	10/23/1991	6.83	0.930	136,000	9,400	37,000	1,200	85,000	13,000	400,000	< 2000	50	< 10	2	< 1	< 1	1
28-2	10/23/1991	7.04	0.916	151,000	11,000	43,000	1,200	83,000	16,000	392,000	< 2000	50	< 10	2	< 1	< 1	1
28-2	10/23/1991	7.02	0.982	152,000	9,800	41,000	1,300	103,000	31,000	418,000	< 2000	50	< 10	2	< 1	< 1	1
28-2	4/21/1992	7.31	0.800	83,000	4,300	22,000	1,400	31,000	18,000	245,000	< 2000	50	< 10	1	< 1	< 1	1
28-2	4/21/1992	7.31	0.751	87,000	4,600	23,000	1,300	36,000	17,000	262,000	< 2000	50	< 10	1	< 1	< 1	1
28-2	4/21/1992	7.34	0.739	107,000	7,100	32,000	1,200	46,000	19,000	286,000	< 2000	50	< 10	1	< 1	< 1	1
28-2	10/27/1992	7.38	0.800	419,000	14,000	117,000	3,000	100,000	23,000	442,000	< 2000	39	< 10	1.7	< 1	< 1	1
28-2	10/27/1992	7.32	1.240	133,000	8,200	32,000	1,300	54,000	17,000	390,000	< 2000	1	< 10	1	< 1	< 1	1
28-2	10/27/1992	7.17	0.790	142,000	10,000	37,000	1,400	76,000	20,000	428,000	< 2000	11	< 10	1	< 1	< 1	1
28-2	4/27/1993	7.14	0.898	95,000	9,000	26,000	640	25,000	11,000	290,000	< 2000	4.8	< 10	1	< 1	< 1	1
28-2	4/27/1993	7.20	0.890	129,000	7,000	37,000	630	34,000	12,000	310,000	< 2000	13	< 10	1	< 1	< 1	1
28-2	4/27/1993	7.25	0.905	99,000	6,900	28,000	580	30,000	11,000	295,000	< 2000	2.2	< 10	1.1	< 1	< 1	1
28-2	10/26/1993	7.15	0.975	159,000	10,000	38,000	1,200	62,000	6,100	468,000	< 2000	9.1	< 10	1.1	< 1	< 1	1
28-2	10/26/1993	7.13	0.883	207,000	11,000	52,000	1,400	77,000	7,700	477,000	< 2000	14	< 10	1	< 1	< 1	1
28-2	10/26/1993	7.20	0.881	162,000	11,000	40,000	1,000	68,000	7,900	454,000	< 2000	4.6	< 10	1.3	< 1	< 1	1
28-2	4/28/1994	7.77	0.818	99,000	5,600	26,000	1,100	16,000	47,000	302,000	< 2000 DP	1	< 10	1	< 1	< 1	1
28-2	4/28/1994	7.74	0.819	119,000	8,100	33,000	1,100	28,000	49,000	339,000	< 2000	1.2	< 10	1	< 1	< 1	1
28-2	4/28/1994	7.72	0.809	195,000	9,100	54,000	1,300	47,000	52,000	376,000	< 2000	1.8	< 10	1	< 1	< 1	1
28-2	12/6/1994	6.72	0.824	124,000	7,700	33,000	1,100	42,000	13,000	376,000	< 2000	1	< 10	1	< 1	< 1	1
28-2	12/6/1994	6.83	0.737	144,000	8,400	37,000	1,200	43,000	15,000	381,000	< 2000	1.5	< 10	1	< 1	< 1	1
28-2	12/6/1994	6.95	0.799	125,000	8,600	34,000	1,000	51,000	20,000	383,000	< 2000	1	< 10	1	< 1	< 1	1
28-2	4/27/1995	7.77	0.715	106,000	7,000	29,000	1,000	29,000	9,100	316,000	< 2000	1	< 10	1	< 1	< 1	1
28-2	10/18/1995	7.24	0.721	184,000	11,000	49,000	1,400	65,000	3,400	422,000	< 2000	4	< 10	1	< 1	< 1	1
28-2	4/23/1996	6.77	0.588	100,000	7,500	32,000	1,200	19,000	9,200	297,000	< 2000	1	< 10	1	< 1	< 1	1
28-2	10/29/1996	7.10	0.620	118,000	7,700	32,000	1,400	48,000	7,300	424,000	< 2000	2.8	< 10	1	< 1	< 1	1
28-2	4/29/1997	7.17	0.699	118,000	8,500	33,000	1,200	37,000	11,000	369,000	< 2000 DI	1.3	< 10	1	< 1	< 1	1
Maximum		7.77	3.00	550000.00	76000.00	420000.00	3000.00	440000.00	700000.00	5600000.00	2000.00	290.00	100.00	59.00	5.00	5.00	20.00
Minimum		6.61	0.59	83000.00	4300.00	22000.00	580.00	16000.00	3400.00	245000.00	2000.00	1.00	3.00	1.00	1.00	1.00	1.00
Average		7.18	1.27	207715.79	15689.47	59768.42	1281.14	159959.60	33340.40	556129.03	2000.00	40.49	40.62	5.70	1.69	1.42	1.94
Standard Deviation		0.29	0.52	92904.74	10008.05	43097.72	426.22	113949.05	70199.46	571898.75	0.00	36.20	29.58	6.65	1.52	1.17	2.93

Appendix B3-6a  
Deep Monitoring Well Groundwater Data Summary  
Dow Corning Corporation, Midland Michigan  
MH 28-11

Site ID:	Date Sampled:	Ph S.U.	Specific conductance mmhos/cm	Calcium, dissolved ug/L	Sodium, dissolved ug/L	Magnesium, dissolved ug/L	Potassium, dissolved ug/L	Chloride ug/L	Sulfate ug/L	Bicarbonate, alkalinity ug/L	Carbonate, alkalinity ug/L	Lead, dissolved ug/L	Phenol, total ug/L	Benzene ug/L	Ethylbenzene ug/L	Toluene ug/L	Chlorobenzene ug/L	
MH28-11	10/7/1997	6.45	0.712	176,000	40,000	29,000	8,800	208,000	107,000	221,000	<	2000	<	1	<	10	<	
MH28-11	4/15/1998	6.90	1.278	226,000	34,000	41,000	7,900	186,000	298,000	213,000	<	2000	<	1	<	10	<	
MH28-11	10/26/1998	6.46	1.504	218,000	44,000	37,000	10,000	277,000	188,000	234,000	<	2000	<	1	<	10	<	
MH28-11	4/26/1999	6.33	1.490	322,000	58,000	50,000	12,000	261,000	339,000	314,000	<	2000		5.5	40	<	1	<
MH28-11	10/20/1999	6.45	1.288	222,000	62,000	39,000	10,000	295,000	252,000	207,000	<	2000	<	1	<	10	<	
MH28-11	4/12/2000	6.92	1.492	305,000	75,000	47,000	10,000	339,000	347,000	227,000	<	2000	<	1	<	10	<	
MH28-11	10/18/2000	6.69	1.615	252,000	59,000	40,000	12,000	285,000	245,000	270,000	<	2000	<	1	<	10	<	
MH28-11	4/18/2001	6.62	1.438	200,000	67,000	34,000	8,400	267,000	131,000	210,000	<	2000	<	1	<	10	<	
MH28-11	4/2/2002	6.64	1.701	232,000	77,000	36,000	9,700	350,000	180,000	238,000	<	2000	<	1	<	10	<	
MH28-11	4/21/2003	6.63	1.888	300,000	103,000	44,000	11,000	467,000	188,000	258,000	<	2000	<	1	<	10	<	
MH28-11	4/26/2004	6.51	2.74	352,000	78,000	51,000	15,000	499,000	232,000	274,000	<	2000	<	1		20	<	
MH28-11	4/27/2005	6.91	2.110	316,000	70,000	39,000	12,000	389,000	156,000	267,000	<	2000	<	1		10	<	
MH28-11	5/2/2006	7.08	1.942	250,000	60,000	34,000	9,900	380,000	130,000	240,000	<	2000	<	1	<	50	<	
MH28-11	10/30/2001	6.83	1.677	238,000	58,000	34,000	11,000	316,000	178,000	248,000	<	2000	<	1	<	10	<	
MH28-11	10/1/2002	6.79	3.270	873,000	80,000	66,000	14,000	404,000	137,000	255,000	<	2000		3.2	<	10	<	
MH28-11	10/23/2003	6.66	2.250	256,000	102,000	42,000	11,000	491,000	174,000	242,000	<	2000	<	1	<	10	<	
MH28-11	10/19/2004	6.98	2.220	249,000	116,000	38,000	12,000	459,000	155,000	272,000	<	2000	<	1	<	10	<	
MH28-11	10/12/2005	6.37	2.040	227,000	133,000	39,000	12,000	448,000	118,000	273,000	<	2000	<	1	<	10	<	
MH28-11	10/19/2006	6.61	1.731	230,000	77,000	33,000	11,000	330,000	120,000	280,000	<	2000	<	1	<	50	<	
MH28-11	4/23/2007	6.92	1.597	180,000	37,000	29,000	6,900	240,000	96,000	270,000	<	2000	<	1	<	50	<	
MH28-11	10/11/2007	6.80	2.150	210,000	130,000	32,000	11,000	420,000	99,000	290,000	<	2000	<	1	<	50	<	
MH28-11	4/15/2008	6.95	2.140	200,000	170,000	31,000	6,800	470,000	99,000	250,000	<	2000	<	1	<	50	<	
MH28-11	10/16/2008	6.81	2.080	190,000	130,000	29,000	8,700	430,000	93,000	260,000	<	2000	<	2	<	50	<	
MH28-11	4/13/2009	7.08	2.330	170,000	210,000	26,000	6,700	520,000	75,000	280,000	<	2000	<	2	<	50	<	
MH28-11	10/6/2009	6.72	2.36	190,000	180,000	29,000	9,200	540,000	93,000	270,000	<	2000	<	1	<	50	<	
Maximum		7.08	3.27	873000.00	210000.00	66000.00	15000.00	540000.00	347000.00	314000.00	2000.00	5.50	50.00	1.00	1.00	1.00	1.00	
Minimum		6.33	0.71	170000.00	34000.00	26000.00	6700.00	186000.00	75000.00	207000.00	2000.00	1.00	10.00	1.00	1.00	1.00	1.00	
Average		6.72	1.88	263360.00	90000.00	37960.00	10280.00	370840.00	169200.00	254520.00	2000.00	1.35	24.40	1.00	1.00	1.00	1.00	
Standard Deviation		0.22	0.52	135943.27	46515.23	8843.45	2097.82	102196.98	77331.54	26620.98	0.00	1.00	18.95	0.00	0.00	0.00	0.00	

Appendix B3-6a  
Deep Monitoring Well Groundwater Data Summary  
Dow Corning Corporation, Midland Michigan  
MH 28-12

Site ID:	Date Sampled:	Ph S.U.	Specific conductance mmhos/cm	Calcium, dissolved ug/L	Sodium, dissolved ug/L	Magnesium, dissolved ug/L	Potassium, dissolved ug/L	Chloride ug/L	Sulfate ug/L	Bicarbonate, alkalinity ug/L	Carbonate, alkalinity ug/L	Lead, dissolved ug/L	Phenol, total ug/L	Benzene ug/L	Ethylbenzene ug/L	Toluene ug/L	Chlorobenzene ug/L
MH28-12	10/19/2006	6.61	1.731	250,000	87,000	36,000	12,000	41,000	140,000	280,000	< 2000	< 1	< 50	< 1	< 1	< 1	< 1
MH28-12	4/23/2007	6.93	1.567	160,000	38,000	25,000	5,400	180,000	72,000	250,000	< 2000	< 1	< 50	< 1		-	< 1
MH28-12	10/11/2007	6.87	2.200	240,000	140,000	37,000	11,000	440,000	99,000	270,000	< 2000	< 1	< 50	< 1	< 1	< 1	< 1
MH28-12	4/15/2008	-	2.220	410,000	180,000	71,000	17,000	490,000	100,000	250,000	< 2000	< 5	< 50	< 1	< 1	< 1	< 1
MH28-12	10/16/2008	6.93	2.070	190,000	140,000	29,000	8,700	450,000	94,000	250,000	< 2000	< 2	< 50	< 1	< 1	< 1	< 1
MH28-12	4/13/2009	7.01	2.360	170,000	210,000	26,000	6,600	540,000	76,000	230,000	< 2000	< 1	< 50	< 1	< 1	< 1	< 1
MH28-12	10/6/2009	6.71	2.410	190,000	200,000	29,000	9,800	560,000	97,000	250,000	< 2000	< 1	< 50	< 1	< 1	< 1	< 1
Maximum		7.01	2.41	410000.00	210000.00	71000.00	17000.00	560000.00	140000.00	280000.00	2000.00	5.00	50.00	1.00	1.00	1.00	1.00
Minimum		6.61	1.57	160000.00	38000.00	25000.00	5400.00	41000.00	72000.00	230000.00	2000.00	1.00	50.00	1.00	1.00	1.00	1.00
Average		6.84	2.08	230000.00	142142.86	36142.86	10071.43	385857.14	96857.14	254285.71	2000.00	1.71	50.00	1.00	1.00	1.00	1.00
Standard Deviation		0.15	0.32	86216.78	62290.79	16046.06	3838.71	197180.48	22124.11	16183.47	0.00	1.50	0.00	0.00	0.00	0.00	0.00

Appendix B3-6a  
Deep Monitoring Well Groundwater Data Summary  
Dow Corning Corporation, Midland Michigan  
MH 10-15

Site ID:	Date Sampled:	Ph S.U.	Specific conductance mmhos/cm	Calcium, dissolved ug/L	Sodium, dissolved ug/L	Magnesium, dissolved ug/L	Potassium, dissolved ug/L	Chloride ug/L	Sulfate ug/L	Bicarbonate, alkalinity ug/L	Carbonate, alkalinity ug/L	Lead, dissolved ug/L	Phenol, total ug/L	Benzene ug/L	Ethylbenzene ug/L	Toluene ug/L	Chlorobenzene ug/L
MH10-15	5/2/2006	7.06	1.989	270,000	57,000	35,000	9,200	400,000	130,000	280,000	< 2000	< 1	< 50	< 1	< 1	< 1	< 1
MH10-15	10/19/2006	6.54	2.040	240,000	76,000	36,000	10,000	390,000	130,000	280,000	< 2000	< 1	< 50	< 1	< 1	< 1	< 1
MH10-15	4/23/2007	6.82	1.732	220,000	40,000	34,000	7,300	300,000	99,000	350,000	< 2000	< 1	< 50	1.5	< 1	< 1	< 1
MH10-15	10/11/2007	6.78	2.180	230,000	130,000	35,000	11,000	430,000	99,000	280,000	< 2000	1.1	< 50	< 1	< 1	< 1	< 1
MH10-15	4/15/2008	6.94	2.210	390,000	170,000	71,000	15,000	480,000	94,000	260,000	< 2000	4.7	< 50	< 1	< 1	< 1	< 1
MH10-15	10/16/2008	6.83	2.070	190,000	130,000	28,000	8,300	440,000	93,000	250,000	< 2000	< 2	< 50	< 1	< 1	< 1	< 1
MH10-15	4/13/2009	7.31	2.310	170,000	200,000	27,000	6,400	520,000	75,000	240,000	< 2000	< 1	< 50	< 1	< 1	< 1	< 1
MH10-15	10/6/2009	6.75	2.400	200,000	180,000	30,000	9,200	550,000	94,000	270,000	< 2000	< 1	< 50	< 1	< 1	< 1	< 1
Maximum		7.31	2.40	390000.00	200000.00	71000.00	15000.00	550000.00	130000.00	350000.00	2000.00	4.70	50.00	1.50	1.00	1.00	1.00
Minimum		6.54	1.73	170000.00	40000.00	27000.00	6400.00	300000.00	75000.00	240000.00	2000.00	1.00	50.00	1.00	1.00	1.00	1.00
Average		6.88	2.12	238750.00	122875.00	37000.00	9550.00	438750.00	101750.00	276250.00	2000.00	1.60	50.00	1.06	1.00	1.00	1.00
Standard Deviation		0.23	0.21	68543.52	59688.33	14162.32	2640.35	79181.08	18986.84	33354.16	0.00	1.30	0.00	0.18	0.00	0.00	0.00





**Shallow Monitoring Well Groundwater Data Summary  
Dow Corning Corporation, Midland Michigan  
SMW 6-1**

Site ID:	Date Sampled:	pH S.U.	Specific conductance mmhos/cm	Calcium, dissolved ug/L	Sodium, dissolved ug/L	Magnesium, dissolved ug/L	Potassium, dissolved ug/L	Chloride ug/L	Sulfate ug/L	Bicarbonate, alkalinity ug/L	Carbonate, alkalinity ug/L	Lead, dissolved ug/L	Phenol, total ug/L	Benzene ug/L	Ethylbenzen e ug/L	Toluene ug/L	Chlorobenzene ug/L
6-1	5/16/1990	7.01	7.240	920,000	190,000	310,000	6,800	2,580,000	9,300	56,000	< 2000	50	< 250	19	< 1	< 1	< 1
6-1	5/16/1990	7.04	7.056	1,400,000	180,000	430,000	6,800	2,470,000	11,000	72,000	< 2000	50	< 100	17	< 1	< 1	< 1
6-1	10/9/1990	7.31	6.374	863,000	149,000	291,000	7,300	2,440,000	8,400	80,000	< 2000	50	< 100	5	< 1	< 1	< 1
6-1	10/9/1990	7.42	6.570	801,000	145,000	269,000	6,500	2,440,000	7,500	89,000	< 2000	50	< 100	1	< 1	< 1	< 1
6-1	10/9/1990	7.47	6.425	935,000	150,000	309,000	7,800	2,450,000	7,600	80,000	< 2000	50	< 100	2	< 1	< 1	< 1
6-1	4/23/1991	6.31	7.504	854,000	187,000	286,000	5,400	2,520,000	7,600	54,000	< 2000	50	< 50	11	< 1	< 1	< 1
6-1	4/23/1991	6.20	7.263	930,000	182,000	307,000	5,800	2,600,000	8,600	56,000	< 2000	50	< 50	15	< 1	< 1	< 1
6-1	4/23/1991	6.38	7.134	1,210,000	183,000	390,000	6,400	2,510,000	9,200	55,000	< 2000	50	< 50	1	< 1	< 1	< 1
6-1	10/23/1991	6.75	6.977	837,000	171,000	272,000	6,300	2,240,000	6,600	61,000	< 2000	50	< 10	1	< 1	< 1	< 1
6-1	10/23/1991	7.66	6.789	912,000	174,000	293,000	6,900	2,240,000	7,400	62,000	< 2000	50	< 10	1	< 1	< 1	< 1
6-1	10/23/1991	7.72	6.850	957,000	172,000	309,000	6,900	2,130,000	7,400	62,000	< 2000	50	< 10	1	< 1	< 1	< 1
6-1	4/21/1992	7.30	7.920	819,000	185,000	279,000	4,900	2,580,000	< 16,000	65,000	< 2000	50	< 10	9	< 1	< 1	< 1
6-1	4/21/1992	7.32	7.710	798,000	188,000	278,000	5,000	2,650,000	2,400	68,000	< 2000	50	< 10	13	< 1	< 1	< 1
6-1	4/21/1992	7.21	7.680	858,000	187,000	296,000	5,500	2,900,000	3,000	67,000	< 2000	50	< 10	11	< 1	< 1	< 1
6-1	10/27/1992	7.66	7.710	937,000	176,000	297,000	7,600	2,540,000	7,800	81,000	< 2000	14	< 10	1	< 1	< 1	< 1
6-1	10/27/1992	7.79	6.920	878,000	179,000	290,000	7,000	2,520,000	7,000	67,000	< 2000	1	< 10	1	< 1	< 1	< 1
6-1	10/27/1992	7.87	5.280	909,000	178,000	309,000	7,800	2,560,000	7,600	81,000	< 2000	12	< 10	1	< 1	< 1	< 1
6-1	4/27/1993	7.76	4.750	934,000	177,000	303,000	5,500	2,520,000	7,800	65,000	< 2000	6.7	< 10	5.5	< 1	< 1	< 1
6-1	4/27/1993	7.65	4.700	889,000	178,000	291,000	4,900	2,480,000	5,200	58,000	< 2000	5.8	< 10	6.9	< 1	< 1	< 1
6-1	4/27/1993	7.72	4.730	1,180,000	182,000	354,000	5,400	2,420,000	5,600	68,000	< 2000	2.3	< 10	12	< 1	< 1	< 1
6-1	10/26/1993	7.43	7.000	937,000	190,000	293,000	7,000	2,470,000	4,700	83,000	< 2000	9.2	< 10	1	< 1	< 1	< 1
6-1	10/26/1993	7.72	6.410	890,000	194,000	281,000	7,200	2,460,000	5,400	79,000	< 2000	4.2	< 10	1	< 1	< 1	< 1
6-1	10/26/1993	7.72	6.560	925,000	197,000	293,000	7,100	2,510,000	5,100	90,000	< 2000	3.2	< 10	1	< 1	< 1	< 1
6-1	4/28/1994	7.84	7.360	848,000	181,000	271,000	5,800	2,460,000	11,000	74,000	< 2000	1	< 10	12	< 1	< 1	< 1
6-1	4/28/1994	7.93	7.540	907,000	186,000	287,000	6,000	2,510,000	14,000	79,000	< 2000	1	< 10	11	< 1	< 1	< 1
6-1	4/28/1994	7.93	7.680	969,000	177,000	296,000	6,200	2,370,000	19,000	88,000	< 2000	1	-	5.3	< 1	< 1	< 1
6-1	12/6/1994	6.92	6.850	840,000	195,000	275,000	7,100	2,490,000	5,200	76,000	< 2000	1	< 10	8	< 1	< 1	< 1
6-1	12/6/1994	6.77	7.010	870,000	193,000	282,000	7,000	2,500,000	6,100	76,000	< 2000	3.3	< 10	7.5	< 1	< 1	< 1
6-1	12/6/1994	6.73	6.890	882,000	191,000	280,000	7,500	2,420,000	9,100	72,000	< 2000	3.4	< 10	7.1	< 1	< 1	< 1
6-1	4/27/1995	6.91	6.900	812,000	196,000	280,000	5,700	2,220,000	7,900	69,000	< 2000	2.2	< 10	2.3	< 1	< 1	< 1
6-1	10/18/1995	7.39	1.890	890,000	204,000	292,000	7,500	2,060,000	5,900	64,000	< 2000	5	< 10	2.4	< 1	< 1	< 1
6-1	4/23/1996	7.02	5.300	760,000	191,000	280,000	5,200	2,380,000	4,300	66,000	< 2000	1	10	21	< 1	< 1	< 1
6-1	10/29/1996	7.26	2.720	778,000	198,000	257,000	6,500	2,760,000	6,700	77,000	< 2000	1.4	10	2.5	< 1	< 1	< 1
6-1	4/29/1997	7.10	3.350	771,000	141,000	225,000	5,400	2,540,000	4,500	67,000	< 2000	5	< 10	1.4	< 1	< 1	< 1
6-1	10/7/1997	6.51	2.940	807,000	189,000	256,000	6,600	2,520,000	< 20,000	84,000	< 2000	1	< 10	3.9	< 1	< 1	< 1
6-1	4/15/1998	7.22	6.560	789,000	189,000	259,000	5,300	2,510,000	8,500	65,000	< 2000	1	10	3.9	< 1	< 1	< 1
6-1	10/26/1998	6.81	6.580	817,000	194,000	256,000	8,100	2,420,000	5,500	68,000	< 2000	7	20	1	< 1	< 1	< 1
6-1	4/26/1999	6.24	4.860	801,000	218,000	266,000	6,700	2,210,000	< 2,000	76,000	< 2000	1.2	10	9.3	< 1	< 1	< 1
6-1	10/20/1999	7.00	4.940	800,000	199,000	253,000	7,400	2,290,000	2,300	61,000	< 2000	2.3	< 10	1.5	< 1	< 1	< 1
6-1	4/12/2000	6.82	4.500	836,000	192,000	266,000	5,500	2,620,000	< 2,000	76,000	< 2000	1	< 10	6.7	< 1	< 1	< 1
6-1	10/18/2000	6.62	5.660	763,000	186,000	245,000	8,000	2,320,000	< 2,000	77,000	< 2000	3.8	< 10	1.1	< 1	< 1	< 1
6-1	4/18/2001	6.99	6.57	728,000	230,000	243,000	6,500	2,420,000	< 2,000	72,000	< 2000	4.1	20	12	< 1	< 1	< 1
6-1	4/2/2002	6.92	6.400	715,000	232,000	240,000	6,100	2,930,000	< 2,000	73,000	< 2000	1	< 10	7.4	< 1	< 1	< 1
6-1	4/21/2003	6.99	6.890	732,000	228,000	245,000	5,700	2,470,000	7,600	74,000	< 2000	1	< 10	8.2	< 1	< 1	< 1
6-1	4/26/2004	7.12	6.500	772,000	227,000	268,000	7,400	2,620,000	6,300	77,000	< 2000	3.5	20	4.7	< 1	< 1	< 1
6-1	4/27/2005	6.86	7.300	861,000	237,000	292,000	5,100	1,870,000	8,600	84,000	< 2000	1	20	4.8	< 1	< 1	< 1
6-1	5/2/2006	7.56	6.820	710,000	220,000	240,000	5,000	2,400,000	5,700	61,000	< 2000	1	< 50	2	< 1	< 1	< 1
6-1	10/30/2001	7.19	6.300	759,000	222,000	250,000	7,400	2,540,000	3,600	81,000	< 2000	1	< 10	2.8	< 1	< 1	< 1
6-1	10/1/2002	7.51	6.630	708,000	215,000	238,000	6,700	2,690,000	< 2,000	78,000	< 2000	1	< 10	2.3	< 1	< 1	< 1
6-1	10/23/2003	6.83	7.790	694,000	210,000	235,000	6,400	2,580,000	< 5,000	61,000	< 2000	1	< 10	1	< 1	< 1	< 1
6-1	10/19/2004	7.79	6.610	720,000	220,000	238,000	7,300	1,860,000	< 5,000	159,000	< 2000	1.2	< 10	1.4	< 1	< 1	< 1
6-1	10/12/2005	6.67	4.250	676,000	208,000	251,000	6,300	2,010,000	5,700	77,000	< 2000	1	< 10	1.5	< 1	< 1	< 1
6-1	10/19/2006	7.10	6.740	680,000	220,000	220,000	5,900	2,100,000	6,900	74,000	< 2000	1	< 50	1.1	< 1	< 1	< 1
6-1	4/23/2007	7.65	7.300	720,000	230,000	240,000	4,300	2,300,000	8,000	68,000	< 2000	1	< 50	2.2	< 1	< 1	< 1
6-1	10/11/2007	7.75	7.090	740,000	220,000	250,000	6,600	2,400,000	6,500	76,000	< 2000	1	< 50	1.4	< 1	< 1	< 1
6-1	4/15/2008	7.65	7.030	74,000	280,000	240,000	5,300	2,400,000	12,000	86,000	< 2000	1	< 50	3.2	< 1	< 1	< 1
6-1	10/16/2008	7.56	6.860	640,000	220,000	210,000	5,700	2,400,000	6,200	80,000	< 2000	1	< 50	1.3	< 1	< 1	< 1
6-1	4/13/2009	7.40	6.920	630,000	240,000	220,000	5,000	2,400,000	11,000	78,000	< 2000	1	< 50	2.5	< 1	< 1	< 1
6-1	10/6/2009	6.95	5.600	710,000	230,000	240,000	7,800	2,500,000	5,800	76,000	< 2000	5.4	< 50	1.5	< 1	< 1	< 1
Maximum		8.20	9.95	1,900,000.00	410,000.00	430,000.00	8,100.00	#####	1,300,000.00	1,900,000.00	2,000.00	170.00	480.00	450.00	7.10	5.00	84.00
Minimum		6.2	1.9	74,000.0	140,000.0	120,000.0	4,300.0	1,800,000.0	2,000.0	5,000.0	2,000.0	1.0	2.0	1.0	1.0	1.0	1.0
Average		7	7	932,429	208,370	275,672	6,379	2,570,345	29,577	106,102	2,000	34	71	10	2	1	2
Standard Deviation		0.4	1.3	247,290.7	39,092.9	47,670.1	934.2	319,899.3	156,307.6	204,547.3	0.0	34.5	92.6	39.6	1.5	1.2	7.4









Site ID:	Date Sampled:	pH S.U.	Specific conductance mmhos/cm	Calcium, dissolved ug/L	Sodium, dissolved ug/L	Magnesium, dissolved ug/L	Potassium, dissolved ug/L	Chloride ug/L	Sulfate ug/L	Bicarbonate, alkalinity ug/L	Carbonate, alkalinity ug/L	Lead, dissolved ug/L	Phenol, total ug/L	Benzene ug/L	Ethylbenzen e ug/L	Toluene ug/L	Chlorobenzene ug/L
7-1	5/16/1990	6.90	2.703	300,000	59,000	120,000	6,600	677,000	77,000	360,000	<	2000	<	50	<	50	8
7-1	5/16/1990	7.18	2.744	380,000	61,000	140,000	6,900	643,000	79,000	372,000	<	2000	<	50	<	50	6
7-1	10/9/1990	7.05	1.296	261,000	54,000	95,000	6,600	506,000	65,000	369,000	<	2000	<	50	<	50	18
7-1	10/9/1990	7.14	2.995	344,000	66,000	127,000	6,600	1,030,000	46,000	261,000	<	2000	<	50	<	50	1
7-1	10/9/1990	6.97	1.963	193,000	36,000	74,000	7,100	235,000	60,000	370,000	<	2000	<	50	<	50	14
7-1	4/23/1991	6.62	1.858	215,000	47,000	80,000	4,900	383,000	60,000	359,000	<	2000	<	50	<	50	9
7-1	4/23/1991	6.48	3.299	220,000	48,000	80,000	4,900	403,000	56,000	360,000	<	2000	<	50	<	50	9
7-1	4/23/1991	6.53	3.300	401,000	77,000	146,000	5,100	1,040,000	46,000	223,000	<	2000	<	50	<	50	2
7-1	10/23/1991	6.93	2.924	341,000	71,000	122,000	6,800	843,000	62,000	283,000	<	2000	<	50	<	10	5
7-1	10/23/1991	7.04	2.881	366,000	70,000	127,000	6,200	770,000	60,000	301,000	<	2000	<	50	<	10	3
7-1	10/23/1991	7.11	2.928	389,000	66,000	128,000	7,200	754,000	62,000	297,000	<	2000	<	50	<	10	4
7-1	4/21/1992	6.74	2.650	169,000	39,000	64,000	4,800	260,000	11,000	354,000	<	2000	<	50	<	10	9
7-1	4/21/1992	6.83	2.080	175,000	40,000	66,000	4,600	284,000	14,000	362,000	<	2000	<	50	<	10	5
7-1	4/21/1992	7.09	2.150	325,000	69,000	124,000	4,800	638,000	21,000	320,000	<	2000	<	50	<	10	2
7-1	10/27/1992	7.23	1.680	196,000	48,000	77,000	6,000	554,000	49,000	343,000	<	2000	<	1	<	10	15
7-1	10/27/1992	7.12	2.380	351,000	65,000	124,000	6,500	832,000	39,000	284,000	<	2000	<	11	<	10	13
7-1	10/27/1992	7.44	2.240	451,000	67,000	147,000	7,000	207,000	31,000	365,000	<	2000	<	25	<	10	8.9
7-1	4/27/1993	6.92	1.455	181,000	41,000	65,000	4,100	268,000	18,000	368,000	<	2000	<	7.2	<	10	8.5
7-1	4/27/1993	6.84	1.460	351,000	57,000	121,000	4,500	456,000	22,000	341,000	<	2000	<	17	<	10	6.3
7-1	4/27/1993	6.80	1.465	148,000	27,000	52,000	5,900	176,000	13,000	363,000	<	2000	<	3.8	<	10	6.4
7-1	10/26/1993	7.02	1.476	368,000	73,000	115,000	5,800	382,000	13,000	363,000	<	2000	<	5.7	<	10	9.5
7-1	10/26/1993	7.53	2.900	445,000	74,000	127,000	5,900	331,000	10,000	325,000	<	2000	<	15	<	10	3.5
7-1	10/26/1993	7.55	2.920	220,000	35,000	63,000	5,300	304,000	10,000	311,000	<	2000	<	13	<	10	5.2
7-1	4/28/1994	6.95	2.090	221,000	48,000	76,000	4,600	398,000	107,000	377,000	<	2000	<	1	<	10	6.8
7-1	4/28/1994	7.16	2.250	604,000	63,000	151,000	5,000	596,000	96,000	327,000	<	2000	<	1	<	10	3.6
7-1	4/28/1994	7.22	2.130	205,000	33,000	65,000	5,400	506,000	98,000	336,000	<	2000	<	1	UF	10	3.1
7-1	12/6/1994	6.84	2.470	328,000	66,000	108,000	5,400	PI 382,000	PI 48,000	346,000	<	2000	<	1	<	10	5.8
7-1	12/6/1994	6.88	2.580	354,000	63,000	110,000	5,500	580,000	46,000	320,000	<	2000	<	1.9	<	10	6
7-1	12/6/1994	7.05	2.340	274,000	42,000	81,000	5,000	698,000	52,000	297,000	<	2000	<	1.4	<	10	3.7
7-1	4/27/1995	7.32	1.503	190,000	43,000	67,000	4,400	275,000	17,000	344,000	<	2000	<	2.1	<	70	6.1
7-1	10/18/1995	7.26	2.470	437,000	78,000	133,000	6,100	715,000	11,000	282,000	<	2000	<	4.1	<	10	9.6
7-1	4/23/1996	6.90	1.444	230,000	58,000	89,000	3,900	418,000	3,900	309,000	<	2000	<	1	<	10	5.2
7-1	10/28/1996	6.77	0.982	253,000	64,000	92,000	5,100	665,000	76,000	296,000	<	2000	<	2.3	<	10	8.8
7-1	4/29/1997	7.31	1.993	231,000	53,000	79,000	4,200	539,000	54,000	309,000	<	2000	DI	1.9	<	10	5.4
7-1	10/6/1997	6.87	1.398	236,000	56,000	78,000	5,000	471,000	55,000	349,000	<	2000	<	1	<	10	9.7
7-1	4/15/1998	7.19	3.086	191,000	43,000	68,000	3,800	338,000	76,000	308,000	<	2000	<	1	<	10	5.4
7-1	10/26/1998	7.13	3.500	174,000	46,000	64,000	4,500	531,000	60,000	318,000	<	2000	<	1	<	10	7.8
7-1	4/26/1999	6.57	1.591	260,000	59,000	95,000	5,000	274,000	325,000	294,000	<	2000	<	1.3	<	10	2.6
7-1	10/20/1999	7.11	2.660	187,000	45,000	69,000	5,300	469,000	121,000	299,000	<	2000	<	1	<	10	5.8
7-1	4/12/2000	6.96	1.597	212,000	45,000	72,000	4,000	665,000	101,000	278,000	<	2000	<	1	<	10	4.6
7-1	10/18/2000	6.71	2.140	279,000	68,000	99,000	5,000	300,000	158,000	344,000	<	2000	<	1	<	10	4.5
7-1	4/18/2001	6.65	1.568	237,000	53,000	88,000	4,000	698,000	48,000	238,000	<	2000	<	1	<	10	3.2
7-1	4/2/2002	7.04	2.220	176,000	51,000	67,000	4,700	357,000	97,000	323,000	<	2000	<	1	<	10	2.3
7-1	4/21/2003	7.00	1.163	183,000	61,000	68,000	3,800	219,000	62,000	241,000	<	2000	<	1	<	10	1.8
7-1	4/26/2004	6.83	1.660	157,000	81,000	59,000	4,200	334,000	46,000	371,000	<	2000	<	1	<	10	1.4
7-1	4/27/2005	6.99	1.745	121,000	53,000	48,000	6,800	196,000	35,000	329,000	<	2000	<	1	<	20	1.5
7-1	5/2/2006	7.28	2.186	180,000	64,000	68,000	7,500	400,000	35,000	320,000	<	2000	<	1	<	50	1
7-1	10/30/2001	6.96	1.533	162,000	43,000	60,000	4,700	459,000	95,000	321,000	<	2000	<	1	<	10	3
7-1	10/1/2002	7.19	1.722	170,000	58,000	65,000	5,200	672,000	54,000	273,000	<	2000	<	1	<	10	3.1
7-1	10/23/2003	6.96	2.050	169,000	76,000	65,000	5,000	703,000	47,000	225,000	<	2000	<	1	<	10	2.4
7-1	10/19/2004	7.18	1.870	249,000	82,000	87,000	6,200	452,000	43,000	370,000	<	2000	<	2.1	<	10	2.5
7-1	10/12/2005	6.53	1.502	184,000	71,000	70,000	6,400	493,000	33,000	319,000	<	2000	<	1	<	20	1.8
7-1	10/19/2006	6.87	2.190	190,000	69,000	68,000	11,000	570,000	< 1,000	300,000	<	2000	<	1	<	50	1.3
7-1	4/23/2007	7.31	2.410	160,000	54,000	58,000	9,200	350,000	28,000	290,000	<	2000	<	1	<	50	1.1
7-1	10/11/2007	7.23	2.620	200,000	73,000	77,000	11,000	520,000	34,000	320,000	<	2000	<	1	<	50	1.4
7-1	4/15/2008	7.29	2.020	170,000	62,000	63,000	11,000	410,000	34,000	300,000	<	2000	<	1	<	50	1
7-1	10/16/2008	7.15	2.490	200,000	65,000	74,000	7,200	680,000	27,000	230,000	<	2000	<	1	<	50	1.1
7-1	4/13/2009	6.97	2.020	190,000	66,000	74,000	7,000	410,000	39,000	280,000	<	2000	<	1	<	50	1
7-1	10/6/2009	6.99	2.09	230,000	73,000	83,000	8,100	480,000	43,000	310,000	<	2000	<	2	<	50	1
	Maximum	8.10	4.90	790,000.00	160,000.00	230,000.00	11,000.00	#####	550,000.00	3,000,000.00	2,000.00	110.00	180.00	95.00	5.00	5.00	60.00
	Minimum	6.4	0.3	121,000.0	9,800.0	48,000.0	3,800.0	52,000.0	1,000.0	180,000.0	2,000.0	1.0	2.0	1.0	1.0	1.0	1.0
	Average	7	3	310,198	71,180	111,628	5,845	719,685	78,281	378,432	2,000	35	41	7	2	1	6
	Standard Deviation	0.32	1	118,969	23,469	38,681	1,660	320,718	78,194	271,713	0	22	32	10	2	1	7







Appendix B3-6b  
Shallow Monitoring Well Groundwater Data Summary  
Dow Corning Corporation, Midland Michigan  
SMW 10-1

Site ID:	Date Sampled:	pH S.U.	Specific conductance mmhos/cm	Calcium, dissolved ug/L	Sodium, dissolved ug/L	Magnesium, dissolved ug/L	Potassium, dissolved ug/L	Chloride ug/L	Sulfate ug/L	Bicarbonate, alkalinity ug/L	Carbonate, alkalinity ug/L	Lead, dissolved ug/L	Phenol, total ug/L	Benzene ug/L	Ethylbenzene ug/L	Toluene ug/L	Chlorobenzene ug/L
10-1	4/28/1994	6.81	1.607	271,000	22,000	62,000	7,700	216,000	128,000	570,000	< 2000	2.5	10	68 <	10 <	10	170
10-1	4/28/1994	7.06	1.681	305,000	24,000	74,000	8,900	-	-	-	-	6 <	10	130 <	10 <	10	260
10-1	4/28/1994	7.06	1.689	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10-1	12/6/1994	6.54	1.940	288,000	37,000	74,000	9,600	416,000	110,000	430,000	< 2000	1.9	20	280 <	10 <	10	390
10-1	12/6/1994	6.60	2.150	-	-	-	-	534,000	109,000	430,000	< 2000	-	-	870 <	20 <	20	620
10-1	4/27/1995	7.27	1.409	275,000	19,000	65,000	7,500	134,000	70,000	553,000	< 2000	9.9	10	19 <	1 <	1	55
10-1	10/18/1995	7.17	1.254	-	-	-	-	452,000	22,000	275,000	< 2000	-	-	740 <	20 <	20	900
10-1	4/23/1996	6.77	1.292	230,000	14,000	54,000	4,500	144,000	197,000	526,000	< 2000	1	10	12 <	2 <	2	30
10-1	10/29/1996	6.65	0.989	275,000	25,000	63,000	7,900	242,000	240,000	474,000	< 2000	2.9	10	91 <	5 <	5	220
10-1	4/30/1997	6.98	1.121	259,000	27,000	60,000	7,100	260,000	132,000	437,000	< 2000	1.3	10	100 <	5 <	5	260
10-1	4/16/1998	7.08	1.237	-	-	-	-	-	-	-	-	-	-	18 <	1 <	1	16
10-1	4/18/2001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10-1	4/2/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10-1	4/21/2003	-	-	345,000	28,000	73,000	11,000	-	-	-	-	-	-	-	-	-	-
10-1	4/26/2004	-	-	-	-	-	-	-	-	-	-	1.3	- <	1 <	1 <	1 <	1
10-1	4/27/2005	-	-	-	-	-	-	-	-	-	-	-	- <	1 <	1 <	1 <	1
10-1	5/2/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10-1	10/30/2001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10-1	10/1/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10-1	10/23/2003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10-1	10/19/2004	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10-1	10/12/2005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10-1	10/19/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10-1	4/23/2007	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10-1	4/15/2008	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10-1	4/13/2009	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Maximum	7.27	5.00	4400000.00	330000.00	3200000.00	15000.00	1400000.00	240000.00	880000.00	2000.00	140.00	100.00	27000.00	630.00	2100.00	4900.00
Minimum	6.54	0.99	160000.00	14000.00	54000.00	4500.00	134000.00	22000.00	275000.00	2000.00	1.00	10.00	1.00	1.00	1.00	1.00
Average	6.91	2.35	974678.57	64285.71	299321.43	9636.84	549095.24	138857.14	476523.81	2000.00	33.99	23.89	4075.87	99.64	93.91	1000.60
Standard Deviation	0.2	0.98	1110896.47	61118.50	603326.34	2433.84	323235.66	55910.00	119378.65	0.00	29.79	23.04	5916.66	133.57	339.25	1116.35





Appendix B3-6b  
Shallow Monitoring Well Groundwater Data Summary  
Dow Corning Corporation, Midland Michigan  
SMW 10-2

Site ID:	Date Sampled:	pH S.U.	Specific conductance mmhos/cm	Total organic carbon ug/L	Calcium, dissolved ug/L	Sodium, dissolved ug/L	Magnesium, dissolved ug/L	Potassium, dissolved ug/L	Chloride ug/L	Sulfate ug/L	Bicarbonate, alkalinity ug/L	Carbonate, alkalinity ug/L	Lead, dissolved ug/L	Phenol, total ug/L	Benzene ug/L	Ethylbenzene ug/L	Toluene ug/L	Chlorobenzene ug/L
10-2	12/6/1994	6.61	1.349		285,000	13,000	61,000	4,500	122,000	83,000	592,000 <	2000	3.3 <	10 <	1 <	1 <	1 <	1
10-2	12/6/1994	6.71	1.376		367,000	14,000	68,000	4,900	123,000	93,000	600,000 <	2000	4.1 <	10 <	1 <	1 <	1 <	1
10-2	4/27/1995	7.47	1.355		222,000	10,000	44,000	5,200	177,000	68,000	327,000 <	2000	3.3 <	10 <	1 <	1 <	1 <	1
10-2	10/18/1995	6.99	1.287		785,000	19,000	134,000	6,800	135,000	77,000	617,000 <	2000 <	1 <	10 <	1 <	1 <	1 <	1
10-2	4/23/1996	6.82	1.083		166,000	9,500	35,000	3,500	130,000	64,000	349,000 <	2000 DI	1.1	10 <	1 <	1 <	1 <	1
10-2	10/29/1996	6.87	0.791		188,000	9,300	37,000	4,900	99,000	77,000	486,000 <	2000	3.1	10 <	1 <	1 <	1 <	1
10-2	4/30/1997	7.12	0.840		178,000	8,500	36,000	3,300	94,000	65,000	422,000 <	2000 <	1 <	10 <	1 <	1 <	1 <	1
10-2	4/26/1999	6.48	0.727		554,000	14,000	129,000	55,000	45,000	49,000	490,000 <	2000	30 <	10 <	1 <	1 <	1 <	1
10-2	4/12/2000	6.96	0.692		234,000	7,400	46,000	8,100	69,000	48,000	379,000 <	2000	5.7 <	10 <	1 <	1 <	1 <	1
10-2	4/18/2001	6.74	0.921		-	-	-	-	-	-	-	-	-	-	1 <	1 <	1 <	1
10-2	4/2/2002	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
10-2	4/21/2003	6.73	0.917		154,000	6,500	29,000	2,800	51,000	50,000	380,000 <	2000 <	1 <	10 <	1 <	1 <	1 <	1
10-2	4/26/2004	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
10-2	4/27/2005	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
10-2	5/2/2006	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
10-2	10/30/2001	6.9	1.111		264,000	9,200	56,000	6,100	71,000	83,000	465,000 <	2000	9.1 <	10 <	1 <	1 <	1 <	1
10-2	10/1/2002	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
10-2	10/23/2003	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
10-2	10/19/2004	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
10-2	10/12/2005	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
10-2	10/19/2006	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
10-2	4/23/2007	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
10-2	4/15/2008	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
10-2	4/13/2009	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Maximum		7.62	2.15		1300000.00	91000.00	480000.00	55000.00	247000.00	218000.00	761000.00	2000.00	50.00	50.00	10.00	13.00	5.00	5.00
Minimum		6.48	0.69		154000.00	6500.00	29000.00	2000.00	45000.00	48000.00	327000.00	2000.00	1.00	4.00	1.00	1.00	1.00	1.00
Average		6.94	1.45		442340.43	21036.17	103042.55	6548.72	152195.12	127048.78	569536.59	2000.00	26.93	18.61	1.48	1.63	1.19	1.47
Standard Deviation		0.25	0.39		252854.77	13437.19	81552.05	8384.13	51820.47	56399.45	121332.41	0.00	22.50	16.88	1.51	1.91	0.85	1.18









Appendix B3-6b  
Shallow Monitoring Well Groundwater Data Summary  
Dow Corning Corporation, Midland Michigan  
MH 28-11

Site ID:	Date Sampled:	Ph S.U.	Specific conductance mmhos/cm	Calcium, dissolved ug/L	Sodium, dissolved ug/L	Magnesium, dissolved ug/L	Potassium, dissolved ug/L	Chloride ug/L	Sulfate ug/L	Bicarbonate, alkalinity ug/L	Carbonate, alkalinity ug/L	Lead, dissolved ug/L	Phenol, total ug/L	Benzene ug/L	Ethylbenzene ug/L	Toluene ug/L	Chlorobenzene ug/L
MH28-11	10/7/1997	6.45	0.712	176,000	40,000	29,000	8,800	208,000	107,000	221,000	< 2000	1 <	10 <	1 <	1 <	1 <	1
MH28-11	4/15/1998	6.90	1.278	226,000	34,000	41,000	7,900	186,000	298,000	213,000	< 2000	1 <	10 <	1 <	1 <	1 <	1
MH28-11	10/26/1998	6.46	1.504	218,000	44,000	37,000	10,000	277,000	188,000	234,000	< 2000	1 <	10 <	1 <	1 <	1 <	1
MH28-11	4/26/1999	6.33	1.490	322,000	58,000	50,000	12,000	261,000	339,000	314,000	< 2000	5.5	40 <	1 <	1 <	1 <	1
MH28-11	10/20/1999	6.45	1.288	222,000	62,000	39,000	10,000	295,000	252,000	207,000	< 2000	1 <	10 <	1 <	1 <	1 <	1
MH28-11	4/12/2000	6.92	1.492	305,000	75,000	47,000	10,000	339,000	347,000	227,000	< 2000	1 <	10 <	1 <	1 <	1 <	1
MH28-11	10/18/2000	6.69	1.615	252,000	59,000	40,000	12,000	285,000	245,000	270,000	< 2000	1 <	10 <	1 <	1 <	1 <	1
MH28-11	4/18/2001	6.62	1.438	200,000	67,000	34,000	8,400	267,000	131,000	210,000	< 2000	1 <	10 <	1 <	1 <	1 <	1
MH28-11	4/2/2002	6.64	1.701	232,000	77,000	36,000	9,700	350,000	180,000	238,000	< 2000	1 <	10 <	1 <	1 <	1 <	1
MH28-11	4/21/2003	6.63	1.888	300,000	103,000	44,000	11,000	467,000	188,000	258,000	< 2000	1 <	10 <	1 <	1 <	1 <	1
MH28-11	4/26/2004	6.51	2.74	352,000	78,000	51,000	15,000	499,000	232,000	274,000	< 2000	1	20 <	1 <	1 <	1 <	1
MH28-11	4/27/2005	6.91	2.110	316,000	70,000	39,000	12,000	389,000	156,000	267,000	< 2000	1	10 <	1 <	1 <	1 <	1
MH28-11	5/2/2006	7.08	1.942	250,000	60,000	34,000	9,900	380,000	130,000	240,000	< 2000	1 <	50 <	1 <	1 <	1 <	1
MH28-11	10/30/2001	6.83	1.677	238,000	58,000	34,000	11,000	316,000	178,000	248,000	< 2000	1 <	10 <	1 <	1 <	1 <	1
MH28-11	10/1/2002	6.79	3.270	873,000	80,000	66,000	14,000	404,000	137,000	255,000	< 2000	3.2 <	10 <	1 <	1 <	1 <	1
MH28-11	10/23/2003	6.66	2.250	256,000	102,000	42,000	11,000	491,000	174,000	242,000	< 2000	1 <	10 <	1 <	1 <	1 <	1
MH28-11	10/19/2004	6.98	2.220	249,000	116,000	38,000	12,000	459,000	155,000	272,000	< 2000	1 <	10 <	1 <	1 <	1 <	1
MH28-11	10/12/2005	6.37	2.040	227,000	133,000	39,000	12,000	448,000	118,000	273,000	< 2000	1 <	10 <	1 <	1 <	1 <	1
MH28-11	10/19/2006	6.61	1.731	230,000	77,000	33,000	11,000	330,000	120,000	280,000	< 2000	1 <	50 <	1 <	1 <	1 <	1
MH28-11	4/23/2007	6.92	1.597	180,000	37,000	29,000	6,900	240,000	96,000	270,000	< 2000	1 <	50 <	1 <	1 <	1 <	1
MH28-11	10/11/2007	6.80	2.150	210,000	130,000	32,000	11,000	420,000	99,000	290,000	< 2000	1 <	50 <	1 <	1 <	1 <	1
MH28-11	4/15/2008	6.95	2.140	200,000	170,000	31,000	6,800	470,000	99,000	250,000	< 2000	1 <	50 <	1 <	1 <	1 <	1
MH28-11	10/16/2008	6.81	2.080	190,000	130,000	29,000	8,700	430,000	93,000	260,000	< 2000	2 <	50 <	1 <	1 <	1 <	1
MH28-11	4/13/2009	7.08	2.330	170,000	210,000	26,000	6,700	520,000	75,000	280,000	< 2000	2 <	50 <	1 <	1 <	1 <	1
MH28-11	10/6/2009	6.72	2.36	190,000	180,000	29,000	9,200	540,000	93,000	270,000	< 2000	1 <	50 <	1 <	1 <	1 <	1
Maximum		7.08	3.27	873000.00	210000.00	66000.00	15000.00	540000.00	347000.00	314000.00	2000.00	5.50	50.00	1.00	1.00	1.00	1.00
Minimum		6.33	0.71	170000.00	34000.00	26000.00	6700.00	186000.00	75000.00	207000.00	2000.00	1.00	10.00	1.00	1.00	1.00	1.00
Average		6.72	1.88	263360.00	90000.00	37960.00	10280.00	370840.00	169200.00	254520.00	2000.00	1.35	24.40	1.00	1.00	1.00	1.00
Standard Deviation		0.22	0.52	135943.27	46515.23	8843.45	2097.82	102196.98	77331.54	26620.98	0.00	1.00	18.95	0.00	0.00	0.00	0.00

Appendix B3-6b  
Shallow Monitoring Well Groundwater Data Summary  
Dow Corning Corporation, Midland Michigan  
MH 28-12

Site ID:	Date Sampled:	Ph S.U.	Specific conductance mmhos/cm	Calcium, dissolved ug/L	Sodium, dissolved ug/L	Magnesium, dissolved ug/L	Potassium, dissolved ug/L	Chloride ug/L	Sulfate ug/L	Bicarbonate, alkalinity ug/L	Carbonate, alkalinity ug/L	Lead, dissolved ug/L	Phenol, total ug/L	Benzene ug/L	Ethylbenzene ug/L	Toluene ug/L	Chlorobenzene ug/L
MH28-12	10/19/2006	6.61	1.731	250,000	87,000	36,000	12,000	41,000	140,000	280,000	< 2000	< 1	< 50	< 1	< 1	< 1	< 1
MH28-12	4/23/2007	6.93	1.567	160,000	38,000	25,000	5,400	180,000	72,000	250,000	< 2000	< 1	< 50	< 1	< 1	-	< 1
MH28-12	10/11/2007	6.87	2.200	240,000	140,000	37,000	11,000	440,000	99,000	270,000	< 2000	< 1	< 50	< 1	< 1	< 1	< 1
MH28-12	4/15/2008	-	2.220	410,000	180,000	71,000	17,000	490,000	100,000	250,000	< 2000	< 5	< 50	< 1	< 1	< 1	< 1
MH28-12	10/16/2008	6.93	2.070	190,000	140,000	29,000	8,700	450,000	94,000	250,000	< 2000	< 2	< 50	< 1	< 1	< 1	< 1
MH28-12	4/13/2009	7.01	2.360	170,000	210,000	26,000	6,600	540,000	76,000	230,000	< 2000	< 1	< 50	< 1	< 1	< 1	< 1
MH28-12	10/6/2009	6.71	2.410	190,000	200,000	29,000	9,800	560,000	97,000	250,000	< 2000	< 1	< 50	< 1	< 1	< 1	< 1
Maximum		7.01	2.41	410000.00	210000.00	71000.00	17000.00	560000.00	140000.00	280000.00	2000.00	5.00	50.00	1.00	1.00	1.00	1.00
Minimum		6.61	1.57	160000.00	38000.00	25000.00	5400.00	41000.00	72000.00	230000.00	2000.00	1.00	50.00	1.00	1.00	1.00	1.00
Average		6.84	2.08	230000.00	142142.86	36142.86	10071.43	385857.14	96857.14	254285.71	2000.00	1.71	50.00	1.00	1.00	1.00	1.00
Standard Deviation		0.15	0.32	86216.78	62290.79	16046.06	3838.71	197180.48	22124.11	16183.47	0.00	1.50	0.00	0.00	0.00	0.00	0.00



Appendix B3-6b  
Shallow Monitoring Well Groundwater Data Summary  
Dow Corning Corporation, Midland Michigan  
MH 10-15

Site ID:	Date Sampled:	Ph S.U.	Specific conductance mmhos/cm	Calcium, dissolved ug/L	Sodium, dissolved ug/L	Magnesium, dissolved ug/L	Potassium, dissolved ug/L	Chloride ug/L	Sulfate ug/L	Bicarbonate, alkalinity ug/L	Carbonate, alkalinity ug/L	Lead, dissolved ug/L	Phenol, total ug/L	Benzene ug/L	Ethylbenzene ug/L	Toluene ug/L	Chlorobenzene ug/L
MH10-15	5/2/2006	7.06	1.989	270,000	57,000	35,000	9,200	400,000	130,000	280,000	< 2000	1 <	50 <	1 <	1 <	1 <	1
MH10-15	10/19/2006	6.54	2.040	240,000	76,000	36,000	10,000	390,000	130,000	280,000	< 2000	1 <	50 <	1 <	1 <	1 <	1
MH10-15	4/23/2007	6.82	1.732	220,000	40,000	34,000	7,300	300,000	99,000	350,000	< 2000	1 <	50	1.5 <	1 <	1 <	1
MH10-15	10/11/2007	6.78	2.180	230,000	130,000	35,000	11,000	430,000	99,000	280,000	< 2000	1.1 <	50 <	1 <	1 <	1 <	1
MH10-15	4/15/2008	6.94	2.210	390,000	170,000	71,000	15,000	480,000	94,000	260,000	< 2000	4.7 <	50 <	1 <	1 <	1 <	1
MH10-15	10/16/2008	6.83	2.070	190,000	130,000	28,000	8,300	440,000	93,000	250,000	< 2000	2 <	50 <	1 <	1 <	1 <	1
MH10-15	4/13/2009	7.31	2.310	170,000	200,000	27,000	6,400	520,000	75,000	240,000	< 2000	1 <	50 <	1 <	1 <	1 <	1
MH10-15	10/6/2009	6.75	2.400	200,000	180,000	30,000	9,200	550,000	94,000	270,000	< 2000	1 <	50 <	1 <	1 <	1 <	1
Maximum		7.31	2.40	390000.00	200000.00	71000.00	15000.00	550000.00	130000.00	350000.00	2000.00	4.70	50.00	1.50	1.00	1.00	1.00
Minimum		6.54	1.73	170000.00	40000.00	27000.00	6400.00	300000.00	75000.00	240000.00	2000.00	1.00	50.00	1.00	1.00	1.00	1.00
Average		6.88	2.12	238750.00	122875.00	37000.00	9550.00	438750.00	101750.00	276250.00	2000.00	1.60	50.00	1.06	1.00	1.00	1.00
Standard Deviation		0.23	0.21	68543.52	59688.33	14162.32	2640.35	79181.08	18986.84	33354.16	0.00	1.30	0.00	0.18	0.00	0.00	0.00

Appendix B3-6b  
Deep Monitoring Well Groundwater Data Summary  
Dow Corning Corporation, Midland Michigan  
MH 10-15

1 of 1

Site ID:	Date Sampled:	Ph S.U.	Specific conductance mmhos/cm	Calcium, dissolved ug/L	Sodium, dissolved ug/L	Magnesium, dissolved ug/L	Potassium, dissolved ug/L	Chloride ug/L	Sulfate ug/L	Bicarbonate, alkalinity ug/L	Carbonate, alkalinity ug/L	Lead, dissolved ug/L	Phenol, total ug/L	Benzene ug/L	Ethylbenzene ug/L	Toluene ug/L	Chlorobenzene ug/L
MH10-15	5/2/2006	7.06	1.989	270,000	57,000	35,000	9,200	400,000	130,000	280,000	< 2000	< 1	< 50	< 1	< 1	< 1	< 1
MH10-15	10/19/2006	6.54	2.040	240,000	76,000	36,000	10,000	390,000	130,000	280,000	< 2000	< 1	< 50	< 1	< 1	< 1	< 1
MH10-15	4/23/2007	6.82	1.732	220,000	40,000	34,000	7,300	300,000	99,000	350,000	< 2000	< 1	< 50	1.5	< 1	< 1	< 1
MH10-15	10/11/2007	6.78	2.180	230,000	130,000	35,000	11,000	430,000	99,000	280,000	< 2000	1.1	< 50	< 1	< 1	< 1	< 1
MH10-15	4/15/2008	6.94	2.210	390,000	170,000	71,000	15,000	480,000	94,000	260,000	< 2000	4.7	< 50	< 1	< 1	< 1	< 1
MH10-15	10/16/2008	6.83	2.070	190,000	130,000	28,000	8,300	440,000	93,000	250,000	< 2000	< 2	< 50	< 1	< 1	< 1	< 1
MH10-15	4/13/2009	7.31	2.310	170,000	200,000	27,000	6,400	520,000	75,000	240,000	< 2000	< 1	< 50	< 1	< 1	< 1	< 1
MH10-15	10/6/2009	6.75	2.400	200,000	180,000	30,000	9,200	550,000	94,000	270,000	< 2000	< 1	< 50	< 1	< 1	< 1	< 1
Maximum		7.31	2.40	390000.00	200000.00	71000.00	15000.00	550000.00	130000.00	350000.00	2000.00	4.70	50.00	1.50	1.00	1.00	1.00
Minimum		6.54	1.73	170000.00	40000.00	27000.00	6400.00	300000.00	75000.00	240000.00	2000.00	1.00	50.00	1.00	1.00	1.00	1.00
Average		6.88	2.12	238750.00	122875.00	37000.00	9550.00	438750.00	101750.00	276250.00	2000.00	1.60	50.00	1.06	1.00	1.00	1.00
Standard Deviation		0.23	0.21	68543.52	59688.33	14162.32	2640.35	79181.08	18986.84	33354.16	0.00	1.30	0.00	0.18	0.00	0.00	0.00

Code	Description
<	Not detected at or above the detection limit
A	Average of values if individual values are not recorded
DI	Duplicate injection precision not met for this analysis.
DP	Duplicate analysis value outside established acceptable limits.
E	Error; results outside quality assurance limits from data check
F	Frozen well
ILD	Invalid Lab Data.
MI	Detection limit elevated due to matrix interferences.
MPB	The analysis of the Method Preparation Blank for this parameter had a positive value; therefore consider this result estimated.
MS	Matrix spike sample value outside established acceptable limits. Data should be considered estimated.
MSD	Matrix spike duplicate outside of laboratory control limits, result must be considered estimated.
NA	Not laboratory analyzed
NS (*)	No sample collected for specific analysis
NW (**)	No water
PI	Sample was filtered to remove particulate interferences prior to analysis.
PR	The sample was not preserved at a pH of 4-5 at the time of sample collection as specified in SW-846 revision 2, Sept. 1994, Ch. 2.
QC	Matrix QC results for this sample are unavailable due to high analyte concentrations.
SI	Sample integrity suspect upon receipt.
SR	Surrogate results are unavailable due to positive results in the sample extract resulting in a dilution of greater than 1:5.
SS	Surrogate spike result below lower control limit. All results must be considered approximate.
UP	Sample was run out of an unpreserved plastic sample bottle due to the phenol sample bottle being broken in the laboratory.

Dow Corning Master List of Qualifiers (in use in other tables &/or other applications):

Code	Description
<	Not detected at or above the detection limit
A	Average of values if individual values are not recorded
AV	Result is quantitated from our average response factor of the calibration curve, estimated due to levels above the linear curve.
B	Broken sample bottle; no analysis
CR	Result confirmed by a replicate measurement.
D	Dilution due to matrix interference
DI	Duplicate injection precision not met for this analysis.
DP	Duplicate analysis value outside established acceptable limits.
DS	Data suspect, due to unacceptable matrix spike recovery
E	Error; results outside quality assurance limits from data check
F	Frozen well
HT	Holding time violated
IN	Results invalid. Vaults 7110 & 7800 samples mislabeled; confirmed by 9/2/98 resample.
IS	Insufficient sample collected to run analysis
IT	Interference caused the detection limit to be higher
J	The associated value is an estimated quantity.
L	Lost sample
MD	Matrix Spike Duplicate for this sample fell outside of laboratory established control limits, result must be considered estimated.
MI	Detection limit elevated due to matrix interferences.
MPB	The analysis of the Method Preparation Blank for this parameter had a positive value; therefore consider this result estimated.
MS	Matrix spike sample value outside established acceptable limits. Data should be considered estimated.
MSD	Matrix spike duplicate outside of laboratory control limits, result must be considered estimated.
NA	Not laboratory analyzed
ND	Not detected, but no detection limit given
NS	No sample collected for specific analysis
NT	Not tested
NW	No water
PI	Sample was filtered to remove particulate interferences prior to analysis.
PR	The sample was not preserved at a pH of 4-5 at the time of sample collection as specified in SW-846 revision 2, Sept. 1994, Ch. 2.
Q	Quality control criteria not met
SI	Sample integrity suspect upon receipt.
SR	Surrogate results are unavailable due to positive results in the sample extract resulting in a dilution of greater than 1:5.
SS	Surrogate spike result below lower control limit. All results must be considered approximate.
U	The analyte was analyzed for, but not detected above the quantitation limit.
UJ	The analyte was analyzed for, but not detected. The associated value is an estimated detection limit.
UP	Sample was run out of an unpreserved plastic sample bottle due to the phenol sample bottle being broken in the laboratory.