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GROUNDWATER MONITORING PLAN FOR THE OCCIDENTAL CHEMICAL CORPORATION SITE IN MONTAGUE, MICHIGAN

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APPENDICES

1. INTRODUCTION

Occidental Chemical Corporation (Occidental) is performing corrective actions at the former Occidental chemical manufacturing facility in Montague, Michigan (the facility). These corrective actions are being performed, in part, to comply with the requirements of an Administrative Order (AO) issued by the U.S. EPA dated March 24, 1993. At the completion of the RCRA Facility Investigation and the Corrective Measures Study, the U.S. EPA issued the Final Decision on July 18, 2001 stating the corrective action requirements for Occidental.

The Final Decision requires groundwater monitoring at the facility. Section 4 of the Program Management Plan presents the management approach for the groundwater monitoring. This document defines the groundwater monitoring program, meeting the requirements of the Final Decision as defined in the Program Management Plan.

Occidental Chemical Corporation will implement this ground water monitoring program. Miller Springs Remediation Management Inc., will manage the ground water monitoring on behalf of Occidental Chemical Corporation.

The facility is located in Montague Township north of White Lake in Muskegon County, Michigan (Figure 1). Historical information related to use of the property and historical releases are presented in the *Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) Task 1: Description of Current Conditions* (WW Engineering & Science, 1994). Characterizations of the geology, groundwater flow, and ground water chemistry are presented *Phase I RCRA Facility Investigation Report for the Occidental Chemical corporation Site in Montague, Michigan* (Earth Tech, October 1996) and *Phase II RFI RCRA Facility Investigation Report for the Occidental Chemical Corporation Site in Montague, Michigan* (Earth Tech, April 1999; as amended in April 7, 2000).

1.1 OBJECTIVES

The final objectives of the groundwater monitoring program have been defined in the Program Management Plan for the site and in the U.S. EPA required modifications and approval of the Program Management Plan. The established final objectives are listed below:

- Demonstrate that the groundwater collection system halts any unacceptable discharge of chlorinated organic compounds to White Lake.

- Demonstrate, through monitoring, that the migration of contaminated groundwater has stabilized to confirm that contaminated groundwater remains within the original "area of contaminated groundwater".

- Demonstrate that the groundwater collection system is reducing the level of contamination in the aquifer.

- Demonstrate that the groundwater protection standards are ultimately met (if technically practicable).

This groundwater monitoring program is designed to accomplish the first two objectives. At this stage in the corrective action, it is not the objective of Occidental to demonstrate that the groundwater protection standards are met. The groundwater collection system halts the flow of impacted groundwater to White Lake. Currently, Occidental is performing an investigation of potential residual DNAPL within the plume of impacted groundwater. This investigation is also a requirement of the Final Decision and is discussed in the Program Management Plan and approved by the U.S. EPA. At the conclusion of this investigation, Occidental is required to submit plans to the U.S. EPA to address the residual material in the aquifer. When these plans are developed and implemented, the monitoring program will be revised to demonstrate if the groundwater protection standard is met. In addition, the reduction of the level of contamination in the aquifer is directly related to actions to address any residual DNAPL. Therefore, this groundwater monitoring program will develop initial data for future demonstrations of reductions in the level of contamination in the aquifer.

Based upon the current state of the Corrective Action at the site, the following are the current objectives for this groundwater monitoring program:

- Demonstrate that the groundwater collection system halts any unacceptable discharge of chlorinated organic compounds to White Lake.

- Demonstrate, through monitoring, that the migration of contaminated groundwater has stabilized to confirm that contaminated groundwater remains within the original "area of contaminated groundwater".

- Develop information that will be used for future demonstrations that the groundwater collection system is reducing the level of contamination in the aquifer.

The following four sections of the report (Sections 2, 3, 4 and 5) will present the portion of the groundwater monitoring program to accomplish each of these three objectives.

1.2 GROUNDWATER PROTECTION STANDARD

The parameters of concern in the groundwater are listed in Table 1. This table also provides the groundwater protection standards that have been developed for this site. These standards are consistent with the requirements of Part 201 of Michigan's Act 451 of 1994 (as amended).

2. GROUNDWATER COLLECTION DEMONSTRATION

Occidental currently operates a series of eight purge wells that halts the flow of impacted groundwater to White Lake. The locations of seven of the purge wells can be found on Figure 2. The location of the remaining purge well, Pf, can be found on Figure 3. This section describes how Occidental will demonstrate that the groundwater collection system halts any unacceptable discharge of chlorinated organic compounds to White Lake. This groundwater monitoring system was developed during the 1980's and approved by the Michigan Department of Environmental Quality (MDEQ) as a demonstration that Occidental halts the flow of chlorinated compounds in ground water to White Lake.

This monitoring program has been established to demonstrate that groundwater in the plume is not discharging to White Lake. This monitoring program will show that the water level in White Lake is higher than the hydraulic head (water level) in the aquifer at locations where the purge wells will have the least impact on the hydraulic head. If the water level in the aquifer is below the water level in White Lake, then water is constantly flowing from White Lake back toward the purge wells.

The level of water in White Lake is measured every 15 minutes. Due to wind tides and precipitation events, the level of White Lake can change by a foot over a few days. This change can be significant when evaluating the continuing flow of water from White Lake back into the aquifer along this section of the lake. To accurately reflect the hydraulic head in the lake, an averaging method was developed with the MDEQ to use for measured water levels in White Lake. For each monitoring event, a time is established at the mid-point of the period when water levels were collected from the monitoring wells. A 24-hour time weighted average water level in White Lake is calculated starting 16 hours before the measurements and extending 8 hours after the measurements. When the average lake level is always above the water level in the aquifer, the water from the lake consistently flows toward the purge well system. As an added level of safety, the level of water in the monitoring wells is maintained at an average of at least 0.10 foot lower than the 24-hour average White Lake water level.

The comparison of the level of White Lake to the level of water in the monitoring wells is performed on data collected two times per week, or over 100 times a year.

This section presents the monitoring wells that are used to measure the water level in the aquifer, the methods used to collect the necessary data, and the procedures used to evaluate the data.

2.1 MONITORING WELLS

A series of six monitoring wells have been installed at locations that represent the areas in the plume that are least likely to be influenced by the purge wells. The locations of these wells were approved by the MDEQ during the 1980s. The locations of the monitoring wells are shown on Figure 2. Table 2 presents a summary of the monitoring wells from east to west. The purge wells adjacent to the monitoring wells are also shown on Table 2. The well logs for the monitoring wells are included in Appendix A.

A stilling well has been placed in White Lake. The stilling well consists of a tube that is open at the bottom that is fastened to the post of a dock so that the stilling well casing will not move. The water in the lake freely enters and exits from the bottom of the tube. A pressure transducer in the stilling well measures the level of the water in White Lake. The pressure transducer is linked into an electronic data logger that is capable of recording the water level at different time intervals. In the winter months, a heating unit is placed within the stilling well to keep the area from freezing.

2.2 MONITORING METHODS

The following methods are used to collect water levels in White Lake and in the monitoring wells.

2.1.1 Monitoring Well Groundwater Level Measurement

Water level measurements in each of the six monitoring wells are collected at least two times per week. Upon arriving at a monitoring well, inspect the well to determine if any damage has occurred to the monitoring well and if any maintenance or repairs are needed. Measure the distance from the top of the well casing to the top of the water in the well to the nearest 0.01 foot with a water level indicator tape. Top of casing elevations for each of the monitoring wells included in the groundwater monitoring plan have been surveyed. The measuring tape will be decontaminated by rinsing the tape with de-ionized water between each well. The top of casing elevation is included in Table 2. Calculate the elevation of the water level in the well by subtracting the measured distance from the top of casing to the water table from the elevation of the top of casing.

If any maintenance is performed on the monitoring well, or if any damage occurs to the well, resurvey the well and use the new surveyed elevation in all calculations taken after the damage or maintenance occurred.

2.2.2 White Lake Water Level Measurements

Manually measure the water level in White Lake using a water level tape. Calibrate the White Lake water level measured by the transducer in the data logger. Set the data logger to record the water level every 15 minutes.

A minimum of once per week, download the lake water level data from the data logger. Back-up the electronic files at an off-site location.

Each time water levels in the monitoring wells are measured, also manually measure the distance from the top of casing on the stilling well to the water level in White Lake.

Once every two years, resurvey the elevation reference on the stilling well in White Lake.

2.3 DATA EVALUATION

The difference between the elevation of water in White Lake and the elevation of water in the monitoring wells will be calculated and reported as described below.

2.3.1 Calculation

To calculate the average lake level, first determine the mid point in the time when water levels were being collected from the six monitoring wells. Then use the White Lake water elevations that are recorded every 15 minutes to calculate the average White Lake water elevation extending for a period of 16 hours before that time and 8 hours after that time.

Once each week calculate the difference between the semi-weekly processed White Lake water level data and the semi-weekly spot water level measurements in the six performance monitoring wells by subtracting the water elevation each performance monitoring well from the average White Lake water elevation. Tabulate the results at each well for each monitoring event. A negative value indicates that the water level is lower in the aquifer than in White Lake, and that water has the potential to flow from White Lake into the aquifer. A positive value indicates that the water level is lower in White Lake than in the aquifer, and that water has the potential to flow from the aquifer into White Lake.

Check the accuracy of the transducer by comparing the water levels in White Lake that were manually measured with the water level tape to the water levels recorded by the transducer. If the numbers do not agree, both the manual and electronic data will be checked and an action plan will be developed to correct the source of the error. This action plan may include checking for ice build-up during winter months,

recalibrating the transducer on the data logger, replacing or repairing the transducer or the data logger, or resurveying the top-of-casing on the stilling well.

2.3.2 Reporting and Actions

For each monitoring well, calculate the average monthly difference between the water level in the well and the water level in White Lake. Maintain the pumping rates so that there is at least an average difference of 0.10 foot at each well each month. Report these valves to the U.S. EPA monthly.

In addition, spot check the water level difference at least weekly. If the water level in every performance monitoring well is at least 0.10 foot lower than the average White Lake level, then no additional action is necessary.

If the water level in any performance monitoring well is less than 0.10 foot lower than the average level in White Lake the potential for an excursion exists. Implement the following corrective procedure to assure that the purge well system maintains at least a 0.10-foot lower water level in all of the performance monitoring wells. Verify the water levels and pumping rates and increase the frequency of water level monitoring. Perform, additional corrective procedures as necessary such as increasing pumping in the wells adjacent to the performance monitoring well, redeveloping wells, servicing pumps, or cleaning lines. While these activities are all performed as part of the routine maintenance at the site, they may also be performed upon recognition that the drop in water level from White Lake back to a performance monitoring well is less than 0.10 foot.

3. PLUME BOUNDARY DEMONSTRATION

The perimeter of the impacted groundwater was delineated during the RFI. A series of wells were used to document areas that contained groundwater not impacted by the facility. During the groundwater corrective action, samples from monitoring wells will be used to demonstrate that the migration of contaminated groundwater has stabilized and that the contaminated groundwater remains within the plume boundaries.

Groundwater samples will be collected from a series of wells semiannually (twice per year). These samples will be analyzed for the parameters of concern listed in Table 1, and the results will be compared to the groundwater protection standard.

3.1 WELLS

A series of twelve monitoring wells have been installed at locations surrounding the existing plume of impacted groundwater. These wells are listed in Table 3, along with the side of the plume that the well monitors. The locations of the monitoring wells are shown on Figures 2 and 3. The well logs for the monitoring wells are included in Appendix A.

3.2 MONITORING METHODS

3.2.1 Groundwater Elevation Monitoring

Upon arriving at a monitoring well, inspect the well to determine if any damage has occurred to the monitoring well and if any maintenance or repairs are needed. Measure the distance from the top of the well casing to the top of the water in the well to the nearest 0.01 foot with a water level indicator tape. Top of casing elevations for each of the monitoring wells included in the groundwater monitoring plan have been surveyed. The measuring tape will be decontaminated by rinsing the tape with de-ionized water between each well. The top of casing elevation is included in Table 3. Calculate the water level in the well by subtracting the measured distance from the surveyed elevation of the top of casing. All water level measurements will be collected within 24 hours.

If any maintenance is performed on the monitoring well, or if any damage occurs to the well, resurvey the well and use the new surveyed elevation in all calculations taken after the damage or maintenance occurred.

3.2.2 Sample Collection and Preservation

Sample collection will follow low-flow purging techniques developed for the Montague Site using the following documents for guidance:

i) United States Environmental Protection Agency (USEPA) low-flow Grounding Water Sampling (Puls and Barcelona 1996);

ii) USEPA Region I low-flow standard operating procedure (SOP) (USEPA 1996); and

iii) USEPA Region II low-flow purging and sampling procedures (USEPA 1998).

Monitoring wells will be sampled using the following low flow - purging protocol:

1. Identify the well using a current Site map and inspect the well for damage. The condition of the surface protection and the well cap will be noted.

2. Measure the water level depth. The groundwater level in the monitoring well will be measured to the nearest 0.01 foot using a pre-cleaned electric water level tape.

3. Purge and sample monitoring wells in the order of least contaminated to most contaminated.

4. Purging will be conducted using a dedicated stainless-steel bladder pump with a Teflon® bladder or a peristaltic pump. The pump discharge line shall be polyethylene, Teflon®, or Teflon®-lined tubing with an inside diameter of 3/8-inch. The air supply line for the bladder pump operation shall be polyethylene or Teflon®. The bladder pump will be secured in the monitoring well and positioned in the well in accordance with Item 5 below. In the event that insufficient water exists in a monitoring well for the proper operation of a full sized bladder pump, a micro purge bladder pump will be applied.

5. The bladder pump, or the intake of the tubing for the peristaltic pump, will be positioned and secured such that the pump or tubing intake corresponds to the mid-point of the well screen, or a minimum of 2 feet above the well bottom or sediment level if present, whichever is more shallow. The bladder pump or peristaltic pump tubing will be lowered very slowly into position to minimize mixing of the stagnant

well casing water and to minimize the agitation of solids (which will increase purging time).

As described in Item 9 below, purging will be continued until stabilization of the purged groundwater is achieved, or until a maximum 20 monitoring well screen volumes of groundwater have been purged without indication of stabilization. Since low-flow purging likely will not draw groundwater from a significant distance above or below the pump intake, the screen volume will be determined using a 5-foot screen length. This 5-foot screen length is based on 2.5 feet above and below the pump intake, provided the well screen extends over this distance. If a 2.5-foot length of well screen does not exist above and below the pump intake, the actual length of well screen above and below the pump intake will be used to determine the screen volume (i.e., the pump intake position in relation to the well bottom, or sediment level if present, and top of screen will be accounted for when determining the screen volume). The screen volume will be determined before purging begins.

6. Static groundwater level conditions in the monitoring well will be allowed to re-establish after lowering the bladder pump into position. The groundwater level in the monitoring well will be measured (to the nearest 0.01 foot) with the bladder pump in place prior to beginning purging.

7. Connect the output tubing to a flow through cell.

8. Purging of the monitoring well will be conducted using a pumping rate between 100 to 500 milliliters per minute (mL/min). Initial purging will begin using a pumping rate within the lower end of this range. Slowly increase the pumping rate until discharge occurs. Once discharge occurs, check the water level, and record the visual water quality. If the purge water appears turbid, purging will be continued until the purge water becomes visually less turbid before connecting the flow-through-cell. The groundwater level will be measured while purging to ensure that less than 0.3 feet of drawdown occurs. The pumping rate may be gradually increased depending upon the amount of drawdown and the behavior of the stabilization parameters (see Item 9 below). Pumping rate adjustments generally will be made within 15 minutes from the start of purging and then should remain constant for the duration of purging. While purging, the pumping rate and groundwater level will be measured and recorded every 10 minutes (or as appropriate). Record

any pumping rate changes and their corresponding times. If it apparent that stabilization of the purged groundwater (see Item 9 below) will not be achieved rapidly, these measurements may be made at longer time intervals to allow field staff to perform other sampling activities.

9. Stabilization of the purged groundwater is necessary prior to sample collection to ensure that the sample is representative of groundwater in the subsurface only, and is not influenced by stagnant groundwater stored in the well casing. The following field parameters will be monitored while purging to evaluate the stabilization of the purged groundwater: pH, temperature, conductivity, and dissolved oxygen (DO). As stabilization approaches, the field parameters will be measured and recorded every 5 minutes (or as appropriate). Stabilization will be considered to be achieved when three consecutive readings for each parameter, taken at 5-minute intervals, are within the following limits:

   - pH ±0.1 pH units of the average value of the three readings;
   - temperature ±3 percent of the average value of the three readings;
   - conductivity ±3 percent of the average value of the three readings; and
   - DO ±10 percent of the average value of the three readings.

   The field parameters will be measured using a flow-through-cell apparatus. Table 5 provides the purge record on which to record the field parameters and other pertinent data. Measurement of the field parameters may be obtained using individual meters or a multiple meter unit. The meters will be calibrated prior to use each day in accordance with the meter manufacturer's instructions. While purging, the meter readings will be monitored for evidence of meter malfunction. The following are common indicators of meter malfunctions:

   - DO above solubility (e.g., oxygen solubility is approximately 11 milligrams per liter [mg/L] at 10 degrees Celsius) may indicate a DO meter malfunction;
   - negative DO greater than 1 to 2 mg/L may indicate a DO meter malfunction (i.e., should have positive DO greater than 1 to 2 mg/L under oxidizing conditions); and
   - DO less than 1 mg/L may indicate either an ORP or a DO meter malfunction (i.e., should have a DO less than 1 mg/L under reducing conditions).

   Meter calibration fluids will be available for meter re-calibration in the field, if necessary. Spare meters will be available for meter replacement, if necessary.

In general, stabilization of the individual field parameters is considered to occur in the order listed above. Should stabilization not be achieved for all monitored field parameters, purging will be continued until a maximum of 20 monitoring well screen volumes have been purged from the well. After purging 20 well screen volumes, purging will be continued if the purge water remains visually turbid and appears to be clearing, or if stabilization parameters are varying slightly outside of the stabilization criteria listed above and appear to be approaching stabilization.

In the event that the groundwater recharge to the monitoring well is insufficient to conduct the low – flow purging protocol, purging will be discontinued before the water level in the monitoring well drops below the top of the pump. Samples will be collected as soon as the volume of groundwater in the well has recovered sufficiently to allow sample collection. Wells in which recovery is insufficient to conduct the low – flow purging protocol will not be subject to the above purging stabilization criteria.

10. After achieving stabilization and disconnection of the flow-through-cell, samples will be collected. Samples collected for soluble metals will be field filtered using an in-line (0.45 micron) filter (Puls and Barcelona 1996).

    The flow-through-cell will be disconnected prior to sample collection to avoid impact to the sample that may result from contamination that may potentially accumulate within the flow-through-cell during purging. The sample bottle will be filled by allowing the discharge to gently flow down the side of the sample bottle and the sample bottle will be allowed to overflow slightly before sealing (overflow is not recommended if the sample bottles have been prepared with preservatives). Preservatives (if required) may be added to the sample bottles by the laboratory before sampling, or may be added after sampling by field personnel (as appropriate). Sample bottles will be sealed and prepared for delivery to the laboratory as per specific sample.

11. Additional samples shall be collected as required. The Groundwater Monitoring Plan requires trip blanks be included in each shipment cooler containing samples to be analyzed for volatile organic compounds (VOCs). One set of matrix spike/matrix spike duplicate (MS/MSD) samples will be collected for analysis from monitoring

wells. The Vault Groundwater Quality Assessment Plan requires one trip blank be included with each Vault sampling event.

12. The sampling will be conducted in accordance with the Site Operation and Maintenance (O&M) Plan and the Health and Safety Plan.

3.2.3 Decontamination Procedures

Rinse the water level tape with de-ionized water between each well. All other sampling equipment is dedicated, so no additional decontamination is necessary.

3.2.4 Sample Labeling Procedures

The outside of each container will be wiped clean and allowed to dry after sample collection. Legible, complete, and securely attached labels will be placed on each sample container at the time of collection. The sample label will include the following information:

- Sample identification
- Name or initials of sampler
- Date and time of collection
- Site identification
- Preservation technique

Waterproof writing utensils will be used to avoid running or smearing of any label information.

3.2.5 Sample Storage and Shipment

Upon sample collection and preservation, the filled sample containers will be cooled and stored at approximately 4^0C. Prior to any shipment, the samples will be packed in coolers sufficiently to protect against damage and iced to keep the samples at 4^0C.

3.2.6 Field Notes

The following field documentation will be collected during each sampling and analysis event:

- Well identification
- Condition of the monitoring well and dedicated sampling equipment
- Depth to groundwater from top of casing

- Sampling method
- Volume of purge water removed
- Sampling time
- Description of any additional samples collected
- Other relevant observations (weather, observers, etc)

3.2.7 Chain of Custody Procedures

Possession of samples from the time of collection through delivery at the laboratory will be documented using a chain-of-custody (COC). The sampler and the laboratory will retain copies of the COC. Information contained on the COC will include sample name, sampling date and time, analysis to be performed, preservation methods, analytical laboratory and any other information pertinent to the sampling event.

3.2.8 Analytical Methods

Samples will be analyzed by H2M Labs, Inc. The samples will be analyzed using the procedures listed in Table 1.

3.3 DATA EVALUATION

The concentration of each compound in each sample from a perimeter well will be directly compared to the groundwater protection standard. The groundwater protection standard is listed in Table 1.

If the concentration of any parameter measured in a perimeter monitoring well is greater than the groundwater protection standard, then that well will be re-sampled and analyzed for the constituent. If the second analysis does not confirm the result, then the sampling will continue as described above and the initial result and the resample will be reported to the U.S. EPA as described in Section 6.

If the second sample confirms that the concentration in the groundwater is greater than the groundwater protection standard, the concentrations will be reported to the U.S. EPA within 7 days of receipt of result. The results will be evaluated to determine if the levels are attributed to contamination introduced from sampling or laboratory procedures, or if the results accurately reflect the concentration in the groundwater. Information considered in this evaluation will include the number of wells that the compound was detected in, the concentrations in the trip blank, and any carryover onto other samples analyzed at the lab. If it is determined that error in the sampling or analytical methods introduced the contamination into the groundwater sample, the well will be re-sampled twice, to confirm that the

compound is not present above the groundwater protection standard. The analytical results, the evaluation of the errors, and the corrective procedures used to assure that the problem does not re-occur will be reported to the U.S. EPA.

If it is found that the results accurately reflect concentration in the groundwater, then the following three activities will occur

First, evaluate if the cause for the increase in concentration can be determined. Causes may include changes in groundwater flow directions, potential movement of DNAPL, and disturbances or activities occurring up gradient of the monitoring well. This evaluation will be submitted to the U.S. EPA within 60 days of the call notifying the agency of the change in the perimeter of the plume.

Second, establish a new monitoring well that defines the current extent of impact farther outside the plume from the impacted well. To accomplish this, it will be beneficial to first determine the cause of the increase in concentration. In most cases, this will involve drilling a new monitoring well. The location and construction methods for the new well will be submitted with the evaluation of the cause of the increase – within 60 days of the call notifying the agency of the change in the perimeter of the plume.

Third, evaluate if the corrective action at the site needs to be changed to address the change in the location of the plume. Since the schedule for this activity will most likely depend on the results from additional wells placed at the site, a schedule for this evaluation will be submitted to the agency with the proposed location and methods for the additional monitoring well.

4. CONCENTRATIONS REMOVED FROM THE AQUIFER

Eight purge wells are being pumped to remove impacted groundwater from the aquifer. Samples of the groundwater from each purge well will be collected quarterly and analyzed for the parameters in Table 1. These analyses will continue a baseline of information on the concentrations of the compounds in the water being removed from the aquifer. These purge wells are located in a line extending across the plume of impacted groundwater, and samples from each purge well represents a view of the section of the aquifer up gradient from that purge well. The analysis of the groundwater collected at each purge well provides a basis for evaluating trends in the concentrations of contaminants in the groundwater and the rate of removal of contaminants.

4.1 WELLS AND EQUIPMENT

There are eight purge wells (Pb, Pc, Pd, Pe, Pf, Pg, Ph, and Pi) that are pumped continuously as part of the groundwater collection system. Each purge well uses a submersible pump for groundwater collection. The pumps are 6-inch, 8-stage Grundfos units powered by Franklin Electric 15 hp 480 volt 3 phase motors.

Two purge wells (Ph and Pi) have carbon dioxide (CO_2) feed systems. These systems were installed to control the pH in the groundwater pumped from these wells. The addition of CO_2 buffers the pH so that silicates and carbonates do not precipitate in the transfer pipe and treatment system when the purge waters are aerated or mixed with water from other wells. The CO_2 feed system lowers the pH in the well casing, prior to the water entering the purge well, piping, and treatment system. This has extended the life and reduced maintenance of the collection and treatment system. Each CO_2 feed system has a manual cut-off valve for the CO_2 addition to the well.

The water lines for each purge well can be accessed at a pump houses located adjacent to each well. Within each pump house is a small sample tap on the line that transports the purge water back to the treatment building. The sample taps are located before the purge line connects to any other lines; when the well is pumping, these sample taps collect samples of the water being pumped from the individual well to the treatment system.

4.2 FIELD SAMPLING METHODS

Samples of the water pumped from each purge well will be collected quarterly, following the procedures listed below. Samples will not be collected for at least two days after a well has been redeveloped through the use of chemical additions or surging.

4.2.1 Groundwater Elevation Monitoring

Depth to groundwater will be measured to the nearest 0.01 foot using a water level indicator tape, with the top of the well casing as a reference elevation. Top of casing elevations for each of the purge wells and monitoring wells have previously been determined.

Upon arriving at a purge well inspect the well to determine if any damage has occurred and if any maintenance or repairs are needed. Measure the distance from the top of the well casing to the top of the water in the well to the nearest 0.1 foot with a water level indicator tape. Decontaminate the measuring tape by rinsing the tape with de-ionized water between each well. Calculate the water level in the well by subtracting the measured distance from the surveyed elevation of the top of casing.

4.2.2 Pre-Sampling Routine for Wells Ph and Pi

Upon arrival at purge well Ph and Pi pump houses, close the CO_2 supply valve and wait for at least four minutes prior to sampling.

4.2.3 Sample Collection and Preservation

Open the sample port and allow water to flow out of the sample port for 1 minute. Collect the purged groundwater for return to the well or transport to the treatment building.

Fill the required sample bottles. Assure that the 40 ml vials collected for the analysis of volatile organic compounds does not contain any trapped air bubbles. Fill the sample bottle for on-site pH analysis last.

After the sample bottles are filled, either pour the collected purge water back into the well casing or transport the purged groundwater back to the treatment building and place the water in the sump that pumps into the carbon treatment system.

Return to the on-site laboratory and analyze the pH of the sub-sample collected for pH analysis.

Trip blanks will be included in each shipment cooler containing samples to be analyzed for volatile organic compounds (VOCs). One set of matrix spike/matrix spice duplicate samples (MS/MSdup) will be collected for analysis from the wells.

4.2.4 Decontamination Procedures

Rinse the pH probe with de-ionized water between each use. No other sampling equipment is used, so no additional decontamination is necessary.

4.2.5 Sample Labeling Procedures

The outside of each container will be wiped clean and allowed to dry after sample collection. Legible, complete, and securely attached labels will be placed on each sample container at the time of collection. The sample label will include the following information:

- Sample identification
- Name or initials of sampler
- Date and time of collection
- Site identification
- Preservation technique

Waterproof writing utensils will be used to avoid running or smearing of any label information.

4.2.6 Sample Storage and Shipment

Upon sample collection and preservation, the filled sample containers will be cooled and stored at approximately 4^0C. Prior to any shipment, the samples will be packed in coolers sufficiently to protect against damage and iced to keep the samples at 4^0C.

4.2.7 Field Notes

The following field documentation will be collected during each sampling and analysis event:

- Well identification
- Condition of the monitoring well and dedicated sampling equipment
- Depth to groundwater from top of casing
- Sampling method

- Sampling time
- Description of any additional samples collected
- Other relevant observations (weather, observers, etc)

4.2.8 Chain of Custody Procedures

Possession of samples from the time of collection through delivery at the laboratory will be documented using a chain-of-custody (COC). The sampler and the laboratory will retain copies of the COC. Information contained on the COC will include sample name, sampling date and time, analysis to be performed, preservation methods, analytical laboratory and any other information pertinent to the **sampling event.**

4.2.9 Analytical Methods

Samples will be analyzed by H2M Labs, Inc. The samples will be analyzed using the parameters listed in Table 1.

4.3 DATA EVALUATION

The data will be reviewed for possible errors and inconsistencies and evaluated for trends indicating the remediation progress of each area. Once per year, a graph of concentration versus time will be prepared and submitted to the U.S. EPA by February 28 of the next year.

5. PLUME INTERIOR MONITORING

Samples from twelve monitoring wells (MW-95-1A, B, C; MW-95-2A, B, C; MW-95-3A, B, C; MW-95-4A, B, C) were collected and analyzed quarterly for the same parameters listed in Table 1 for six consecutive quarters during 2002 and 2003. Monitoring wells MW-95-1A, MW-95-2A, MW-95-3A and MW-95-4A were analyzed for all parameters including Mirex. These analyses provide a baseline to gage the effectiveness of the DNAPL removal program. The locations of the plume interior monitoring wells are shown on Figure 3. The monitoring wells are listed in Table 4 and the well logs are included in Appendix A.

5.1 FIELD SAMPLING METHODS

5.1.1 Groundwater Elevation Monitoring

Upon arriving at a monitoring well, inspect the well to determine if any damage has occurred to the monitoring well and if any maintenance or repairs are needed. Measure the distance from the top of the well casing to the top of the water in the well to the nearest 0.01 foot with a water level indicator tape. Top of casing elevations for each of the monitoring wells included in the groundwater monitoring plan have been surveyed. The measuring tape will be decontaminated by rinsing the tape with de-ionized water between each well. The top of casing elevation is included in Table 4. Calculate the water level in the well by subtracting the measured distance from the surveyed elevation of the top of casing.

If any maintenance is performed on the monitoring well, or if any damage occurs to the well, resurvey the well and use the new surveyed elevation in all calculations taken after the damage or maintenance occurred.

5.1.2 Sample Collection and Preservation

Prior to the collection of the water samples, each well will be purged to remove standing water. Each monitoring well has a dedicated Well Wizard bladder pump for purging and sample collection. Using compressed nitrogen gas, operate the bladder pump. Use 60 psi delivery pressure from the compressed nitrogen tank and allow the pump to purge for at least 20 minutes prior to collecting the samples. Purged groundwater will be collected and treated in the on-site groundwater treatment system.

After the well casing is purged, fill the required sample bottles. Assure that the 40 ml vials collected for the analysis of volatile organic compounds do not contain any trapped air bubbles.

After the sample bottles are filled, shut-off the compressed gas source, which will stop the flow of water from the well. Assure that the well top is covered.

Trip blanks will be included in each shipment cooler containing samples to be analyzed for volatile organic compounds (VOCs). One set of matrix spike/matrix spice duplicate samples (MS/MSdup) will be collected for analysis from the monitoring wells.

5.1.3 Decontamination Procedures

Rinse the pH probe with de-ionized water between each use. Rinse the water level tape with de-ionized water between each well. No other sampling equipment is used, so no additional decontamination is necessary.

5.1.4 Sample Labeling Procedures

The outside of each container will be wiped clean and allowed to dry after sample collection. Legible, complete, and securely attached labels will be placed on each sample container at the time of collection. The sample label will include the following information:

- Sample identification
- Name or initials of sampler
- Date and time of collection
- Site identification
- Preservation technique

Waterproof writing utensils will be used to avoid running or smearing of any label information.

5.1.5 Sample Storage and Shipment

Upon sample collection and preservation, the filled sample containers will be cooled and stored at approximately 4^0C. Prior to any shipment, the samples will be packed in coolers sufficiently to protect against damage and iced to keep the samples at 4^0C.

5.1.6 Field Notes

The following field documentation will be collected during each sampling and analysis event:

- Well identification

- Condition of the monitoring well and dedicated sampling equipment
- Depth to groundwater from top of casing
- Sampling method
- Volume of purge water removed
- Sampling time
- Number and type of sample containers filled
- Description of any additional samples collected
- Other relevant observations (weather, observers, etc)

5.1.7 Chain of Custody Procedures

Possession of samples from the time of collection through delivery at the laboratory will be documented using a chain-of-custody (COC). The sampler and the laboratory will retain copies of the COC. Information contained on the COC will include sample name, sampling date and time, analysis to be performed, preservation methods, analytical laboratory and any other information pertinent to the sampling event.

5.1.8 Analytical Methods

Samples will be analyzed by Appl Laboratories. The samples will be analyzed using the procedures listed in Table 1.

5.2 DATA EVALUATION

The data will be reviewed for possible errors and inconsistencies and evaluated for trends indicating the remediation progress of each area. Once per year, a graph of concentration versus time will be prepared and submitted to the U.S. EPA by February 28 of the next year.

6. STANDARD REPORTING

All data will be reported to the U.S. EPA within the monthly report for the month following receipt of analytical results from the laboratory. This report will include the analytical data, the field data, and the data evaluation described in Sections 2, 3, 4 and 5.

If the data evaluation requires additional reporting to the U.S. EPA, this reporting will occur in separate letters following the schedule outlined in each section. The monthly report will still include the data and initial data evaluation, and will also include references to all correspondence to U.S. EPA related to this monitoring program.

7. REFERENCES

Puls, R.W., and MJ. Barcelona, 1996. Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures; EPA Ground Water Issue, R.S. Kerr Environmental Research Center, Ada, Oklahoma, EPA/540/S-95/504, April.

USEPA, 1996. Low Stress (low flow) Purging and Sampling Procedure for the Collection of Ground Water Samples from Monitoring Wells, Region I, SOP#: GW 0001, Revision Number 2, July 30.

USEPA, 1998. Ground Water Sampling Procedure, Low Stress (Low Flow) Purging and Sampling, Region II, Final GW Sampling SOP, March 16.

FIGURES

FIGURE 2

FIGURE 3

NORTH

WHITBECK RD

HANCOCK RD

LAMOS RD

EQUIP. WASH PAD

STORAGE BUILDING

EQUALIZATION POND

OFFICES

MONITORING POINT

WATER TREATMENT BUILDING

OUTFALL 001

WHITE LAKE

BLUEBERRY RIDGE

WASTE DISPOSAL VAULT

OLD CHANNEL TRAIL

1,453,000

LEGEND

- – – – – – OUTFALL PIPE
- – · – · – LEACHATE LINE
- +++++++ RAILROAD TRACKS
- – · – · – APPROXIMATE SITE BOUNDARY
- ——— EXTENT OF MAPS IN FIGURES 2 & 3

0 500 1000 2000

SCALE IN FEET

24791FD1B
KOR010202

EARTH TECH

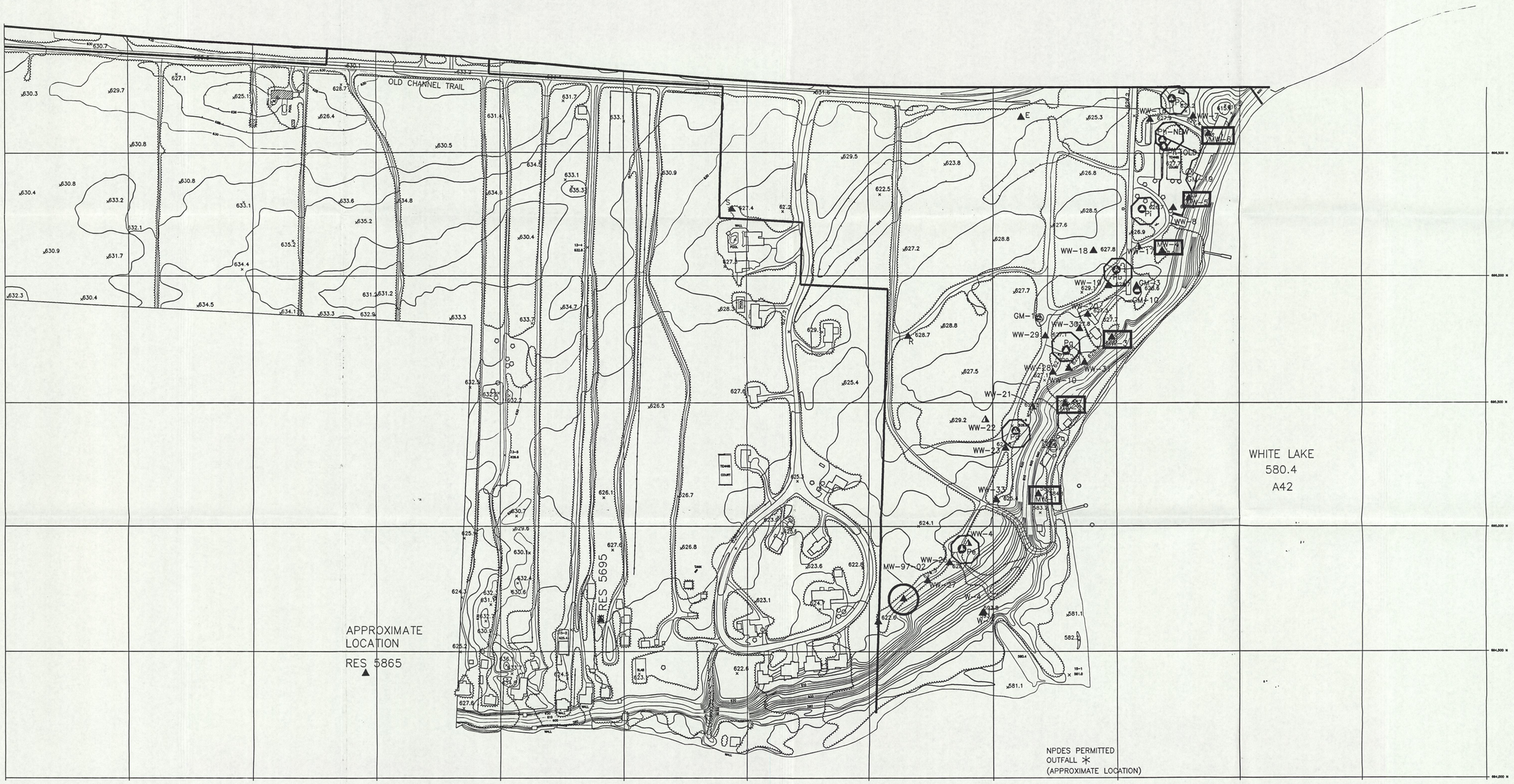
FIGURE 1

SITE LOCATION MAP

GLENN SPRINGS HOLDINGS, INC.
MONTAGUE, MICHIGAN

NOVEMBER, 2001

24791.21



LEGEND

- ▨ – FORMER PRODUCTION WELL
- ◬ – NON-PUMPING PURGE WELL
- ◬ – PURGE WELL
- ▲ – TEMPORARY WELL
- ▲ – PERMANENT MONITORING WELL
- — – APPROXIMATE SITE BOUNDARY
- □ – GROUNDWATER COLLECTION DEMONSTRATION MONITORING WELLS
- ○ – PLUME BOUNDARY MONITORING WELLS
- ⯃ – PURGE WELLS

EARTH TECH
5555 Glenwood Hills Parkway, SE • P.O. Box 874 • Grand Rapids, MI 49588-0874 (616) 942-5600

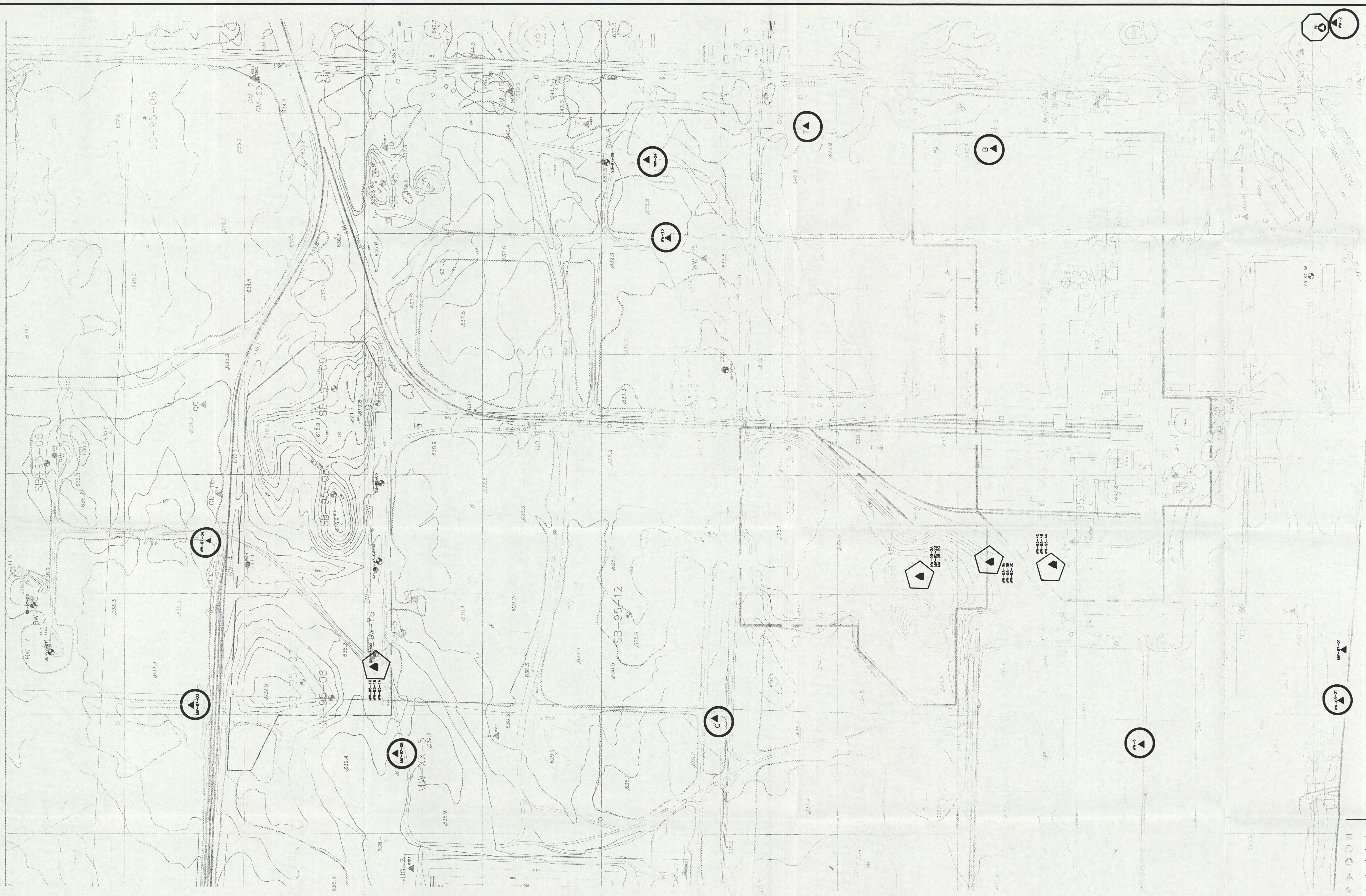
NO.	REVISIONS	BY	DATE
1	DELETE ROAD SAMPLE LOCATIONS	MJP	1/95
2	REVISED IN ACCORDANCE WITH CONSTRUCTION RECORDS	BY	DATE

OCCIDENTAL CHEMICAL CORP.
MONTAGUE, MICHIGAN
GROUNDWATER MONITORING PLAN
LAKESHORE SITE SOUTH

DESIGNED BY TJT	DATE JAN. '94
DRAWN BY MJP	DATE JAN. '94
CHECKED BY TJT	DATE JAN. '94
FILE 19316-1DB	EDIT KOP010202
SCALE	1:200
DRAWING	200
PLOT	
PROJECT	24791.01

FIGURE 2

SHEET NO.



LEGEND

- FORMER PRODUCTION WELL
- NON-PUMPING PURGE WELL
- PURGE WELL
- PERMANENT MONITORING WELL
- SOIL BORING
- STAFF GAUGE
- DISPOSAL WELL
- BRINE WELL
- PLUME INTERIOR MONITORING WELL
- PLUME BOUNDARY MONITORING WELL
- PURGE WELLS

NORTH

0 100 200 400

SCALE IN FEET

EARTH TECH

5555 Glenwood Hills Parkway, SE P.O. Box 874 Grand Rapids, MI 49588-0874 (616) 942-9600

NO.	REVISIONS	BY	DATE	BY	DATE

REVISED IN ACCORDANCE WITH CONSTRUCTION RECORDS

OCCIDENTAL CHEMICAL CORP.
MONTAGUE, MICHIGAN
GROUNDWATER MONITORING PLAN
FACILITY SITE MAP CENTRAL

DESIGNED BY TS/WF	DATE MAR '99
DRAWN BY J.A.S.	DATE MAR '99
CHECKED BY	DATE
FILE 24791WWWBB	EDIT KJG010604
SCALE	1:200 DRAWING
	200 PLOT
PROJECT	24791.01

FIGURE 3

L:\work\24791\CADD\ES\24791ckf\PHASEII\24791wwwBB.dwg, 01/06/2004 02:34:02 PM, 1:1, GRAND RAPIDS, MI

TABLES

TABLE 1

ANALYTICAL PARAMETERS

Compound	Short Name	Analytical Method Number	Target Detection Limit (ug/L)	Residential and Commercial Drinking Water Criteria (ug/L)	Groundwater Surface Water Interface Criteria (ug/L)
Hexachlorobenzene	C-66	8121	0.01	**1.0**	ID
Hexachlorocyclopentadiene	C-56	8121	0.01	**50**	ID
Octachlorocyclopentene	C-58	8121	1.0	**50**	ID
Hexachlorobuitadiene	C-46	8121	0.01	15	**0.053**
Hexachloroethane		8121	2.0	7.3	**6.7**
Tetrachloroethene		601	1.0	**5.0**	45
Trichloroethene		601	1.0	**5.0**	200
Carbon tetrachloride		601	1.0	**5.0**	45
Chloroform		601	1.0	**100**	170
Chloride		325.3	1.0×10^3	2.5×10^5	$\mathbf{1.25 \times 10^5}$
Cis-1,2-dichloroethylene		8260	0.5	**70**	ID
Trans-1,2-dichloroethylene		8260	0.5	**100**	ID
Mirex*		8121	0.01	**0.02**	NA

* Mirex will only be analyzed for MW-95-1A, MW-95-2A, MW-95-3A and MW-95-4A

- Bold numbers indicate the more stringent criteria derived from State of Michigan Part 201 generic cleanup criteria.

ID = Inadequate Data

TABLE 2

GROUNDWATER COLLECTION DEMONSTRATION MONITORING WELLS

Monitoring Well	Adjacent Purge Well	Top of Casing Elevation (feet USGS)
	NORTHEAST	
	Pc	630.66
MW-6		630.09
	Ph	630.25
MW-5		629.79
	Pi	623.40
MW-3		630.89
	Pb	630.50
MW-4		631.21
	Pg	629.40
MW-2		589.77
	Pd	630.75
MW-1		587.66
	Pe	624.94
	SOUTHWEST	

TABLE 3

PLUME BOUNDARY MONITORING WELLS

Monitoring Well	Edge of Plume Monitored	Top of Casing Elevation (feet USGS)
MW-97-03	North side / up gradient	635.81
MW-97-04	North side / up gradient	637.91
MW-97-05	West side / north area	639.93
C	West side / central area	639.04
WW-6	West side / central area	643.24
MW-03-01	West side / south area	637.09
MW-97-02	West side / at lake	626.02
WW-24	East side / north area	636.51
WW-13	East side / north area	639.20
T	East side / central area	642.49
B	East side / south area	645.10
WW-2	East side / at lake	632.36

TABLE 4

PLUME INTERIOR MONITORING WELLS

Monitoring Well	Depth of Screen (feet USGS)	Top of Casing Elevation (feet USGS)
MW-95-1A	40.9	638.89
MW-95-1B	58.0	638.79
MW-95-1C	108.8	638.82
MW-95-2A	26.0	621.19
MW-95-2B	82.0	621.24
MW-95-2C	114.0	621.30
MW-95-3A	46.0	637.57
MW-95-3B	71.0	637.81
MW-95-3C	117.0	638.16
MW-95-4A	53.0	644.74
MW-95-4B	86.0	644.85
MW-95-4C	140.0	644.99

TABLE 5
MONITORING WELL PURGING RECORD

Project Data:

Project Name: _____ Date: _____
Ref. No.: _____ Personnel: _____

Monitoring Well Data:

Well No.: _____ Screen Length (ft): _____
Measurement Point: _____ Depth to Pump Intake(ft) [1]: _____
Constructed Well Depth (ft): _____ Well Diameter, D (in): _____
Measured Well Depth (ft): _____ Well Screen Volume, V, (mL) [2]: _____
Depth of Sediment (ft): _____ Depth to Water Before Placing Pump (ft): _____
Depth to Water After Placing Pump (ft): _____

Time	*Pumping Rate (ml/min)*	*Depth to Water (ft)*	*Draw down from Initial Water Level [3] (ft)*	*pH*	*Temperature °C*	*Conductivity (nS/cn)*	*ORP (mV)*	*DO (mg/L)*	*Turbidity (NTU)*	*Volume Purged, VP (mL)*	*No. of Well Screen Volumes Purged [4]*

Notes:

[1] The pump intake must be place at the mid-point of screen or at a minimum of 2 ft above any sediment accumulated at the well bottom, whichever is shallower.

[2] The well screen volume is based on a 5-foot screen length, $V_s=p*(D/2)^2*(5*12)*(2.54)^3$

[3] The drawdown from the initial water level should not exceed 0.3 foot.

[4] Purging will continue until stabilization is achieved or until 20 well screen volumes have been purged. Purging may continue beyond 20 well screen volumes if water remains visually turbid but appears to be clearing, or stabilization parameters are varying slightly outside of the stabilization criteria but appear to be stabilizing.

APPENDIX A

WELL LOGS

WATER WELL AND PUMP RECORD

PERMIT NUMBER

1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Muskegon	Montague	¼ ¼ ¼	31	N/S	E/W

Distance And Direction From Road Intersection

Monitoring Well Number MW-6

Street Address & City of Well Location

Locate with X in Section Below — Sketch Map: (1 MILE)

3 OWNER

Name: Occidental Chemical Corporation

Address: 2190 Holton Road, Montague, Michigan 49437

Address Same As Well Location: Yes / No

4 WELL DEPTH (completed) — Date of Completion: 5/22/86

122'6"

5 Cable tool / Rotary / Driven / Dug / Hollow rod / Auger / Jetted

6 USE Domestic / Type I Public / Irrigation / Type II Public / Heat pump / Test Well / Type III Public / Monitoring

7 CASING Diameter — Height Above/Below Surface — Weight — lbs./ft. — Grouted — Drive Shoe: Yes / No

8 SCREEN Not Installed — Type: Stainless Steel — Diameter: 4" PS — Slot/Gauge — Length: 7' 3" — Set between ft. and ft. — FITTINGS: Packer / Lead Packer / Bremer Check / Blank above screen ft. / Other

9 STATIC WATER LEVEL ft. below land surface — Flow

10 PUMPING LEVEL (below land surface) ft. after hrs. pumping at 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 Cement / Bentonite / Other — Yes from 41 ft. to Up — Neat cement / Bentonite / Other — No. of Bags of cement: 1/2 Pail Bentonite Pellets — Additives: 8 Bag Bentonite

13 Nearest source of possible contamination — Type — Distance ft. — Direction — 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

2

FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Top soil, yellow sand	3'6"	3'6"
Clean sand	2'	5'6"
Coarse sand & fine gravel	3'6"	9'
Clean, dry sand	26'	35'
Coarse sand	3'	38'
Coarse sand & fine gravel	5'	43'
Clean, coarse sand	23'6"	66'6"
Small layer of red clay with red clay chunks	2'6"	69'
Clean #8 Slot sand-Active	24'	93'
#8 to 10 Slot sand-Active with red clay chunks showing	1'6"	94'6"
#8 to 10 Slot sand-Active	23'6"	118'
No clay Actove water sand with clay wash & clay chunks showing	4'	122'

USE A 2ND SHEET IF NEEDED

15 Remarks, elevation, source of data, etc.

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.

Riegler Water Well Drilling, Inc. 0246

REGISTERED BUSINESS NAME — REGISTRATION NO.

Address: 2190 Henry Street, Muskegon, Michiga

Signed: [signature] — AUTHORIZED REPRESENTATIVE — Date

D67d 2/84

Authority: Act 368 PA 1978 — Completion Required — Penalty: Conviction of a viola of any provision is a misdemeanor.

IMPORTANT: File with deed

WELL OWNER COPY

0000063

WATER WELL AND PUMP RECORD

PERMIT NUMBER

1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Muskegon	Montague	¼ ¼ ¼	31	N/S	E/

Distance And Direction From Road Intersection: Monitoring Well Number MW 5

Street Address & City of Well Location:

Locate with "X" in Section Below: W, E, S, 1 MILE, ½ MI.

Sketch Map:

3 OWNER OF WELL: Occidental Chemical Corporation

Address: Whitbeck Road, Montague, Michigan 4943

Address Same As Well Location? ☒ Yes ☐ No

4 WELL DEPTH (completed): 96 ft. **Date of Completion:** 5/22/86

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

6 USE: ☐ Domestic ☐ Type I Public ☐ Type III Public ☐ Irrigation ☐ Type II Public ☐ Heat pump ☐ Test Well ☐ Type IV Public ☒ Monitoring

7 CASING: Stainless Steel ☐ Steel ☐ Threaded ☐ Plastic ☐ Welded Height: Above/Below Surface ____ ft. Diameter ____ in. to ____ ft. Depth. Weight ____ lbs./ft. Wall Thickness ____ Casing Joints: ☐ Coupled ☐ Welded ☐ Solvent ☐ Other. Grouted Drill Hole Diameter ____ in. to ____ ft. Depth. Drive Shoe: ☒ Yes ☐ No

8 SCREEN: ☐ Not Installed Type: Stainless Steel Diameter 4" PS Slot/Mesh: 10 Length 60 ft. Set between 36 ft. and 96 ft. FILTERS: ☐ Gravel Pack ☐ Sand Pack ☐ Bremer Check ☐ Blank above screen ____ ft. ☐ Other X

9 STATIC WATER LEVEL: ____ ft. below land surface ☐ Flow

10 PUMPING LEVEL: ____ ft. below land surface ____ ft. after ____ hrs. pumping at ____ 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? ☐ Yes ☐ No From 41 ft. Up ☒ Neat cement ☒ Bentonite ☐ Other Pail Bentonite No. of bags of cement 10 Additives 2 Bags Bentoni

13 Nearest source of possible contamination: Type ____ Distance ____ ft. Direction ____ 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 ____ Gallo

2 FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Top soil & yellow dry sand	2'6"	2'6"
Clear white sand	6'6"	9
Sand with fine gravel	3	12
Clean, white dry sand	18	30
Clean, white dry sand	11	41
Medium coarse water sand	55	96
Solid blue clay	2'6"	98'6"

USE A 2ND SHEET IF NEEDED

15 Remarks, elevation, source of data, etc.

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.

Riegler WAter Well Drilling, Inc. 0246

REGISTERED BUSINESS NAME — REGISTRATION NO.

Address 2190 Henry Street, Muskegon, Michi

Signed Paul Rizzato Date ____

AUTHORIZED REPRESENTATIVE

D67d 2/84

IMPORTANT: File with deed.

WELL OWNER COPY

Authority: Act 368 PA 1978
Completion: Required
Penalty: Conviction of a violati of any provision is a misdemeanor

0000062

GEOLOGICAL SURVEY NO.

WATER WELL AND PUMP RECORD

PERMIT NUMBER

1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Muskegon	Montague	1/4 1/4 1/4	31	N/S	E/W

Distance And Direction From Road Intersection

Monitoring Well Number MW 3

Street Address & City of Well Location

Locate with "X" in Section Below — Sketch Map

3 OWNER OF WELL: Occidental Chemical Corporation

Address: Whitbeck Road, Montague, Michigan 49437

Address Same As Well Location? [X] Yes [ ] No

4 WELL DEPTH (completed): 98'6" — Date of Completion: 5/29/86

5 [X] 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 [X] Monitoring

7 CASING: Stainless Steel — Diameter: 4" — Above/Below — Plastic — Welded — Weight ___ lbs./ft.

Grouted Drill Hole — Drive Shoe [ ] Yes [X] No

8 SCREEN: [ ] Not Installed — Type: Stainless Steel — Diameter: 4" PS — Slot/Gauze: — Length: 60 ft. — Set between 38'6" and 59'6"

FITTINGS: [ ] K-Packer [ ] Lead Packer [ ] Bremer Check [ ] Blank above screen — Other: X

9 STATIC WATER LEVEL ___ ft. below land surface [ ] Flow

10 PUMPING LEVEL below land surface

___ ft. after ___ hrs. pumping at ___ G.P.M.

___ ft. after ___ hrs. pumping at ___ G.P.M.

11 WELL HEAD COMPLETION: [ ] Pitless adapter [X] 12" above grade [ ] Basement offset [ ] Approved pit

12 WELL GROUTED? [ ] No [X] Yes From 41 ft. Up

[X] Neat cement [X] Bentonite [X] Other: 1/2 Pail Bentonite Pell

No. of bags of cement: 5 Additives: Bag Bentonite

13 Nearest source of possible contamination — Type — Distance — ft. Direction

Well disinfected upon completion? [ ] Yes [ ] No

14 PUMP: [X] Not Installed [ ] Pump Installation Only

Manufacturer's name — Model number — HP — Volts — Length of Drop Pipe — Capacity — G.P.M. — TYPE: [ ] Submersible [ ] Jet

PRESSURE TANK — Manufacturer's name — Model number — Capacity — Gall.

2 FORMATION DESCRIPTION

Formation Description	Thickness of Stratum	Depth to Bottom of Stratum
Top soil	6"	6"
Medium dry sand	9'6"	10
Medium dry sand some clay balls	3	13
Coarse dry sand	5	18
Medium dry sand	10	29
Medium coarse dry sand	9	38
Clean, medium dry sand	9	47
Coarse, medium dry sand	14	61
Water sand, medium fine with		
some red clay	1	62
Medium water sand	12	74
Water sand with some red clay		
chunks and firm	2	76
Clean water sand, medium to fine	14	90
Medium water sand with some		
clay chunks	8'6"	98'6"

2ND SHEET IF NEEDED

15. Remarks, elevation, source of data, etc.

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.

Riegler WAter Well Drilling, Inc. 0246

REGISTERED BUSINESS NAME — REGISTRATION NO.

Address: 2190 Henry Street Muskegon, Michi

Signed: Paul Swartz — Date

AUTHORIZED REPRESENTATIVE

Authority: Act 368 PA 1978. Completion: Required. Penalty: Conviction of a violation of any provision is a misdemeanor.

D67d 2/84

IMPORTANT: File with deed.

WELL OWNER COPY

0300060

WATER WELL AND PUMP RECORD

PERMIT NUMBER

1 LOCATION OF WELL

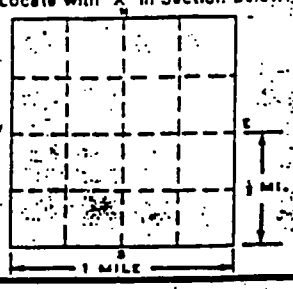
County	Township Name	Fraction	Section Number	Town Number	Range Number
Muskegon	Montague	¼ ¼ ¼	31	N/S	E/

Distance And Direction From Road Intersection

Monitoring Well Number MW-4

Street Address & City of Well Location

Locate with "X" in Section Below — Sketch Map:



3 OWNER OF WELL Occidental Chemic[illegible] Corporation

Address: Whitbeck Road

Montague, Michigan 4943

Address Same As Well Location? ☒ Yes ☐ No

4 WELL DEPTH (completed) 95 — Date of Completion 5/28/86

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

6 USE ☐ Domestic ☐ Type I Public ☐ Type III Public ☐ Irrigation ☐ Type II Public ☐ Heat pump ☐ Test Well ☐ Type IV Public ☒ Monitoring

7 CASING Stainless Steel

Diameter ☐ Sheet ☐ Reamed ☐ Height: Above/Below

Type ☐ Plastic ☐ Welded ☐ Threaded ☐ Drive shoe at surface ft.

4 in. to 35 ft. depth — Weight lbs./ft.

in. to ft. depth

Grouted: Drill Hole Diameter: Drive Shoe ☐ Yes

to ft. depth ☒ No

in. to ft. depth

8 SCREEN ☐ Not Installed

Type Stainless Steel Diameter 4" PS

Slot/Gage 8 Length 60 ft.

Set between 35 ft. and 95

FITTINGS ☐ K-Packer ☐ Lead Packer ☐ Bremer Check ☐ Blank above screen ft. Other Y

9 STATIC WATER LEVEL

ft. below land surface ☐ F

10 PUMPING LEVEL ft. below land surface

ft. after hrs. pumping at 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 41 ft. Up

☒ Neat cement ☒ Bentonite ☐ Other

No. of bags of cement 5 Additives 1 Bag

13 Nearest source of possible contamination

Type Distance ft. Direction

Well disinfected upon completion? ☒ Yes ☐ No

14 PUMP ☒ Not Installed ☐ Pump Installation Only

Manufacturer's name

Model number HP Volts

Length of Drop Pipe Capacity G.

TYPE: ☐ Submersible ☐ Jet ☐ Turbine

PRESSURE TANK

Manufacturer's name

Model number Capacity Ga

2 FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Top soil	7"	7"
Clean sand with some gravel	9'5"	10 ft
Clean sand with some gravel	24'6"	34'6"
Fine to medium sand with trace of clay	6"	35
Clean, dry sand	10	45
Fine to medium water sand	24	69
Chunks of reddish clay and sand	2	71
Fine to medium water sand	24	95
Clay with Very fine sand	5	100

USE A 2ND SHEET IF NEEDED

15. Remarks, elevation, source of data, etc.

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.

Riegler Water Well Drilling, Inc. 0246

REGISTERED BUSINESS NAME REGISTRATION NO.

Address 2190 Henry Street, Muskegon, Michi[illegible]

Signed [signature] Date

AUTHORIZED REPRESENTATIVE

Authority: Act 368 PA 1978

Completion Required

Penalty: Conviction of a vio[illegible] of any provision is misdemeanor.

D67d 2/84

IMPORTANT: File with deed.

WELL OWNER COPY

0000061

WATER WELL AND PUMP RECORD

PERMIT NUMBER

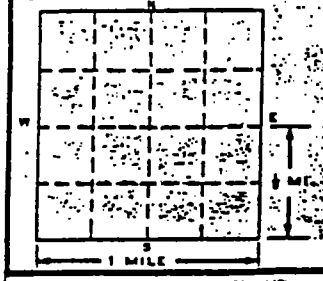
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Muskegon	Montague	¼ ¼ ¼	31	N/S	E

Distance And Direction From Road Intersection: Monitoring Well Number MW-2

Street Address & City of Well Location:

Locate with "X" in Section Below



Sketch Map:

3 OWNER OF WELL: Occidental Chemical Corporation

Address: Whitbeck Road, Montague, Michigan 494

Address Same As Well Location: ☒ Yes ☐ No

4 WELL DEPTHS (completed): 64 ft. **Date of Completion:** 6/6/86

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

6 USE: ☐ Domestic ☐ Type I Public ☐ Type III Public ☐ Irrigation ☐ Type II Public ☐ Heat pump ☐ Test Well ☐ Type IV Public ☒ Monitoring

7 CASING: Stainless Steel ☐ Steel ☐ Threaded ☐ Weight ☐ Above/Below ☐ Plastic ☐ Welded ☐ Diameter 4 in. to 8 ft. depth; Weight ____ lbs./ft.; Grouted Drillhole Diameter ____ in. to ____ ft. depth; Drive Shoe ☐ Yes ☒ No

2 FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Black dtop soil	1	1
Dry sand	5	6
Medium water sand	50	56
Medium water sand with some clay	5	61
Medium to fine water sand with some clay	3	64
Solid blue clay	4	68

8 SCREEN: ☐ Not Installed Type Stainless Steel Diameter 4" PS Slot/Gauge XXXX 8 Length 60 ft. Set between 4 ft. and 64 ft.

FITTINGS: ☐ K-Packer ☐ Lead Packer ☐ Bremer Check ☐ Blank above screen ____ ft. Other X

9 STATIC WATER LEVEL: ____ ft. below land surface ☐

10 PUMPING LEVEL: below land surface ____ ft. after ____ hrs. pumping at ____ 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 41 ft. to 11 ☐ Neat cement ☒ Bentonite ☒ Other ____ No. of bags of cement 1 1-Bag Quick Gel Additives 1/2 Pail Bent

13 Nearest source of possible contamination: Type ____ Distance ____ ft. Direction ____

14 Well disinfected upon completion? ☐ Yes ☐ No

14 PUMP: ☒ Not Installed ☐ Pump Installation Only

Manufacturer's Name ____ Model number ____ Volts ____ Length of Drop Pipe ____ ft. Capacity ____ G.P.M. TYPE: ☐ Submersible ☐ Jet PRESSURE TANK: Manufacturer's name ____ Model number ____ Capacity ____ Gal.

USE A 2ND SHEET IF NEEDED

15 Remarks, elevation, source of data, etc.

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.

Riegler Water Well Drilling, Inc. REGISTERED BUSINESS NAME ____ REGISTRATION NO. ____

Address 2190 Henry Street, Muskegon, Michi

Signed Paul Riegler AUTHORIZED REPRESENTATIVE Date ____

D67d 2/84

Authority: Act 368 PA 1978 Completion: Required Penalty: Conviction of a viol of any provision is misdemeanor

IMPORTANT: File with deed.

WELL OWNER COPY

0000059

GEOLOGICAL SURVEY NO. _____

WATER WELL AND PUMP RECORD

PERMIT NUMBER _____

1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Muskegon	Montague	¼ ¼ ¼	31	N/S	E

Distance And Direction From Road Intersection

Monitoring Well Number MW-1

Street Address & City of Well Location

Locate with "X" in Section Below — Sketch Map:

3 OWNER OF WELL Occidental Chemical Corpo

Address 7 Whitbeck Road Montague, Michigan 49437

Address Same As Well Location? ☒ Yes ☐ No

4 WELL DEPTH: (completed) 67 ft. **Date of Completion** 6/5/86

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Auger ☐ Jetted ☐ _____

6 USE: ☐ Domestic ☐ Type I Public ☐ Type III Public ☐ Irrigation ☐ Type II Public ☐ Heat pump ☐ Test Well ☐ Type IV Public ☒ Monitori

7 CASING: Diameter ☐ Steel ☐ Concrete Height Above/Below Surface ft. ☐ Plastic ☐ Welded 4 in. to 27 ft. Weight _____ lbs./ft. _____ in. to _____ ft. Threaded Grouted Drill Hole Diameter _____ in. to _____ ft. depth Drive Shoe ☐ Yes ☒ No _____ in. to _____ ft. depth

8 SCREEN ☐ Not Installed Type Stainless Steel Diameter 4" PS Slot/Gauge 8 Length 60 ft. Set between 17 ft. and 67 ft. FITTINGS: ☐ K-Packer ☐ Lead Packer ☐ Bremer Check ☐ Blank above screen _____ ft. Other X

9 STATIC WATER LEVEL _____ ft. below land surface ☐ Flow

10 PUMPING LEVEL (below land surface) _____ ft. after _____ hrs. pumping at _____ 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 41 ft. Up ☒ Neat cement ☒ Bentonite ☐ Other _____ No. of bags of cement _____ Additives 1 Bag Bento

13 Nearest source of possible contamination Type _____ Distance _____ ft. Direction _____ Well disinfected upon completion? ☐ Yes ☐ No

14 PUMP ☒ Not Installed ☐ Pump Installation Only Manufacturer's name _____ Model number _____ H.P. _____ Volts _____ Length of Drop Pipe _____ ft. Capacity _____ G.P.M. TYPE: ☐ Submersible ☐ Jet _____ PRESSURE TANK Manufacturer's name _____ Model number _____ Capacity _____ Gal.

2 FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sod	6"	6"
Muck	1 ft. 1'6"	
Greyish Brown wet sand, mixed	6'6"	8 ft
Brown medium sand	15	25
Fine to medium sand	42	67
Sand with chunks of clay	8	75
Solid clay	2	77

USE A 2ND SHEET IF NEEDED

15. Remarks, elevation, source of data, etc.

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. Contractor's

Riegler Water Well Drilling, Inc. 0246

REGISTERED BUSINESS NAME REGISTRATION NO.

Address 2190 Henry Street, Muskegon, Mich

Signed John R. Wellbrock Date _____

AUTHORIZED REPRESENTATIVE

D67d 2/84

Authority: Act 368 PA 1978
Completion: Required
Penalty: Conviction of a viol of any provision is misdemeanor

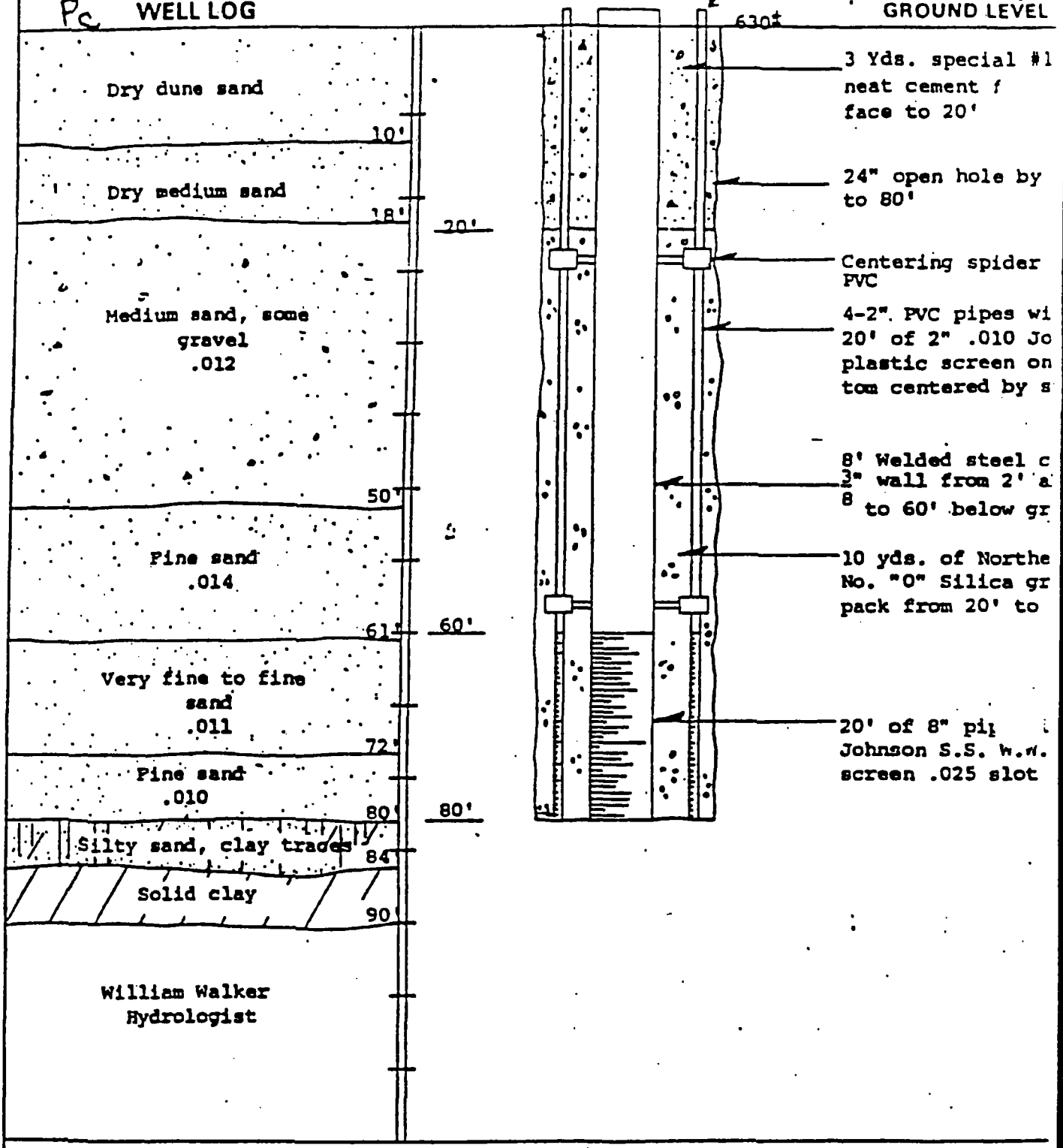
IMPORTANT: File with deed.

WELL OWNER COPY

0000058

Pc WELL LOG

630.35 (M.P.) 628.15 (L
630± GROUND LEVEL



City Montague State Mich.

Location Approx. 200' S. of Old Channel Trail & 150' E. of dirt service rd. (Whitbeck Rd. extended)

County Muskegon Twp. Montague Section 31

Test Capacity 200 GPM. Static Water Level 44'-10" ft. Pumping Level 54'1" ft.
Specific Capacity 21.5 GPM/Ft. D.D.
Date Drilled 12-28-79
Driller Paul Wyatt
Job No. 2448

Well No. Purge Well "C"
Hooker Chemical & Plastics Cor
Montague, Mich.

GEOLOGICAL SURVEY NO.

WATER WELL AND PUMP RECORD

PERMIT NUMBER

1 LOCATION OF WELL

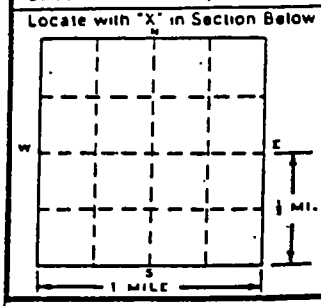
County	Township Name	Fraction	Section Number	Town Number	Range Number
Muskegon	Whitehall-Montague	¼ ¼ ¼		11-12 N/	17 W

Distance And Direction From Road Intersection

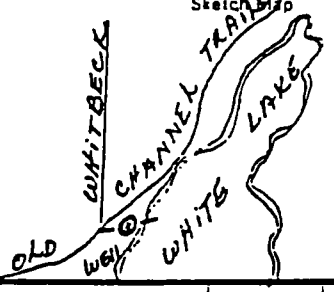
1/4 Mile South of Old Channel Trail PH (NEW)

Street Address & City of Well Location: Old Channel Trail, Montague

Locate with "X" in Section Below



Sketch Map



3 OWNER OF WELL

Occidental Chemical Co.

Address: Montague, Michigan

Address Same As Well Location? ☐ Yes ☐ No

4 WELL DEPTH: 93 FT. | Date Completed: MO 11 DAY 8 YEAR 91 | ☒ New Well ☐ Replacement Well

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 ☒ Purge

7 CASING Diameter ☒ Steel ☐ Threaded ☐ Plastic ☐ Welded

20 in. to 72 ft. depth

10 in. to 73 ft. depth

Grouted Drill Hole Diameter

_____ in. to _____ ft. depth

_____ in. to _____ ft. depth

Height Above Surface 1½ ft

Weight _____ lbs./ft

Drive Shoe ☒ Yes ☐ No

2 FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sand (med.)	50	50
Sand & Gravel	5	55
Fine Sand	38	93
Bottomed on Gray Clay @ 93'		

8 SCREEN. ☐ Not Installed

Type Stailess Steel Diameter 10"

Slot Size 20 Length 20'

Set between 73 ft. and 93 ft

FITTINGS: ☐ K-Packer ☐ Lead Packer ☐ Bremer Check

☒ Blank above screen 73 ft Other _____

9 STATIC WATER LEVEL

55 ft. below land surface ☐ Flow

10 PUMPING LEVEL. below land surface

_____ ft. after _____ hrs. pumping at _____ 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 50 to surface

☒ Neat cement ☐ Bentonite ☐ Other _____

No. of bags of cement _____ Additives _____

13 Nearest source of possible contamination

Type Sewer Line Distance 20 ft. Direction West

Well disinfected upon completion? ☒ Yes ☐ No

Was old well plugged? ☐ Yes ☐ No

14 PUMP ☐ Not Installed ☐ Pump Installation Only

Manufacturer's name Grundfos

Model number _____ HP 15 Volts 460

Length of Drop Pipe 75 ft. capacity _____ G.P.M

TYPE: ☐ Submersible ☐ Jet _____

PRESSURE TANK

Manufacturer's name _____

Model number _____ Capacity _____ Gallon

USE A 2ND SHEET IF NEEDED

15. Remarks, elevation, source of data, etc.

20"X 10" Gravel Pack Purge Well

17. Rig Operator's Name:

G.F. Neubecker, III

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.

Raymer Company, Inc. 0384

REGISTERED BUSINESS NAME REGISTRATION NO.

Address 3311 Three Mile Rd., N.W., Grand Rapids

Signed _____ Date Nov. 20, 19

AUTHORIZED REPRESENTATIVE

Authority: Act 368 PA 1978

Completion: Required

Penalty: Conviction of a violation

D67d 2/89

IMPORTANT: File with deed.

0000079

1 LOCATION OF WELL

County: Muskegon | Township Name: Montauge | Fraction: 1/4 1/4 1/4 | Section Number: 3 | Town Number: N/S | Range Number: E/W

Distance And Direction From Road Intersection:

12" x 8" Artificial Gravel Packed Water Well - Number - by road - # Pl (PI)

Street Address Of Well Location:

Location Sketch Map

2 OWNER OF WELL: Occidental Chemical Corporation

Address: Whitbeck Road, Montague, Michigan 49437

Address Same As Well Location: Yes No

4 WELL DEPTH: (completed) 95'10" | Date of Completion: 1/15/86

Cable tool, Rotary, Driven, Dug, Hollow rod, Auger, Jetted

8 USE: Domestic, Type I Public, Type III Public, Irrigation, Type II Public, Heat pump, Test Well, Type IV Public, X Purge Well

5 CASING: Steel, Plastic, X Welded, Diameter 8 in. to 70 ft. depth, Grouted Drill Hole Diameter in. to ft. depth, Above/Below Surface ft, Weight lbs./ft., Drive Shoe Yes, X No

6 SCREEN: Not installed, Type Stainless Steel, Diameter 8"PS, Slot/Gauge 10, Length 25'10", Set between 70 ft. and 95'10" ft., FITTINGS: Gasket, Lead Packer, Bremer Check, Blank above screen ft., Other

9 STATIC WATER LEVEL: Flow, ft. below land surface

10 PUMPING LEVEL below land surface: ft. after hrs. pumping at 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, X Yes From 15 ft. to ft., Neat cement, Bentonite, Other, No. of bags of cement, Additives

13 Nearest source of possible contamination: Type, Distance ft., Direction, Well disinfected upon completion? Yes No

14 PUMP: X 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

7 FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Top soil	1	1
Clean yellow dry sand	5	6
Clean white dry sand	4	10
Coarse sand & fine gravel	3	13
Dry clean sand	22	35
Clean water sand	26'6"	61'6"
Layer of red clay chunks not solid	1'6"	63
Clean water sand	11'6"	74'6"
Blue clay	6"	75
Water sand with small amount of clay	5	80
Clean water sand	19	99
Fine sand, clay wash with large amounts of clay	2	101
Solid blue clay	4'6"	105'6"

15 Remarks: pleasing source of data, etc.

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.

Riegler Water Well Drilling, Inc. 0246

REGISTERED BUSINESS NAME | REGISTRATION NO.

Address: 2190 Henry Street, Muskegon, MI

Signed: Gerald Riegler AUTHORIZED REPRESENTATIVE | Date: 2/10/86

D678 (12/84)

IMPORTANT: File with deed.

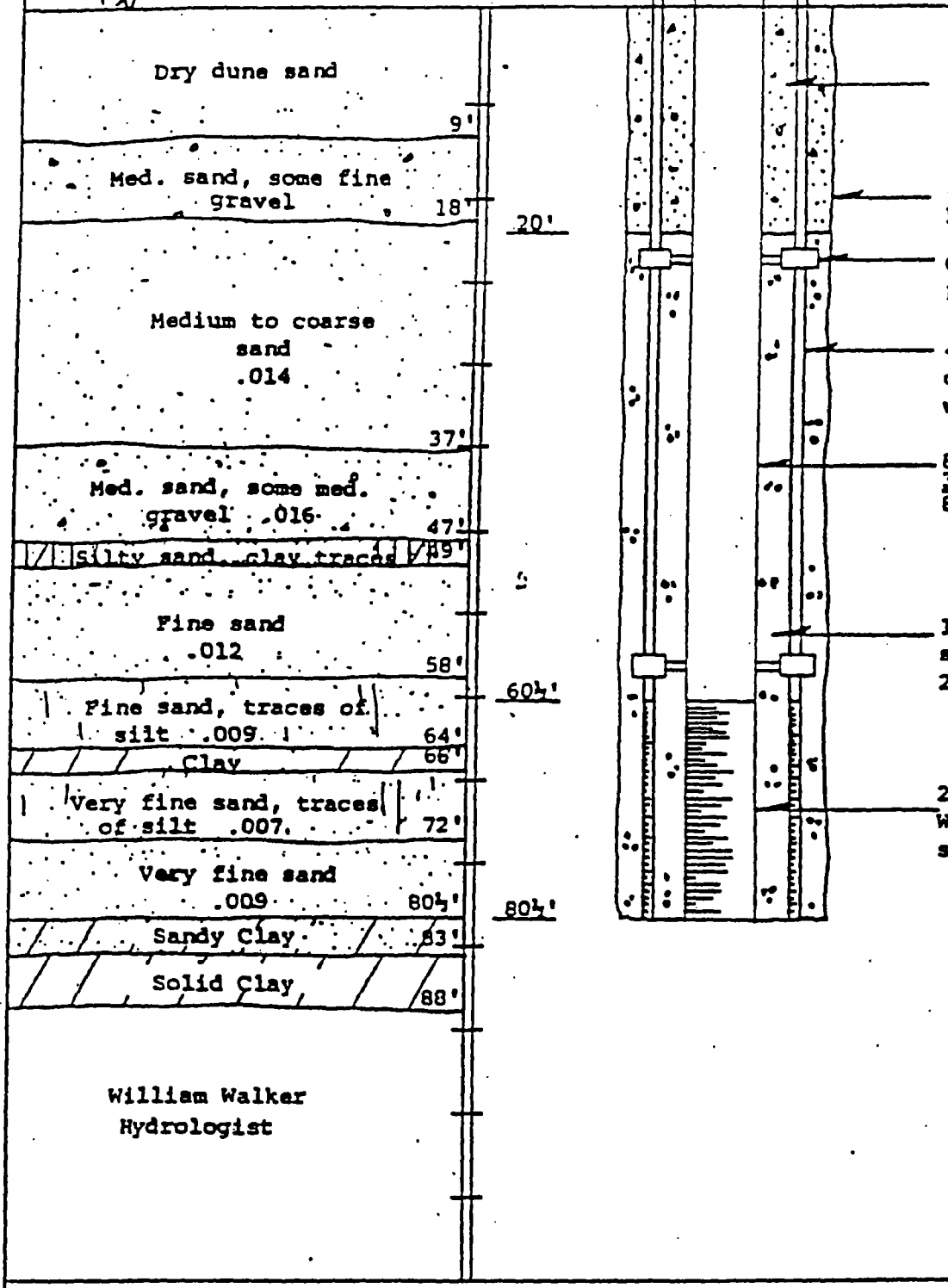
WELL OWNER COPY

Authority: Act 368 PA 1978
Completion: Required
Penalty: Conviction of a violation of any provision is a misdemeanor.

0000080

Pl. WELL LOG

630.29 (M.P.) 628.09 (
~~EL 630'~~ GROUND LEVE



City Montague State Mich.

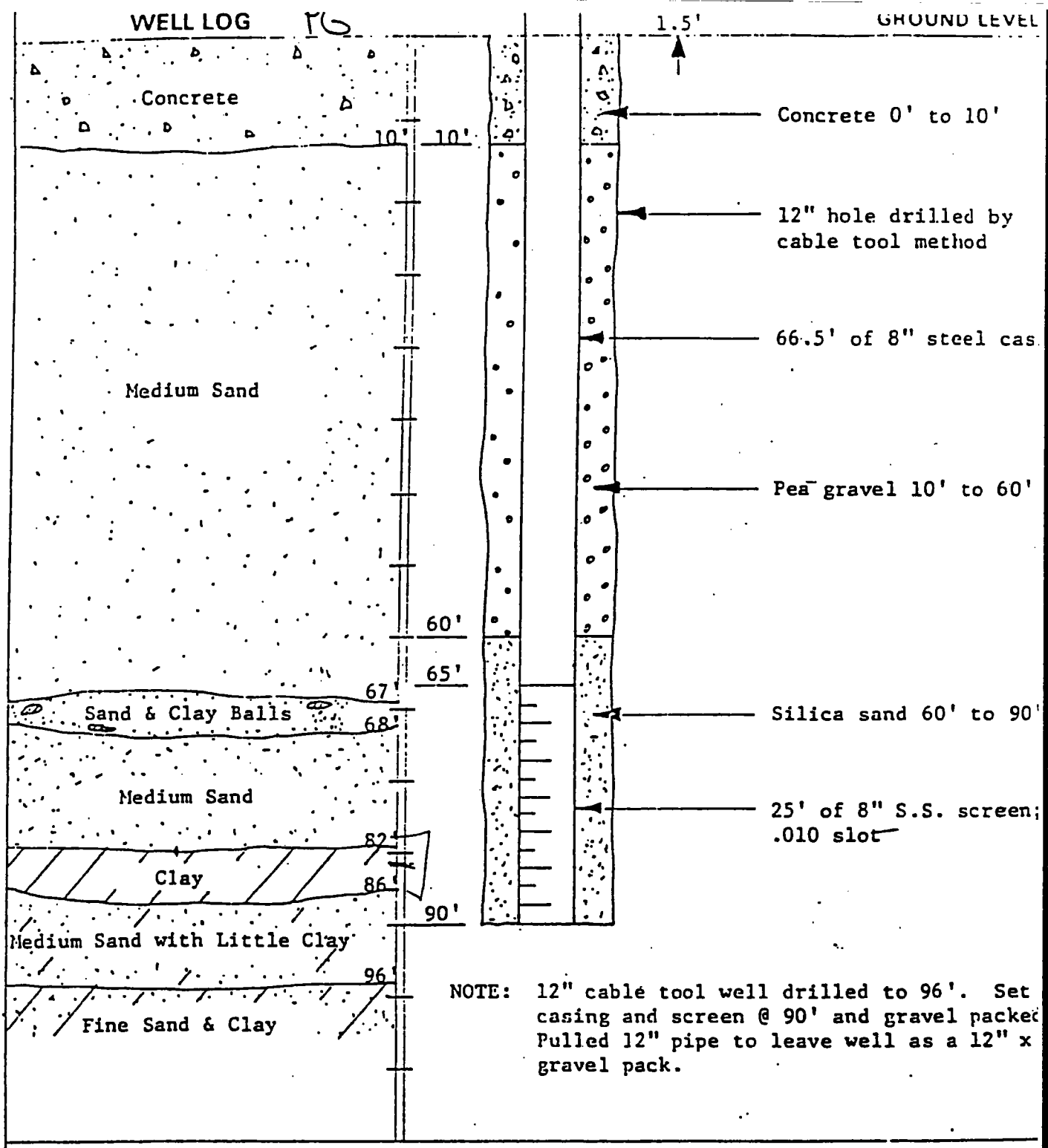
Location Approx. ½ mile S. of Old Channel Trail & 40' W. of dirt service rd. (Wh
Rd. extended) & 120' NW of GM#3

County Muskegon Twp. Monatque Section 31

Test Capacity 200 GPM. Static Water Level 46'-2" ft. Pumping Level 55'-8" ft.
Specific Capacity 21.0 GPM/Ft. D.D.
Date Drilled 12-20-79
Driller Paul Wyatt

Well No. Purge Well "B"
Hooker Chemicals & Plasti
Montague, Mich.

WELL LOG 26



NOTE: 12" cable tool well drilled to 96'. Set casing and screen @ 90' and gravel packed Pulled 12" pipe to leave well as a 12" x gravel pack.

City Montague State Michigan

Location 300' West of Old Channel Trail, 400' North of Lake; 50' West of WW 10, 375 West of P_b, 375' East of P_d

County Muskegon Twp. Montague Section 31

— originally drilled as WW-3

Test Capacity 1" Air Lift GPM. Static Water Level 47 ft. Pumping Level ft.

Specific Capacity * GPM/Ft. D.D.

Date Drilled 4-27-83

Driller Al Cockey

Job No. 4020

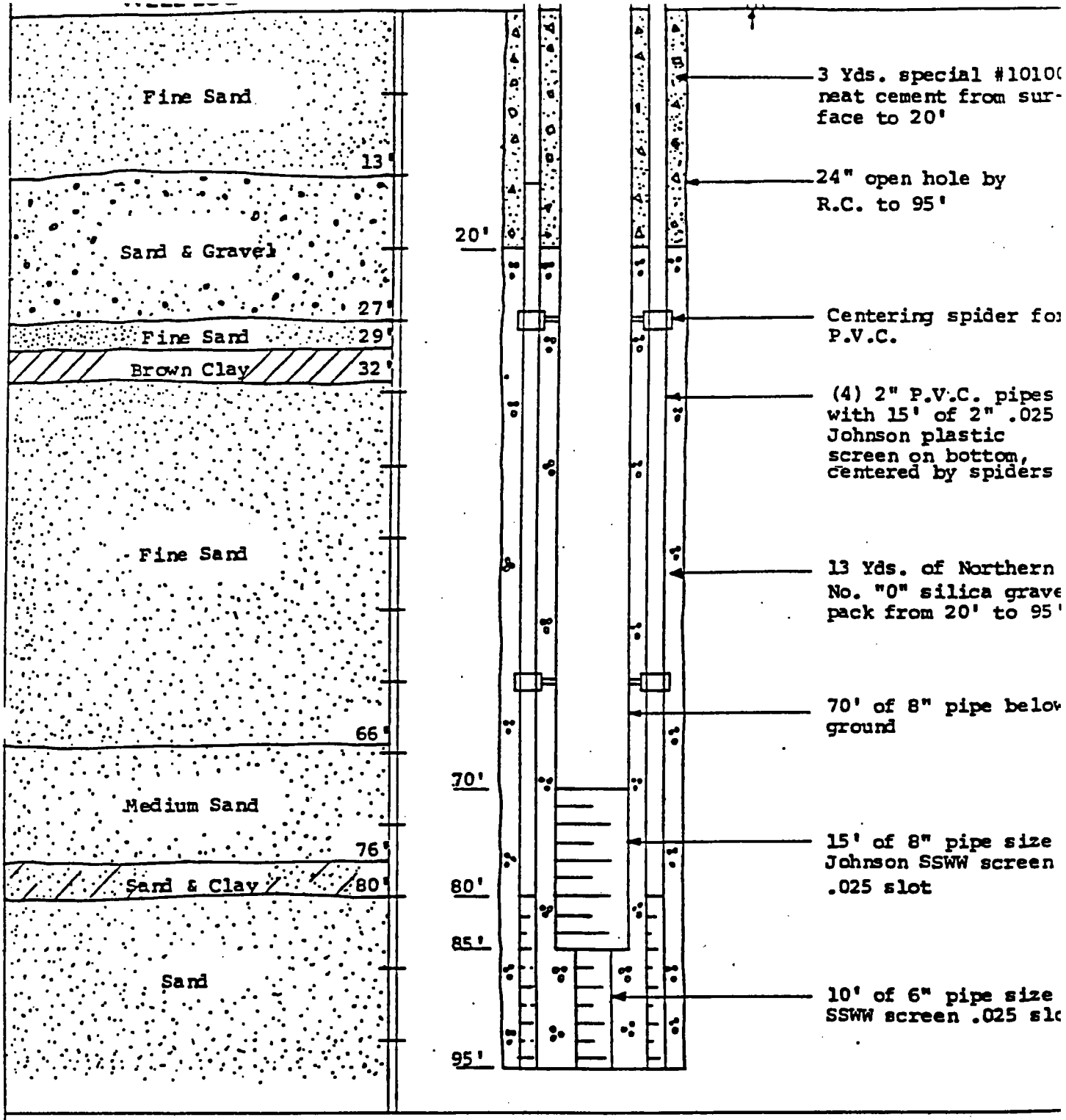
*No pumping test. Used air lift to clean up well.

Well No. [redacted]

HOOKER CHEMICAL COMPANY
MONTAGUE, MICHIGAN

PEERLESS-MIDWEST, INC.
Granger, Indiana

0000078



City Montague State Michigan

Location Approximately 1400' S. of Old Channel Trail, 250' W. of power lines

County Muskegon Twp. Montague Section 31

Test Capacity 315 GPM. Static Water Level 48.0 ft. Pumping Level 66.5 ft.
Specific Capacity 17.0 GPM/Ft. D.D.
Date Drilled 12-4-81
Driller Allen Cockey
Job No. 3378

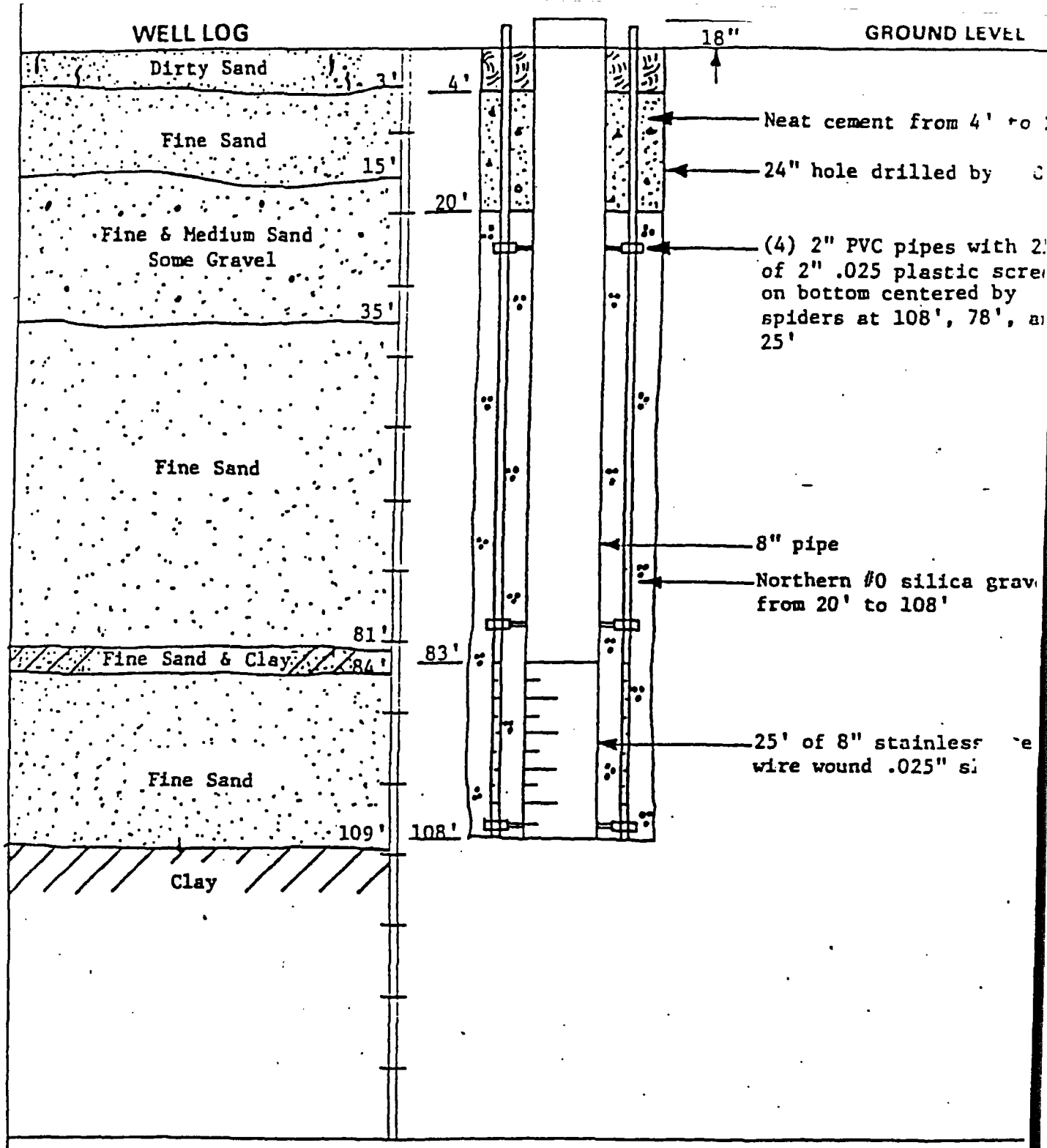
Well No. Purge Well "Pd"

HOOKER CHEMICAL & PLASTICS CORP
MONTAGUE, MICHIGAN

PEERLESS-MIDWEST, INC.
Connersville, Indiana

0000075

WELL LOG



City Montague State Michigan

Location Approximately 2000' South of Old Channel Trail - 750' SW of Power Lines

County Muskegon Twp. Montague Section 31

Test Capacity 195 GPM. Static Water Level 46 ft. Pumping Level 62.5 ft.
Specific Capacity 11.8 GPM/Ft. D.D.
Date Drilled 12-3-82
Driller Mike Garrage
Job No. 3863

Well No PE
HOOKER CHEMICAL & PLASTIC
MONTAGUE, MICHIGAN

0000076

PEERLESS-MIDWEST, INC.
Granger, Indiana

EARTH TECH

Well / Boring Log

MW-97-03

State	County	Township/City	T	R	Sec.	Fraction
MI	Muskegon	Montague	12 N	17 W	30	SW 1/4, NE 1/4

Location and Comments:

Groundwater Encountered
While Drilling at: 18.0 bgs ▽

Water Level Data

Date	Time	Depth to Water (bgs/TOC)
		▽
		▽
		▽

TOC Elev: ____ Grd Elev: ____
Horiz. Coord:

Protective Casing Material: Steel
Diameter: 4" Cap Type: ____
Height Above Ground: ~2.5'
Locked: X Yes __ No Bolted: __ Yes X No

Well Development
Date: 12/2/97 Time: 11:00 am
Volume: 50 gal. Method: Bailer
Comments:

Client: ____
Project Number: ____
Date: Started 11/6/97 Finished 11/7/97
Time: Started 8:30 am Finished 6:30 pm
Contractor: Carlo Environmental Technologies, Inc.
Address: 44907 Trinity Drive
Clinton Twp., MI 48038
Equipment: CME 85
Crew Chief: Don Bond
Logged By: Brent Bell

Drilling Method(s)	Depth	Borehole Dia.
4.25" HSA	132'	8.25"

Well Construction
Seal / Backfill

Concrete →
2.0
Bentonite Slurry →
▽

Depth (ft)	Lithological Description	USCS	Graphic Log	Depth (ft)	Blow Counts	Attempted / Recovered	PID 11.7 eV Lamp	Time Collected	Date
0	0.0 Moss, natural organics	Pt		0	1				
1	0.5 SAND, medium to fine, some coarse SAND, trace fine GRAVEL, brown, dry	SP		1	1 1 1		0	8:40	11/6/97
2				2	2 2 2 2		0	8:43	
3				3	2 2 2				
4				4	2				
5				5	2 2 2		0	8:47	
6				6	2				
7				7	3 3 3 3		0	8:50	
8				8	1				
9				9	2 3 2		0	8:87	
10				10	3				
11	11.0 CLAY, brown, stiff, dry, some SILT vein layers	CL		11	2 2 3		0	9:00	
12	12.2 SAND, fine to medium, some SILT, brown, dry	SP		12	3				
13				13	3 4 4 5		0	9:03	
14				14	5				
15	14.3 SAND, very fine to fine, little SILT, light brown, dry	SP		15	5 6 8 8		0	9:10	
16				16	6				
17				17	6 8 10		0	9:17	
18	17.6 SAND, fine to medium, little very fine SAND, trace fine GRAVEL, moist to wet	SP		18	10 4				
19	18.3 SAND, fine to medium, little very fine SAND, trace SILT, brown, wet			19	7 13			9:25	
20				20	17				

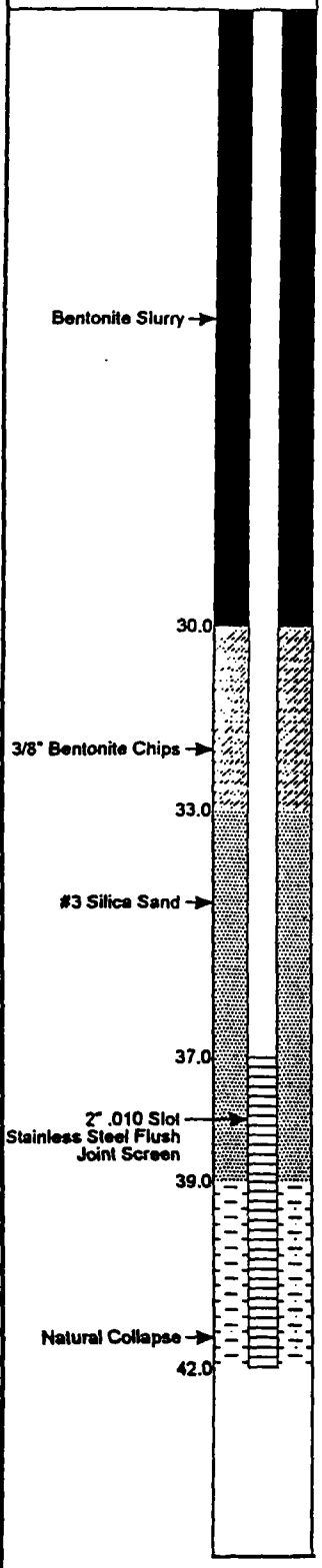
EARTH TECH

Well / Boring Log MW-97-03

Location and Comments:

Client:

Project Number:



Depth (ft)	Lithological Description	USCS	Graphic Log	Depth (ft)	Blow Counts	Attempted / Recovered	PID 11.7 eV Lamp	Time Collected	Date
20–24		SP		20–24	5, 6, 6, 7 / 2, 3, 6, 5			9:40 / 9:47	
24	24.0 SAND, very fine to fine, some medium SAND, trace SILT, brown, wet	SP		24–30	2, 4, 8, 4 / 4, 5, 6, 6 / 7, 9, 15, 11			9:52 / 10:00 / 10:07	
30	30.5 SAND, fine to medium, little very fine SAND, brown, wet	SP		30–45	2, 4, 4, 9 / 8, 8, 8, 9 / 5, 7, 9, 8 / 6, 8, 12, 12 / 6, 8, 9, 12 / 6, 10, 12, 14 / 10, 12, 14, 18 / 4, 10			10:12 / 10:20 / 10:30 / 10:50 / 11:05 / 11:25 / 11:35	

WELL_LOG 24791_01.GPJ ETECH_GR.GDT 1/8/98

EARTH TECH

Well / Boring Log MW-97-03

Location and Comments:

Client:

Project Number:

Well Construction Seal / Backfill	Depth (ft)	Lithological Description	USCS	Graphic Log	Depth (ft)	Blow Counts	Attempted / Recovered	PID 11.7 eV Lamp	Time Collected	Date
	45				45	12, 14			11:45	
	46				46	6, 8, 9, 10			2:30	
	47				47					
	48				48	2, 3, 8, 12			2:40	
	49				49					
	50				50	7, 9, 11, 13			2:47	
	51	50.5 SAND, very fine to fine, some SILT, brown, wet	SP		51					
	52				52	6, 11, 16, 20			2:58	
	53				53					
	54				54	4, 9, 14, 19			3:05	
	55	54.7 SAND, very fine to fine, little medium SAND, trace soft silty CLAY veins	SP		55					
	56				56	9, 12, 16, 20			3:15	
	57	57.0 SAND, fine to medium, little very fine SAND, trace SILT, trace fine to medium GRAVEL, brown, wet	SP		57					
	58				58	4, 9, 15, 20			3:25	
	59				59					
	60				60	8, 10, 12, 14			3:35	
	61				61					
	62				62	9, 20, 23, 36			3:45	
	63				63					
	64				64	10, 12, 13, 13			3:51	
	65				65					
	66				66	5, 6, 12, 9			4:15	
	67				67					
	68	67.7 CLAY, gray, soft, moist, trace SILT	CL		68	3, 3, 6, 7			4:28	
	69	68.7 CLAY, gray, stiff, dry, little SILT, trace fine GRAVEL, dry			69					
	70				70					

EARTH TECH

Well / Boring Log MW-97-03

Location and Comments:

Client:

Project Number:

Well Construction Seal / Backfill	Depth (ft)	Lithological Description	USCS	Graphic Log	Depth (ft)	Blow Counts	Attempted / Recovered	PID 11.7 eV Lamp	Time Collected	Date
	70		CL		70	5				
	71				71	8			4:35	
						10				
	72				72	12				
						4				
	73				73	4			4:55	
						5				
	74				74	4				
						4				
	75				75	4				11/7/9
						5				
	76				76	4				
	77	76.5 CLAY, gray, soft, some SILT, sticky, slightly moist	CL		77	6			8:15	
						7				
	78	77.5 SILT, gray, little fine SAND, wet	ML		78	8				
						6				
	79				79	7				
		79.0 SAND, medium to fine, brown, little very fine SAND, wet	SP			6			8:30	
	80				80	8				
						7				
	81				81	9			8:55	
						13				
	82				82	18				
		82.0 SILT, gray, dry	ML			4				
	83	82.5 CLAY, gray, stiff, trace fine GRAVEL, dry	CL		83	9			9:20	
						13				
	84				84	14				
						9				
	85				85	13			9:30	
						18				
	86				86	18				
						13				
	87				87	22			9:40	
						25				
	88				88	30				
						7				
	89				89	10			10:00	
						18				
	90				90	22				
						12				
	91				91	16			10:20	
						20				
	92				92	17				
		92.0 CLAY, gray, soft, sticky, little SILT, moist	CL			13				
	93				93	18			10:35	
						24				
	94	93.5 CLAY, gray, stiff, little fine GRAVEL, trace medium to coarse GRAVEL, dry			94	27				
						10				
	95				95	12				

EARTH TECH

Well / Boring Log

MW-97-03

Location and Comments:

Client:

Project Number:

Well Construction Seal / Backfill	Depth (ft)	Lithological Description	USCS	Graphic Log	Depth (ft)	Blow Counts	Attempted / Recovered	PID 11.7 eV Lamp	Time Collected	Date
	95				95	16, 16			10:55	
	96				96	9, 11, 14, 19				
	97				97	5, 10, 14, 16			11:10	
	98				98	10, 12, 15, 20				
	99				99	7, 12, 17, 21			1:20	
	100				100	12, 17, 20, 18				
	101				101	13, 14, 17, 19			1:35	
	102				102	7, 10, 14, 10				
	103		CL		103	10, 11, 9, 7			1:45	
	104				104	8, 11, 12, 10				
	105				105	6, 6, 10, 12			2:00	
	106				106	8, 10, 10, 13				
	107				107	4, 6, 8			2:15	
	108				108					
	109				109				2:40	
	110				110					
	111				111				3:10	
	112				112					
	113	113.0 CLAY, gray, medium stiff, little fine GRAVEL, trace medium to coarse GRAVEL, dry	CL		113				3:15	
	114				114					
	115	114.5 CLAY, gray, soft, trace fine GRAVEL, dry			115				3:40	
	116				116					
	117		CL		117				3:50	
	118				118					
	119				119				4:15	
	120				120					

EARTH TECH

Well / Boring Log MW-97-03

Location and Comments:

Client:

Project Number:

Well Construction Seal / Backfill	Depth (ft)	Lithological Description	USCS	Graphic Log	Depth (ft)	Blow Counts	Attempted / Recovered	PID 11.7 eV Lamp	Time Collected	Date
	120	120.0 CLAY, gray, stiff, trace fine GRAVEL, dry			120	6 12				
	121				121	8			4:30	
						9				
	122				122	13				
						5				
	123				123	7			4:40	
						11				
	124				124	11				
						6				
	125				125	9			4:55	
						12				
	126		CL		126	13				
						7				
	127				127	12			5:15	
						13				
	128				128	15				
						7				
	129				129	11			5:35	
						17				
	130				130	16				
						8				
	131				131	10			5:55	
						14				
	132				132	18				
	133	E.O.B. @ 132'			133					
	134				134					
	135				135					
	136				136					
	137				137					
	138				138					
	139				139					
	140				140					
	141				141					
	142				142					
	143				143					
	144				144					
	145				145					

WELL_LOG 24791_01.GPJ ETECH_GR.GDT 1/8/98

EARTH TECH

Well / Boring Log — MW-97-04

State	County	Township/City	T	R	Sec.	Fraction
MI	Muskegon	Montague	12 N	17 W	30	SW 1/4, NE 1/4

Location and Comments:

Groundwater Encountered
While Drilling at: 21.0 bgs

Water Level Data

Date	Time	Depth to Water (bgs/TOC)

TOC Elev: ____ Grd Elev: ____
Horiz. Coord:

Protective Casing Material: Steel
Diameter: 4" Cap Type: Locking "J"
Height Above Ground: 2.5 Plug
Locked: X Yes __ No Bolted: __ Yes X No

Well Development
Date: 12/3/97 Time: 8:00 am
Volume: 75 gal. Method: Air Lift
Comments:

Client:
Project Number:
Date: Started 11/17/97 Finished 11/21/97
Time: Started 3:00 pm Finished 3:00 pm
Contractor: Carlo Environmental Technologies, Inc.
Address: 44907 Trinity Drive
Clinton Twp., MI 48038
Equipment: CME 85
Crew Chief: Chad McDonnell
Logged By: Don Johnson/Kurt Osterman

Drilling Method(s)	Depth	Borehole Dia.
4.25" HSA	136'	8.25"

Well Construction Seal / Backfill: Concrete Cap (1.0); 2" Stainless Steel Casing; Bentonite Slurry, High Performance

Depth (ft)	Lithological Description	USCS	Graphic Log
0.0	Natural organics, dark brown, slightly moist	Pt	
0.5	SAND, fine to medium, little SILT, trace natural organics, brown, dry	SP	
3.0	SAND, fine to medium, trace coarse SAND, light brown, dry	SP	
12.0	SAND, medium to fine, some coarse SAND, light brown, dry	SP	
14.2	SAND, medium to coarse, little fine SAND, some fine GRAVEL, light brown, dry	SP	
18.5	SAND, fine to medium, some very fine SAND, light brown, dry	SP	

Depth (ft)	Blow Counts	Attempted / Recovered	PID 11.7 eV Lamp	Time Collected	Date
0-1	1, 2		0	3:35	11/17/97
1-2	1, 2				
2-3	3, 4		0	3:45	
3-4	4, 5				
4-5	3, 4		0	3:48	
5-6	2, 3				
6-7	3, 2		0	3:54	
7-8	4, 5				
8-9	4, 4		0	4:01	
9-10	6, 6				
10-11	4, 3		0	4:05	
11-12	4, 4				
12-13	3, 4		0	4:08	
13-14	4, 4				
14-15	4, 3		0	4:13	
15-16	4, 4				
16-17	3, 3		0	4:19	
17-18	4, 6				
18-19	4, 4		0	4:23	
19-20	5, 8				

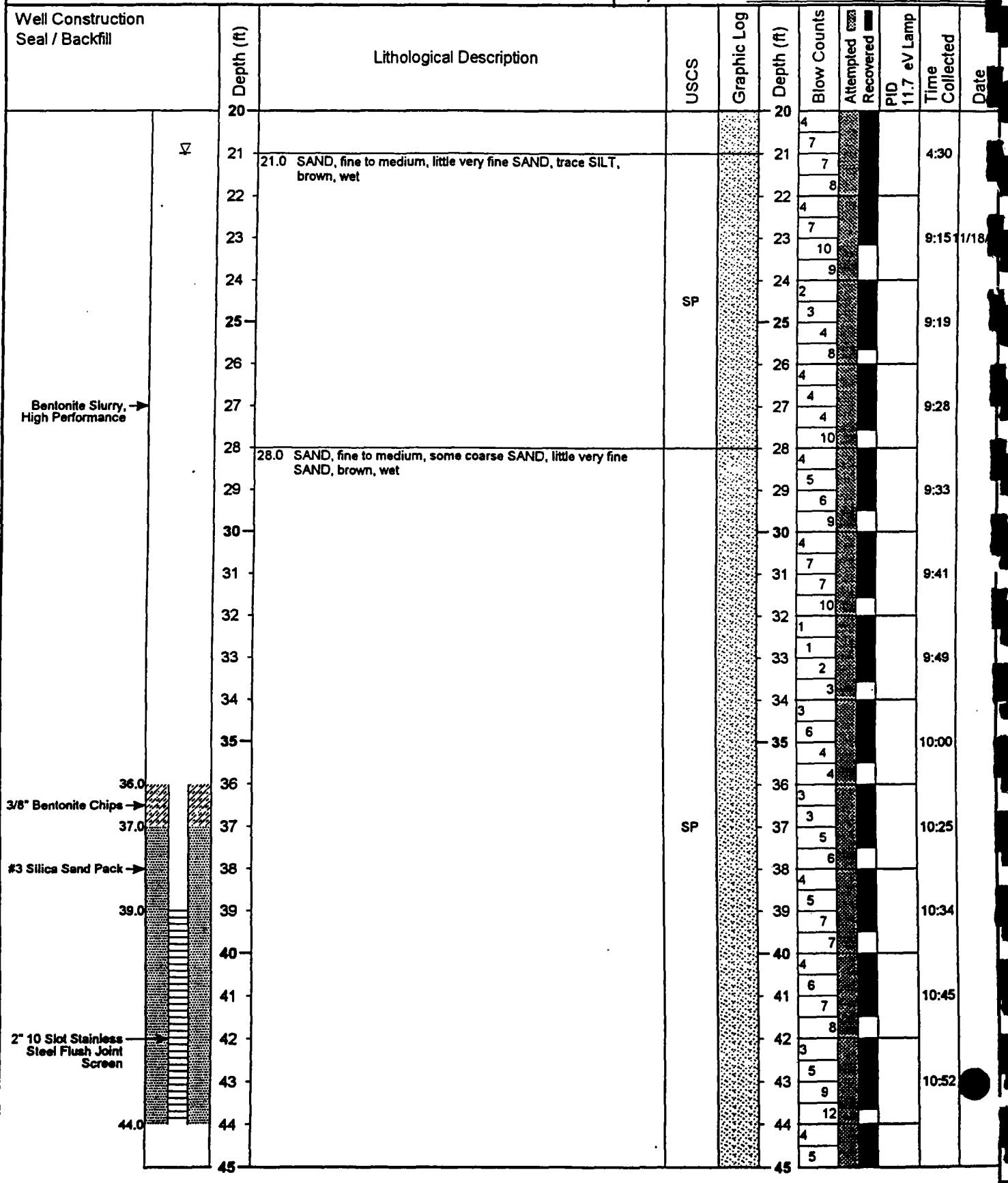
EARTH TECH

Well / Boring Log MW-97-04

Location and Comments:

Client:

Project Number:



WELL_LOG 24791_01.GPJ ETECH_GR.GDT 1/5/98

EARTH TECH

Well / Boring Log

MW-97-04

ocation and Comments:

Client:

Project Number:

Well Construction Seal / Backfill	Depth (ft)	Lithological Description	USCS	Graphic Log	Depth (ft)	Blow Counts	Attempted / Recovered	PID 11.7 eV Lamp	Time Collected	Date
	45				45	9			11:00	
	46	46.0 SAND, fine to medium, some very fine SAND, little SILT, brown, wet	SP		46	11				
	47				47	3			11:10	
	48				48	6				
	49	48.5 SAND, fine to medium, some coarse SAND, little very fine SAND, brown, wet	SP		49	9			11:20	
	50				50	8				
	51				51	2			11:30	
	52				52	4				
	53	52.7 SAND, fine to medium, some very fine SAND, trace SILT, brown, wet	SP		53	5			1:20	
	54				54	8				
	55	54.6 CLAY, soft, sandy, some SILT, moist	CL		55	4			1:30	
		55.1 SAND, fine to medium, some coarse SAND, little very fine SAND, wet	SP			3				
	56	55.8 CLAY, stiff, dry, little SILT, trace fine GRAVEL	CL		56	5				
	57				57	8			1:45	
	58				58	4				
	59				59	8			2:00	
	60				60	11				
	61				61	16			2:15	
	62	61.6 SAND, fine to medium, some SILT, brown, wet	SP		62	7				
	63	62.2 SILT, brown/gray, some CLAY, soft, moist	ML		63	9			2:30	
	64	63.2 CLAY, brown/gray, stiff, sandy, some fine GRAVEL, dry	CL		64	13				
	65				65	14			2:43	
	66				66	8				
	67				67	11			2:58	
	68				68	13				
	69				69	22			3:13	
	70				70	5				

EARTH TECH

Well / Boring Log — MW-97-04

Location and Comments:

Client:

Project Number:

Well Construction Seal / Backfill	Depth (ft)	Lithological Description	USCS	Graphic Log	Depth (ft)	Blow Counts	Attempted / Recovered	PID 11.7 eV Lamp	Time Collected	Date
	70				70	7				
	71				71	12 15 13			3:35	
	72	71.4 CLAY, gray, stiff, sandy, some fine GRAVEL, dry			72	4				
	73				73	8 13 17			4:05	
	74				74	5				
	75				75	11 16 20			4:25	
	76				76	7				
	77		CL		77	12 13 17			4:45	
	78				78	5				
	79				79	8 12 18			5:10	
	80				80	13				
	81				81	19 26 29			8:45	11/19/97
	82	82.0 CLAY, gray, stiff, some fine GRAVEL, dry			82	8				
	83				83	13 16 22			9:10	
	84				84	5				
	85				85	12 17 22			9:30	
	86				86	6				
	87				87	19 23 16			9:55	
	88				88	7				
	89				89	12 17 22			10:30	
	90				90	8				
	91				91	13 16 19			10:50	
	92				92	7				
	93				93	12 13 19			11:10	
	94				94	4				
	95				95	10				

EARTH TECH

Well / Boring Log — MW-97-04

ocation and Comments:

Client:

Project Number:

Well Construction Seal / Backfill	Depth (ft)	Lithological Description	USCS	Graphic Log	Depth (ft)	Blow Counts	Attempted / Recovered	PID 11.7 eV Lamp	Time Collected	Date
	95				95	14			11:30	
	96				96	22				
	97				97	10			1:55	
	98				98	15				
	99				99	18			2:15	
	100				100	24				
	101				101	12			2:40	
	102				102	18				
	103				103	22			3:05	
	104				104	29				
	105				105	13			3:30	
	106				106	17				
	107				107	18			4:40	
	108				108	24				
	109		CL		109	6			8:35	11/20/97
	110				110	9				
	111				111	13			9:20	
	112				112	18				
	113				113	7			9:45	
	114				114	11				
	115				115	15			10:15	
	116				116	18				
	117				117	8			10:55	
	118				118	13				
	119				119	16			11:20	
	120				120	23				

EARTH TECH

Well / Boring Log — MW-97-04

Location and Comments:

Client:

Project Number:

Well Construction Seal / Backfill	Depth (ft)	Lithological Description	USCS	Graphic Log	Depth (ft)	Blow Counts	Attempted / Recovered	PID 11.7 eV Lamp	Time Collected	Date
	120				120	6 14				
	121				121	9 13 23			1:05	
	122				122	6				
	123				123	10 13 23			1:55	
	124				124	9				
	125				125	10 11			2:25	
	126				126	14 8				
	127				127	9 12			3:10	
	128				128	13 8				
	129				129	9 13			3:35	
	130				130	12 9				
	131				131	10 11 11			4:00	
	132				132	11				
	133				133	11 13			4:55	
	134				134	18 9				
	135				135	11 14			5:20	
	136	E.O.B. @ 136'			136	15				
	137				137					
	138				138					
	139				139					
	140				140					
	141				141					
	142				142					
	143				143					
	144				144					
	145				145					

WELL_LOG 24791_01.GPJ ETECH_GR.GDT 1/5/98

EARTH TECH

Log of Well / Boring MW-97-05

State	County	Township/City	T	R	Section	Fraction

Location and Comments:

Groundwater Encountered
While Drilling at: 28.00 bgs ▽

Water Level Data

Date	Time	Depth to Water (bgs/TOC)
12/6/97	8:00 am	▽ 22.45 bgs
		▽
		▽

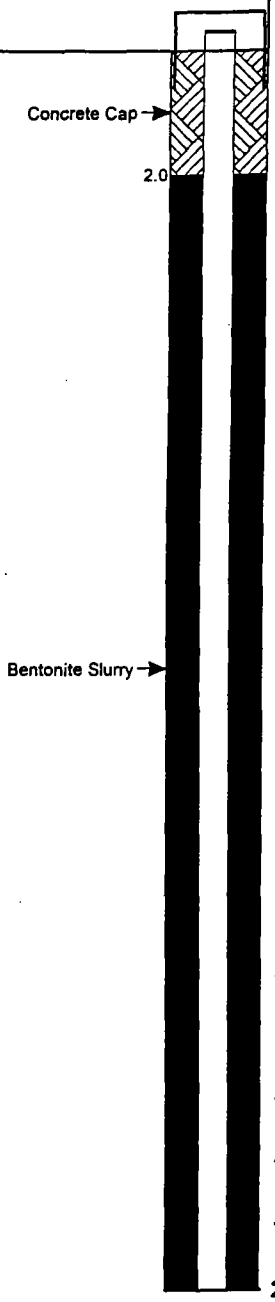
TOC Elev: _____ Grd Elev: _____
Horiz. Coord:

Protective Casing Material: 4" x 4" Steel
Diameter: 4" x 4" Cap Type: J-Plug
Height Above Ground: ~2.5'
Locked: X Yes __ No Bolted: __ Yes X No

Well Development
Date: 12/5/97 Time: 4:00 pm
Volume: 90 gal. Method: Air Lift
Comments: Water became very clear

Client:
Project Number:
Date: Started 11/24/97 Finished 12/4/97
Time: Started 12:45 pm Finished 5:00 pm
Contractor: Carlo Environmental Technologies, Inc.
Address: 44907 Trinity Drive
Clinton Twp., MI 48038
Equipment: CME 85
Crew Chief: Chad McDonnell/Don Bond
Logged By: Kurt Osterman/Tom Sampson/Brent Bell

Drilling Method(s)	Depth	Borehole Dia.
4.25" HSA	138'	8.25"



Depth (ft)	Lithological Description	USCS	Graphic Log	Depth (ft)	Blow Counts	Attempted / Recovered	PID 11.7 eV Lamp	Time Collected	Date
0	0.0 Natural organics, grass	Pt		0	2				
	0.5 SAND, medium to fine, some coarse SAND, brown, moist				2 4 5		0	1:00	11/24/97
5		SP		5	3 4 4 5 / 3 3 5 6		0	1:10 / 1:13	
10	10.0 SAND, medium to fine, trace coarse SAND, light brown, moist	SP		10	3 5 7 8 / 4 5 7 6		0	1:20 / 1:25	
15	14.0 SAND, medium to fine, light brown, moist	SP		15	4 6 6 8 / 2 4 4 3 / 2 2 2 2		0	1:30 / 1:37 / 1:45	
20	18.0 SAND, medium to fine, medium to fine GRAVEL, brown, moist	SP		20	3 4 4 5 / 4 6 6 9		0	1:48 / 2:14	

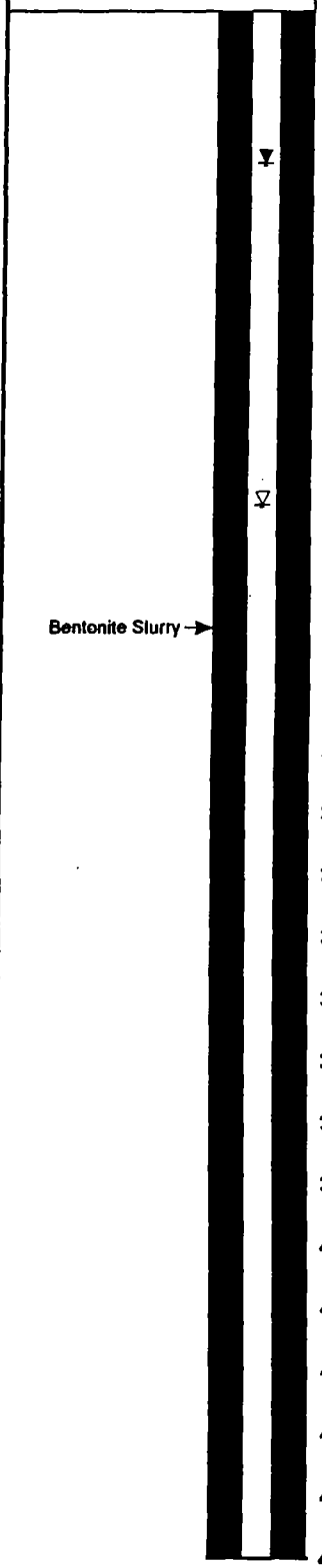
EARTH TECH

Well / Boring Log — MW-97-05

Location and Comments:

Client:

Project Number:



Depth (ft)	Lithological Description	USCS	Graphic Log	Depth (ft)	Blow Counts	Attempted / Recovered	PID 11.7 eV Lamp	Time Collected	Date
20				20	6				
21	21.0 SAND, medium to fine, little fines, brown, moist	SP		21	6 8 9		0	2:18	
22				22	7				
23				23	9 10 10		0	2:31	
24				24	5				
25				25	8 10 13		0	2:36	
26				26	5				
27				27	9 11 12		0	2:45	
28	28.0 SAND, medium to fine, brown, wet	SP		28	4				
29				29	8 12 15			9:05	11/25/9
30	30.0 SAND, medium to fine, some coarse SAND, brown, wet	SP		30	6				
31				31	5 8 12			9:10	
32				32	8				
33				33	11 16 15			9:20	
34				34	2				
35				35	5 7 8			9:30	
36				36	3				
37				37	6 10 15			9:35	
38				38	3				
39				39	5 8 10			9:46	
40				40	4				
41				41	8 9 12			9:56	
42	42.0 CLAY, soft, gray	CL		42	9				
43	42.5 SAND, medium to fine, very fine SAND, brown, wet	SP		43	11 15 22			10:12	
44	44.0 SAND, fine, some SILT, brown, wet	SP		44	3 9				
45				45					

WELL_LOG 24791_01.GPJ ETECH_GR.GDT 1/8/98

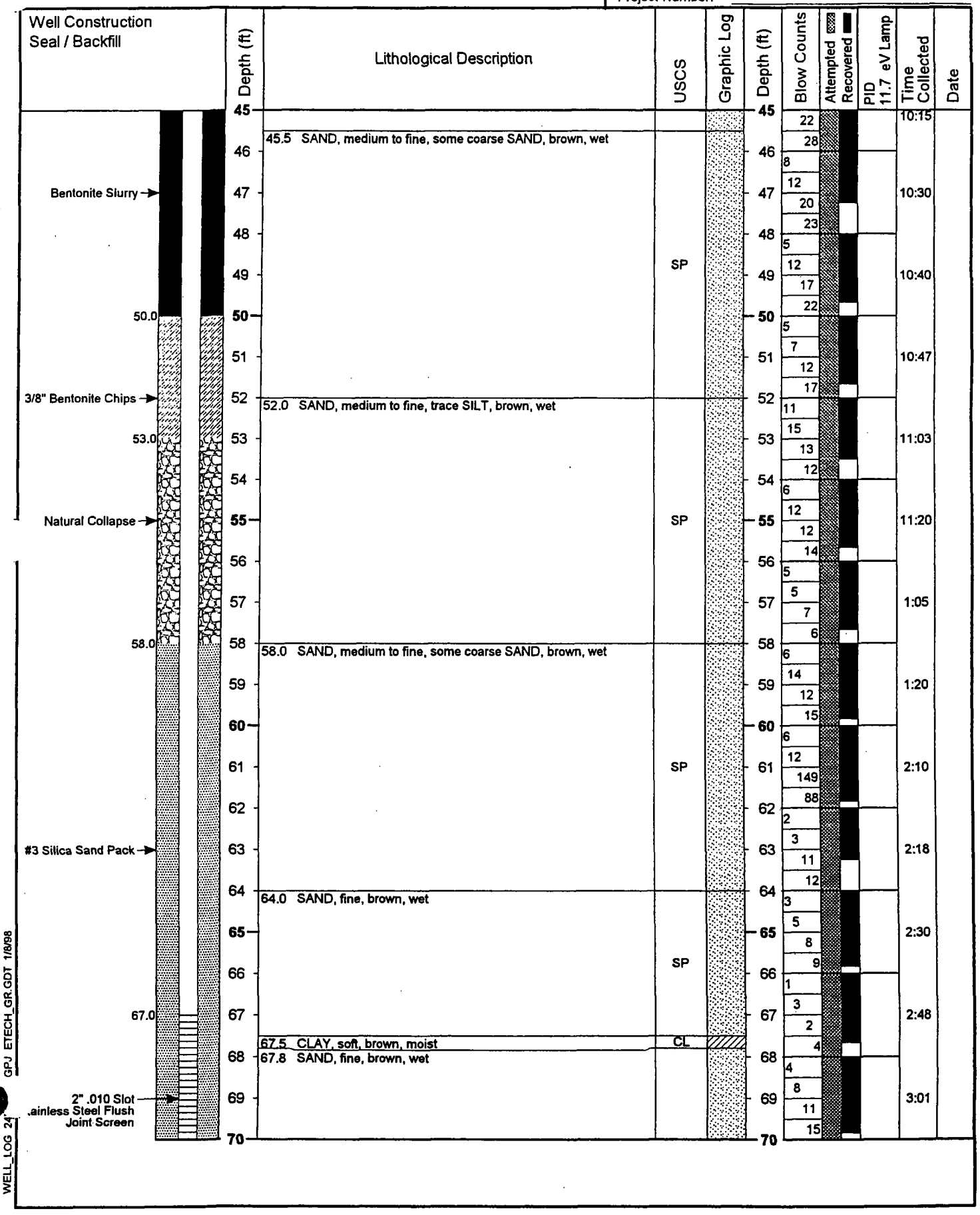
EARTH TECH

Well / Boring Log MW-97-05

ocation and Comments:

Client:

Project Number:



GPJ ETECH_GR.GDT 1/8/98

WELL_LOG 24

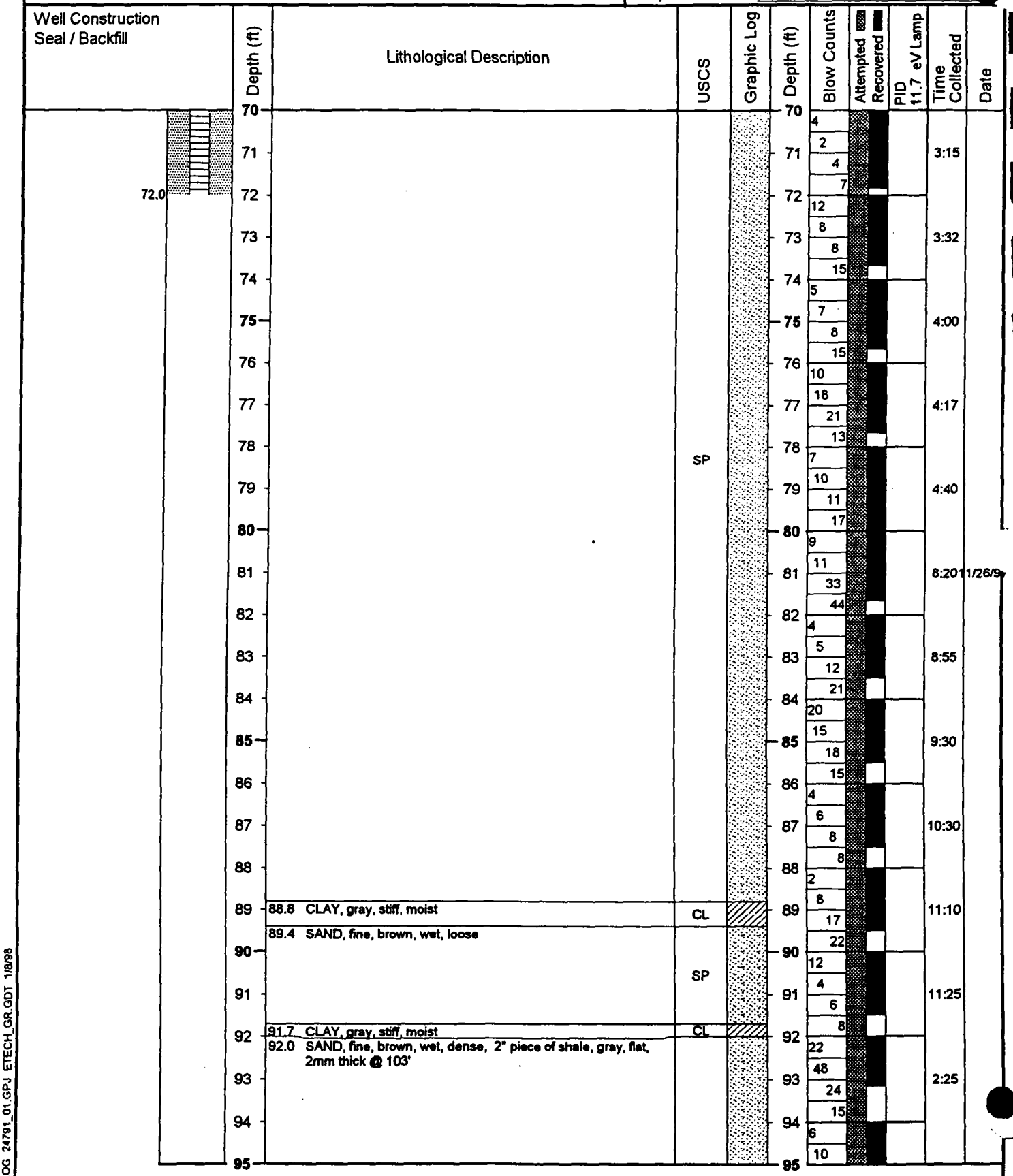
EARTH TECH

Well / Boring Log MW-97-05

Location and Comments:

Client:

Project Number:



EARTH TECH

Well / Boring Log

MW-97-05

ocation and Comments:

Client:

Project Number:

Well Construction Seal / Backfill	Depth (ft)	Lithological Description	USCS	Graphic Log	Depth (ft)	Blow Counts	Attempted / Recovered	PID 11.7 eV Lamp	Time Collected	Date
	95		SP		95	12, 17			2:15	
	96				96					
	97				97				No Sample	
	98				98	5				
	99				99	7, 7, 9			4:50	
	100				100	11, 14, 17, 21			5:10	
	101				101					
	102				102	4, 7, 17, 10			11:30	12/2/97
	103				103					
	104				104	28, 95, 57, 23			11:50	
	105				105					
	106				106	12, 4, 5, 4			3:00	12/3/97
	107				107					
	108	107.5 CLAY, gray to brown, stiff, damp, brown fine 1 mm SAND lens, CLAY, brown, below sand lens	CL		108	5, 4, 4, 6			3:25	
	109	108.5 SAND, fine, brown, wet, loose	SP		109					
	110	109.5 CLAY, gray, stiff, damp	CL		110	10, 15, 17, 26			3:45	
	111	110.0 SAND, fine, brown, wet	SP		111					
	112	112.0 CLAY, brown, stiff, damp, occasional fine GRAVEL/coarse SAND			112	6, 9, 14, 18			4:10	
	113				113					
	114				114	9, 13, 18, 24			4:30	
	115				115					
	116				116	7, 9, 12, 14			4:45	
	117				117					
	118				118	11, 15, 20			9:03	12/4/97
	119				119					
	120				120					

EARTH TECH

Well / Boring Log MW-97-05

Location and Comments:

Client:

Project Number:

Well Construction Seal / Backfill	Depth (ft)	Lithological Description	USCS	Graphic Log	Depth (ft)	Blow Counts	Attempted / Recovered	PID 11.7 eV Lamp	Time Collected	Date
	120				120	3 15				
	121				121	12 21			9:25	
	122				122	22 9				
	123				123	14 15			9:40	
	124				124	24 12				
	125		CL		125	22 25			10:10	
	126				126	30 14				
	127				127	26 31			10:30	
	128				128	39 16				
	129				129	23 29			11:00	
	130				130	22 7				
	131				131	12 17			11:30	
	132				132	27 13				
	133				133	16 21			11:50	
	134				134	23 16				
	135				135	22 23			12:25	
	136				136	25 13				
	137				137	15 18			12.40	
	138				138	22				
	139	*E.O.B. @ 138'*			139					
	140				140					
	141				141					
	142				142					
	143				143					
	144				144					
	145				145					

WELL_LOG 24791_01.GPJ ETECH_GR.GDT 1/8/98

Well C

Land surface elevation: 636 feet

	Depth	Thickness
Medium sand	0 - 45	45
Medium sand, trace of gravel	45 - 50	5
Sand, medium	50 - 55	5
Sand, medium, trace clay	55 - 65	10
Red clay	65 - 70	5

CIDCO, INC.

1909 OAKWOOD AVENUE
BLOOMINGTON, ILLINOIS 61

Field Record of Exploration

MW-6

Contracted With HOOKER CHEMICAL--NO TAGUE, MICHIGAN Boring No. MW-6

Project Name MONITORING WELLS Contract No.

Location perimeter

Datum Hammer Wt. Hammer Drop Hole Dia. 8"

Surface Elev. Core Dia. Casing

Date Started 11-11-81 Completed 11-12-81 Drilling Method HSA

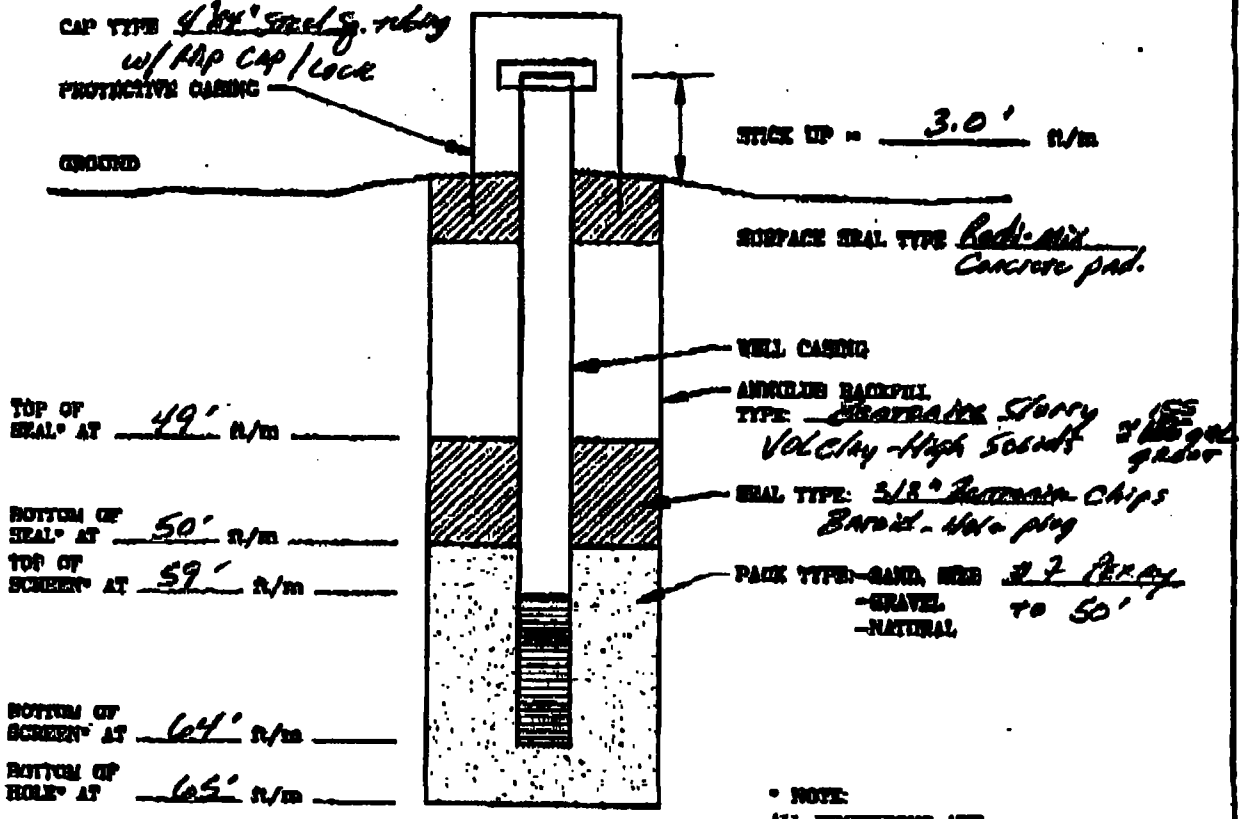
Samples			Log
	WATER SAMPLES		Description
No.	Depth	Purge Time	Br. f-m sand
1	45.5-47.5	10 min.	
2	55.5-57.5	10 min.	
3	65.5-67.5	10 min.	Gray clay
4	75.5-77.5	10 min.	
5	85.5-87.5	10 min.	
6	95.5-97.5	10 min.	
	SOIL SAMPLES		END OF BORING 99.5'
7	97.0-99.5		

WATER 11-11 & 11-12-81

DD 44.0' 2:20pm
BAR 94.0' 11:10am
AAR dry 43.0' 12:05pm

OVERBURDEN INSTRUMENTATION LOG

PROJECT NAME Oxy-USA
PROJECT NUMBER 9920
CLIENT Miller Springs Remediation
LOCATION Montague, Mi.
HOLE DESIGNATION MW-03-01
DATE COMPLETED 09-09-03
DRILLING METHOD 2.5" Rotary
CRA SUPERVISOR Chris Johnson/Brent Bell



SCREEN TYPE: ☑ continuous slot (Wire Wound) ☐ perforated ☐ louvre ☐ other: _____
SCREEN MATERIAL: ☑ stainless steel ☐ plastic ☐ other: _____
SCREEN LENGTH: 5.0 ft/m SCREEN DIAMETER: 2 in/cm SCREEN SLOT SIZE: .012"
WELL CASING MATERIAL: Stainless Steel (304) WELL CASING DIAMETER: 2" in/cm
HOLE DIAMETER: 7 1/8" Rotary pedle bit. -Reverse Circulation drilled w/ Reverse.
DEVELOPMENT: METHOD: Air. DURATION: 25 min @ 1000 psi.

CRA FORM FD-18

STRATIGRAPHY LOG (OVERBURDEN)

PAGE 1 OF 2

* Replacement well for Mine Laundry well: MW-93-01

PROJECT NAME OXY-USA
PROJECT NUMBER 9970
CLIENT Miller Springs Remediation
LOCATION Montague, MI.

DRILLING CONTRACTOR Rayner Co. Inc.
DRILLER Charlie Kane
SURFACE ELEVATION Nor MW-200' W of 93-01
WEATHER (A.M.)
(P.M.)

BOREHOLE DESIGNATION MW-03-01
DATE/TIME STARTED 09-02-03 / 1030
DATE/TIME COMPLETED 09-02-03 / 1600
DRILLING METHOD 7.5" Rotary
CRA SUPERVISOR Chris Pekarske / Brent Burkley

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/mbgs) FROM	AT	TO	SAMPLE DESCRIPTION — ORDER OF DESCRIPTORS: PRIMARY COMPONENT/SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY (POCKET PENETROMETER), GRADATION/STRUCTURE, COLOUR MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS	SAMPLE DETAILS: SAMPLING METHOD	PENETRATION RECORD SPLIT SPOON BLOWS 6"	6"	6"	6"	RECOVERY	PID (ppm)	ANALYSIS CHEMICAL	GRAIN SIZE
Grade		0.5'	topsoil - dark brown Sand, Root band - in tree woods.	Grab	N/A					0.0		
0.5'		15.0'	Sand, fine, trace med. & Light brown-tan. dry.							0.0		
15.0'		20.0'	Sand, fine, trace med, trace coarse, lt. Lt. brown-tan - dry - trace more							0.0		
20.'		25.'	Sand, fine, Some med, Some Coarse, V. Lt. Brown & Little fine red gravel							0.0		
25.0'		35.'	Sand, fine, Little med-Coarse. V. Lt. Brown. & Little fine gravel							0.0		
35.0'		45.'	Sand, fine, Trace med-Coarse. V. Lt. Brown.							0.0		
45.0'		55'	Sand, fine, V. Lt. Brown.							0.0		
55.'		60'	Sand, fine, Trace med-Coarse, Trace Little Silt - Silty Clays. Sat.							0.0		
60.'		65'	Sand, fine, Trace med-Coarse, Trace - None Silt - Silty Clay.							0.0		

DEPTH OF BOREHOLE CAVING _____ DEPTH OF FIRST GROUNDWATER ENCOUNTER ~35' TOPSOIL THICKNESS 0.5'
WATER LEVEL IN OPEN BOREHOLE ON COMPLETION _____ AFTER ____ HOURS ____
COMPLETION DETAILS: Target Well Depth is 64' - Overdrilled to 66'

NOTES AND COMMENTS

CRA

1001 (29) SEPT 15/87(W) REV.D (F-91)

EARTH TECH

Well / Boring Log — MW-97-02

State	County	Township/City	T	R	Sec.	Fraction
MI	Muskegon	Montague	12 N	17 W	31	SE 1/4, SE 1/4

Location and Comments:

Groundwater Encountered
While Drilling at: 41.0 bgs

Water Level Data

Date	Time	Depth to Water (bgs/TOC)
11/26/97	10:50 am	44.85 TOC

TOC Elev: ____ Grd Elev: ____
Horiz. Coord:

Well Development
Date: 12/2/97 Time: 5:00 pm
Volume: ____ Method: Air lift
Comments:

Protective Casing Material: Steel
Diameter: 4" Cap Type: ____
Height Above Ground: ~2.5'
Locked: X Yes __ No Bolted: __ Yes X No

Client: ____
Project Number: ____
Date: Started 11/3/97 Finished 11/5/97
Time: Started 11:00 am Finished 3:00 pm
Contractor: Carlo Environmental Technologies, Inc.
Address: 44907 Trinity Drive
Clinton Twp., MI 48038
Equipment: CME 85
Crew Chief: Don Bond
Logged By: Don Johnson

Drilling Method(s)	Depth	Borehole Dia.
4.25" HSA	142'	8.25"

Well Construction Seal / Backfill

Concrete Cap
2.0
Bentonite Slurry
2" Stainless Steel Flush Joint

Depth (ft)	Lithological Description	USCS	Graphic Log	Depth (ft)	Blow Counts	Attempted / Recovered	PID 11.7 eV Lamp	Time Collected	Date
0	0.0 Natural organics, some dark brown SAND	Pt		0	1				
1	0.5 SAND, medium to fine, some coarse SAND, trace fine GRAVEL, brown, dry			1	1 1 1		0	11:20	11/3/97
2				2	3				
3				3	3 3 3		0	11:23	
4				4	1				
5		SP		5	2 2 2		0	11:27	
6				6	2				
7				7	2 3		0	11:30	
8				8	4 1				
9				9	2 1		0	11:35	
10	10.0 SAND, medium to coarse, some fine to medium GRAVEL, little fine SAND, light brown, dry			10	2				
11				11	2 2 2		0	11:40	
12		SP		12	2				
13				13	3 3 5		0	11:42	
14				14	3				
15	14.2 SAND, fine to medium, little coarse SAND, some fine GRAVEL, light brown			15	4 4 3		0	11:45	
16		SP		16	4				
17				17	4 5 4		0	11:48	
18	18.0 SAND, fine to very fine, little medium SAND, trace fine GRAVEL, light brown, dry			18	3				
19				19	3 3 3		0	11:55	
20				20					

WELL_LOG 2*.GPJ ETECH_GR.GDT 1/8/98

EARTH TECH

Well / Boring Log MW-97-02

Location and Comments:

Client:

Project Number:

Well Construction Seal / Backfill	Depth (ft)	Lithological Description	USCS	Graphic Log	Depth (ft)	Blow Counts	Attempted / Recovered	PID 11.7 eV Lamp	Time Collected	Date
	20				20	2				
	21				21	2				
	22		SP		22	3		0	11:59	
	23				23	4				
	24				24	2				
	25				25	2		0	12:01	
		25.0 SAND, very fine to fine, little SILT, trace medium SAND, light brown, dry				2				
	26				26	2				
	27				27	3		0	12:05	
	28				28	5				
	29				29	5				
	30		SP		30	2		0	12:13	
	31				31	2				
	32				32	3				
	33				33	4				
	34				34	2		0	12:16	
	35				35	2				
		35.0 SAND, fine to medium, little fine to medium GRAVEL, trace SILT, light brown, dry				2				
	36				36	3				
	37				37	4		0	12:20	
	38		SP		38	4				
	39				39	4				
	40				40	4				
	41				41	4		0	12:23	
		41.0 SAND, fine to medium, little coarse SAND, trace fine GRAVEL, wet				5				
	42				42	5				
	43				43	2		0	12:30	
	44		SP		44	3				
	45				45	5				
						7				
						6				
						8				
						8		0	12:35	
						9				
						1				
						5				
			SP			6		0	12:40	
						7				
						2				
						5				
						7			12:50	
						9				
						3				
						5				
						7			12:55	
			SP			7				
						5				
						5				

WELL_LOG 24791_01.GPJ ETECH_GR.GDT 1/8/98

EARTH TECH

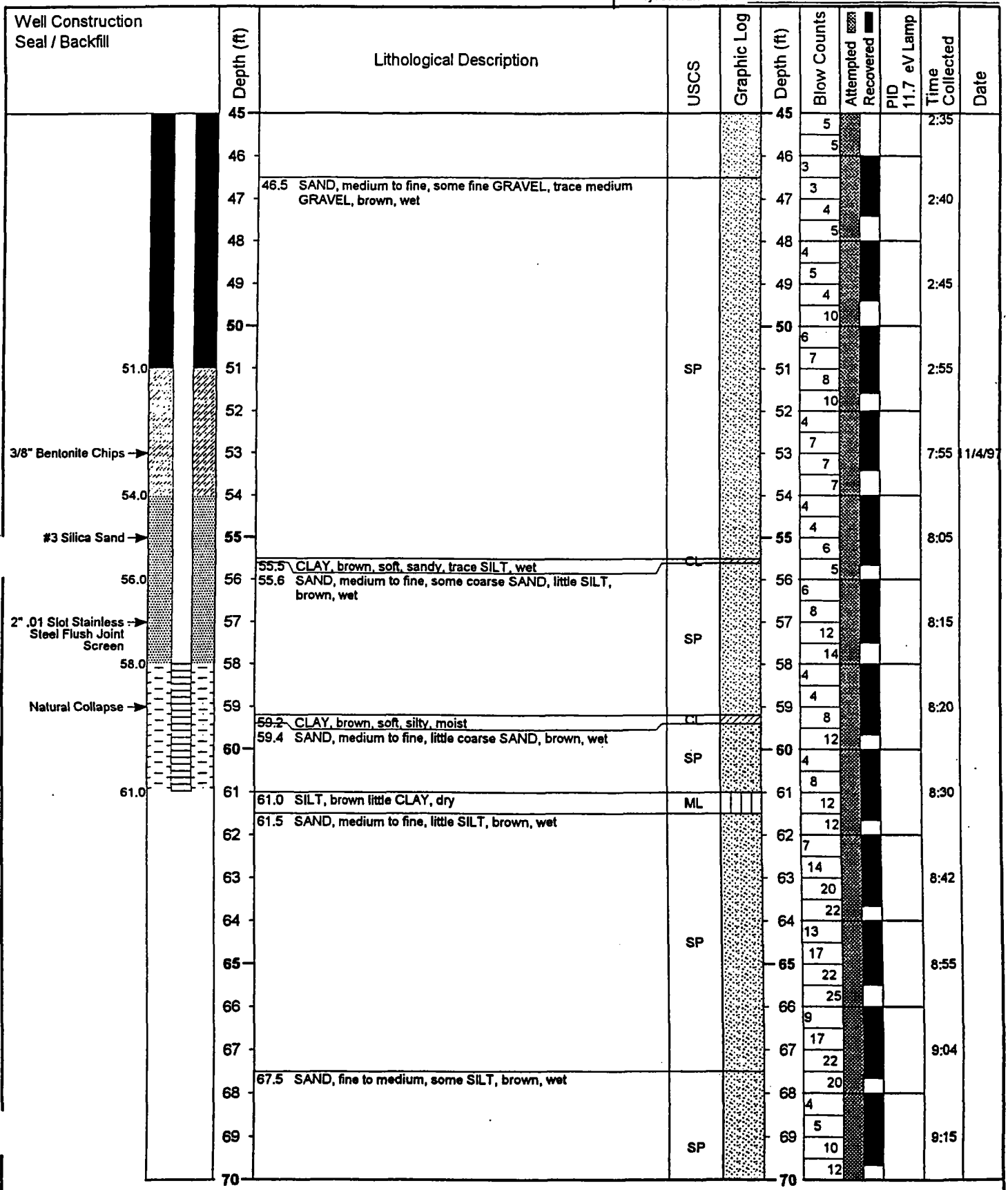
Well / Boring Log

MW-97-02

Location and Comments:

Client:

Project Number:



EARTH TECH

Well / Boring Log MW-97-02

Location and Comments:

Client:

Project Number:

Well Construction Seal / Backfill	Depth (ft)	Lithological Description	USCS	Graphic Log	Depth (ft)	Blow Counts	Attempted / Recovered	PID 11.7 eV Lamp	Time Collected	Date
	70				70	7				
	71	71.0 CLAY, brown, silty, soft, moist	CL		71	8 15			9:30	
	72	71.5 SAND, fine to medium, little SILT, trace CLAY, brown, wet	SP		72	20 8				
	73	73.0 SAND, fine to medium, little coarse SAND, some SILT, brown, wet			73	11 19			9:45	
	74				74	20 9				
	75				75	14 18			10:00	
	76				76	34 7				
	77				77	9 18			10:25	
	78				78	26 6				
	79		SP		79	6 17			10:35	
	80				80	20 4				
	81				81	8 12			10:42	
	82				82	22 14				
	83				83	23 35			10:55	
	84				84	47 9				
	85	84.7 CLAY, brown, silty, soft, moist	CL		85	9 17			11:15	
	86	84.9 SAND, fine to medium, little SILT, trace coarse SAND, brown, wet			86	20 7				
	87		SP		87	17 20			11:30	
	88				88	22 5				
	89	89.0 CLAY, brown, soft, silty, moist	CL		89	6 15			11:45	
	90	89.1 SAND, fine to medium, little SILT, trace coarse SAND, brown, wet			90	20 7				
	91				91	7 21			12:00	
	92				92	20 10				
	93		SP		93	24 40			12:15	
	94				94	48 27				
	95				95	38				

EARTH TECH

Well / Boring Log MW-97-02

ocation and Comments:

Client:

Project Number:

Well Construction Seal / Backfill	Depth (ft)	Lithological Description	USCS	Graphic Log	Depth (ft)	Blow Counts	Attempted / Recovered	PID 11.7 eV Lamp	Time Collected	Date
	95				95	70			12:30	
						0				
	96				96	11				
	97				97	20			12:50	
						27				
	98	97.7 SAND, medium to coarse, little fine SAND, some fine GRAVEL, dark brown, wet	SP		98	30				
						5				
	99	~~99.0~~ CLAY, sandy, soft, little SILT, moist	CL		99	4			1:00	
		99.2 SAND, fine to medium, little coarse SAND, trace SILT, brown, wet				22				
	100				100	30				
						11				
	101				101	29			1:15	
						30				
	102				102	38				
						4				
	103		SP		103	3			1:40	
						25				
	104				104	30				
						13				
	105				105	26			1:50	
						32				
	106				106	40				
						14				
	107				107	22			2:10	
						40				
	108	107.5 SILT, gray, some CLAY, little very fine to fine SAND, wet	ML		108	45				
						8				
	109	108.5 SAND, very fine to fine, some SILT, trace CLAY, gray, wet			109	12			2:40	
						18				
	110		SP		110	19				
						9				
	111				111	11			3:00	
		111.2 CLAY, medium, stiff, little SILT, gray, dry, high plasticity				13				
	112		CL		112	19				
						11				
	113	112.5 SAND, very fine to fine, some SILT, trace medium SAND, brown/gray, wet			113	17			3:20	
						40				
	114		SP		114	52				
						8				
	115	115.0 CLAY, gray, very silty, trace fine SAND, stiff, dry			115	10			3:35	
						12				
	116				116	16				
						10				
	117				117	14			3:50	
						19				
	118				118	22				
			CL			12				
	119				119	16			4:10	
						18				
	120				120					

EARTH TECH

Well / Boring Log MW-97-02

Location and Comments:

Client:

Project Number:

Well Construction Seal / Backfill	Depth (ft)	Lithological Description	USCS	Graphic Log	Depth (ft)	Blow Counts	Attempted / Recovered	PID 11.7 eV Lamp	Time Collected	Date
	120				120	13 25				
	121				121	15			4:30	
						20				
	122				122	21				
		122.0 SAND, very fine, to fine, some SILT, trace CLAY, gray, wet				16				
	123		SP		123	15			4:50	
						19				
		123.5 CLAY, gray, stiff, some SILT, dry				25				
	124		CL		124	17				
		124.5 SAND, very fine to fine, gray, wet	SP			22				
	125	124.8 CLAY, gray, stiff, some SILT, dry	CL		125	21			5:05	
		125.5 SAND, gray, fine to very fine, some SILT, trace CLAY, wet				30				
	126		SP		126	9				
						11				
	127	127.0 CLAY, gray, trace fine to medium GRAVEL, dry			127	10			9:15	1/5/9
						14				
	128				128	8				
	129				129	10			9:50	
						10				
	130				130	12				
						6				
	131				131	9			10:15	
						13				
	132				132	18				
						6				
	133				133	9			10:45	
						14				
	134				134	20				
			CL			10				
	135				135	10			11:15	
						12				
	136				136	17				
						10				
	137				137	13			11:40	
						18				
	138				138	27				
						12				
	139				139	18			12:05	
						20				
	140				140	25				
						12				
	141				141	15			12:35	
						20				
	142				142	25				
		E.O.B. @ 142'								
	143				143					
	144				144					
	145				145					

CIBCO, INC. BLOOMINGTON, ILLINOIS 61

Field Record of Exploration WW-24

Contracted With [illegible] Boring No. WW-24

Project Name [illegible] Contract No.

Location

Datum Hammer Wt. Hammer Drop Hole Dia. 2"

Surface Elev. Core Dia. Casing

Date Started 12-3-81 Completed 12-4-81 Drilling Method HSA

Samples

WATER SAMPLES

No.	Depth	Purge Time
1	35.5-37.0	15 min.
2	45.5-47.5	15 min.
3	55.5-57.5	20 min.
4	65.5-67.5	10 min.
5	75.5-77.5	10 min.
	85.5-87.5	10 min.

SOIL SAMPLES

7	101.5-104.0	

PUMP SET @ 48.0'
SCREEN SET @ 50.0'-60.0'
3' of stand pipe = amount of 3" pipe set above ground

Log

Description	
Br. f-m sand dry	7
Br. f-m sand wet	7
Gray clay moist	7
END OF BORING 104.0'	

WATER 12-3 - 12-4-81

DD 30.0' 11:30am
BAR 29.5' 6:00pm
ANR caved 25.5' 8:30am

CIDCO, INC.

1909 OAKWOOD AVENUE
BLOOMINGTON, ILLINOIS 6

Field Record of Exploration

Contracted With [illegible] Boring No. WW-13

Project Name MONITORING WELLS Contract No.

Location [illegible]

Datum Hammer Wt. Hammer Drop Hole Dia. 8"

Surface Elev. Core Dia. Casing

Date Started 11-12-81 Completed 11-12-81 Drilling Method HSA

Samples			Log
	WATER SAMPLES		Description
No.	Depth	Purge Time	Br. f-m sand
1	35.5-37.5	10 min.	
2	45.5-47.5	10 min.	
3	55.5-57.5	10 min.	Clay & silt layers
4	65.5-67.5	10 min.	
5	75.5-77.5	10 min.	
6	85.5-87.5	10 min.	Gray clay
	SOIL SAMPLES		
7	87.5-89.5		
			END OF BORING 89.5'

PUMP SET @ 50.0'
SCREEN SET @ 52.0'-62.0'
3' of standpipe = amount of 3" pipe set above ground

WATER 11-12 & 11-13-81

DD 34.0' 2:40pm
BAR 32.5' 7:45pm
AAR dry 33.0' 8:30am

0000122

WELL #1 (/)

WATER WELL RECORD
ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

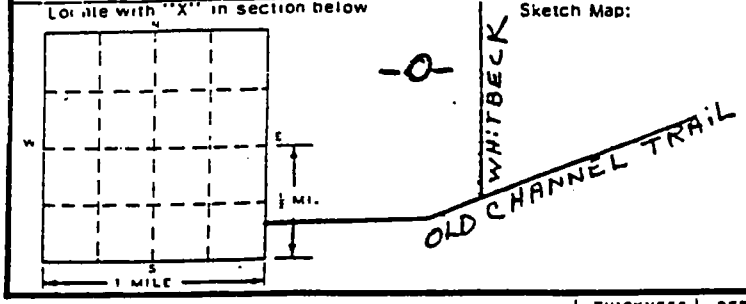
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Muskegon	Montague	¼ ¼ ¼	30	11-12 N/S.	17 W

Distance And Direction from Road Intersections: 175' West of Whitbeck Rd.

Street address & City of Well Location: Whitbeck Rd., Montague, Mi.

Locate with "X" in section below



Sketch Map:

3 OWNER OF WELL: Hooker Industrial Chemic

Address: Old Channel Trail, Montague, Mic

4 WELL DEPTH: (completed) 92 ft. Date of Completion: March 17, 1978

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. 4 in. to 86 ft. Depth; ____ in. to ____ ft. Depth

Height: Above/Below Surface 1 ft. Weight 11 lbs./ft. Drive Shoe? Yes ☒ No ☐

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Sand	8	8
Sand & Gravel	22	30
Coarse Sand	25	55
Gravel	5	60
Sand	9	69
Clay & Gravel	6	75
Sand	17	92

USE A 2ND SHEET IF NEEDED

8 SCREEN:
Type: Plastic Dia.: 4"
Slot/Gauze 12 Length 6'
Set between 86 ft. and 92 ft.
Fittings:

9 STATIC WATER LEVEL
44 ft. below land surface

10 PUMPING LEVEL below land surface
____ 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) 2.0 Chlorides (Cl) 3,250.00
Hardness 60 grs. 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
____ feet ____ Direction ____ Type
Well disinfected upon completion ☐ Yes ☐ No

15 PUMP: ☐ Not installed
Manufacturer's Name Gould
Model Number 7J03 HP 3/4 Volts 110
Length of Drop Pipe 76 ft. capacity 9 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.

C.S. Berger Co., Inc. 0384
REGISTERED BUSINESS NAME REGISTRATION NO.

Address 3311 Three Mile Rd., N.W., Grand Rapi

Signed ____ Date 5-1-78
AUTHORIZED REPRESENTATIVE

D67d 100M (Rev. 12-68)

GEOLOGICAL SURVEY COPY

0000088

	Depth	Thickness
Well B		
Land surface elevation: 642 feet		
Medium sand	0 - 15	15
Medium sand, traces of gravel	15 - 40	25
Medium sand gravel	40 - 55	15
Medium sand	55 - 70	15
Medium sand, traces of gravel	70 - 77	7

CIDCO, INC.

1909 OAKWOOD AVENUE
BLOOMINGTON, ILLINOIS 61

Field Record of Exploration

MW-2

Contracted With ROGER ORMOND--...TAGUE, MICHIGAN Boring No. MW-2

Project Name MONITORING WELLS Contract No.

Location [illegible] plan

Datum Hammer Wt. Hammer Drop Hole Dia. 2"

Surface Elev. Core Dia. Casing

Date Started 11-15-81 Completed 11-16-81 Drilling Method HSA

Samples

WATER SAMPLES

No.	Depth	Purge Time
1	50.5-52.5	10 min.
2	60.5-62.5	10 min.
3	70.5-72.5	10 min.
4	80.5-82.5	10 min.
5	90.5-92.5	10 min.
	100.5-102.5	10 min.
7	110.5-112.5	10 min.

SOIL SAMPLES

8	113.0-114.5

PUMP SET 80.0'
SCREEN SET 82.0'-92.0'
3' of standpipe = amount of 3" pipe set above ground

Log

Description	
Br. f-m sand	0
	1
Gray clay	1
END OF BORING 114.5'	

WATER 11-15 & 11-16-81

DD 46.5' 4:45pm
BAR 40.0' 11:30am
AAR dry 40.0' 3:30pm

EARTH TECH

Well / Boring Log

Well/Boring No. SB-95-1
Client: Occidental Chemical Company
Project No.: 23123.00
Date: Started: 10/09/95 Finished: 10/11/95
Time: Started: 03:20 PM Finished: 04:00 PM

State	County	Township	Fraction	Section	T	R
MI	Muskegon	Montague		30	12N	17W

Contractor: Stearns Drilling Company
Address: 6974 Hammond
Dutton MI 49316
Equipment: CME 1050
Crew Chief: Darryl Krause
ET Supervisor: Cathie Cotton

Location: Former P#1

Drilling Method(s)	Depth
4-1/4 ID HSA	134.0'
2"x 2" Split Spoon	136.0'

Ground Surface Elevation (feet): 636.40

Grouting/Seal	
Depth/To	Material/Method
0.0-186.0'	Bentonite Grout

Remarks:

Water Level: 26 ft. Below Ground

Thick-ness (feet)	Depth to base (feet)	USCS *	Lithologic Description	Sample Depth	Blow Counts 6"	12"	18"	24"	PID OVM 580B Headspace	Background
18.8	18.8	SP	SAND, medium to fine, loose, light brown, moist	1.0 - 2.5'	2	6	9	-	0	0
0.8	19.6	SW	SAND, medium-fine to medium-coarse, little coarse sand, trace fine gravel, loose, brown,	3.5 - 5.0'	2	4	5	-	0	0
			very moist	6.0 - 7.5'	3	5	6	-	0	0
9.6	29.2	SP	SAND, fine, loose, light brown, moist to wet at 26.0'	8.5 - 10.0'	2	4	7	-	0	0
0.4	29.6	CL	CLAY, some silt, very soft, cohesive, brown, moist	11.0 - 12.5'	2	4	6	-	0	0
0.4	30.4	SP	SAND, fine, loose, wet, brown	13.5 - 15.0'	2	3	4	-	0	0
1.2	31.2	CL/ML	CLAY, very silty, soft, crumbly, brown, moist	16.0 - 17.5'	1	1	2	-	0	0
10.3	41.5	SP	SAND, very fine, some silt, well compacted, brown, wet	18.5 - 20.0'	1	2	4	-	4.1	0
0.5	42.0	ML/CL	SILT, some clay, soft, brown, moist	21.0 - 22.5'	2	2	3	-	2	0
39.4	81.4	SP	SAND, fine, loose, light brown, wet	23.5 - 25.0'	2	2	3	-	7.5	0
0.4	81.8	CL	CLAY, firm, cohesive, brown, moist	26.0 - 27.5'	1	2	3	-	13.7	0
9.9	91.7	SP	SAND, fine, little medium-fine sand, loose, light brown, wet	28.0 - 30.0'	2	2	2	3	10.9	0
0.3	92.0	ML	SILT, some very fine sand, trace clay, softly compacted, crumbly, brown, moist	30.0 - 32.0'	4	8	8	13	28	0
17.0	109.0	SP	SAND, fine, lightly compacted, light brown, wet	32.0 - 34.0'	4	6	8	12	50	0
1.5	110.5	CL	CLAY, some silt, very firm, crumbly, dark gray, moist	34.0 - 36.0'	1	4	2	5	64.4	0
0.4	110.9	SP	SAND, very fine, loose, brown, wet	36.0 - 38.0'	1	1	3	4	115.1	0
0.7	111.6	CL	CLAY, some silt, very stiff, brown/gray, little moist	38.0 - 40.0'	1	2	4	5	52	0
0.9	112.5	ML/SP	SILT and SAND, very fine, tightly compacted, brown/gray, moist	40.0 - 42.0'	2	3	3	4	265	0
1.1	113.6	SP	SAND, fine, tightly compacted, brown, wet	42.0 - 44.0'	2	3	5	6	123.3	0
1.1	114.7	CL	CLAY, some fine sand, very firm to stiff, brown, trace, moist	44.0 - 46.0'	1	1	1	3	65.7	0
1.0	115.7	SP	SAND, very fine, little silt, loose, tightly compacted, brown, wet	46.0 - 48.0'	2	3	6	9	89	0
0.8	116.5	ML/SP	SILT and SAND, very fine, trace clay, firm, crumbly, brown, wet	48.0 - 50.0'	2	2	7	10	83.6	0
1.5	119.0	SP	SAND, fine to very fine, well compacted, light brown, wet	50.0 - 52.0'	5	7	11	14	43.1	
2.7	121.7	CL	CLAY, little silt, very firm to stiff, gray, moist	52.0 - 54.0'	3	6	6	11	42.9	
0.3	122.0	SP	SAND, very fine, little silt, well compacted, gray/brown, wet	54.0 - 56.0'	3	7	11	18	44.4	0

* = The USCS symbol assigned is based on visual and manual observations and not on tests performed in the laboratory.

EARTH TECH

l / Boring Log

Well/Boring No. SB-95-1

Client: Occidental Chemical Company

Project No.: 23123.00

Date: Started: 10/09/95 Finished: 10/11/95

Time: Started: 03:30 PM Finished: 04:00 PM

State	County	Township	Fraction	Section	T	R
MI	Muskegon	Montague		30	12N	17W

Contractor: Stearns Drilling Company
Address: 6974 Hammond
Dutton MI 49316
Equipment: CME 1050
Crew Chief: Darryl Krause
ET Supervisor: Cathie Cotton

Location: Former P#1

Drilling Method(s)	Depth
4-1/4 ID HSA	134.0'
2" x 2" Split Spoon	136.0'

Ground Surface Elevation (feet): 636.40

Grouting/Seal	
Depth/To	Material/Method
0.0-186.0'	Bentonite Grout

Remarks:

Water Level: 26 ft. Below Ground

ness (feet)	Depth to base (feet)	USCS *	Lithologic Description
6.0	128.0	CL	CLAY, little silt, trace fine gravel, gray, moist
4.0	132.0	CL	CLAY, little fine sand, firm, gray/brown, cohesive, moist
4.0	136.0	CL	CLAY, little silt, stiff, gray, moist
			EOB @ 136'

	PID OVM 580B					
Blow Counts						
Sample Depth	6"	12"	18"	24"	Headspace	Background
56.0 - 58.0'	6	2	3	4	23.7	0
58.0 - 60.0'	3	4	8	11	1.5	0
60.0 - 62.0'	3	5	11	12	0	0
62.0 - 64.0'	3	5	14	15	0	0
64.0 - 66.0'	7	12	20	24	0	0
66.0 - 68.0'	8	13	19	25	0	0
68.0 - 70.0'	6	14	18	29	0	0
70.0 - 72.0'	8	15	21	27	0	0
72.0 - 74.0'	10	15	21	27	0	0
74.0 - 76.0'	6	12	12	12	0	0
76.0 - 78.0'	6	9	14	17	0	0
78.0 - 80.0'	7	15	9	16	0	0
80.0 - 82.0'	8	8	7	7	0	0
82.0 - 84.0'	4	6	13	13	0	0
84.0 - 86.0'	5	7	16	25	0	0
86.0 - 88.0'	5	13	17	20	3.8	0
88.0 - 90.0'	8	6	6	10	0	0
90.0 - 92.0'	5	7	20	27	0	0
92.0 - 94.0'	5	13	27	35	0	0
94.0 - 96.0'	6	10	23	29	0	0
96.0 - 98.0'	18	23	32	51	0	0
98.0 - 100.0'	10	7	22	33	0	0
100.0 - 102.0'	12	15	28	55	0	0
102.0 - 104.0'	5	6	19	26	0	0
104.0 - 106.0'	7	8	49	32	2.3	0

* = The USCS symbol assigned is based on visual and manual observations and not on tests perfromed in the laboratory.

EARTH TECH

Well/Boring No. SB-95-1

Client: Occidental Chemical Company

Project No.: 23123.00

Date: Started: 10/09/95 Finished: 10/11/

Time: Started: 03:20 PM Finished: 04:00 PM

Well / Boring Log

State	County	Township	Fraction	Section	T	R
MI	Muskegon	Montague		31	12N	17W

Contractor: Stearns Drilling Company
Address: 6974 Hammond
Dutton MI 49316
Equipment: CME 1050
Crew Chief: Darryl Krause
ET Supervisor: Cathie Cotton

Location: Former P#1

Drilling Method(s)	Depth
4-1/4 ID HSA	134.0'
2" x 2" Split Spoon	136.0'

Ground Surface Elevation (feet): 636.40

Grouting/Seal

Depth/To	Material/Method
0.0-136.0'	Bentonite Grout

Remarks:

Water Level: 26 ft. Below Ground

Thick-ness (feet)	Depth to base (feet)	USCS *	Lithologic Description

Sample Depth	Blow Counts 6"	12"	18"	24"	Headspace	Background
					PID 0VM 580B	
106.0 - 108.0'	16	24	27	33	0	0
108.0 - 110.0'	4	6	18	37	0	0
110.0 - 112.0'	6	18	24	58	0	0
112.0 - 114.0'	12	38	56	55	0	0
114.0 - 116.0'	15	35	68	75	0	0
116.0 - 118.0'	15	35	41	58	0	0
118.0 - 120.0'	6	15	30	53	0	0
120.0 - 122.0'	5	20	58	45	0	0
122.0 - 124.0'	13	15	30	65	0	0
124.0 - 126.0'	10	15	27	58	-	-
126.0 - 128.0'	3	15	21	27	-	-
128.0 - 130.0'	5	5	33	58	-	-
130.0 - 132.0'	7	11	22	14	-	-
132.0 - 134.0'	6	24	45	85	-	-
134.0 - 136.0'	5	6	34	65	-	-

* = The USCS symbol assigned is based on visual and manual observations and not on tests perfromed in the laboratory.

EARTH TECH

l / Boring Log

Well/Boring No. SB-95-2

Client: Occidental Chemical Company

Project No.: 23123.00

Date: Started: 10/26/95 Finished: 10/27/95

Time: Started: 10:00 AM Finished: 03:30 PM

State	County	Township	Fraction	Section	T	R
MI	Muskegon	Montague		31	12N	17W

Contractor: Stearns Drilling Company

Address: 6974 Hammond
Dutton MI 49316

Equipment: CME 1050

Crew Chief: Darryl Krause

ET Supervisor: Cathie Cotton

Location: Former P#2

Drilling Method(s)	Depth
4-1/4 ID HSA	130.0'

Ground Surface Elevation (feet): 618.90

Grouting/Seal

Depth/To	Material/Method
0.0-130.0'	Bentonite Grout

Remarks:

Water Level: 18.9 ft. Below Ground

ness (feet)	Depth to base (feet)	USCS *	Lithologic Description
6.5	6.5	SP	SAND, medium to fine, little medium to coarse sand, loose, light brown, moist, some dark
			brown streaking at 4.5'-5.0', solvent odor beginning at 3.5'
4.0	10.5	SP	SAND, fine, trace fine gravel, loose, light brown, moist, strong odor
2.5	13.0	SP	SAND, medium to fine, trace coarse sand and fine to medium gravel, loose, dark brown with gray
			streaking at 12.2'. 0.08' layer of silty clay at 12.4', multicolored streaking below
			clay lense, moist, slightly oily appearance, very strong odor
6.3	19.3	SP	SAND, fine to medium-fine, loose, light brown, very moist
4.7	24.0	SW	SAND, fine to medium, little coarse sand, trace fine gravel, loose, light brown, wet, little
			odor
9.5	33.5	SP	SAND, fine, trace medium sand, loose, light brown, wet
0.1	33.65	CL	CLAY, trace silt, trace fine gravel, stiff, brown, moist
10.1	43.7	SP	SAND, fine, trace medium sand, loose light brown, wet
0.1	43.8	CL	CLAY, silty, soft, brown, cohesive, moist
0.2	44.0	ML	SILT, little very fine sand, loose, brown, wet
0.6	44.6	SP	SAND, medium-fine to fine, little medium sand, loose, brown with gray discolored lenses, wet
1.0	45.6	SP	SAND, very fine, some silt, well compacted, brown to reddish brown, wet
0.1	45.7	CL	CLAY, trace silt, firm, cohesive, brown, moist
0.6	46.3	ML	SILT, little very fine sand, loose, brown, wet
5.2	51.5	SP	SAND, very fine, little silt, well compacted, 0.02' silt lens at 51.0', brown, very moist to
			wet
1.0	52.5	SP	SAND, fine to medium fine, loose, light brown, wet
19.5	72.0	SP	SAND, fine, moderately compacted, light brown, wet
	85.0	SP	SAND, fine, trace silt, occasional fine silt lens, loose, light brown, wet
	93.0	SP-ML	SAND, very fine, some silt, tightly compacted, 0.10' clay lense at 86.4', becoming loose at
			89.0', gray brown, wet

Blow Counts	PID OVM 580B with 11.8 eV lamp					
Sample Depth	6"	12"	18"	24"	Headspace	Background
1.0 - 2.5'	3	5	7	-	28.5	0
3.5 - 5.0'	3	5	7	-	563	0
6.0 - 7.5'	5	8	13	-	295	0
8.5 - 10.0'	8	10	14	-	>2000	0
11.0-12.5'	7	6	7	-	>2000	0
13.5 - 15.0'	10	14	18	-	>2000	0
16.0 - 17.5'	8	15	22	-	>2000	0
18.5 - 20.0'	8	11	14	-	686	0
20.0 - 22.0'	5	7	8	11	966	0
22.0 - 24.0'	3	3	4	8	304	0
24.0 - 26.0'	3	3	8	14	449	0
26.0 - 28.0'	3	3	7	13	14.5	0
28.0 - 30.0'	3	3	5	9	0	0
30.0 - 32.0'	2	3	5	9	0	0
32.0 - 34.0'	2	4	8	12	36.2	0
34.0 - 36.0'	4	8	11	12	36.2	0
36.0 - 38.0'	3	6	11	16	65.3	0
38.0 - 40.0'	7	7	9	13	87.1	0
40.0 - 42.0'	3	6	9	14	130.6	0
42.0 - 44.0'	5	8	16	22	>2000	0
44.0 - 46.0'	2	4	12	13	>2000	0
46.0 - 48.0'	8	12	16	22	>2000	0
48.0 - 50.0'	7	9	11	21	939	0
50.0 - 52.0'	3	6	17	34	263	0
52.0 - 54.0'	13	28	35	65	115.2	0

* = The USCS symbol assigned is based on visual and manual observations and not on tests performed in the laboratory.

EARTH TECH

Page: 2 of 3

Well/Boring No. SB-95-2

Client: Occidental Chemical Company

Project No.: 23123.00

Date: Started: 10/26/95 Finished: 10/27/.

Time: Started: 10:00 AM Finished: 03:30 PM

Well / Boring Log

State	County	Township	Fraction	Section	T	R
MI	Muskegon	Montague		31	12N	17W

Contractor: Stearns Drilling Company
Address: 6974 Hammond
Dutton MI 49316
Equipment: CME 1050
Crew Chief: Darryl Krause
ET Supervisor: Cathie Cotton

Location: Former P#2

Drilling Method(s)	Depth
4-1/4 ID HSA	130.0'

Ground Surface Elevation (feet): 618.90

Grouting/Seal

Depth/To	Material/Method
0.0-130.0'	Bentonite Grout

Remarks:

Water Level: 18.9 ft. Below Ground

Thick-ness (feet)	Depth to base (feet)	USCS *	Lithologic Description
3.0	96.0	SP-ML	SAND and SILT, tightly compacted, gray, very moist
11.0	107.0	SP	SAND, fine to very fine, trace silt, occasional fine clay lens, tightly compacted, light brown, wet
6.6	113.6	SP	SAND, very fine, well compacted, light brown, wet
16.4	130.0	CL	CLAY, trace silt, very firm to stiff, cohesive, brown/gray, moist, 0.1' layer of fine sand at 115.7', less than 0.1' layer of fine sand at 117.6'
			EOB @ 130'

Blow Counts / Sample Depth	6"	12"	18"	24"	PID - OVM 580B 11.8 eV lamp Headspace	Background
54.0 - 56.0'	5	13	19	32	99.3	0
56.0 - 58.0'	5	8	14	29	121.3	0
58.0 - 60.0'	9	14	29	43	207.5	0
60.0 - 62.0'	9	9	11	29	80.7	0
62.0 - 64.0'	14	19	19	21	311	0
64.0 - 66.0'	5	7	13	26	276	0
66.0 - 68.0'	9	11	15	15	126	0
68.0 - 70.0'	20	15	15	30	440	0
70.0 - 72.0'	14	31	38	46	311	0
72.0 - 74.0'	4	5	8	24	797	0
74.0 - 76.0'	9	8	11	27	115.2	0
76.0 - 78.0'	6	10	21	41	271	0
78.0 - 80.0'	5	11	17	22	138	0
80.0 - 82.0'	17	7	9	10	40	0
82.0 - 84.0'	9	10	15	25	40	0
84.0 - 86.0'	13	13	25	41	75.7	0
86.0 - 88.0'	19	56	>100	-	0	0
88.0 - 90.0'	12	18	25	26	0	0
90.0 - 92.0'	14	25	39	>100	0	0
92.0 - 94.0'	7	9	15	45	0	0
94.0 - 96.0'	8	13	30	49	0	0
96.0 - 98.0'	6	14	41	65	0	0
98.0 - 100.0'	8	20	22	18	0	
100.0 - 102.0'	8	15	18	26	0	
102.0 - 104.0'	5	14	32	66	0	0

* = The USCS symbol assigned is based on visual and manual observations and not on tests performed in the laboratory.

E A R T H T E C H

l / Boring Log

Well/Boring No. SB-95-2

Client: Occidental Chemical Company

Project No.: 23123.00

Date: Started: 10/26/95 Finished: 10/27/95

Time: Started: 10:00 AM Finished: 03:30 PM

State	County	Township	Fraction	Section	T	R
MI	Muskegon	Montague		31	12N	17W

Contractor: Stearns Drilling Company

Address: 6974 Hammond
Dutton MI 49316

Equipment: CME 1050

Crew Chief: Darryl Krause

ET Supervisor: Cathie Cotton

Location: Former P#2

Drilling Method(s)	Depth
4-1/4 ID HSA	130.0'

Ground Surface Elevation (feet): 618.90

Grouting/Seal

Depth/To	Material/Method
0.0-130.0'	Bentonite Grout

Remarks:

Water Level: 18.9 ft. Below Ground

ness (feet)	Depth to base (feet)	USCS *	Lithologic Description

Sample Depth	Blow Counts 6"	12"	18"	24"	PID - OVM 580B 11.8 eV lamp Headspace	Background
104.0 - 106.0'	7	12	49	90	0	0
106.0 - 108.0'	8	8	11	22	0	0
108.0 - 110.0'	6	7	22	25	0	0
110.0 - 112.0'	5	6	12	18	0	0
112.0 - 114.0'	8	14	18	40	0	0
114.0 - 116.0'	6	11	32	46	0	0
116.0 - 118.0'	16	36	54	75	0	0
118.0 - 120.0'	38	60	90	>100	0	0
120.0 - 122.0'	6	7	11	13	-	-
122.0 - 124.0'	6	7	8	12	-	-
124.0 - 126.0'	7	9	13	15	-	-
126.0 - 128.0'	7	8	12	14	-	-
128.0 - 130.0'	8	9	12	16	-	-

* = The USCS symbol assigned is based on visual and manual observations and not on tests performed in the laboratory.

EARTH TECH

Well / Boring Log

Well/Boring No. SB-95-3

Client: Occidental Chemical Company

Project No.: 23123.00

Date: Started: 10/18/95 Finished: 10/20/

Time: Started: 09:00 AM Finished: 5:30 PM

State	County	Township	Fraction	Section	T	R
MI	Muskegon	Montague		31	12N	17W

Contractor: Stearns Drilling Company

Address: 6974 Hammond
Dutton MI 49316

Equipment: CME 1050

Crew Chief: Darryl Krause

ET Supervisor: Cathie Cotton

Location: Former P#3

Drilling Method(s)	Depth
4-1/4 ID HSA	147.0'

Ground Surface Elevation (feet): 635.60

Grouting/Seal

Depth/To	Material/Method
0.0-147.0'	Bentonite Grout

Remarks:

Water Level: 37.4 ft. Below Ground

Thick-ness (feet)	Depth to base (feet)	USCS *	Lithologic Description	Sample Depth	Blow Counts 6"	12"	18"	24"	PID Headspace	PID Background
2.0	2.0	SP	SAND, medium-fine to medium, trace coarse sand, loose, rust brown, moist	1.0 - 2.5'	2	3	6	-	0	0
34.0	36.0	SP	SAND, fine to medium-fine, trace coarse sand, loose, brown, moist, dark brown staining at 16.5',	3.5 - 5.0'	2	5	8	-	0	0
			becoming well compacted at 28.0'	6.0 - 7.5'	5	8	11	-	0.5	0
33.1	69.1	SP	SAND, fine, loose, blonde, wet at 37.0', solvent odor at interface and below	8.5 - 10.0'	6	8	9	-	1	0
0.5	69.6	CL	CLAY, little silt, very firm, cohesive, brown, moist	11.0 - 12.5'	5	6	10	-	1	0
0.3	69.9	SP-ML	SAND, very fine, very silty, loose, brown, wet	13.5 - 15.0'	3	6	10	-	2.5	0
0.1	70.0	CL	CLAY, some silt, firm, brown	16.0 - 17.5'	2	4	6	-	4.1	0
1.7	71.7	SP	SAND, fine to very fine, loose, 2 small layers of crumbly silty clay (less than 0.10'), light	18.5 - 20.0'	3	5	8	-	1.5	0
			brown, wet	21.0 - 22.5'	4	6	11	-	1.5	0
0.5	72.2	CL-ML	CLAY, some silt, very firm, crumbly, brown, moist	23.5 - 25.0'	8	10	14	-	3	0
2.2	74.4	SP	SAND, very fine, little silt, layer of very silty clay (0.10') at 73.0', loose, brown with	26.0 - 27.5'	6	12	15	-	4.6	0
			rusty colored streaks, wet	28.5 - 30.0'	10	20	27	-	7.2	0
1.6	76.0	SP	SAND, very fine, moderately compacted, light brown, wet	31.0 - 32.5'	10	14	16	-	3.6	0
10.8	86.8	SP	SAND, fine, loose, light brown, thin (0.10') clay lens at 79.0', wet	33.5 - 35.0'	5	7	7	-	8.7	0
1.2	88.0	SP	SAND, very fine, very tightly compacted, light brown, wet	36.0 - 37.5'	11	17	31	-	235.2	0
4.0	92.0	SP	SAND, fine, well compacted, light brown, wet	38.0 - 40.0'	21	27	29	31	176	0
2.0	94.0	SP	SAND, very fine, trace of dark gray streaking at 94.0', very tightly compacted, light brown,	40.0 - 42.0'	11	17	22	24	161.2	0
			wet	42.0 - 44.0'	7	14	18	29	141.5	0
3.7	97.7	SP	SAND, fine to very fine, well compacted, light brown, wet	44.0 - 46.0'	9	18	25	28	297	0
0.5	98.2	SP-ML	SAND, very fine, very silty, tightly compacted, light brown, wet	46.0 - 48.0'	7	17	32	39	36.5	0
7.8	106.0	SP	SAND, very fine, well compacted, light brown, wet	48.0 - 50.0'	3	7	11	15	126.6	0
4.0	110.0	SP-ML	SAND, very fine, very silty, very well compacted, gray/brown, wet layer of firm silty clay	50.0 - 52.0'	3	5	8	10	56.6	0
			(less than 0.10') at 108.1'	52.0 - 54.0'	2	4	8	11	19.5	
[illegible]	112.0	SP	SAND, very fine, trace silt, tightly compacted, brown, wet	54.0 - 56.0'	5	9	15	17	13.3	
[illegible]	112.5	SP-ML	SAND and SILT, very fine, very tightly compacted, gray/brown, very moist	56.0 - 58.0'	5	10	14	18	11.8	0

* = The USCS symbol assigned is based on visual and manual observations and not on tests performed in the laboratory.

E A R T H T E C H

Well/Boring No. SB-95-3

Client: Occidental Chemical Company

Project No.: 23123.00

Date: Started: 10/18/95 Finished: 10/20/95

Time: Started: 09:00 AM Finished: 05:30 PM

ll / Boring Log

State	County	Township	Fraction	Section	T	R
MI	Muskegon	Montague		31	12N	17W

Contractor: Stearns Drilling Company

Address: 6974 Hammond
Dutton MI 49316

Equipment: CME 1050

Crew Chief: Darryl Krause

ET Supervisor: Cathie Cotton

Location: Former P#3

Drilling Method(s)	Depth
4-1/4 ID HSA	147.0'

Ground Surface Elevation (feet): 635.60

Grouting/Seal

Depth/To	Material/Method
0.0-147.0'	Bentonite Grout

Remarks:

Water Level: 37.4 ft. Below Ground

-ness (feet)	Depth to base (feet)	USCS *	Lithologic Description
5.1	117.6	SP	SAND, very fine, little silt, tightly compacted, brown, wet
0.2	117.8	CL	CLAY, some silt lenses, soft, brown, cohesive, moist
0.7	118.5	ML	SILT, trace clay, trace very fine sand, soft, little cohesive, brown, very moist
2.0	120.5	SP-ML	SAND, very fine, some silt, tightly compacted, light brown, very moist
1.2	121.7	ML/CL	SILT, some clay, some 0.1'-0.2' layers of very fine silty sand, soft, crumbly, gray/brown,
			wet
0.4	122.1	CL-ML	CLAY, some silt, soft, cohesive, gray/brown, moist
2.2	124.3	SP/ML	SAND and SILT, very fine, some 0.1'-0.3' layers of clay and silt, well compacted, gray/brown,
			moist
0.7	125.0	CL-ML	CLAY, some silt, firm, cohesive, gray/brown, moist
0.4	125.4	SP/CL	SAND, very fine, some clay, soft, little cohesive, gray/brown, very moist
0.7	126.1	SP/ML	SAND, very fine, some silt, loose, gray/brown, wet
2.9	129.0	CL	CLAY, trace silt, firm to stiff, cohesive, brown, moist
1.0	130.0	SP	SAND, fine, loose, brown, wet
1.0	131.0	CL	CLAY, firm, cohesive, gray/brown, moist
1.7	132.7	SP	SAND, fine, loose, well compacted, brown, little silt, wet
2.3	135.0	CL	CLAY, fine, cohesive, gray/brown, moist
0.6	135.6	ML	SILT, little clay, little fine sand, soft, cohesive, gray/brown, moist
0.6	136.2	SP/ML	SAND, very fine, some silt, loose, gray/brown, wet
0.7	136.9	CL-ML	CLAY, very silty, soft, cohesive, gray, moist
0.4	137.3	ML	SILT, little clay, little fine sand, slightly cohesive, gray, very moist
0.5	137.8	CL	CLAY, little silt, firm, cohesive, gray, moist
	139.5	ML/SP	SILT, some very fine sand, loose, brown/gray, very moist to wet, some clayey areas that are
			not uniform or in horizontal layers noted throughout this silt layer
4.5	144.0	CL	CLAY, little silt, very firm, stiff, brown/gray, moist

Sample Depth	Blow Counts 6"	12"	18"	24"	PID Headspace	PID Background
58.0 - 60.0'	5	7	12	16	20	0
60.0 - 62.0'	6	9	12	14	24.7	0
62.0 - 64.0'	10	19	31	55	11.8	0
64.0 - 66.0'	4	18	16	20	10.8	0
66.0 - 68.0'	5	11	18	32	105	0
68.0 - 70.0'	5	8	17	38	881	0
70.0 - 72.0'	5	18	34	39	>2000	0
72.0 - 74.0'	15	15	20	36	324	0
74.0 - 76.0'	13	17	29	34	34.5	0
76.0 - 78.0'	8	10	25	32	19.9	0
78.0 - 80.0'	8	18	21	46	25.3	0
80.0 - 82.0'	12	24	50	62	18.4	0
82.0 - 84.0'	15	66	72	75	4.9	0
84.0 - 86.0'	12	24	28	16	50.5	0
86.0 - 88.0'	32	49	112	123	14.1	0
88.0 - 90.0'	20	39	48	53	22.1	0
90.0 - 92.0'	27	39	64	69	4.3	0
92.0 - 94.0'	30	120	>200	-	3.6	0
94.0 - 96.0'	10	27	36	37	18.4	0
96.0 - 98.0'	16	36	44	77	3	0
98.0 - 100.0'	7	16	25	37	1.8	0
100.0 - 102.0'	6	11	21	28	4.9	0
102.0 - 104.0'	23	29	41	55	21.5	0
104.0 - 106.0'	16	19	21	18	1.8	0
106.0 - 108.0'	11	23	41	55	0	0

* = The USCS symbol assigned is based on visual and manual observations and not on tests performed in the laboratory.

EARTH TECH

Well/Boring No. SB-95-3

Client: Occidental Chemical Company

Project No.: 23123.00

Well / Boring Log

Date: Started: 10/18/95 Finished: 10/20/.

Time: Started: 09:00 AM Finished: 05:30 PM

State	County	Township	Fraction	Section	T	R
MI	Muskegon	Montague		31	12N	17W

Contractor: Stearns Drilling Company

Address: 6974 Hammond
Dutton MI 49316

Equipment: CME 1050

Crew Chief: Darryl Krause

ET Supervisor: Cathie Cotton

Location: Former P#3

Drilling Method(s)	Depth
4-1/4 ID HSA	147.0'

Ground Surface Elevation (feet): 635.60

Grouting/Seal

Depth/To	Material/Method
0.0-147.0'	Bentonite

Remarks:

Water Level: 37.4 ft. Below Ground

Thickness (feet)	Depth to base (feet)	USCS *	Lithologic Description
1.5	145.5	CL	CLAY, little fine sand, soft, cohesive, gray, moist
1.5	147.0	CL	CLAY, very firm, smooth, gray, moist
7.0	154.0	CL	CLAY, little silt, firm, cohesive, gray, moist
			EOB @ 154'

Sample Depth	Blow Counts 6"	12"	18"	24"	PID Headspace	PID Background
108.0 - 110.0'	11	36	72	93	0	0
110.0 - 112.0'	10	27	32	36	0	0
112.0 - 114.0'	30	67	110	>140	0	0
114.0 - 116.0'	19	27	34	39	0	0
116.0 - 118.0'	18	40	50	70	0	0
118.0 - 120.0'	15	42	55	74	0	0
120.0 - 122.0'	11	15	18	18	0	0
122.0 - 124.0'	20	27	32	64	0	0
124.0 - 126.0'	7	12	12	15	0	0
126.0 - 128.0'	10	14	41	44	0	0
128.0 - 130.0'	8	11	14	20	0	0
130.0 - 132.0'	6	6	12	20	0	0
132.0 - 134.0'	7	18	21	30	0	0
134.0 - 136.0'	20	22	39	44	0	0
136.0 - 138.0'	21	39	48	78	0	0
138.0 - 140.0'	15	22	36	39	0	0
140.0 - 142.0'	16	18	29	34	0	0
142.0 - 144.0'	7	11	17	17	-	0
144.0 - 146.0'	9	15	21	40	-	0
146.0 - 148.0'	9	11	17	40	-	0
148.0 - 150.0'	8	22	24	35	-	0
150.0 - 152.0'	11	19	25	44	-	0
152.0 - 154.0'	7	8	10	15	-	

* = The USCS symbol assigned is based on visual and manual observations and not on tests performed in the laboratory.

EARTH TECH

ll / Boring Log

Well/Boring No. SB-95-4

Client: Occidental Chemical Company

Project No.: 23123.00

Date: Started: 10/12/95 Finished: 10/17/95

Time: Started: 11:30 AM Finished: 11:30 AM

State	County	Township	Fraction	Section	T	R
MI	Muskegon	Montague		31	12N	17W

Contractor: Stearns Drilling Company

Address: 6974 Hammond
Dutton MI 49316

Equipment: CME 1050

Crew Chief: Darryl Krause

ET Supervisor: Cathie Cotton

Location: Former P#4

Drilling Method(s)	Depth
4-1/4 ID HSA	156.0'

Ground Surface Elevation (feet): 642.40

Grouting/Seal

Depth/To	Material/Method
0.0-156.0'	Bentonite Grout

Remarks:

Water Level: 46 ft. Below Ground

ness (feet)	Depth to base (feet)	USCS *	Lithologic Description	Sample Depth	Blow Counts 6"	12"	18"	24"	PID - OVM 580B with 10.6 eV lamp Headspace	Background
2.8	2.8	SP	SAND, medium-fine, loose, light brown, moist	1.0 - 2.5'	3	4	6	-	2	0
4.0	6.8	SP	SAND, medium-fine to medium, trace silt, trace fine gravel, loose, dark rust, trace moist	3.5 - 5.0'	2	3	3	-	11.8	0
2.2	9.0	SP	SAND, fine, loose, light brown, moist	6.0 - 7.5'	3	5	6	-	1.6	0
4.5	13.5	SP	SAND, medium-fine to medium, trace coarse sand and fine gravel, rust color, very loose, moist	8.5 - 10.0'	2	3	4	-	1.6	0
11.0	24.5	SP	SAND, medium-fine, loose, light brown, moist	11.0 - 12.5'	2	2	2	-	9	0
1.4	25.9	SP	SAND, medium-fine to medium, trace coarse sand and fine gravel, loose, light brown, very	13.5 - 15.0'	2	2	3	-	6.5	0
			moist	16.0 - 17.5'	3	3	3	-	19.6	0
5.1	31.0	SP	SAND, very fine, little silt, lightly compacted, light tan, moist	18.5 - 20.0'	3	3	4	-	13.1	0
29.0	60.0	SP	SAND, fine, loose, tan, moist, becoming very moist at 37.0', wet at 46.0', trace gravel at 59.0'	21.0 - 22.5'	2	2	3	-	19.6	0
6.0	66.0	SP	SAND, fine to medium-fine, tightly compacted, light brown, wet	23.5 - 25.0'	1	1	3	-	24.6	0
7.0	73.0	SP	SAND, fine to medium-fine, loose, light brown, very wet	26.0 - 27.5'	7	8	13	-	61.5	0
3.0	76.0	SP	SAND, fine, moderately compacted, light brown, wet	28.5 - 30.0'	5	8	11	-	39.3	0
15.6	91.6	SP	SAND, fine, loose, light brown, very wet, very fine lens of clay (0.01') at 87.2'	31.0 - 32.5'	3	9	13	-	70.5	0
1.7	93.3	CL	CLAY, very silty, some layers of silt and sand, little very fine sand, firm, cohesive, brown,	33.5 - 35.0'	3	5	9	-	54.1	0
			wet	36.0 - 37.5'	11	13	16	-	79.5	0
2.7	96.0	SP	SAND, very fine, some silt, well compacted, brown, wet	38.5 - 40.0'	5	9	14	-	54.1	0
0.5	96.5	CL	CLAY, some silt, soft, cohesive, brown, moist	41.0 - 42.5'	3	8	9	-	61.5	0
25.5	122.0	SP	SAND, fine, well compacted, brown, wet	43.5 - 45.0'	6	10	12	-	30.3	0
4.2	126.2	SP	SAND, very fine, 0.01' lens of clay at 123.5', well compacted, brown, wet, (0.01') lens of	46.0 - 47.5'	6	8	15	-	205	0
			clay at 125.7'	48.0 - 50.0'	3	9	15	18	432	0
1.6	127.8	CL	CLAY, little silt, small layer of silt (0.05') at 127.2', soft, cohesive, gray/brown, moist	50.0 - 52.0'	6	10	14	13	382	0
8.1	135.9	SP	SAND, very fine, loose, brown, wet	52.0 - 54.0'	3	4	12	18	479	0
	136.4	CL	CLAY, little silt, soft, cohesive, brown, moist	54.0 - 56.0'	9	12	13	28	148	0
	139.0	SP-ML	SAND, very fine, little silt, trace clay, soft, some loose, wet layers, brown,	56.0 - 58.0'	3	4	9	14	403	0
			wet	58.0 - 60.0'	8	17	35/0	-	447	0

* = The USCS symbol assigned is based on visual and manual observations and not on tests performed in the laboratory.

EARTH TECH

Well / Boring Log

Well/Boring No. SB-95-4

Client: Occidental Chemical Company

Project No.: 23123.00

Date: Started: 10/12/95 Finished: 10/17/.

Time: Started: 11:30 AM Finished: 11:30 AM

State	County	Township	Fraction	Section	T	R
MI	Muskegon	Montague		31	12N	17W

Contractor: Stearns Drilling Company

Address: 6974 Hammond
Dutton MI 49316

Equipment: CME 1050

Crew Chief: Darryl Krause

ET Supervisor: Cathie Cotton

Location: Former P#4

Drilling Method(s)	Depth
4-1/4 ID HSA	156.0'

Ground Surface Elevation (feet): 642.40

Grouting/Seal	
Depth/To	Material/Method
0.0-156.0'	Bentonite Grout

Remarks:

Water Level: 46 ft. Below Ground

Thick-ness (feet)	Depth to base (feet)	USCS *	Lithologic Description
1.0	140.0	ML/SP	SILT, some very fine sand, little clay, soft, little cohesive, gray/brown, very moist
2.4	142.4	CL	CLAY, little silt, firm, cohesive, brown, wet, some layers of very loose,
			soupy silt
0.3	142.7	ML/CL	SILT, some clay, soft, cohesive, brown, very moist
4.5	147.2	CL	CLAY, little silt, firm to stiff, cohesive, gray/brown, moist
2.0	149.2	CL	CLAY, little fine sand, soft, cohesive, brown, moist
0.2	149.4	SP/CL	SAND and CLAY, soft, little cohesive, brown, wet
3.1	152.5	CL/SP	CLAY, some fine sand, soft, cohesive, brown, moist
3.5	156.0	CL	CLAY, little silt, trace fine sand, soft to firm, cohesive, gray/brown, little moist
			EOB @ 156'

Sample Depth	Blow Counts 6"	12"	18"	24"	PID - OVM 580B with 10.6 eV lamp Headspace	Background
60.0 - 62.0'	12	49	35	47	194	0
62.0 - 64.0'	14	49	62	59	117.2	0
64.0 - 66.0'	11	34	38	45	110.7	0
66.0 - 68.0'	4	5	9	12	33.8	0
68.0 - 70.0'	3	4	7	9	25.7	0
70.0 - 72.0'	7	11	17	21	3.2	0
72.0 - 74.0'	10	17	24	35	0	0
74.0 - 76.0'	12	12	12	27	3.9	0
76.0 - 78.0'	9	7	6	8	3	0
78.0 - 80.0'	6	10	8	9	30.4	0
80.0 - 82.0'	3	3	4	5	>2000	0
82.0 - 84.0'	6	8	8	19	>2000	0
84.0 - 86.0'	8	7	9	13	823	0
86.0 - 88.0'	9	8	13	20	178.3	0
88.0 - 90.0'	4	8	14	26	>2000	0
90.0 - 92.0'	6	10	19	20	725	0
92.0 - 94.0'	4	11	24	41	766	0
94.0 - 96.0'	4	5	8	19	106.5	0
96.0 - 98.0'	17	31	41	60	322	0
98.0 - 100.0'	16	28	35	39	88.1	0
100.0 - 102.0'	18	32	68	85	218.8	0
102.0 - 104.0'	24	54	51	34	13.5	0
104.0 - 106.0'	18	28	47	62	18.4	
106.0 - 108.0'	13	32	39	72	39.4	
108.0 - 110.0'	19	96	105	125	34.8	0

* = The USCS symbol assigned is based on visual and manual observations and not on tests performed in the laboratory.

E A R T H T E C H

l / Boring Log

Well/Boring No. SB-95-4

Client: Occidental Chemical Company

Project No.: 23123.00

Date: Started: 10/12/95 Finished: 10/17/95

Time: Started: 11:30 AM Finished: 11:30 AM

State	County	Township	Fraction	Section	T	R
MI	Muskegon	Montague		31	12N	17W

Contractor: Stearns Drilling Company

Address: 6974 Hammond
Dutton MI 49316

Equipment: CME 1050

Crew Chief: Darryl Krause

ET Supervisor: Cathie Cotton

Location: Former P#4

Drilling Method(s)	Depth
4-1/4 ID HSA	156.0'

Ground Surface Elevation (feet): 642.40

Grouting/Seal

Depth/To	Material/Method
0.0-156.0'	Bentonite Grout

Remarks:

Water Level: 46 ft. Below Ground

-ness (feet)	Depth to base (feet)	USCS *	Lithologic Description

Sample Depth	Blow Counts 6"	12"	18"	24"	PID - OVM 580B with 10.6 eV lamp Headspace	Background
110.0 - 112.0'	22	39	84	122	34.4	0
112.0 - 114.0'	44	68	79	135	18.1	0
114.0 - 116.0'	32	65	89	134	14.2	0
116.0 - 118.0'	32	27	49	101	13.5	0
118.0 - 120.0'	8	11	25	27	5.1	0
120.0 - 122.0'	5	7	11	22	4.7	0
122.0 - 124.0'	14	38	40	57	95.8	0
124.0 - 126.0'	8	11	13	14	13.5	0
126.0 - 128.0'	11	23	25	49	0	0
128.0 - 130.0'	11	15	18	38	7.8	0
130.0 - 132.0'	9	9	27	38	423	0
132.0 - 134.0'	11	18	28	46	59.3	0
134.0 - 136.0'	15	35	65	51	27.6	0
136.0 - 138.0'	18	28	49	55	21.6	0
138.0 - 140.0'	26	17	15	18	4.4	0
140.0 - 142.0'	6	6	9	30	2	0
142.0 - 144.0'	11	23	20	30	3.2	0
144.0 - 146.0'	36	63	95	125	-	-
146.0 - 148.0'	21	38	41	65	-	-
148.0 - 150.0'	6	11	22	35	-	-
150.0 - 152.0'	6	10	11	21	-	-
152.0 - 154.0'	19	37	46	70	-	-
154.0 - 156.0'	18	30	34	65	-	-

* = The USCS symbol assigned is based on visual and manual observations and not on tests performed in the laboratory.

EARTH TECH

Page: 1 of 1

Well/Boring No. MW-95-1A (36'-41')

Client: Occidental Chemical Company

Project No.: 23123.00

Date: Started: 10/23/95 Finished: 10/24/95

Time: Started: 03:30 PM Finished: 09:30 AM

ell / Boring Log

State	County	Township	Fraction	Section	T	R
MI	Muskegon	Montague		30	12N	17W

Contractor: Stearns Drilling Company
Address: 6974 Hammond
Dutton MI 49316
Equipment: CME 1050
Crew Chief: Darryl Krause
ET Supervisor: Cathie Cotton

Location: P#1 (SB-95-1)

Drilling Method(s)	Depth
4-1/4 ID HSA with Poly Plug	41.0'

Ground Surface Elevation (feet): 636.40

Grouting/Seal

Depth/To	Material/Method
0.0-3.0'	Concrete Pad
3.0-31.0'	Bentonite Grout .
31.0-33.8'	Bentonite Hole Plug
33.8-41.0'	Medium coarse Silica Sand

Water Level: 26 ft. Below Ground

Remarks:

ck-ness (feet)	Depth to base (feet)	USCS *	Lithologic Description
			See Log for SB-95-1 (0'-136')

Blow Counts / Sample Depth	PID 6"	12"	18"	24"	Headspace	Background

* = The USCS symbol assigned is based on visual and manual observations and not on tests performed in the laboratory.

EARTH TECH

Project Name: Occidental Chemical Company

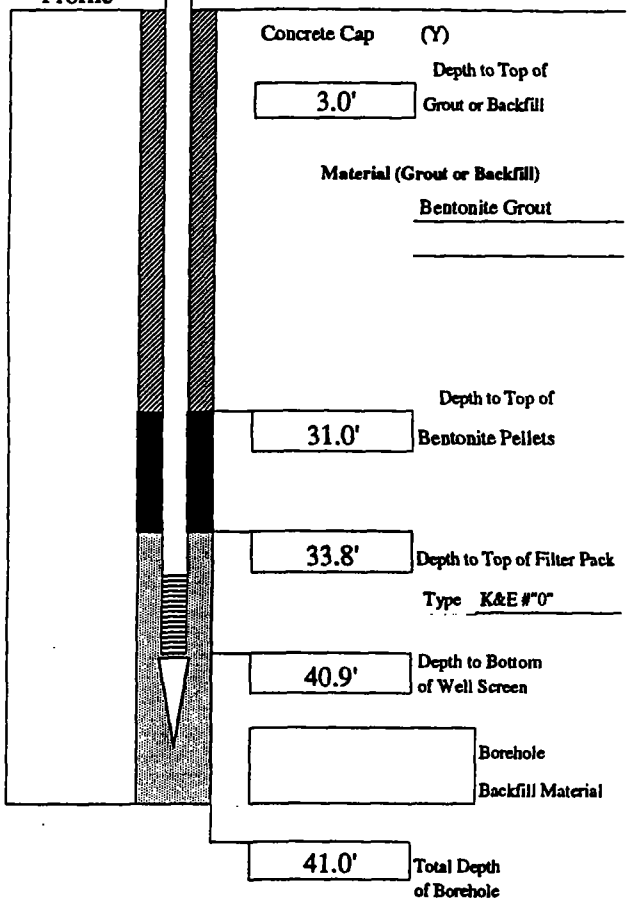
Project No: 23123.00

Log of Well Installation

Well Number: MW-95-1A (36'-41')

Top of Casing Elevation (feet): 638.89

Generalized Subsurface Profile



Water Level Data

Date	Time	Water Level	Elevation

Development: Brainerd - Killman pump
110 gallons

Survey Reference:

Well Casing
- Diameter: 2"
- Length: 38.5'
- Material: Schedule 304 Stainless Steel
- Cap Type: Compression fit "J" Plug with vent

Well Screen
- Diameter: 2"
- Length: 5'
- Slot/Type: 7 Slot continuous wire wound
- Material: Schedule 304 Stainless Steel

Protective well casing
- Material: Steel Sq. 4"
- Height Above Ground: 2.8
- Lock Type: 2402

General Notes:

EARTH TECH

ell / Boring Log

Page: 1 of 1
Well/Boring No. MW-95-1B (53'-58')
Client: Occidental Chemical Company
Project No.: 23123.00
Date: Started: 10/24/95 Finished: 10/24/95
Time: Started: 09:45 AM Finished: 02:00 PM

State	County	Township	Fraction	Section	T	R
MI	Muskegon	Montague		30	12N	17W

Contractor: Stearns Drilling Company
Address: 6974 Hammond
Dutton MI 49316
Equipment: CME 1050
Crew Chief: Darryl Krause
ET Supervisor: Cathie Cotton

Location: P#1 (SB-95-1)

Drilling Method(s)	Depth
4-1/4 ID HSA with Poly Plug	58.0'

Ground Surface Elevation (feet): 636.40

Grouting/Seal

Depth/To	Material/Method
0.0-3.0'	Concrete Pad
3.0-48.0'	Bentonite Grout
48.0-51.0'	Bentonite Hole Plug
51.0-58.0'	Medium coarse Silica Sand

Water Level: 26 ft. Below Ground

Remarks:

...k-ness (feet)	Depth to base (feet)	USCS *	Lithologic Description
			See Log for SB-95-1 (0'-136')

Blow Counts / PID	Sample Depth	6"	12"	18"	24"	Headspace	Background

* = The USCS symbol assigned is based on visual and manual observations and not on tests performed in the laboratory.

EARTH TECH

Project Name: Occidental Chemical Company

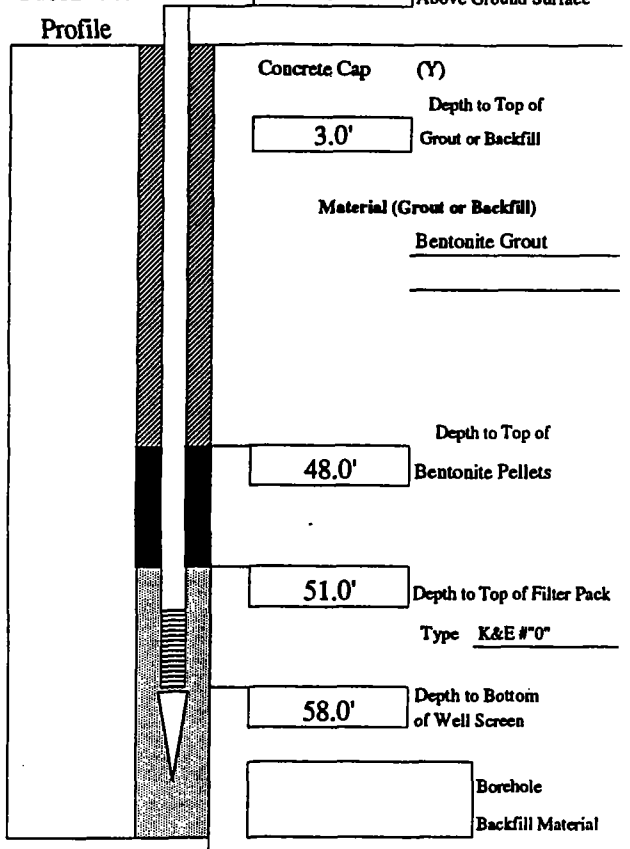
Project No: 23123.00

Log of Well Installation

Well Number: MW-95-1B (53'-58')

Top of Casing Elevation (feet): 638.79

Generalized Subsurface Profile



Water Level Data

Date	Time	Water Level	Elevation

Development: Air lift
400 gallons

Survey Reference:

Well Casing
- Diameter: 2"
- Length: 55.0'
- Material: Schedule 304 Stainless Steel
- Cap Type: Compression fit "J" Plug with vent

Well Screen
- Diameter: 2"
- Length: 5'
- Slot/Type: 7 Slot continuous wire wound
- Material: Schedule 304 Stainless Steel

Protective well casing
- Material: Steel Sq. 4"
- Height Above Ground: 2.7'
- Lock Type: 2402

General Notes:

EARTH TECH

ell / Boring Log

Page: 1 of 1
Well/Boring No. MW-95-1C (104'-109')
Client: Occidental Chemical Company
Project No.: 23123.00
Date: Started: 10/24/95 Finished: 10/25/95
Time: Started: 02:50 PM Finished: 11:00 AM

State	County	Township	Fraction	Section	T	R
MI	Muskegon	Montague		30	12N	17W

Contractor: Stearns Drilling Company
Address: 6974 Hammond
Dutton MI 49316
Equipment: CME 1050
Crew Chief: Darryl Krause
ET Supervisor: Cathie Cotton

Location: P#1 (SB-95-1)

Drilling Method(s)	Depth
4-1/4 ID HSA with Poly Plug	109.0'

Ground Surface Elevation (feet): 636.40

Grouting/Seal

Depth/To	Material/Method
0.0-3.0'	Concrete Pad
3.0-101.1'	Bentonite Grout
101.1-102.1'	"0" Best fine Silica Sand
102.1-109.0'	Medium coarse Silica Sand

Water Level: 26 ft. Below Ground

Remarks:

k-ness (feet)	Depth to base (feet)	USCS *	Lithologic Description
			See Log for SB-95-1 (0'-136')

PID						
Blow Counts					Headspace	Background
Sample Depth	6"	12"	18"	24"		

* = The USCS symbol assigned is based on visual and manual observations and not on tests performed in the laboratory.

EARTH TECH

Project Name: Occidental Chemical Company

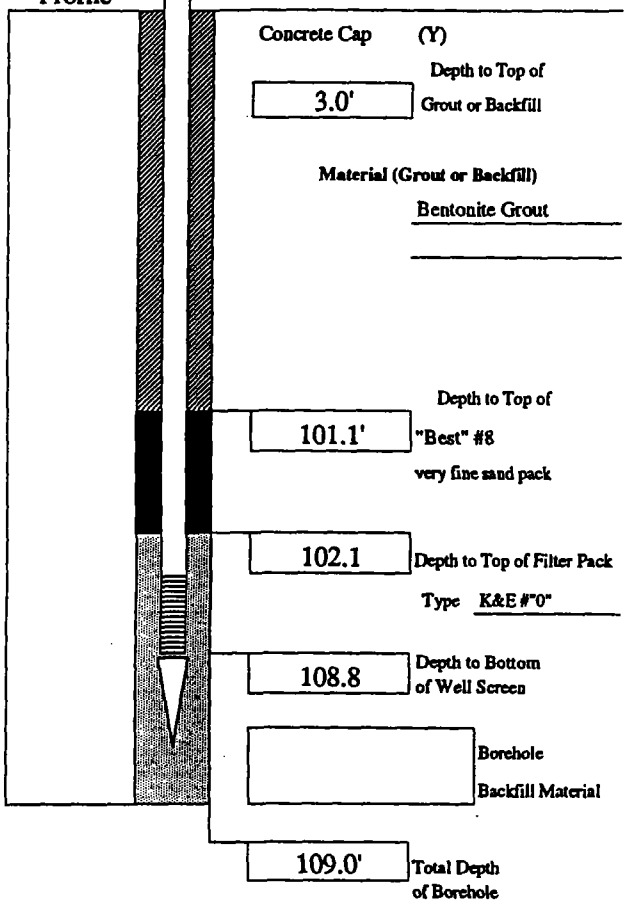
Project No: 23123.00

Log of Well Installation

Well Number: MW-95-1C (104'-109')

Top of Casing Elevation (feet): 638.82

Generalized Subsurface Profile



Water Level Data

Date	Time	Water Level	Elevation

Development: Air lift
400 gallons

Survey Reference:

Well Casing
- Diameter: 2"
- Length: 106.1'
- Material: Schedule 304 Stainless Steel
- Cap Type: Compression fit "J" Plug with vent

Well Screen
- Diameter: 2"
- Length: 5'
- Slot/Type: 7 Slot continuous wire wound
- Material: Schedule 304 Stainless Steel

Protective well casing
- Material: Steel Sq. 4"
- Height Above Ground: 2.8'
- Lock Type: 2402

General Notes:

EARTH TECH

Page: 1 of 1

Well/Boring No. MW-95-2A (21'-26')

Client: Occidental Chemical Company

Project No.: 23123.00

Date: Started: 11/20/95 Finished: 11/21/95

Time: Started: 04:00 PM Finished: 08:00 AM

ell / Boring Log

State	County	Township	Fraction	Section	T	R
MI	Muskegon	Montague		31	12N	17W

Contractor: Stearns Drilling Company

Address: 6974 Hammond
Dutton MI 49316

Equipment: CME 750

Crew Chief: Darryl Krause

ET Supervisor: Eric Meyers

Location: P#2 (SB-95-2)

Drilling Method(s)	Depth
4-1/4 HSA	26.0'

Ground Surface Elevation (feet): 618.90

Grouting/Seal

Depth/To	Material/Method
0.0-1.5'	Concrete Pad
1.5-16.0'	Quick Grout
16.0-19.0'	Bentonite Pellets
19.0-26.0'	K&E Filter Pack

Water Level: 18.9 ft. Below Ground

Remarks:

ck-ness (feet)	Depth to base (feet)	USCS *	Lithologic Description	PID Blow Counts Sample Depth	6"	12"	18"	24"	Headspace	Background
			See Log for SB-95-2 (0'-130')							

* = The USCS symbol assigned is based on visual and manual observations and not on tests performed in the laboratory.

EARTH TECH

Project Name: Occidental Chemical Company

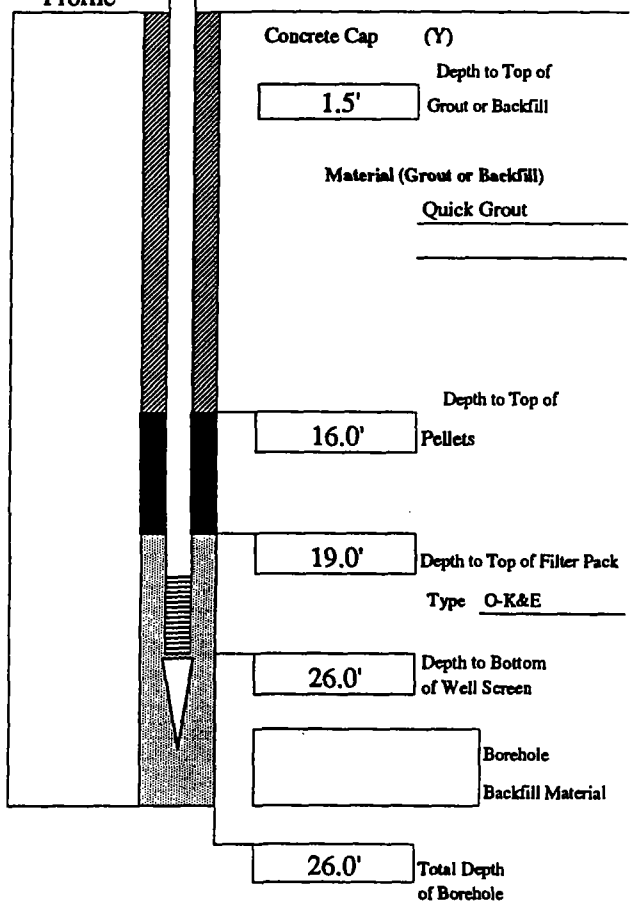
Project No: 23123.00

Log of Well Installation

Well Number: MW-95-2A (21'-26')

Top of Casing Elevation (feet): 621.19

Generalized Subsurface Profile



Water Level Data

Date	Time	Water Level	Elevation

Development: Brianerd - Killman Pump
65 gallons

Survey Reference:

Well Casing
- Diameter: 2" Flush Joint
- Length: 23'
- Material: Stainless Steel
- Cap Type: J-Plug

Well Screen
- Diameter: 2" Flush Joint
- Length: 5'
- Slot/Type: 7'
- Material: Stainless Steel

Protective well casing
- Material: Steel Sq. 4"
- Height Above Ground: 3'
- Lock Type: 2402

General Notes:

EARTH TECH

ell / Boring Log

Page: 1 of 1
Well/Boring No. MW-95-2B (77'-82')
Client: Occidental Chemical Company
Project No.: 23123.00
Date: Started: 11/21/95 Finished: 11/21/95
Time: Started: 08:30 AM Finished: 12:30 PM

State	County	Township	Fraction	Section	T	R
MI	Muskegon	Montague		31	12N	17W

Contractor: Stearns Drilling Company
Address: 6974 Hammond
Dutton MI 49316
Equipment: CME 1050
Crew Chief: Darryl Krause
ET Supervisor: Eric Meyers

Location: P#2 (SB-95-2)

Drilling Method(s)	Depth
4-1/4 HSA	83.0'

Ground Surface Elevation (feet): 618.90

Grouting/Seal

Depth/To	Material/Method
0.0-1.5'	Concrete Pad
1.5-72.0'	Quick Grout
72.0-75.0'	Bentonite Pellets
75.0-82.0'	K&E Filter Pack

Water Level: 18.9 ft. Below Ground

Remarks:

ck-ness (feet)	Depth to base (feet)	USCS *	Lithologic Description
			See Log for SB-95-2 (0'-130')

PID Blow Counts Sample Depth	6"	12"	18"	24"	Headspace	Background

* = The USCS symbol assigned is based on visual and manual observations and not on tests performed in the laboratory.

EARTH TECH

Project Name: Occidental Chemical Company

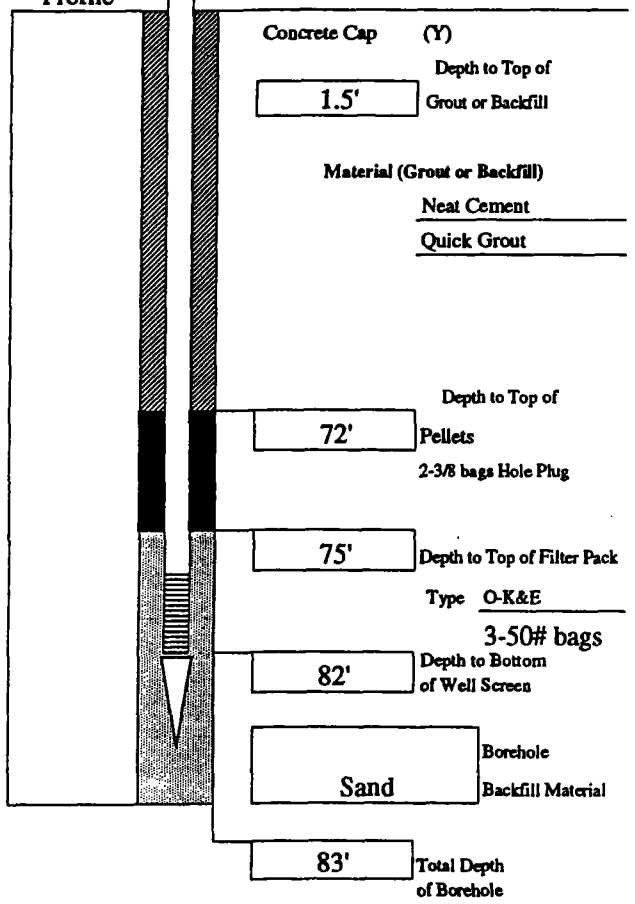
Project No: 23123.00

Log of Well Installation

Well Number: MW-95-2B (77'-82')

Top of Casing Elevation (feet): 621.24

Generalized Subsurface Profile



Water Level Data

Date	Time	Water Level	Elevation

Development: Air lift
300 gallons

Survey Reference:

Well Casing
- Diameter: 2" Flush Joint
- Length: 80'
- Material: Stainless Steel
- Cap Type: J-Plug

Well Screen
- Diameter: 2" Flush Joint
- Length: 5'
- Slot/Type: 7'
- Material: Stainless Steel

Protective well casing
- Material: Steel Sq. 4"
- Height Above Ground: 3'
- Lock Type: 2402

General Notes:

EARTH TECH

Page: 1 of 1

Well/Boring No. MW-95-2C (109'-114')

Client: Occidental Chemical Company

Project No.: 23123.00

Date: Started: 11/21/95 Finished: 11/22/95

Time: Started: 02:00 PM Finished: 10:00 AM

ell / Boring Log

State	County	Township	Fraction	Section	T	R
MI	Muskegon	Montague		31	12N	17W

Contractor: Stearns Drilling Company
Address: 6974 Hammond
Dutton MI 49316
Equipment: CME 1050
Crew Chief: Darryl Krause
ET Supervisor: Eric Meyers

Location: P#2 (SB-95-2)

Drilling Method(s)	Depth
4-1/4 HSA	114.0'

Ground Surface Elevation (feet): 619.00

Grouting/Seal

Depth/To	Material/Method
0.0-1.5'	Concrete Pad
1.5-105.0'	Quick Grout
105.0-107.0'	Fine Sand
107.0-114.0'	K&E Filter Pack

Water Level: 18.9 ft. Below Ground

Remarks:

k-ness (feet)	Depth to base (feet)	USCS *	Lithologic Description
			See Log for SB-95-2 (0'-130')

Blow Counts / Sample Depth	PID 6"	12"	18"	24"	Headspace	Background

* = The USCS symbol assigned is based on visual and manual observations and not on tests performed in the laboratory.

EARTH TECH

Project Name: Occidental Chemical Company

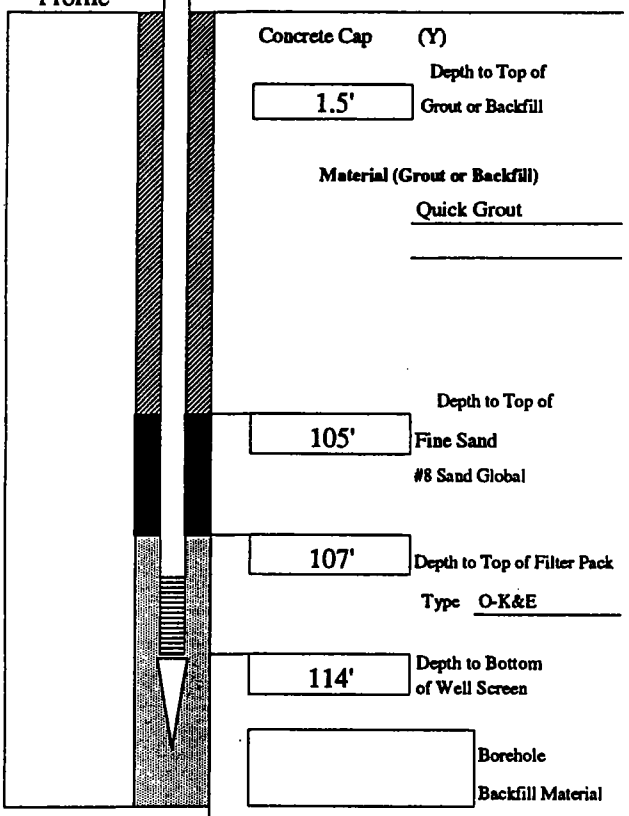
Project No: 23123.00

Log of Well Installation

Well Number: MW-95-2C (109'-114')

Top of Casing Elevation (feet): 621.30

Generalized Subsurface Profile



Water Level Data

Date	Time	Water Level	Elevation

Development: Air lift
400 gallons

Survey Reference:

Well Casing
- Diameter: 2"
- Length: 111.5'
- Material: Stainless Steel
- Cap Type: J-Plug

Well Screen
- Diameter: 2"
- Length: 5'
- Slot/Type: 7'
- Material: Stainless Steel

Protective well casing
- Material: Steel Sq. 4"
- Height Above Ground: 3'
- Lock Type: 2402

General Notes:

EARTH TECH

ell / Boring Log

Page: 1 of 1
Well/Boring No. MW-95-3A (41'-46')
Client: Occidental Chemical Company
Project No.: 23123.00
Date: Started: 11/09/95 Finished: 11/09/95
Time: Started: 11:00 AM Finished: 02:00 PM

State	County	Township	Fraction	Section	T	R
MI	Muskegon	Montague		31	12N	17W

Contractor: Stearns Drilling Company
Address: 6974 Hammond
Tutor MI 49316
Equipment: CM. 1050
Crew Chief: Darnel Krause
ET Supervisor: Cathie Cotton

Location: P#3 (SB-95-3)

Drilling Method(s)	Depth
4-1/4 HSA	46.0'

Ground Surface Elevation (feet): 635.60

Grouting/Seal

Depth/To	Material/Method
0.0-3.0'	Concrete Pad
3.0-36.5'	Bentonite Grout
36.5-39.0'	Bentonite Hole Plug
39.0-46.0'	Medium coarse Silica Sand

Water Level: 37.4 ft. Below Ground

Remarks:

k-ness (feet)	Depth to base (feet)	USCS *	Lithologic Description
			See Log for SB-95-3 for Litho

Blow Counts / Sample Depth	PID 6"	12"	18"	24"	Headspace	Background

* = The USCS symbol assigned is based on visual and manual observations and not on tests performed in the laboratory.

EARTH TECH

Project Name: Occidental Chemical Company

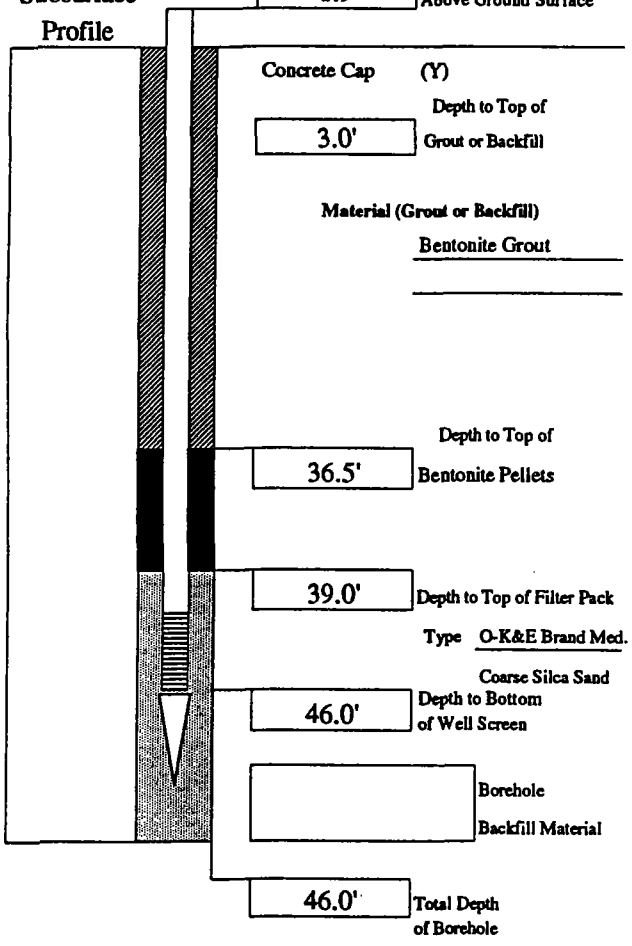
Project No: 23123.00

Log of Well Installation

Well Number: MW-95-3A (41'-46')

Top of Casing Elevation (feet): 637.57

Generalized Subsurface Profile



Water Level Data

Date	Time	Water Level	Elevation

Development: Brainerd-Killman Pump
75 gallons

Survey Reference:

Well Casing
- Diameter: 2"
- Length: 43.5'
- Material: Schedule 304 Stainless Steel
- Cap Type: Compression fit "J" Plug with vent

Well Screen
- Diameter: 2"
- Length: 5'
- Slot/Type: 7 Slot continuous wire wound
- Material: Schedule 304 Stainless Steel

Protective well casing
- Material: Steel Sq. 4"
- Height Above Ground: 2.3'
- Lock Type: 2402

General Notes:

E A R T H T E C H

ell / Boring Log

Page: 1 of 1
Well/Boring No. MW-95-3B (66'-71')
Client: Occidental Chemical Company
Project No.: 23123.00
Date: Started: 11/08/95 Finished: 11/08/95
Time: Started: 02:20 PM Finished: 05:30 PM

State	County	Township	Fraction	Section	T	R
MI	Muskegon	Montague		31	12N	17W

Contractor: Stearns Drilling Company
Address: 6974 Hammond
Dutton MI 49316
Equipment: CME 1050
Crew Chief: Darryl Krause
ET Supervisor: Cathie Cotton

Location: P#3 (SB-95-3)

Drilling Method(s)	Depth
4-1/4 HSA	71.0'

Ground Surface Elevation (feet): 635.60

Grouting/Seal

Depth/To	Material/Method
0.0-3.0'	Concrete Pad
3.0-60.9'	Bentonite Grout
60.9-63.9'	Bentonite Hole Plug
63.9-71.0'	Medium coarse Silica Sand

Water Level: 37.4 ft. Below Ground

Remarks:

ck-ness (feet)	Depth to base (feet)	USCS *	Lithologic Description
			See Log for SB-95-3 for Litho

Blow Counts / PID: Sample Depth	6"	12"	18"	24"	Headspace	Background

* = The USCS symbol assigned is based on visual and manual observations and not on tests performed in the laboratory.

EARTH TECH

Project Name: Occidental Chemical Company

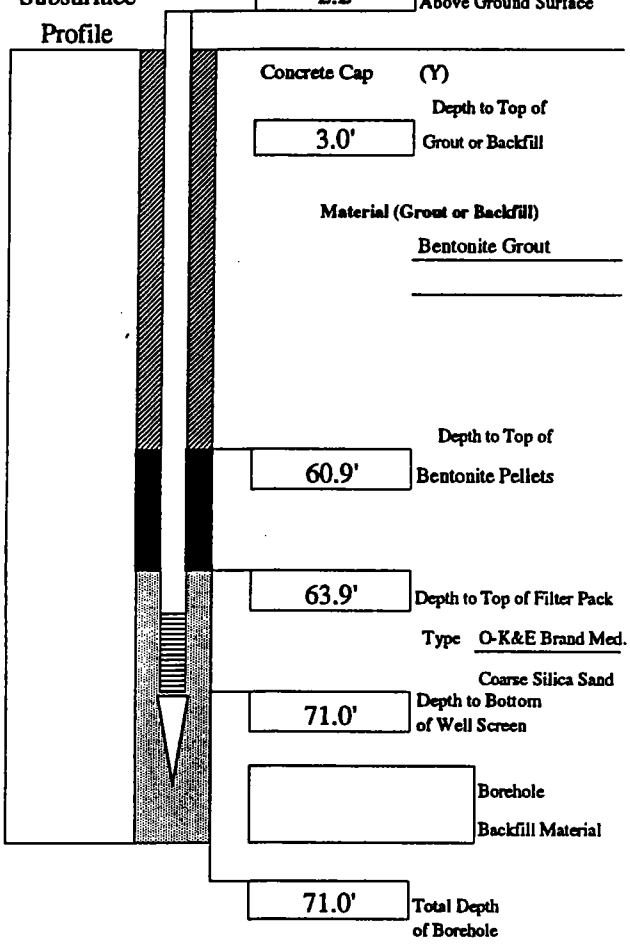
Project No: 23123.00

Log of Well Installation

Well Number: MW-95-3B (66'-71')

Top of Casing Elevation (feet): 637.81

Generalized Subsurface Profile



Water Level Data

Date	Time	Water Level	Elevation

Development: Air lift
300 gallons

Survey Reference:

Well Casing
- Diameter: 2"
- Length: 68.2'
- Material: Schedule 304 Stainless Steel
- Cap Type: Compression fit "J" Plug with vent

Well Screen
- Diameter: 2"
- Length: 5'
- Slot/Type: 7 Slot continuous wire wound
- Material: Schedule 304 Stainless Steel

Protective well casing
- Material: Steel Sq. 4"
- Height Above Ground: 2.5'
- Lock Type: 2402

General Notes:

EARTH TECH

Page: 1 of 1

Well/Boring No. MW-95-3C (112'-117')

Client: Occidental Chemical Company

Project No.: 23123.00

Date: Started: 11/10/95 Finished: 11/10/95

Time: Started: 08:00 AM Finished: 11:45 AM

...ll / Boring Log

State	County	Township	Fraction	Section	T	R
MI	Muskegon	Montague		31	12N	17W

Contractor: Stearns Drilling Company
Address: 6974 Hammond
Dutton MI 49316
Equipment: CME 1050
Crew Chief: Darryl Krause
ET Supervisor: Cathie Cotton

Location: P#3 (SB-95-3)

Drilling Method(s)	Depth
4-1/4 HSA	117.0'

Ground Surface Elevation (feet): 636.10

Grouting/Seal

Depth/To	Material/Method
0.0-3.0'	Concrete Pad
3.0'-108.0'	Bentonite Grout
108.0-110.0'	Very fine Silica Sand
110.0-117.0'	Medium coarse Silica Sand

Water Level: 37.4 ft. Below Ground

Remarks:

...ness (feet)	Depth to base (feet)	USCS *	Lithologic Description
			See Log for SB-95-3 for Litho

Blow Counts / PID	Sample Depth	6"	12"	18"	24"	Headspace	Background

* = The USCS symbol assigned is based on visual and manual observations and not on tests performed in the laboratory.

EARTH TECH

Project Name: Occidental Chemical Company

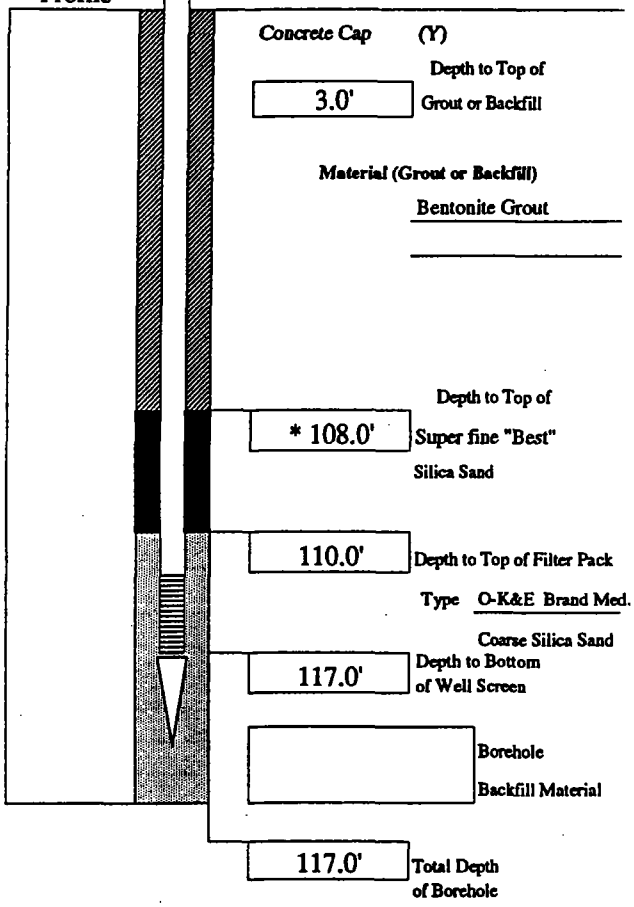
Project No: 23123.00

Log of Well Installation

Well Number: MW-95-3C (112'-117')

Top of Casing Elevation (feet): 638.16

Generalized Subsurface Profile



Water Level Data

Date	Time	Water Level	Elevation

Development: Air lift
300 gallons

Survey Reference:

Well Casing
- Diameter: 2"
- Length: 114.0'
- Material: Schedule 304 Stainless Steel
- Cap Type: Compression fit "J" Plug with vent

Well Screen
- Diameter: 2"
- Length: 5'
- Slot/Type: 7 Slot continuous wire wound
- Material: Schedule 304 Stainless Steel

Protective well casing
- Material: Steel Sq. 4"
- Height Above Ground: 2.5'
- Lock Type: 2402

General Notes: * Estimated depth to silica sand.

EARTH TECH

ell / Boring Log

Page: 1 of 1
Well/Boring No. MW-95-4A (48'-53')
Client: Occidental Chemical Company
Project No.: 23123.00
Date: Started: 10/31/95 Finished: 10/31/95
Time: Started: 08:15 AM Finished: 10:25 AM

State	County	Township	Fraction	Section	T	R
MI	Muskegon	Montague		31	12N	17W

Contractor: Stearns Drilling Company
Address: 6974 Hammond
Dutton MI 49316
Equipment: CME 1050
Crew Chief: Darryl Krause
ET Supervisor: Cathie Cotton

Location: P#4 (SB-95-4)

Drilling Method(s)	Depth
4-1/4 ID HSA	53.6'

Ground Surface Elevation (feet): 642.40

Grouting/Seal

Depth/To	Material/Method
0.0-3.0'	Concrete Pad
3.0-43.4'	Bentonite Grout
43.4-46.0"	Bentonite Hole Plug
46.0-53.6'	K&E "0" Silica Sand

Water Level: 46 ft. Below Ground

Remarks:

K-ness (feet)	Depth to base (feet)	USCS *	Lithologic Description
			See Log for SB-95-4

PID: Blow Counts / Sample Depth	6"	12"	18"	24"	Headspace	Background

* = The USCS symbol assigned is based on visual and manual observations and not on tests performed in the laboratory.

EARTH TECH

Project Name: Occidental Chemical Company

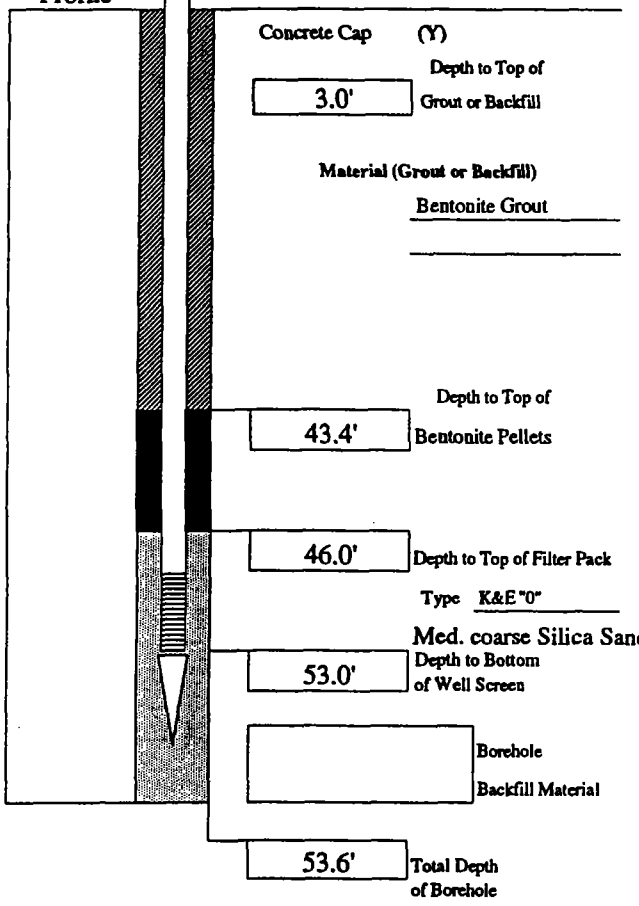
Project No: 23123.00

Log of Well Installation

Well Number: MW-95-4A (48'-53')

Top of Casing Elevation (feet): 644.74

Generalized Subsurface Profile



Water Level Data

Date	Time	Water Level	Elevation

Development: Brainerd-Killman Pump
90 gallons

Survey Reference:

Well Casing
- Diameter: 2"
- Length: 50.6'
- Material: Schedule 304 Stainless Steel
- Cap Type: Compression fit "J" Plug with vent

Well Screen
- Diameter: 2"
- Length: 5'
- Slot/Type: 7 Slot continuous wire wound
- Material: Schedule 304 Stainless Steel

Protective well casing
- Material: Steel Sq. 4"
- Height Above Ground: 2.7'
- Lock Type: 2402

General Notes:

EARTH TECH

ell / Boring Log

Page: 1 of 1
Well/Boring No. MW-95-4B (81'-86')
Client: Occidental Chemical Company
Project No.: 23123.00
Date: Started: 10/31/95 Finished: 10/31/95
Time: Started: 10:40 AM Finished: 04:30 PM

State	County	Township	Fraction	Section	T	R
MI	Muskegon	Montague		31	12N	17W

Contractor: Stearns Drilling Company
Address: 6974 Hammond
Dutton MI 49316
Equipment: CME 1050
Crew Chief: Darryl Krause
ET Supervisor: Cathie Cotton

Location: P#4 (SB-95-4)

Drilling Method(s)	Depth
4-1/4 ID HSA	86.4'

Ground Surface Elevation (feet): 642.40

Grouting/Seal

Depth/To	Material/Method
0.0-3.0'	Concrete Pad
3.0-72.2'	Bentonite Grout
72.2-79.2'	Bentonite Hole Plug
79.0-86.4'	K&E med. coarse Silica Sand

Water Level: 46 ft. Below Ground

Remarks:

k-ness (feet)	Depth to base (feet)	USCS *	Lithologic Description	PID Blow Counts Sample Depth	6"	12"	18"	24"	Headspace	Background
			See Log for SB-95-4							

* = The USCS symbol assigned is based on visual and manual observations and not on tests performed in the laboratory.

EARTH TECH

Project Name: Occidental Chemical Company

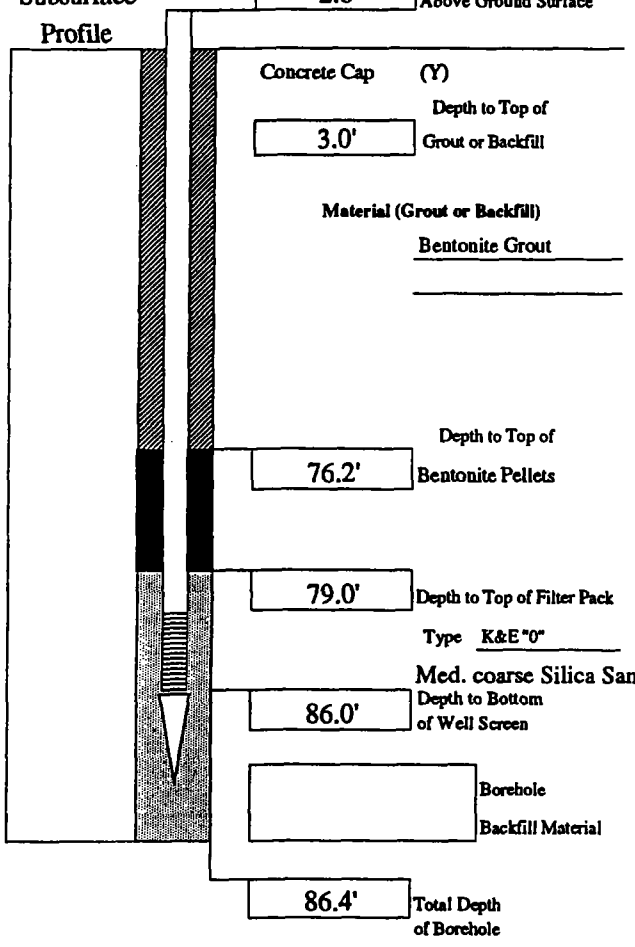
Project No: 23123.00

Log of Well Installation

Well Number: MW-95-4B (81'-86')

Top of Casing Elevation (feet): 644.85

Generalized Subsurface Profile



Water Level Data

Date	Time	Water Level	Elevation

Development: Air lift
400 gallons

Survey Reference:

Well Casing
- Diameter: 2"
- Length: 83.6'
- Material: Schedule 304 Stainless Steel
- Cap Type: Vented compression fit "J" Plug

Well Screen
- Diameter: 2"
- Length: 5'
- Slot/Type: 7 Slot continuous wire wound
- Material: Schedule 304 Stainless Steel

Protective well casing
- Material: Steel Sq. 4"
- Height Above Ground: 2.8'
- Lock Type: 2402

General Notes:

EARTH TECH

ell / Boring Log

Page: 1 of 1
Well/Boring No. MW-95-4C (135'-140')
Client: Occidental Chemical Company
Project No.: 23123.00
Date: Started: 11/01/95 Finished: 11/01/95
Time: Started: 08:00 PM Finished: 05:00 AM

State	County	Township	Fraction	Section	T	R
MI	Muskegon	Montague		31	12N	17W

Contractor: Stearns Drilling Company
Address: 6974 Hammond
Dutton MI 49316
Equipment: CME 1050
Crew Chief: Darryl Krause
ET Supervisor: Cathie Cotton

Location: P#4 (SB-95-4)

Drilling Method(s)	Depth
4-1/4 ID HSA	140.0'

Ground Surface Elevation (feet): 642.40

Grouting/Seal

Depth/To	Material/Method
0.0-3.0'	Concrete Pad
3.0-131.5'	Bentonite Grout
131.5-132.7'	Bentonite Holeplug
132.7-140.0'	K&E med. coarse Silica Sand

Water Level: 46 ft. Below Ground

Remarks:

k-ness (feet)	Depth to base (feet)	USCS *	Lithologic Description
			See Log for SB-95-4

PID						
Blow Counts					Headspace	Background
Sample Depth	6"	12"	18"	24"		

* = The USCS symbol assigned is based on visual and manual observations and not on tests performed in the laboratory.

EARTH TECH

Project Name: Occidental Chemical Company

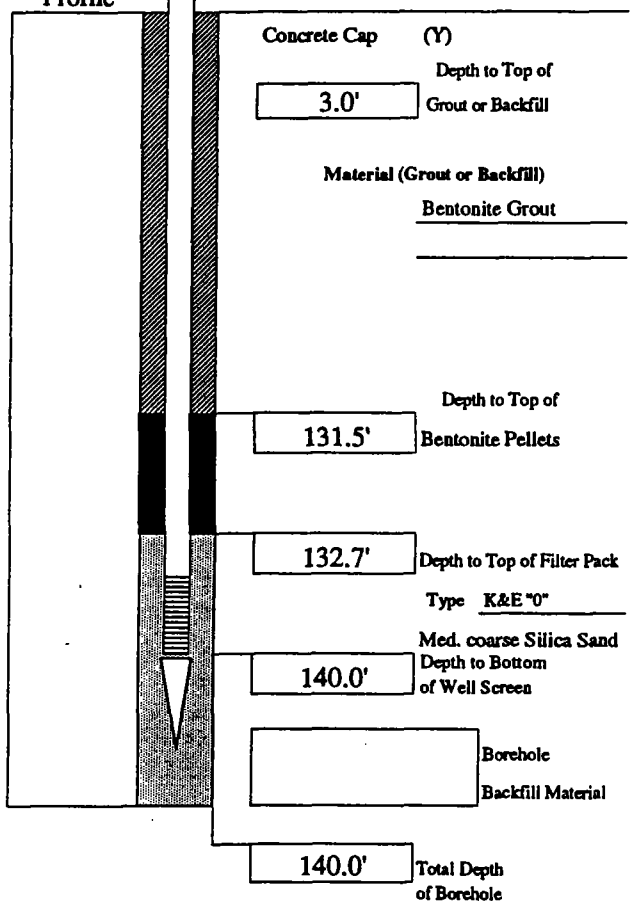
Project No: 23123.00

Log of Well Installation

Well Number: MW-95-4C (135'-140')

Top of Casing Elevation (feet): 644.99

Generalized Subsurface Profile



Water Level Data

Date	Time	Water Level	Elevation

Development: Air lift
* 400 gallons (estimated)

Survey Reference:

Well Casing
- Diameter: 2"
- Length: 137.6'
- Material: Schedule 304 Stainless Steel
- Cap Type: Compression fit "J" Plug with vent

Well Screen
- Diameter: 2"
- Length: 5'
- Slot/Type: 7 Slot continuous wire wound
- Material: Schedule 304 Stainless Steel

Protective well casing
- Material: Steel Sq. 4"
- Height Above Ground: 2.8'
- Lock Type: 2402

General Notes: