HYDROGEOLOGIC REPORT FOR THE SOUTHEAST CONTAINER STORAGE AREA

MICHIGAN DISPOSAL WASTE TREATMENT PLANT
MID 000 724 831

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1.0 Introduction

The following report has been prepared to summarize the results of an investigation of hydrogeologic conditions within the upper sand unit in the proximity of the Southeast Container Storage Area (SECSA) at Michigan Disposal Waste Treatment Plant (MDWTP) in Van Buren Township, Michigan. The location of the SECSA on a map of the site is shown on Figure 1. The SECSA will be used for waste handling activities by the MDWTP per condition 8 of Part VII contained within the operating license issued September 30, 1999. This investigation was conducted in accordance with an approved work plan in order to meet the requirements of Michigan Public Act 451, Part 111. The purpose of the hydrogeologic investigation is to adequately describe the dimensions and characteristics of the water-bearing upper sand unit so that a groundwater monitoring program capable of detecting an impact from the SECSA activities can be devised. This report includes recommendations for a groundwater monitoring program.

2.0 Background

The upper sand unit at the site has been encountered in numerous hydrogeologic investigations at Site #2 and described in several hydrogeologic reports. It is believed to be deltaic in origin, forming a surface veneer of silty sand and sandy silt over the silty clay till. The unit is on average 12 feet thick, and has been found to have a saturated interval in some, but not all locations. It has been found to be as thick as 23 feet in places and nearly absent in others. As part of a hydrogeologic study completed in the early 1980's, a water table map, constructed from surface exposures of the water table, depicted a southerly flow direction toward Belleville Lake, a regional discharge feature. That map, however, represented pre-landfill conditions, which have most likely changed significantly.

An investigation of this unit performed for Van Buren Township on property adjacent to the facility and south and west of the SECSA found that the flow direction in this unit was east-northeast. This suggested that a local discharge feature might be influencing flow direction within this unit.

The upper sand unit has been removed as part of landfill and treatment plant construction over most of the site and, what remains, is isolated from existing waste management units by clay berms and landfill liner systems. The unit is not considered the uppermost aquifer for the purposes of monitoring the landfill cells. Because the sand unit was likely to be found beneath and around the SECSA (i.e., it has not been removed), and waste handling operations will be conducted in the SECSA structure, which will be on a paved surface with drainage collection, the upper sand is the proper target for a monitoring program for this waste management unit.

It is possible that constructed features on the site are influencing groundwater flow in the upper sand. Such features include, storm-water lines to the sedimentation basin, storm-water lines leading to the lined pond, double-contained leachate lines to the wastewater treatment plant, buried communications cables, the sedimentation basin, open drainage ditches, stockpiles of soil, pavement and buildings. Therefore, the locations of these features were considered in the investigation.

3.0 Purpose and Scope of Work

The purpose of the investigation was to describe hydrogeologic and background water quality conditions within the upper sand unit in the vicinity of the SECSA. The following summarize the specific objectives of this investigation:

1. To determine the location, thickness and material properties of the upper sand unit.

2. To determine the hydrologic properties of the upper sand unit including the direction(s) and rate of movement of groundwater within this unit.

3. To identify all structures and barriers near the SECSA which might influence the direction and rate of flow within the upper sand unit.

4. To establish baseline groundwater quality in the upper sand unit at the SECSA.

5. To propose a long term monitoring program for the upper sand unit at the SECSA.

To accomplish the objectives outlined above, the following tasks were completed during the course of the investigation:

1. Six continuously sampled soil borings were drilled through the shallow sand unit into the upper several feet of the underlying silty clay till. Four of the borings were at the perimeter of the SECSA, one in the center of the SECSA and one between the SECSA and the sedimentation basin. The locations of these borings, designated as P-1 through P-6, are shown on Figure 2.

2. A piezometer was installed in each test boring listed above.

3. An attempt was made to determine the potential influence of all man-made structures on groundwater flow within the upper sand. This included a review of all as-built drawings available, plotting surveyed elevations of various structures on a site plan, and the placement of a staff gauge within the sedimentation basin to measure water levels within the basin.

4. Static water level elevation data was collected from all six piezometers, the staff gauge, and from the shallow wells installed by Van Buren Township. Levels were collected monthly for a period of three months (January through March, 2000) in order to determine groundwater flow directions and any short-term fluctuations of the flow directions.

5. In-situ hydraulic conductivity tests were performed at one well in order to estimate the hydraulic conductivity of the upper sand unit.

6. Groundwater samples were collected from the six piezometers installed in and around the SECSA. The samples were collected and analyzed as described in Section 4.5 of this report.

4.0 Methods

This section of the report describes the methods and procedures used to complete the work items listed above.

4.1 Test Borings - Test borings were installed December 6th and 7th, 1999 by Alliance Environmental, Inc. under the supervision of NTH Consultants, Ltd. The borings were advanced using a 4-1/4" inside diameter hollow stem auger with an EnviroCore sampler. The EnviroCore sampler, which collects a 2-inch diameter continuous sample, was pushed with a pneumatic hammer the entire depth of the boring through the upper sand until the underlying clay was encountered. Core samples were withdrawn in three-foot lengths and logged by field personnel. Samples from each core were placed in sealed plastic bags, allowed to warm in a heated vehicle and then the headspace scanned with a calibrated HNu meter for the presence of volatile organics. Four soil samples collected from the base of the sand unit (i.e. the screened interval) were submitted for grain-size analyses. Samples of the soil were given a field classification according to the Unified Soils Classification System (ASTM D-2488) by a qualified geologist or field technician.

After the collection of the samples, the test borings were over-drilled using the hollow-stem augers to the depth at which clay was encountered. Care was taken to avoid advancing the augers into the clay. This prepared the test boring for piezometer installation.

4.2 Piezometer Installation - Piezometers were installed in each of the six soil borings as saturated conditions were encountered at each location. The piezometers were constructed of 2" PVC casing with 7 slot (0.007 inch opening) screens. Screen length was 5 feet in each case, which was sufficient to include the entire interval of saturated thickness in each of the six locations. As the augers were withdrawn, a sand pack using graded silica sand was added to the annular space to a level approximately two feet above the screened interval. Then, approximately two feet of bentonite hole-pug was added followed by quick grout to the surface. The piezometers are protected with a lockable protective casing cemented into place. The ground surface near the piezometer is sloped to prevent ponding of water around the annular space.

Due to the low yield and limited saturated thickness, each piezometer was developed using a bailer. The purged water was monitored for pH and specific conductance using calibrated field meters and observed for clarity. Development was considered complete when the pH and specific conductance stabilized at reasonable values and the water was relatively sediment-free.

Each piezometer was surveyed for xyz coordinates with the top of casing elevations referenced to a permanent USGS datum by EQ survey personnel. In addition, a staff gauge was added to the sedimentation basin and surveyed so as to monitor the elevation of the water in the basin.

4.3 Static Water Elevations - Following piezometer installation, static water elevations were measured monthly by EQ personnel at each of the six piezometers, three wells installed by Van Buren Township, and the staff gauge for a period of three months following installation (January through March, 2000). The depth to the water was measured using an electric water level indicator capable of recording water levels to the nearest 0.01 foot.

4.4 Hydraulic Conductivity Tests - Attempts to estimate the *in-situ* hydraulic conductivity of the upper sand unit were conducted by NTH on December 17, 1999. Well P-4 was selected because there was nearly 4 feet of saturated thickness. A pressure transducer was used to measure the response to the addition of a "slug" to the well. However, NTH was unable to get meaningful data from the slug tests most likely because the screened interval was longer than the saturated thickness and because the very small volume of the "slug", which was limited by the distance from the top of the transducer to the top of the water column, probably induced a response in the sand pack rather than the native sand.

NTH next attempted a single well pump test again using the pressure transducer to measure the response. The objective of this test was produce a drawdown versus time curve and possibly estimate a specific capacity if the water level would stabilize. The well was pumped for approximately two minutes at about 3 gpm and the water level may have been stabilizing when it fell below the pump intake. So again the test yielded little useful data. Based on estimated specific capacity data and an analysis of time-drawdown data using the program AQTESOLV™, NTH attempted to estimate a hydraulic conductivity. However, the estimated values, were more indicative of a coarse sand or gravelly sand than a fine to medium sand containing silt. Based on experience with sand units of similar characteristics, the estimates derived from these tests do not appear accurate. This conclusion is further validated by the hydraulic conductivity values estimated from grain-size curves, which yield values more in line with those typical for fine to medium sand.

4.5 Sample Collection - Groundwater samples were collected on January 11, 2000 from each of the six piezometers by sampling personnel from EQ. Due to the low yield of the wells, samples were collected utilizing a disposable bailer equipped with a VOC flow restrictor device. The wells were purged prior to sampling with at least 3 well casing volumes of water removed prior to sampling. The samples were collected in bottles provided by the contract laboratory, TriMatrix Laboratories, Inc. of Grand Rapids, Michigan. Sample handling and preservation was completed per the approved work plan. Field QA/QC procedures included the collection of a blind duplicate sample, field blanks and a trip blank. Each sample collected was analyzed for the parameters listed within the approved work plan.

5.0 Results and Discussion

The data gathered through this investigation and an analysis of these data is presented in this section of the report. Geologic conditions, hydrologic conditions and ground water quality results are presented in the next three subsections, respectively.

5.1 Geologic Conditions - The soils encountered in each of the test borings are shown on the individual log of test borings included on Figures 1-6 in Appendix A of this report. The soil conditions encountered by these test borings were consistent with those seen in earlier hydrogeologic investigations at the facility. At each boring, various amounts of fill and/or topsoil were encountered at the surface. The fill material was generally a silty clay and not always easily distinguishable from the native soils. The fill ranged from 1.5 to 8 feet in thickness. Beneath the fill at each location, a water-bearing granular unit was encountered. This unit was a brown or gray fine to medium sand with various amounts of silt and gravel and ranged from 9.5 to 15 feet thick.

Grain-size analyses from the four samples collected from near the bottom of the boring (in the saturated sand deposit) from borings P-1, P-2, P-4 and P-6 (see Figure Nos. 13-17, Appendix A) contained from 67 to 91 percent fine/medium sand. Finer particles (e.g. silt/clay) comprised 9 to 30 percent of the samples. This unit also contained small silt or clay seams in places typical of this unit and indicative of the lacustrine origin.

Using the empirical relationships developed by Prugh (from J.P. Powers, Construction Dewatering, 2nd Ed., Wiley & Sons, New York, 1992), hydraulic conductivities were estimated from the grain-size distributions for the four samples. These estimates ranged from about $1X10^{-3}$ cm/sec to $2.5 X10^{-2}$ cm/sec.

Beneath the upper sand unit the silty clay till was encountered at each location. The depth to clay ranged from 14.4 to 18 feet below ground surface. This corresponds to an elevation range 683.6 to 687.6 for the surface of the silty clay till unit. A contour map of the clay surface elevation is shown on Figure 3. As shown, there is relatively little topography in the clay surface. There does appear to be a relatively gentle decline in the surface elevation from west to east.

5.2 Hydrologic Conditions - Groundwater was detected in the lower portion of the upper sand unit in all six boring locations. Therefore, piezometers were installed at each location. The logs for each piezometer are included on Figures 7-12 in Appendix A. There was generally between 2 to 4 feet of saturated thickness within this unit. The zone of saturation is entirely within the sand. Therefore groundwater within the upper sand unit is under water table (i.e. unconfined) conditions.

Static water elevations collected from the six piezometers and three of the wells installed by Van Buren Township are summarized on Table 1. The elevation of the groundwater surface is generally between 687 and 689 in the area around the SECSA. Groundwater levels exhibited a slight increase over the three month period of measurements. A hydrograph (Figure 4) shows that the levels at each piezometer exhibited a similar change over this time period. This is the expected result for this system that directly responds to recent recharge events by percolation through the overlying soils.

Groundwater flow contour maps for each set of monthly measurements are shown on Figures 5 through 7. As shown, the flow direction is east/northeast within the upper sand unit. This is consistent with the flow directions found by Van Buren Township based on data from their wells in the same unit. The flow maps suggest that the flow direction turns more directly east as it flows down the flow path. This makes sense as there is no outlet to the north: the upper sand unit has been replaced with clay dikes where landfill units are constructed. The groundwater is flowing toward the local discharge feature, Quirk Drain, probably by way of the sedimentation basin. Water levels in the sedimentation basin were 6 to 7 feet lower than in the eastern most piezometer, P-5, and thus is likely a discharge feature. Normally, water in the sedimentation basin outflows into Quirk Drain through a culvert when levels are high enough. However, since June of 1999, the outlet has been plugged and water is pumped out of the sedimentation basin only as needed.

In order to determine if man-made structures may influence groundwater flow in the upper sand unit. All such known structures were placed on a map of the SECSA (see Figure 8). Based on this information, two structures, the 42" storm water culvert to the sedimentation basin and the storm sewer line that delivers run-off from paved areas to the lined pond were found at elevations that are, at least in part, close to or beneath the water level within the upper sand. As such, these structures are potential preferential pathways for the movement of groundwater in the upper sand unit, either through the backfill material or leakage into the structure itself. The surveyed inverts of the lined pond storm sewer pipes are actually slightly above current water levels. Thus this structure will have no effect in the area of the SECSA unless water levels rise at least one foot from current levels. The invert for the storm water culvert for the sedimentation basin is several feet below the current groundwater surface. However, there is no evidence in the water level data to suggest that this structure is exerting a significant influence on the flow within the unit. Several piezometers are close to the culvert (e.g. P-3 and P-4) and neither show anomalously low levels. Therefore, if there is any preferential flow associated with this structure it appears to be only a minor, localized phenomena.

Because the data from the in-situ hydraulic conductivity tests do not appear to be valid, grain-size distribution estimates for hydraulic conductivity were used to estimate groundwater flow velocity in the upper sand unit. The measured horizontal gradient is approximately 0.005 ft/ft. Assuming an effective porosity of 25% and using the range of estimated hydraulic conductivities described above ($1X10^{-3}$ cm/sec to $2.5\ X10^{-2}$ cm/sec), the estimated horizontal flow rate for groundwater in the unit is likely to range from 20 to 500 feet per year in the area of the SECSA.

5.3 Groundwater Quality - During the drilling and installation of the piezometers, the core material was both visually examined and screened with an HNu meter for the presence of volatile organics. These activities are useful in detecting the presence of gross contamination or waste materials within the soils at each location. No visibly identifiable waste materials or contamination was seen at any location. The subgrade material directly beneath the asphalt at the location for P-6 produced a greenish hue when penetrated with the auger but appeared to be only ground up limestone. The material was odorless and produced no reading on the HNu. In fact, none of the soil samples produced positive HNu readings at any location. Therefore, there was no evidence that either waste constituents or grossly contaminated soils are present at the locations where wells were placed.

Groundwater quality analyses, minus the voluminous QA/QC report, are included in Appendix B of this report. A summary of the groundwater quality results for samples collected from the six piezometers is presented on Table 2. In addition to the parameters shown on the summary table, each sample was analyzed for an extensive list of volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs) and polychlorinated biphenyls (PCBs). With the exception of one VOC (see Table 2), none of the VOCs, SVOCs or PCBs were detected in any of the samples.

There are two main purposes to collecting groundwater data for this hydrogeologic investigation. First, it is important to define existing water quality including any evidence for pre-existing (to the SECSA operations) impact from on-site or off-site activities. Secondly, this information, combined with information regarding the types of waste that will be handled in the SECSA structure, are used to develop a monitoring program capable of detecting impacts from the future SECSA operations.

The general groundwater quality within the upper sand unit is typical for a shallow unprotected aquifer in an industrial/populated area in that there is likely evidence for surface activities such as road salting. Chloride concentrations ranging from 102 to 1250 mg/l are indicative of this activity. The water quality for two of the six wells was plotted on a trilinear diagram for visual inspection. The calculations are shown on Table 3 and the diagram is found on Figure 10. Only two wells were plotted because the lab erroneously did not analyze for sodium. When notified, the lab was able to get sodium data for wells P-1 and P-5 only. As shown, the data for P-1 plots in a different location than P-5 (which probably would plot similar to P-3, P-4 and P-6). This is due to the presence of higher concentrations of calcium and sulfate in this sample compared to the others. Both P-1 and P-2 were installed in areas with some amount of clay fill. Therefore, a possible source may be the dissolution of the mineral gypsum within the clay. Water in contact with the on-site clay, once it has been disturbed, has been known to produce this effect; for instance consolidation water from clay used in liner construction has been shown to contain high levels of sulfate and calcium.

Also included on both Table 3 and Figure 10 is typical groundwater from the regional aquifer beneath the clay till as represented by recent data from nearby wells MW-23R and MW-24. As shown, there is a distinct difference in the composition between the water in the two units in terms of the relative concentrations of major ions. The difference is even more pronounced when absolute concentrations are considered as the shallow water contains significantly more dissolved solids than the water from the regional aquifer (see Table 3). This is not unexpected as the thick clay till sequence between the two water-bearing units effectively limits any interconnection between the two and the shallow groundwater flows laterally to local discharge points.

To address the issue of pre-existing impacts to water quality in the upper sand zone, the water quality data were compared to relevant groundwater standards. Part 111 (of Act 451) regulations for hazardous waste facilities refer to Act 307 Type B standards for drinking water for use in clean-ups at hazardous waste sites. In addition, new standards have been developed under Part 201 (of Act 451) for drinking water in residential areas. Both of these standards are shown on Table 2. From the data collected for this investigation, aesthetic-based drinking water standards are exceeded for chloride, sulfate and iron in two or more of the wells. In addition, health-based standards were exceeded for molybdenum and nickel at well P-2.

The exceedance of aesthetic-based standards are, as described above, likely a result normal surface activities such as the road salting (both on-site and roads/highway) and the placement of clay fill. As such, there is unlikely to be any relation to prior or current hazardous waste activities at the site. The water quality results at P-2, which includes the detection of one VOC (acetone), two metals (molybdenum and nickel) above drinking water standards, and an elevated iron concentration, are somewhat anomalous compared to other locations. This well is located upgradient of the SECSA and is downgradient of only the entrance road and perhaps some of the ancillary site operations such as equipment garages. Therefore, theses results may be an indication of something within the soils local to the well, or may be anomalous results that will not be confirmed. This well should be resampled to confirm the results before any conclusions are made.

6.0 Proposed Groundwater Monitoring Program

As described above, the main purpose for this hydrogeologic investigation was to gain enough information to prepare an effective groundwater monitoring program for the Southeast Container Storage Area. With the information collected and evaluations completed for this investigation, the following proposed monitoring program was developed. A final plan, when adopted, will be incorporated into MDWTP's existing groundwater sampling and analysis plan (SAP). The revised SAP will need to be reviewed and approved by MDEQ prior to incorporation into the operating license. The incorporation of the revised SAP into the operating license will require a minor modification to the license. Therefore, detailed procedures for sampling and analysis are not included in this proposed plan. Rather, this plan presents the rationale for the selection of important plan components such as well locations, parameter selection, monitoring frequency and data evaluation. Each is described below.

6.1 Monitoring Well Location - Data from several months of measurements from the piezometers installed around the SECSA and from previous data from the Van Buren Township study suggests that groundwater flow is generally west to east across the SECSA. Therefore, if a release of waste constituents were to occur in this area, the constituents would migrate in a generally eastward direction within the upper sand unit. A proposed monitoring well location map is presented on Figure 9 of this report. To effectively monitor the SECSA, three downgradient wells, existing wells P-1 and P-3 and one new well (P-7) should be monitored as downgradient wells. Existing wells P-2 and P-4 can be used as upgradient wells that will help determine if any changes to water quality caused by activities upgradient of the SECSA are flowing toward the area. Well P-5 can be used for water levels only. The proposed arrangement will provide coverage in the direction of groundwater flow at approximately 150-foot intervals. Furthermore, both the outlet to the sedimentation basin, which is probably the local discharge feature, and the receiving surface water feature (Quirk Drain) are already monitored as part of other monitoring programs at the site.

6.2 Parameter Selection - Parameters useful for groundwater monitoring were selected based on the most common waste constituents likely to be handled in the SECSA. Unlike landfill monitoring where the monitoring parameter list is based on leachate as the source with a strong consideration given to geochemical behavior of the various potential monitoring constituents, monitoring parameters for the SECSA should be selected primarily based on the amount of particular waste constituents that will be handled there. The reason for this is that any releases from this structure would go directly into the shallow soils and groundwater, probably without significant amounts of natural attenuation. Therefore, selected monitoring parameters should reflect the types of waste constituents handled and the fact that the probability of a release of a particular waste constituent will be proportional to the amount of that material that is handled.

To select monitoring parameters, the identity and quantity of waste constituents treated by the MDWTP in 1999 was reviewed. From this review, the most commonly handled waste constituents were indentified . From these, monitoring parameters that could be analyzed by USEPA SW-846 Methods were selected for use in the monitoring program. This list is presented on Table 4. The list includes the eleven most commonly handled trace metals, eleven indicator parameters that were selected due to the fact that they are actual wastes (e.g. ammonia, cyanide, magnesium, iron), are salts of acid or caustic wastes (chloride, sulfate, sodium, potassium, phosphorus) or general indicators of waste properties (pH and alkalinity), and various volatile and semi-volatile organic compounds. The metals and indicator parameters were selected from waste constituents that were handled in quantities of a thousand pounds or more. The volatile and semi-volatile organic parameters were selected from waste constituents handled in much lower quantities.

6.3 Monitoring Frequency - Recommended monitoring frequencies are listed on Table 4. Both quarterly and annual monitoring parameters are included. The quarterly list includes those parameters indicative of the most commonly handled waste types. The annual list adds some additional parameters that are representative of somewhat less commonly handled waste constituents. The annual list includes the volatile and semi-volatile organic compounds, which, on a weight basis, are much lower volume wastes than metals, acids and caustics. During the establishment of statistical background (see below) the samples will be analyzed for the annual parameter list.

6.4 Data Evaluation - Monitoring data will be evaluated statistically to determine if there is evidence of a possible release from the SECSA. Background for the statistical analyses will be completed by sampling each well monthly for a period of eight months (minimum). If operations in the SECSA have not yet begun after the eight-month background period, EQ, could, at their discretion, add additional background monitoring.

At the end of background, the data will be evaluated to determine: 1) whether to use interwell or intrawell statistical procedures, 2) which statistical procedures are applicable for each parameter, and 3) whether any data transformations are necessary in order to apply statistical tests. Interwell statistical procedures will be used if 1) flow directions remain consistent with a clear distinction between upgradient and downgradient wells, and 2) the upgradient background is reasonable for establishing limits for downgradient wells. If either of these two conditions is not met, intrawell statistical methods will be employed. Although the selection of statistical methods will be based on evaluation of the data, it is anticipated that a combination of control charts for parameters that are not highly censored and non-parametric prediction limits for censored data will be utilized.

7.0 Conclusions and Recommendations

Based on the results of this hydrogeologic investigation, the following conclusions were reached:

1. Geologic conditions in the upper sand unit in the area of the SECSA are consistent with those found in previous investigations. The lacustrine sand unit was found at each of the six boring locations. The thickness of this unit plus any overlying fill material was between 14.4 and 18 feet. The silty clay till was found beneath the upper sand in each location.

2. Groundwater under water table conditions was found at each location with the saturated thickness varying from 2 to 4 feet. Groundwater flow was found to be from west to east at a rate of 20 to 500 feet per year.

Groundwater in the sand appears to discharge into the sedimentation basin and/or the local discharge zone, Quirk Drain.

3. The general groundwater quality within the upper sand unit is typical for a shallow unprotected aquifer in an industrial/populated area in that there is likely evidence for surface activities such as road salting. Aesthetic-based drinking water standards were exceeded for chloride, sulfate and iron at several locations and health-based standards for nickel and molybdenum at P-2.

4. Groundwater monitoring should be based on the most common waste types that will be handled at the SECSA. Eight monthly samples should be collected for background and an appropriate final statistical program should developed based the background data characteristics.

To continue the process required by the operating license for SECSA monitoring the following recommendations are made:

1. Resample P-2 for VOCs, nickel and molybdenum to determine if the initial results can be confirmed.

2. Upon receiving comments from MDEQ on this proposed monitoring plan and completion of background data collection, MDWTP should revise the SAP and submit a minor license modification for review and approval.

3. Abandon piezometer P-6 in accordance with MDEQ guidelines to prevent its accidental destruction and the potential for waste to enter the borehole.

4. Continue to monitor static water levels monthly so that seasonal effects can be evaluated.

TABLES

Table 1. Static Water Level Elevations - SECSA Piezometers - EQ MDIWTP

Well I.D.	Top-of-Casing Elevation	Ground Surface Elevation	Depth to Clay (ft)	Elevation of Clay Surface	Static Water Level Elevations 1/27/2000	2/29/2000	3/29/2000
P-1	703.50	701.0	16.0	685.0	688.72	688.97	688.90
P-2	707.16	704.1	16.5	687.6	689.14	689.16	689.08
P-3	706.88	704.2	18.0	686.2	688.43	688.53	688.55
P-4	707.43	703.8	17.1	686.7	689.50	689.60	689.63
P-5	701.28	698.0	14.4	683.6	687.79	688.12	688.03
P-6	700.70	700.5	15.1	685.4	688.62	688.75	688.79
TW-1	703.39	700.9	13.6	687.3	NA	NA	NA
MW-1S-98	702.31	700.0	12.0	688.0	692.58	692.89	693.07
MW-2-98	701.21	698.7	12.0	686.7	691.51	691.81	691.86
MW-3-98	698.39	696.2	11.5	684.7	689.67	689.99	689.92
MW-4-98	697.13	697.5	12.0	685.5	NA	NA	NA

Table 2. Groundwater Quality Results - Southeast Container Storage Area - WDI Site #2

Constituent	P-1	P-2	P-3	P-4	P-5	P-6	Part 201 DWS	Act 307 DWS
Alkalinity, Total	374	366	342	357	323	719	NA	NA
Alkalinity, Bicarbonate	374	366	342	357	323	719	NA	NA
Alkalinity, Carbonate	<2	<2	<2	<2	<2	<2	NA	NA
Chloride	102	680	1250	509	857	402	250	250
Sulfate	842	645	68	89	65	62	250	250
Cyanide, Total	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.2	0.15**
Arsenic	0.0017	0.037	<0.001	0.0057	<0.001	0.0072	0.05	0.00002
Barium	0.042	0.091	0.29	0.18	0.064	0.45	2	2
Cadmium	0.0003	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	0.005	0.0035
Calcium	398	459	176	112	138	357	NA	NA
Chromium	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.1	0.12
Copper	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	1	1.3
Iron	0.32	62.7	<0.02	1.82	0.12	25.2	0.3	0.3
Lead	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.004	0.004
Magnesium	81	60	21	17	18	65	420	NA
Molybdenum	<0.025	0.041	<0.025	<0.025	<0.025	<0.025	0.037	NA
Nickel	<0.05	0.14	<0.05	<0.05	<0.05	<0.05	0.1	0.53
Potassium	8.4	3.1	7.2	2.6	4.4	8.4	NA	NA
Selenium	0.0032	0.0086	0.0016	0.001	0.0016	0.0088	0.05	0.035
Vanadium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.064	0.061
Zinc	<0.02	0.044	<0.02	<0.02	<0.02	<0.02	2.4	2.3
Acetone	<0.01	0.019	<0.01	<0.01	<0.01	<0.01	0.7	0.73

all data in mg/L

** value for free cyanide

Table 3. Ground Water Classifications Based on Major Ion Composition - SECSA - EQ MDWTP

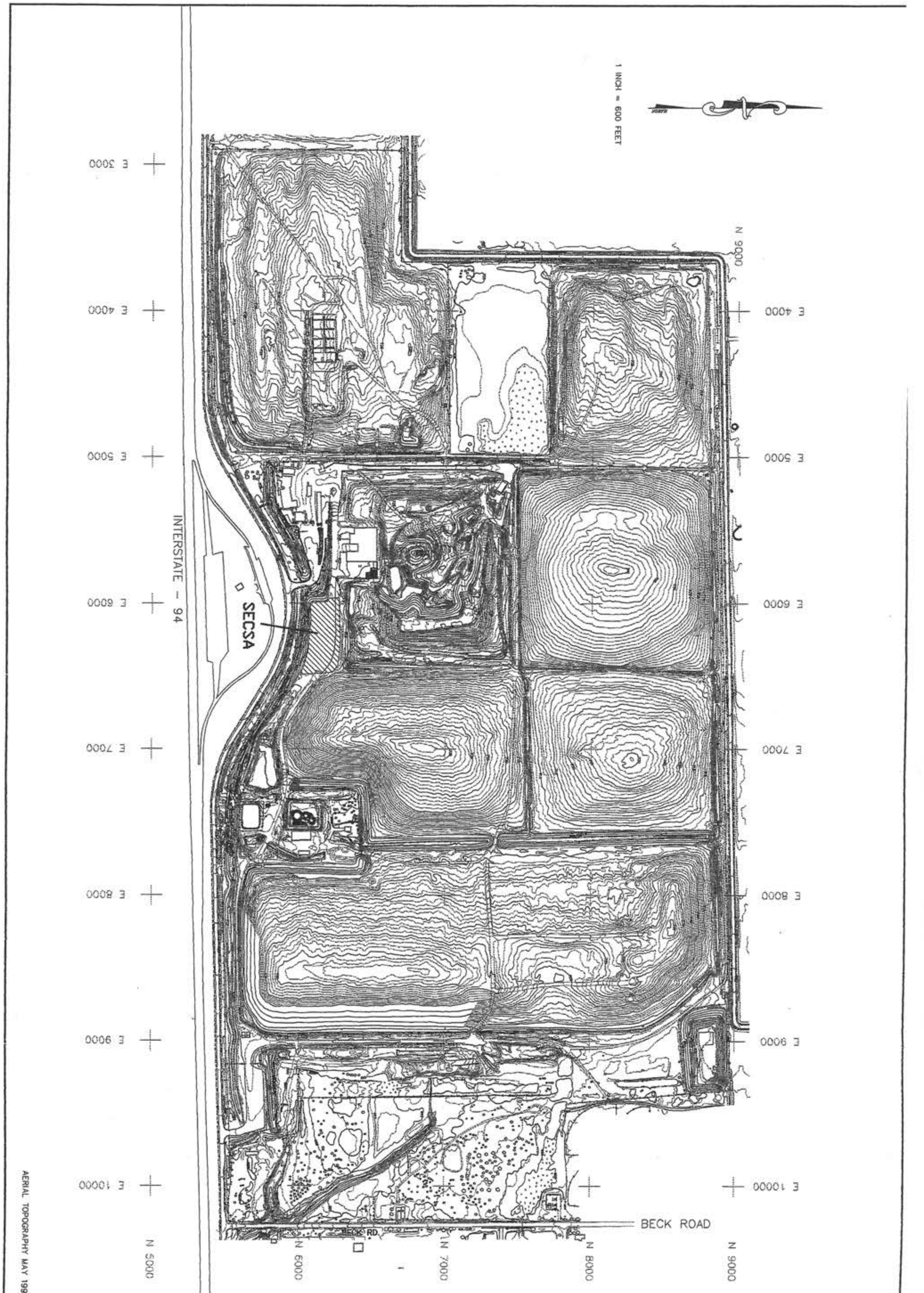
Well	Concentration (mg/l				Concentration (meq/l)			Total	Proportions				Dominant
	Ca	Mg	Na	K	Ca	Mg	Na + K	Cations	%Ca	%Mg	% Na + K	% Ca + Mg	Cation
P-1	387	81	60	8.4	19.3	6.7	2.8	28.8	67.1	23.1	9.8	90.2	Calcium
P-5	138	18	459	4.4	6.9	1.5	20.1	28.4	24.2	5.2	70.6	29.4	Sodium
OB-23R	110	36	14	1.2	5.5	3.0	0.6	9.1	60.4	32.6	7.0	93.0	Calcium
OB-24	70	21	16	2.8	3.5	1.7	0.8	6.0	58.3	28.8	12.8	87.2	Calcium

Well	Concentration (mg/l				Concentration (meq/l)			Total	Proportions				Dominant
	Cl	SO4	HCO3	CO3	Cl	SO4	HCO3 + CO3	Anions	%Cl	%SO4	HCO3 + CO	%Cl + SO4	Anion
P-1	102	842	374	1	2.9	17.5	7.5	27.9	10.3	62.8	26.9	73.1	Sulfate
P-5	857	65	323	1	24.2	1.4	6.5	32.0	75.5	4.2	20.3	79.7	Chloride
OB-23R	15	73	280	5	0.4	1.5	5.8	7.7	5.5	19.7	74.8	25.2	Bicarbonate
OB-24	1	12	230	5	0.03	0.2	4.8	5.0	0.6	5.0	94.5	5.5	Bicarbonate

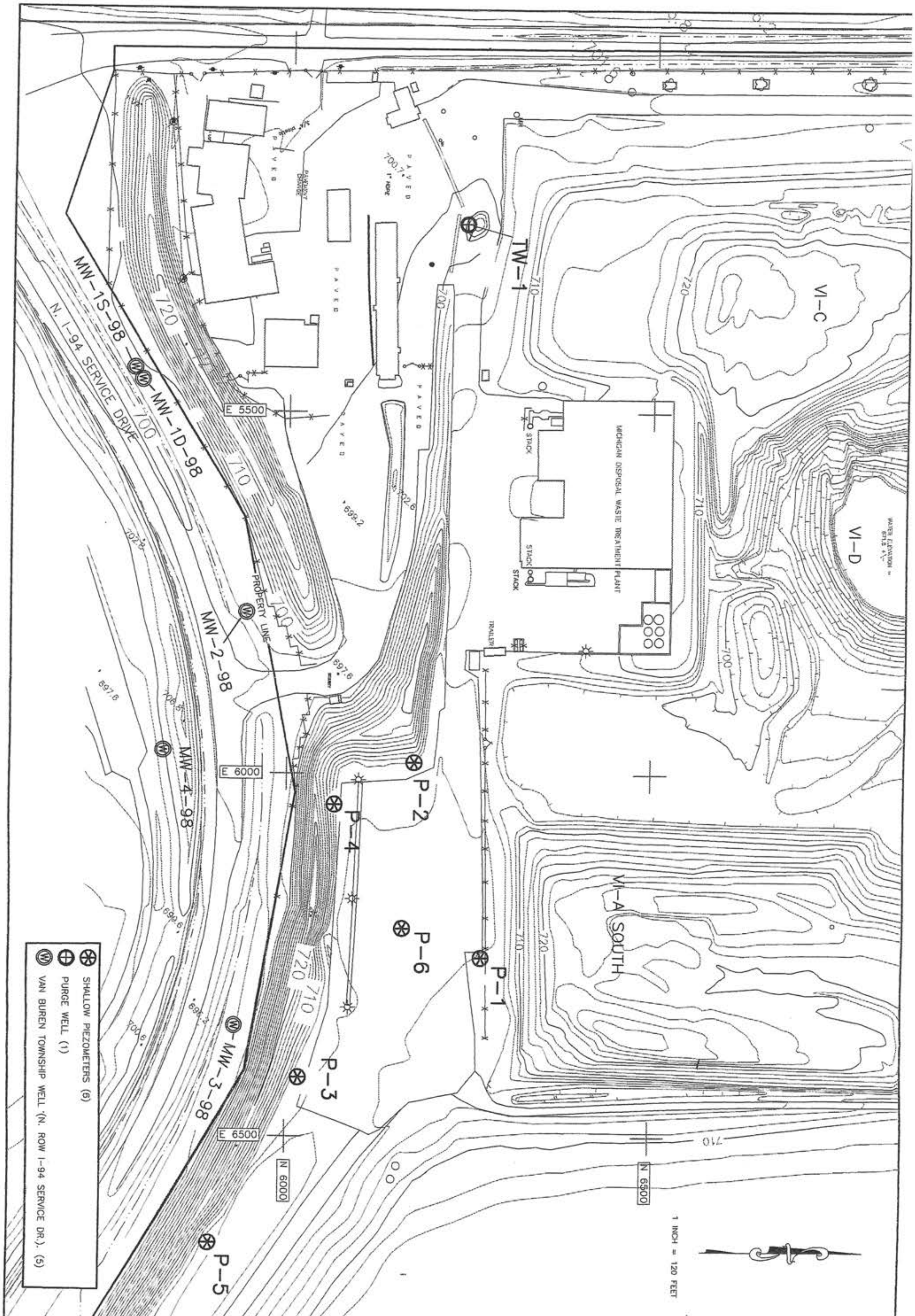
Table 4. Proposed Monitoring Parameters and Frequencies - SECSA

Parameter	Monitoring Frequency	
	Quarterly	Annual
Metals		
Zinc	X	X
Nickel	X	X
Chromium	X	X
Copper	X	X
Barium	X	X
Aluminum	X	X
Lead	X	X
Manganese		X
Cadmium		X
Antimony		X
Arsenic		X
Indicator Parameters		
Sodium	X	X
Potassium	X	X
Sulfate	X	X
Phosphorus	X	X
Chloride	X	X
Cyanide (total)	X	X
Ammonia	X	X
Magnesium	X	X
pH	X	X
Alkalinity	X	X
Volatile Organic Compounds		
Methyl Ethyl Ketone		X
Xylene (total)		X
Methanol		X
Isopropyl Alcohol		X
Trichloroethylene		X
Tetrachloroethylene		X
Toluene		X
Vinyl Acetate		X
Ethyl Benzene		X
Styrene		X
Benzene		X
1,1,1-Trichloroethane		X
Semi-Volatile Organic Compounds		
Phenol		X
Napthalene		X
Dibutyl Phthalate		X
Phenanthrene		X
Butyl Benzyl Phthalate		X
Bis (2-ethylhexyl) Phthalate		X
Acenaphthylene		X
Fluorene		X

FIGURES

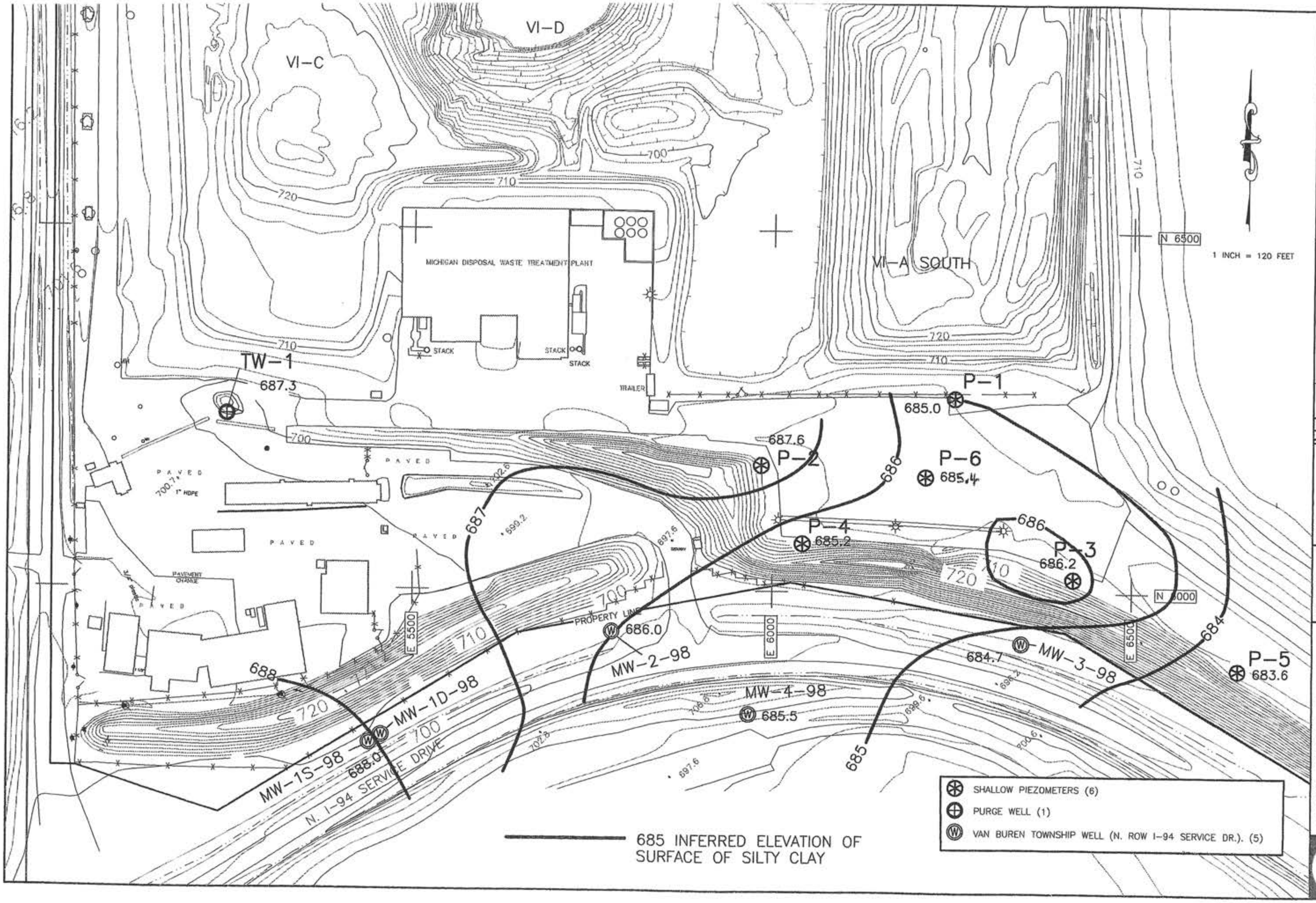


1	**WAYNE DISPOSAL SITE NO. 2** SECSA LOCATION	PROJ. FILE: J*	FILENAME: S2MTB	REVISIONS A B C D E	THE ENVIRONMENTAL QUALITY COMPANY 36255 MICHIGAN AVENUE, WAYNE, MI. 48184 TEL. (734) 329-8000
	SITE LOCATION MAP	DATE: 05/12/00 SHEET 1 OF 9	SCALE: 1"= 600' DRN BY: JCD		



2	**WAYNE DISPOSAL SITE NO. 2**	PROJ. FILE: J*	FILENAME: S2MTA	THE ENVIRONMENTAL QUALITY COMPANY 36255 MICHIGAN AVENUE, WAYNE, MI. 48184 TEL. (734) 329-8000
	PIEZOMETER LOCATION MAP	DATE: 05/12/00 SHEET 2 OF 9	SCALE: 1" = 120' DRN BY: JCD	

REVISIONS A B C D E



3

WAYNE DISPOSAL SITE NO. 2

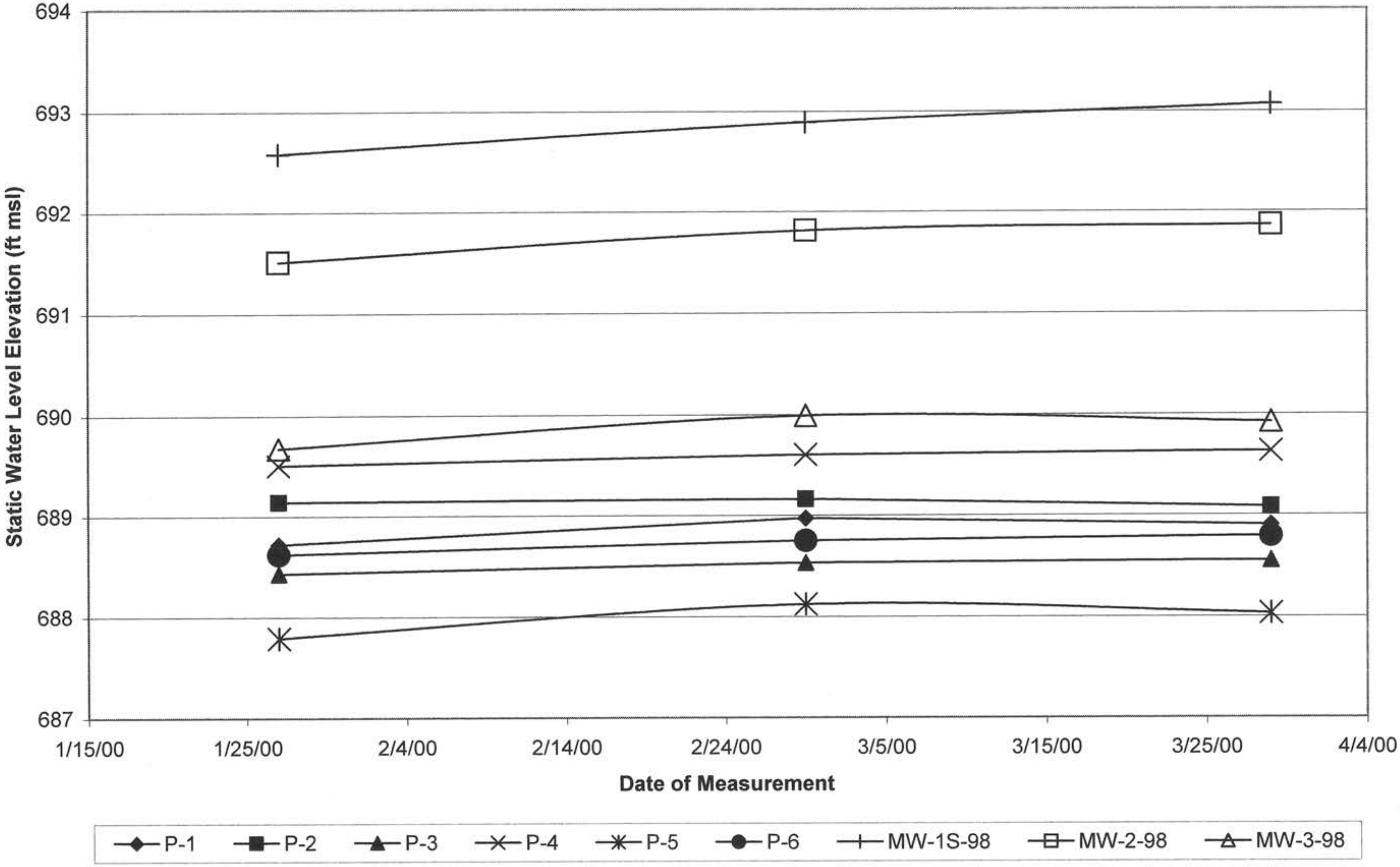
CLAY SURFACE ELEVATION MAP

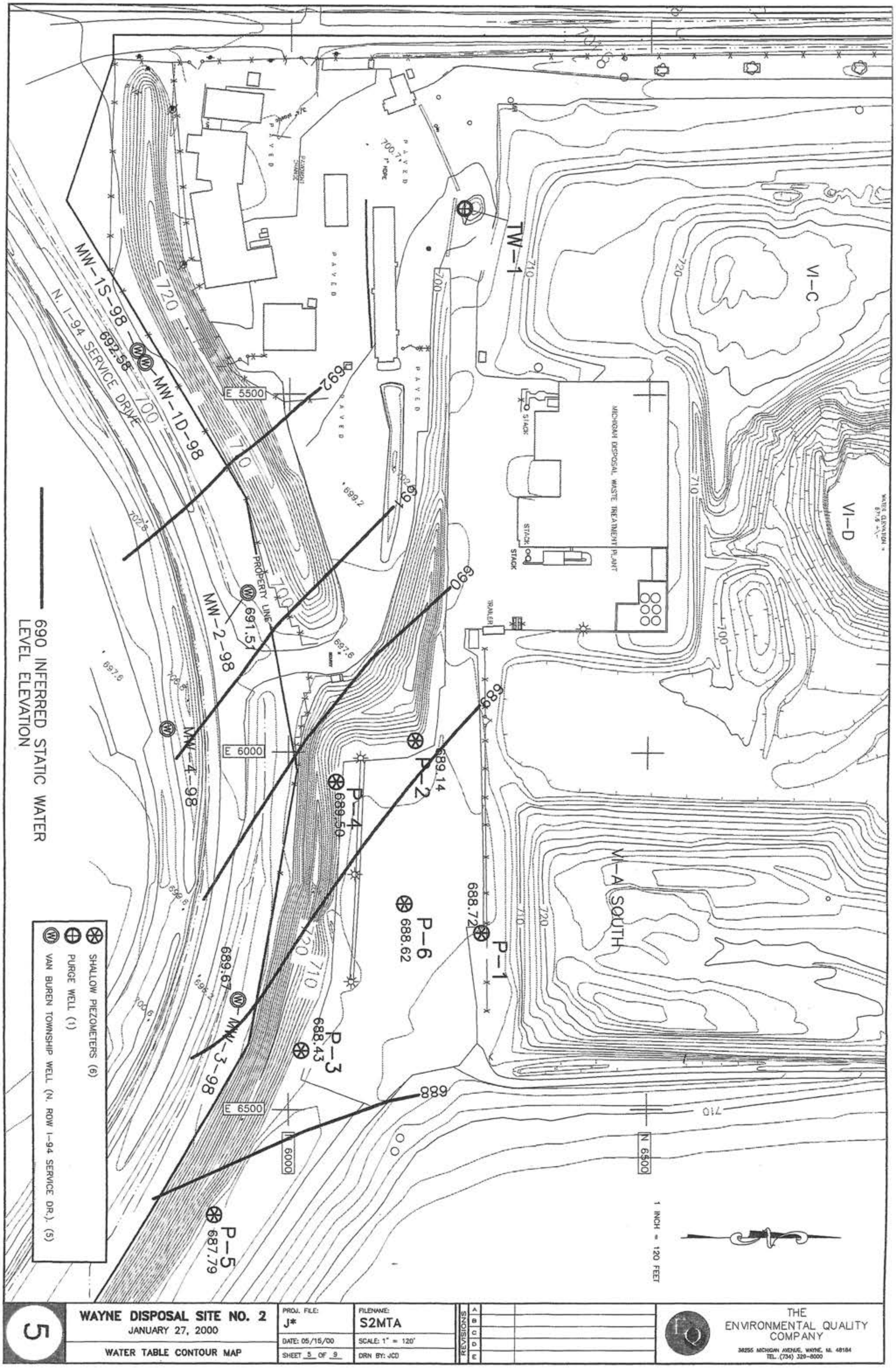
PROJ. FILE: J*	FILENAME: S2MTA
DATE: 05/15/00	SCALE: 1" = 120'
SHEET 3 OF 9	DRN BY: JCD

REVISIONS A B C D E

THE
ENVIRONMENTAL QUALITY
COMPANY
39255 MICHIGAN AVENUE, WAYNE, MI. 48184
TEL. (734) 329-8000

Figure 4. Static Water Level Hydrograph - Upper Sand Unit - WDI





5

WAYNE DISPOSAL SITE NO. 2
JANUARY 27, 2000

WATER TABLE CONTOUR MAP

PROJ. FILE: J*	FILENAME: S2MTA	REVISIONS	A B C D E
DATE: 05/15/00	SCALE: 1" = 120'		
SHEET 5 OF 9	DRN BY: JCD		

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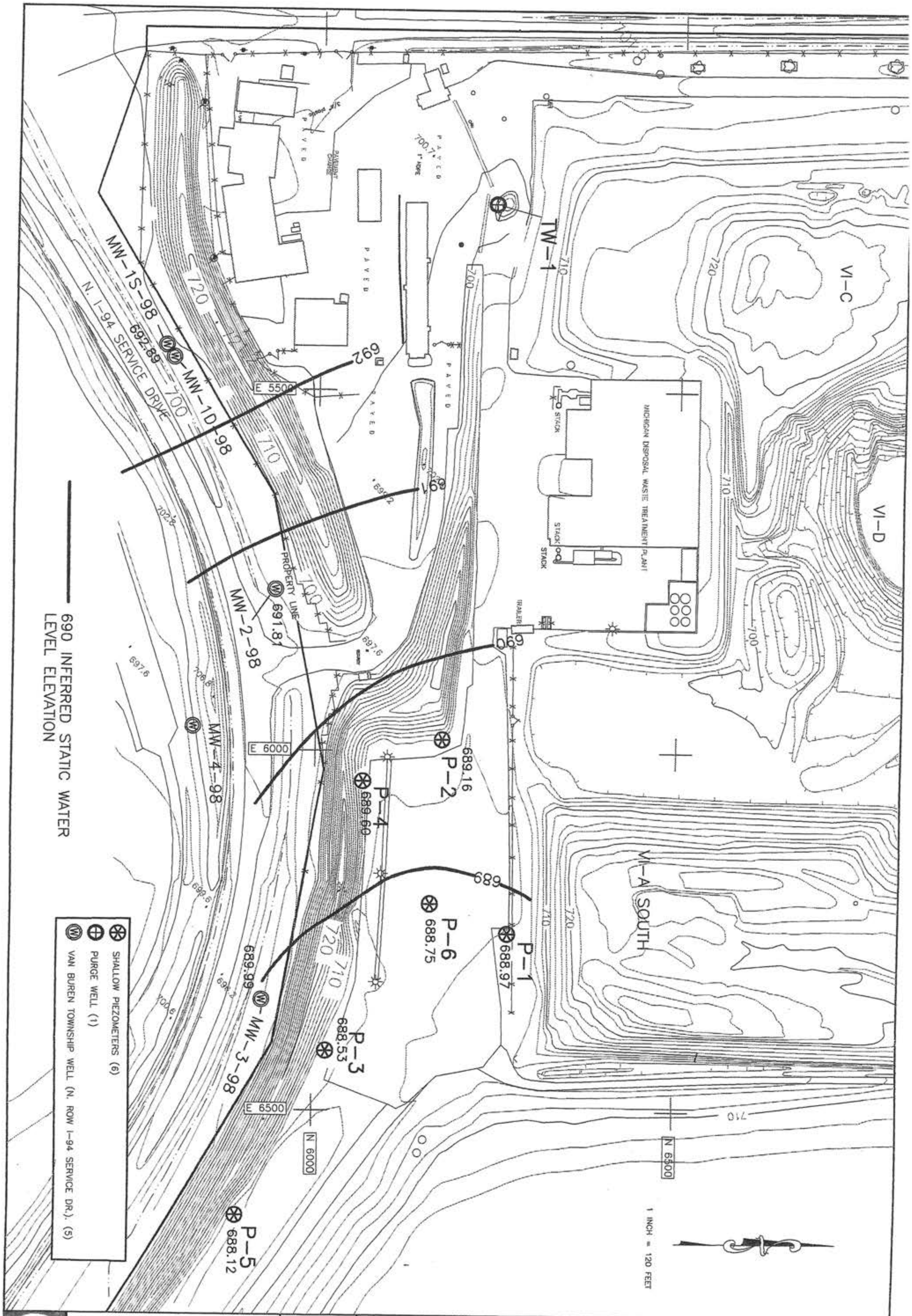
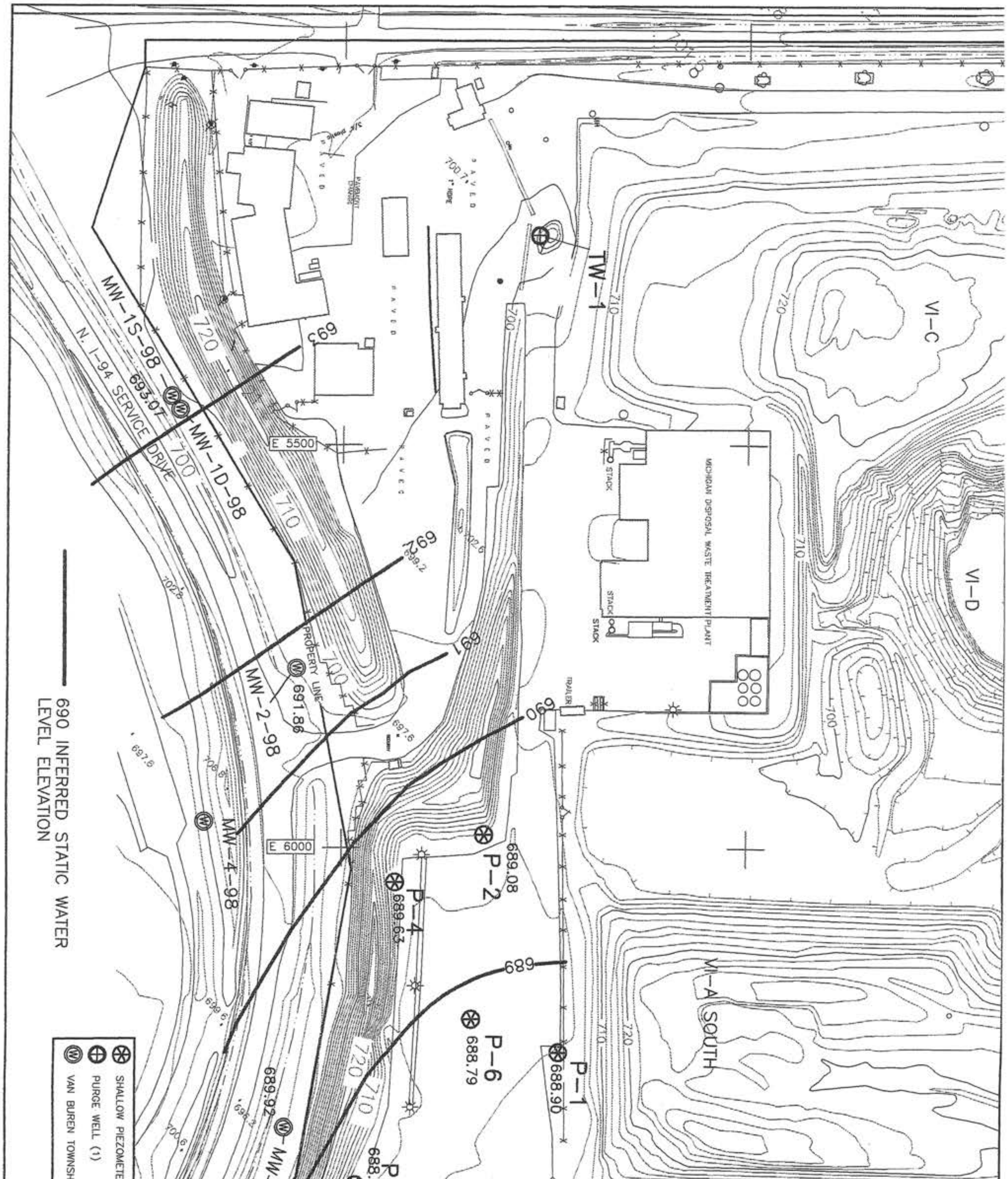


6	**WAYNE DISPOSAL SITE NO. 2** FEBRUARY 29, 2000	PROJ. FILE: J*	FILENAME: S2MTA
	WATER TABLE CONTOUR MAP	DATE: 05/15/00	SCALE: 1" = 120'
		SHEET 6 OF 9	DRN BY: JCD

REVISIONS		
A		
B		
C		
D		
E		

THE
ENVIRONMENTAL QUALITY
COMPANY
38255 MICHIGAN AVENUE, WAYNE, MI. 48184
TEL. (734) 329-8000



7

WAYNE DISPOSAL SITE NO. 2
MARCH 31, 2000

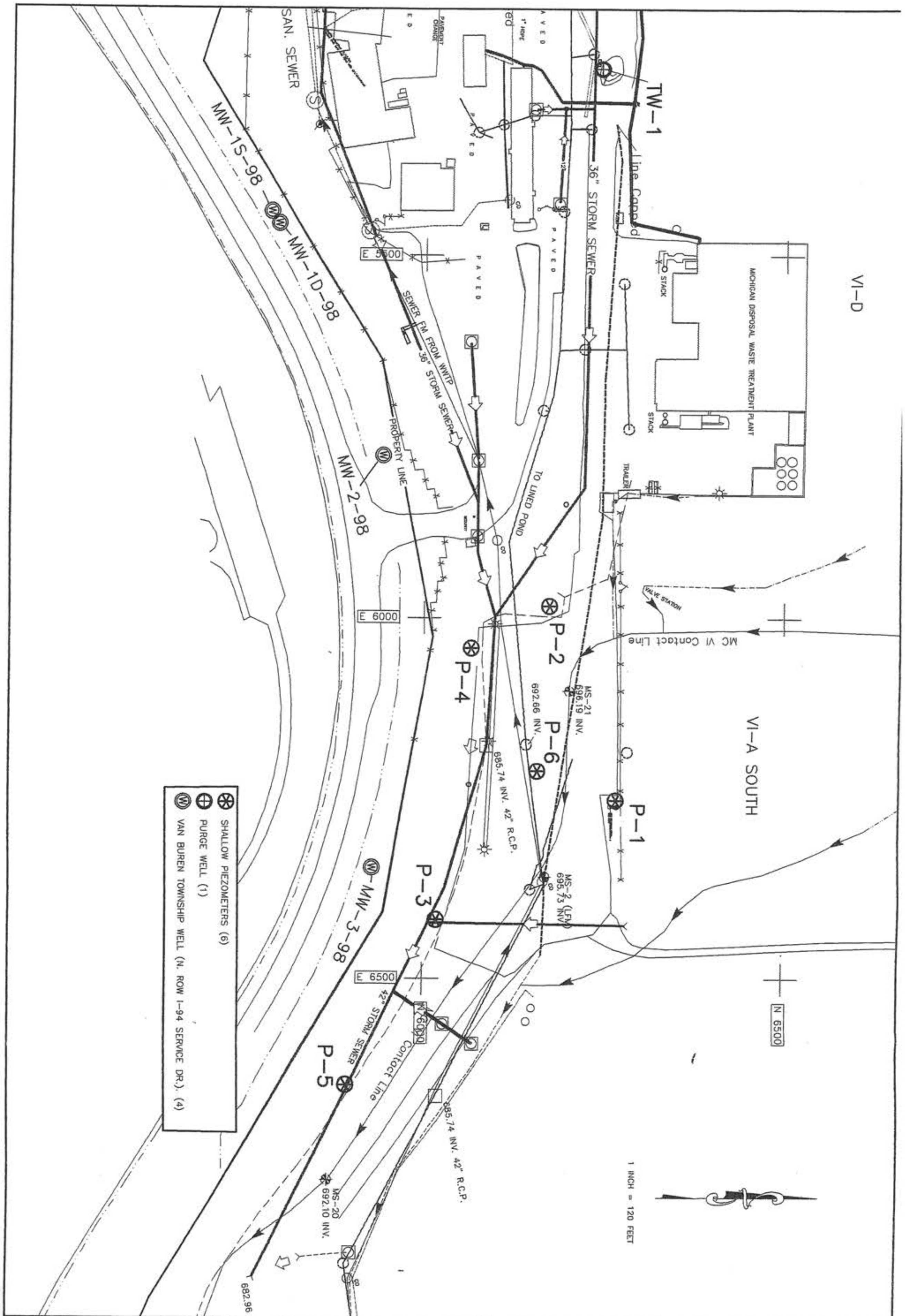
WATER TABLE CONTOUR MAP

PROJ. FILE: J*
DATE: 05/15/00
SHEET 7 OF 9

FILENAME: S2MTA
SCALE: 1" = 120'
DRN BY: JCD

REVISIONS
A
B
C
D
E

THE
ENVIRONMENTAL QUALITY
COMPANY
36255 MICHIGAN AVENUE, WAYNE, MI. 48184
TEL. (734) 326-6000



8

WAYNE DISPOSAL SITE NO. 2
SECSA HYDRO
UTILITIES LOCATIONS AND ELEVATIONS

PROJ. FILE: J*
FILENAME: S2MTA
DATE: 05/12/00
SCALE: 1" = 120'
SHEET 8 OF 9
DRN BY: JCD

REVISIONS
A
B
C
D
E

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ENVIRONMENTAL QUALITY
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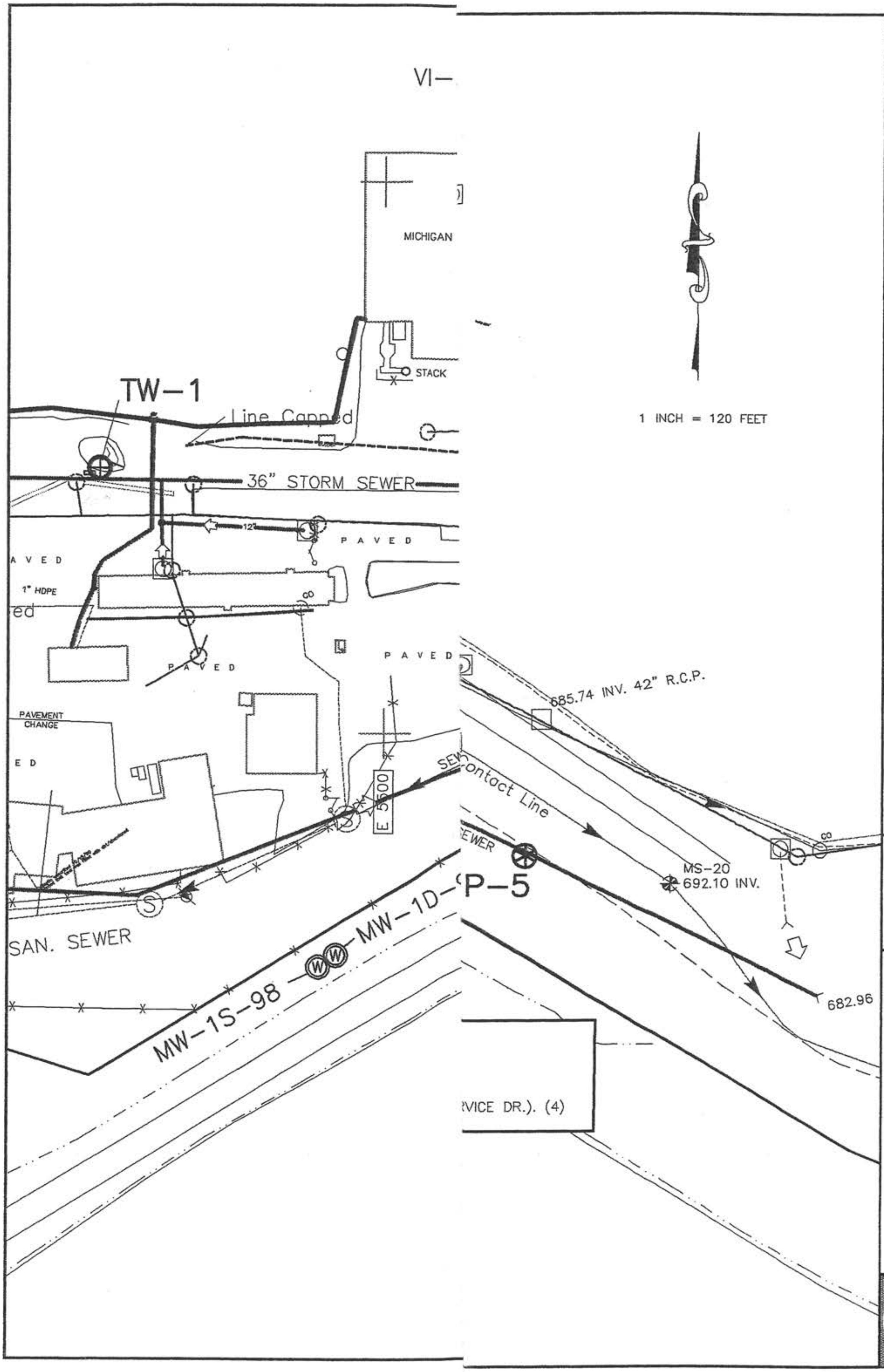
TEL. (734) 329-8000



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TEL. (734) 329-8000

REVISIONS
A
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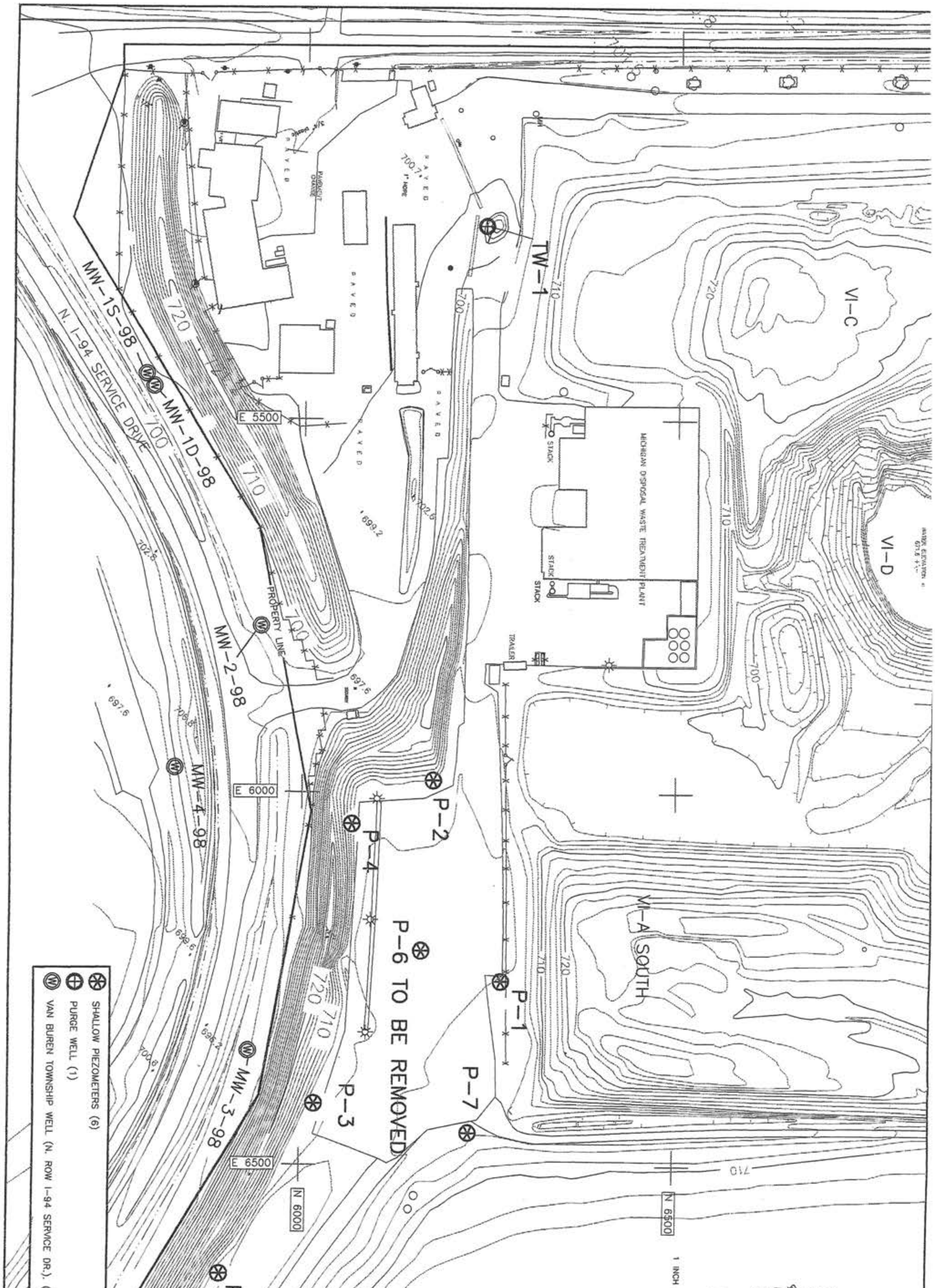
E

WAYNE DISPOSAL SITE NO. 2
SECSA HYDRO

UTILITIES LOCATIONS AND ELEVATIONS

PROJ. FILE: **J***
FILENAME: **S2MTA**
DATE: 05/12/00
SCALE: 1" = 120'
SHEET 8 OF 9
DRN BY: JCD

8



9

WAYNE DISPOSAL SITE NO. 2
P-7 INSTALLATION / P-6 REMOVAL

PROPOSED MONITORING WELL LOCATION MAP

PROJ. FILE: J*	FILENAME: S2MTA
DATE: 05/12/00	SCALE: 1" = 120'
SHEET 9 OF 9	DRN BY: JCD

REVISIONS
A
B
C
D
E

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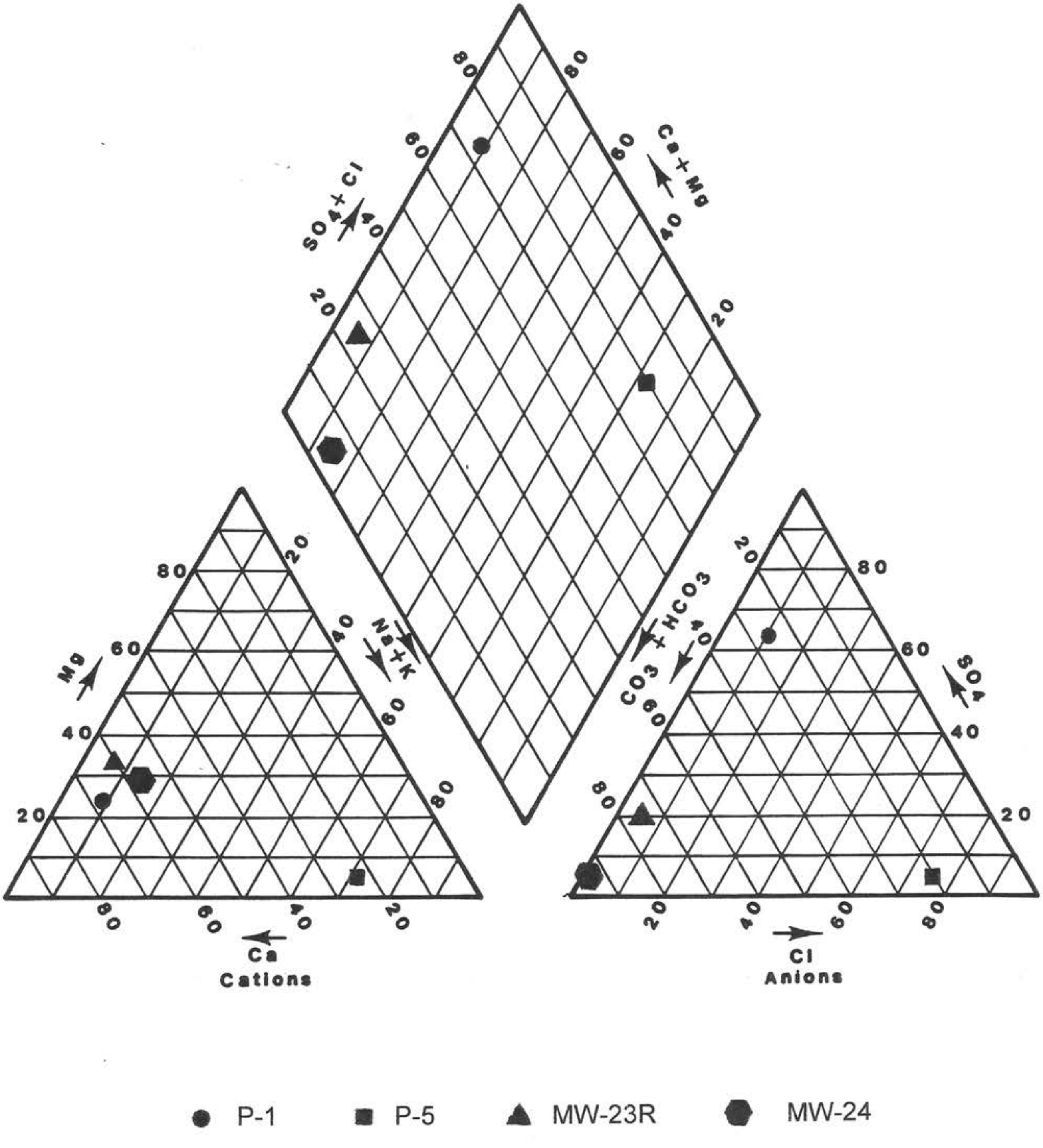
TEL. (734) 329-8000

Figure 10. Trilinear Diagram for SECSA and Regional Aquifer Wells



APPENDIX A. TEST BORING LOGS, WELL LOGS AND GRAIN-SIZE CURVES

LOG OF TEST BORING NO: P-1

NTH CONSULTANTS, LTD.

Project Name: *EQ Site #2 - Southeast Container Storage Area*

Project Location: *Belleville, Michigan*

NTH Proj. No: *13-990953-00*

Checked By: DLH

SUBSURFACE PROFILE

ELEV. (FT)	PRO-FILE	GROUND SURFACE ELEVATION: 701.0	DEPTH (FT.)
700		FILL: Gray SILTY CLAY with Some Sand & Trace of Gravel	5.9
695		Gray SAND	6.0
		Gray SILTY CLAY with Some Sand & Trace of Gravel	8.9
		Gray SAND	9.0
690		Gray SILTY CLAY with Some Sand & Trace of Gravel	11.0
		Gray SAND with Some Silt & Trace of Gravel	15.0
685		Gray SILTY FINE SAND	16.0
		Gray SILTY CLAY with Trace of Fine Sand	18.0
		End of Boring	
680			20
675			25
670			30
665			35

SOIL SAMPLE DATA

SAMP. TYPE/ NO.	BLOWS/ 6"	STD.PEN. RESIST. (N)	MOIST. CONT. (%)	DRY DENS. (pcf)	UNCONF. COMP.ST. (psf)	HNu READING (ppm)
S-1	-- -- --	--				<1
S-2	-- -- --	--				--
S-3	-- -- --	--				--
S-4	-- -- --	--				<1
S-5	-- -- --	--				<1
S-6	-- -- --	--				<1

Total Depth: *18 FT*
Drilling Date: *12/06/99*
Inspector: *D. Hohner*
Contractor: *Alliance Environmental, Inc.*
Driller: *J. Ward*

Water Level Observation:
Groundwater encountered at 11.0 ft bgs.

Notes:

Drilling Method:
Drill rig with 4-1/4" inside-diameter, hollow-stem augers and EnviroCore sampler to end of boring.

Plugging Procedure:
Monitoring well P-1 installed in borehole with screen tip set at 16.0 ft bgs.

FIGURE NO. 1

LOG OF TEST BORING NO: P-2

NTH CONSULTANTS, LTD.

Project Name: *EQ Site #2 - Southeast Container Storage Area*
Project Location: *Belleville, Michigan*
NTH Proj. No: *13-990953-00*
Checked By: DLH

SUBSURFACE PROFILE

GROUND SURFACE ELEVATION: 703.6

DEPTH (FT.)	DESCRIPTION
0.5	TOPSOIL
1.5	Gray SILTY CLAY with Some Sand & Trace of Gravel
16.5	Brown FINE TO MEDIUM SAND with Little Silt & Trace of Clay
21.0	Gray SILTY CLAY with Little Sand
	End of Boring

ELEV. (FT): 700, 695, 690, 685, 680, 675, 670
DEPTH (FT.): 5, 10, 15, 20, 25, 30, 35

SOIL SAMPLE DATA

SAMP. TYPE/ NO.	BLOWS/ 6"	STD.PEN. RESIST. (N)	MOIST. CONT. (%)	DRY DENS. (pcf)	UNCONF. COMP.ST. (psf)	HNu READING (ppm)
S-1	-- -- --	--				<1
S-2	-- -- --	--				<1
S-3	-- -- --	--				<1
S-4	-- -- --	--				<1
S-5	-- -- --	--				<1
S-6	-- -- --	--				<1
S-7	-- -- --	--				<1

Total Depth: *21 FT*
Drilling Date: *12/07/99*
Inspector: *D. Hohner*
Contractor: *Alliance Environmental, Inc.*
Driller: *J. Ward*

Drilling Method:
Drill rig with 4-1/4" inside-diameter, hollow-stem augers and EnviroCore sampler to end of boring.

Plugging Procedure:
Monitoring well P-2 installed in borehole with screen tip set at 17.0 ft bgs.

Water Level Observation:
Groundwater encountered at 17.0 ft bgs.

Notes:

FIGURE NO. 2

LOG OF TEST BORING NO: P-3

NTH CONSULTANTS, LTD.

Project Name: *EQ Site #2 - Southeast Container Storage Area*

Project Location: *Belleville, Michigan*

NTH Proj. No: *13-990953-00*

Checked By: DLH

SUBSURFACE PROFILE

GROUND SURFACE ELEVATION: 704.2

ELEV. (FT)	DEPTH (FT.)	Description
	0.0 – 8.0	Gray SILTY CLAY with Some Sand & Trace of Gravel
	8.0 – 14.5	Brown SILTY FINE SAND
	14.5 – 17.5	Brown SAND with Some Silt & Trace of Gravel
	17.5 – 18.0	Gray SILT & FINE SAND
	18.0 – 21.0	Gray SILTY CLAY with Little Sand
	21.0	End of Boring

ELEV. (FT): 700, 695, 690, 685, 680, 675, 670

DEPTH (FT.): 5, 10, 15, 20, 25, 30, 35

SOIL SAMPLE DATA

SAMP. TYPE/ NO.	BLOWS/ 6"	STD.PEN. RESIST. (N)	MOIST. CONT. (%)	DRY DENS. (pcf)	UNCONF. COMP.ST. (psf)	HNu READING (ppm)
S-1	-- -- --	--				<1
S-2	-- -- --	--				<1
S-3	-- -- --	--				<1
S-4	-- -- --	--				<1
S-5	-- -- --	--				<1
S-6	-- -- --	--				<1
S-7	-- -- --	--				<1

Total Depth: *21 FT*
Drilling Date: *12/07/99*
Inspector: *D. Hohner*
Contractor: *Alliance Environmental, Inc.*
Driller: *J. Ward*

Water Level Observation:
Groundwater encountered at 14.5 ft bgs.

Notes:

Drilling Method:
Drill rig with 4-1/4" inside-diameter, hollow-stem augers and EnviroCore sampler to end of boring.

Plugging Procedure:
Monitoring well P-3 installed in borehole with screen tip set at 17.5 ft bgs.

FIGURE NO. 3

LOG OF TEST BORING NO: P-4

NTH CONSULTANTS, LTD.

Project Name: *EQ Site #2 - Southeast Container Storage Area*

Project Location: *Belleville, Michigan*

NTH Proj. No: *13-990953-00*

Checked By:

SUBSURFACE PROFILE

GROUND SURFACE ELEVATION: 703.8	DEPTH (FT.)
Brown SAND with Little Silt, Trace of Gravel & Organic Matter	1.0
Gray SILTY CLAY with Some Sand & Trace of Gravel	3.0
Brown SAND	3.5
Gray SILTY CLAY with Some Sand & Trace of Gravel	8.5
Brown SILTY FINE SAND	13.5
Gray SILTY FINE SAND	17.0
Gray SILT	17.1
Gray SILTY CLAY with Little Sand & Trace of Gravel	18.0
End of Boring	

SOIL SAMPLE DATA

SAMP. TYPE/ NO.	BLOWS/ 6"	STD.PEN. RESIST. (N)	MOIST. CONT. (%)	DRY DENS. (pcf)	UNCONF. COMP.ST. (psf)	HNu READING (ppm)
S-1	-- -- --	--				<1
S-2	-- -- --	--				<1
S-3	-- -- --	--				<1
S-4	-- -- --	--				<1
S-5	-- -- --	--				<1
S-6	-- -- --	--				<1

Total Depth: *18 FT*
Drilling Date: *12/06/99*
Inspector: *D. Hohner*
Contractor: *Alliance Environmental, Inc.*
Driller: *J. Ward*

Water Level Observation:
Groundwater encountered at 13.5 ft bgs.

Notes:

Drilling Method:
Drill rig with 4-1/4" inside-diameter, hollow-stem augers and EnviroCore sampler to end of boring.

Plugging Procedure:
Monitoring well P-4 installed in borehole with screen tip set at 17.0 ft bgs.

FIGURE NO. 4

LOG OF TEST BORING NO: P-5

Project Name: *EQ Site #2 - Southeast Container Storage Area*
Project Location: *Belleville, Michigan*

NTH CONSULTANTS, LTD.
NTH Proj. No: *13-990953-00*
Checked By: DLH

SUBSURFACE PROFILE				SOIL SAMPLE DATA						
ELEV. (FT)	PRO-FILE	GROUND SURFACE ELEVATION: 698.0	DEPTH (FT.)	SAMP. TYPE/ NO.	BLOWS/ 6"	STD.PEN. RESIST. (N)	MOIST. CONT. (%)	DRY DENS. (pcf)	UNCONF. COMP.ST. (psf)	HNu READING (ppm)
695		Gray SILTY CLAY with Some Sand, Trace of Gravel & Organic Matter 3.0		S-1	-- -- --	--				<1
		Brown FINE TO MEDIUM SAND with Some Silt, Trace of Coarse Sand & Gravel	5	S-2	-- -- --	--				<1
690		9.0		S-3	-- -- --	--				<1
685		Brown to Gray SILTY FINE SAND	10	S-4	-- -- --	--				<1
		14.3 Gray SILT 14.4	15	S-5	-- -- --	--				<1
		Gray SILTY CLAY with Some Sand & Trace of Gravel 17.0		S-6	-- -- --	--				<1
680		End of Boring								
			20							
675										
			25							
670										
			30							
665										
			35							

Total Depth: *17 FT*
Drilling Date: *12/06/99*
Inspector: *D. Hohner*
Contractor: *Alliance Environmental, Inc.*
Driller: *J. Ward*

Water Level Observation:
Groundwater encountered at 9.0 ft bgs.

Notes:

Drilling Method:
Drill rig with 4-1/4" inside-diameter, hollow-stem augers and EnviroCore sampler to end of boring.

Plugging Procedure:
Monitoring well P-5 installed in borehole with screen tip set at 14.0 ft bgs.

FIGURE NO. 5

LOG OF TEST BORING NO: P-6

NTH CONSULTANTS, LTD.

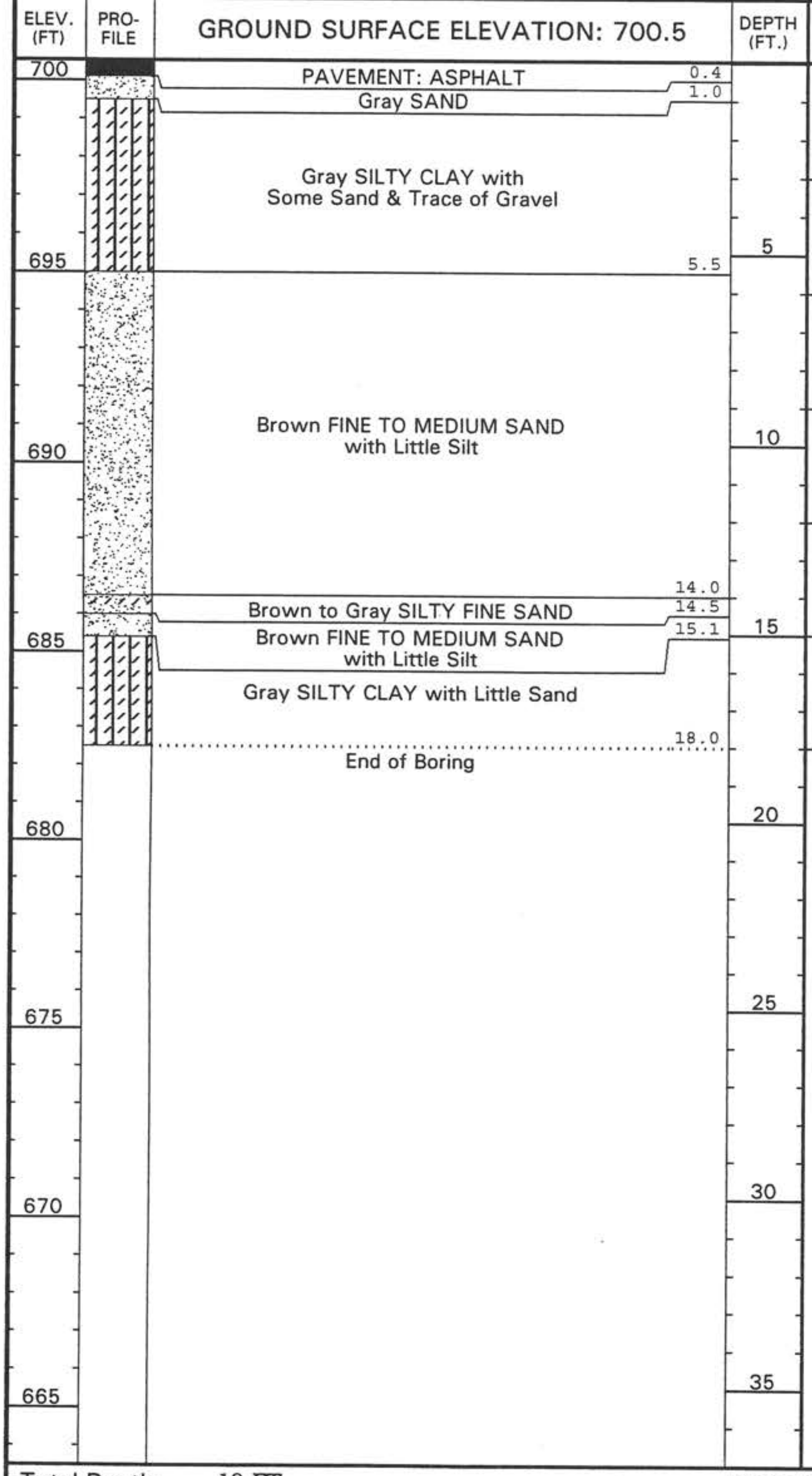
Project Name: *EQ Site #2 - Southeast Container Storage Area*

Project Location: *Belleville, Michigan*

NTH Proj. No: *13-990953-00*

Checked By: DLH

SUBSURFACE PROFILE



GROUND SURFACE ELEVATION: 700.5

Description	Depth (ft.)
PAVEMENT: ASPHALT	0.4
Gray SAND	1.0
Gray SILTY CLAY with Some Sand & Trace of Gravel	5.5
Brown FINE TO MEDIUM SAND with Little Silt	14.0
Brown to Gray SILTY FINE SAND	14.5
Brown FINE TO MEDIUM SAND with Little Silt	15.1
Gray SILTY CLAY with Little Sand	18.0
End of Boring	

SOIL SAMPLE DATA

SAMP. TYPE/ NO.	BLOWS/ 6"	STD.PEN. RESIST. (N)	MOIST. CONT. (%)	DRY DENS. (pcf)	UNCONF. COMP.ST. (psf)	HNu READING (ppm)
S-1	-- -- --	--				< 1
S-2	-- -- --	--				< 1
S-3	-- -- --	--				< 1
S-4	-- -- --	--				< 1
S-5	-- -- --	--				< 1
S-6	-- -- --	--				< 1

Total Depth: *18 FT*
Drilling Date: *12/07/99*
Inspector: *D. Hohner*
Contractor: *Alliance Environmental, Inc.*
Driller: *J. Ward*

Water Level Observation:
Groundwater encountered at 11.0 ft bgs.

Notes:

Drilling Method:
Drill rig with 4-1/4" inside-diameter, hollow-stem augers and EnviroCore sampler to end of boring.

Plugging Procedure:
Monitoring well P-6 installed in borehole with screen tip set at 15.0 ft bgs.

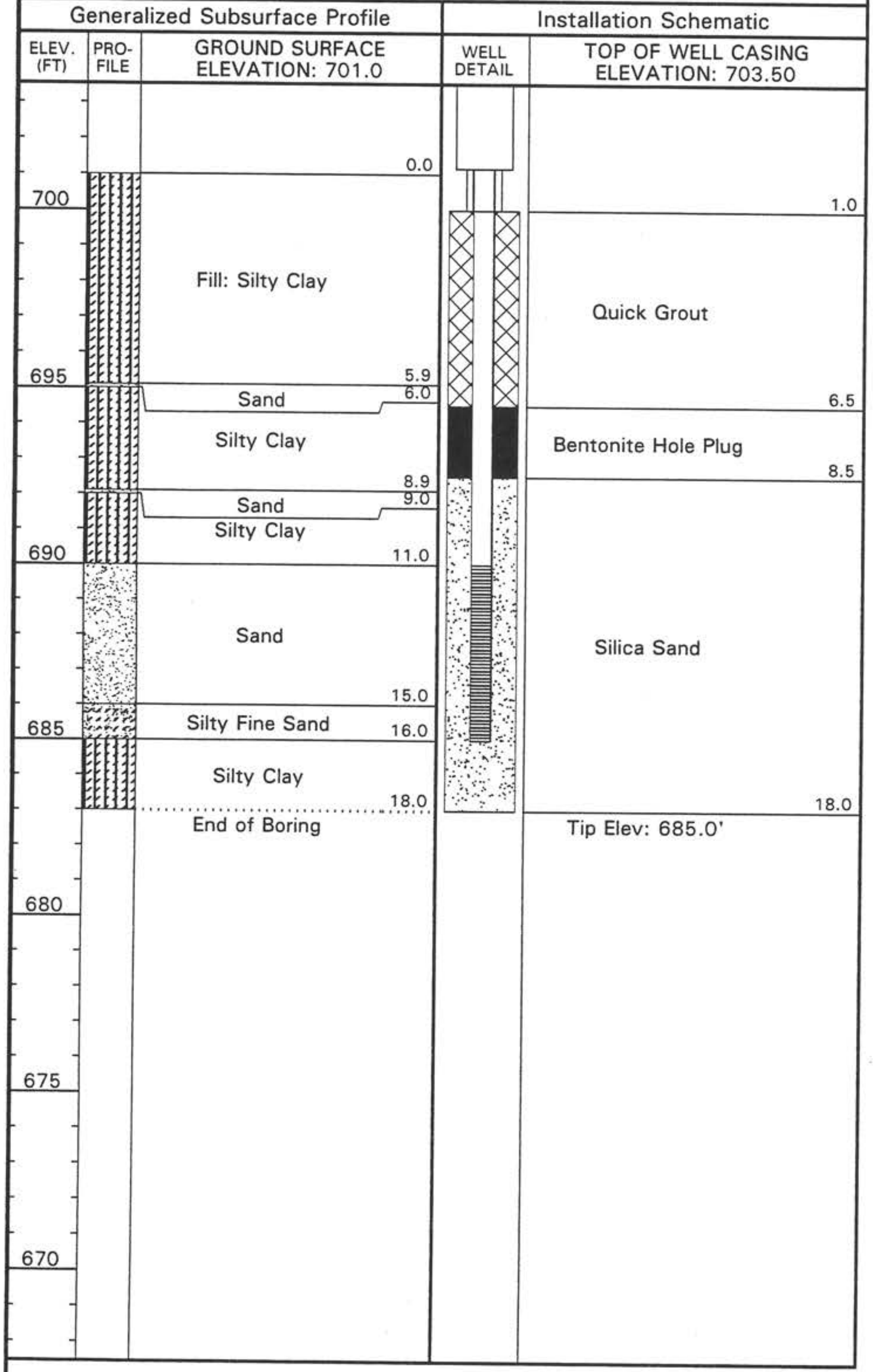
FIGURE NO. 6

MONITORING WELL NO: P-1

NTH CONSULTANTS, LTD.

Project Name: *EQ-Site #2 - Southeast Container Storage Area*
Project Location: *Belleville, Michigan*
NTH Proj. No: *13-990953-00*
Checked By: DLH

LOG OF MONITORING WELL



GROUNDWATER DATA

DATE	ELEV. (ft.)	COMMENTS
12/06/99	688.49	(depth at 15.01 ft)

NOTES

[1] For details of subsurface strata, see Log of Test Boring No. P-1.

Started: *12/06/99*
Completed: *12/06/99*
Inspector: *D. Hohner*
Contractor: *Alliance Environmental, Inc.*
Driller: *J. Ward*
Equipment:
Well Type: *monitoring*

Casing Diameter: *2.0 inches*
Casing Length: *13.5 feet*
Casing Type: *PVC*
Screen Diameter: *2.0 inches*
Screen Length: *5.0 feet*
Screen Mesh: *0.007 inch*
Screen Type: *PVC*

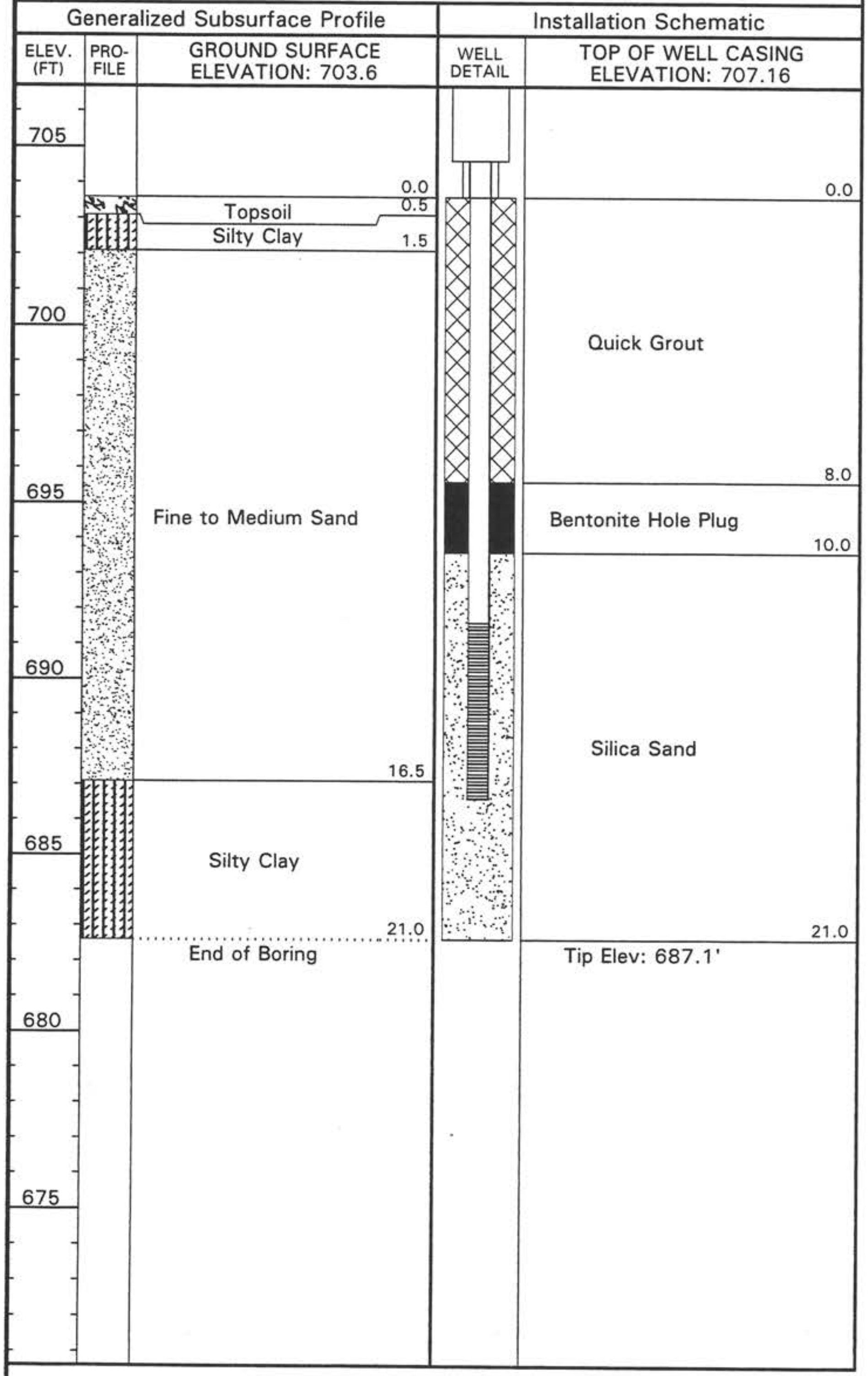
FIGURE NO. 7

MONITORING WELL NO: P-2

NTH CONSULTANTS, LTD.

Project Name: *EQ-Site #2 - Southeast Container Storage Area*
Project Location: *Belleville, Michigan*
NTH Proj. No: *13-990953-00*
Checked By: DLH

LOG OF MONITORING WELL



GROUNDWATER DATA

DATE	ELEV. (ft.)	COMMENTS
12/07/99	689.11	(depth @ 18.05 ft)

NOTES

[1] For details of subsurface strata, see Log of Test Boring No. P-2.

Started: *12/07/99*
Completed: *12/07/99*
Inspector: *D. Hohner*
Contractor: *Alliance Environmental, Inc.*
Driller: *J. Ward*
Equipment:
Well Type: *monitoring*

Casing Diameter: *2.0 inches*
Casing Length: *15.06 feet*
Casing Type: *PVC*
Screen Diameter: *2.0 inches*
Screen Length: *5.0 feet*
Screen Mesh: *0.007 inch*
Screen Type: *PVC*

FIGURE NO. 8

MONITORING WELL NO: P-3

NTH CONSULTANTS, LTD.

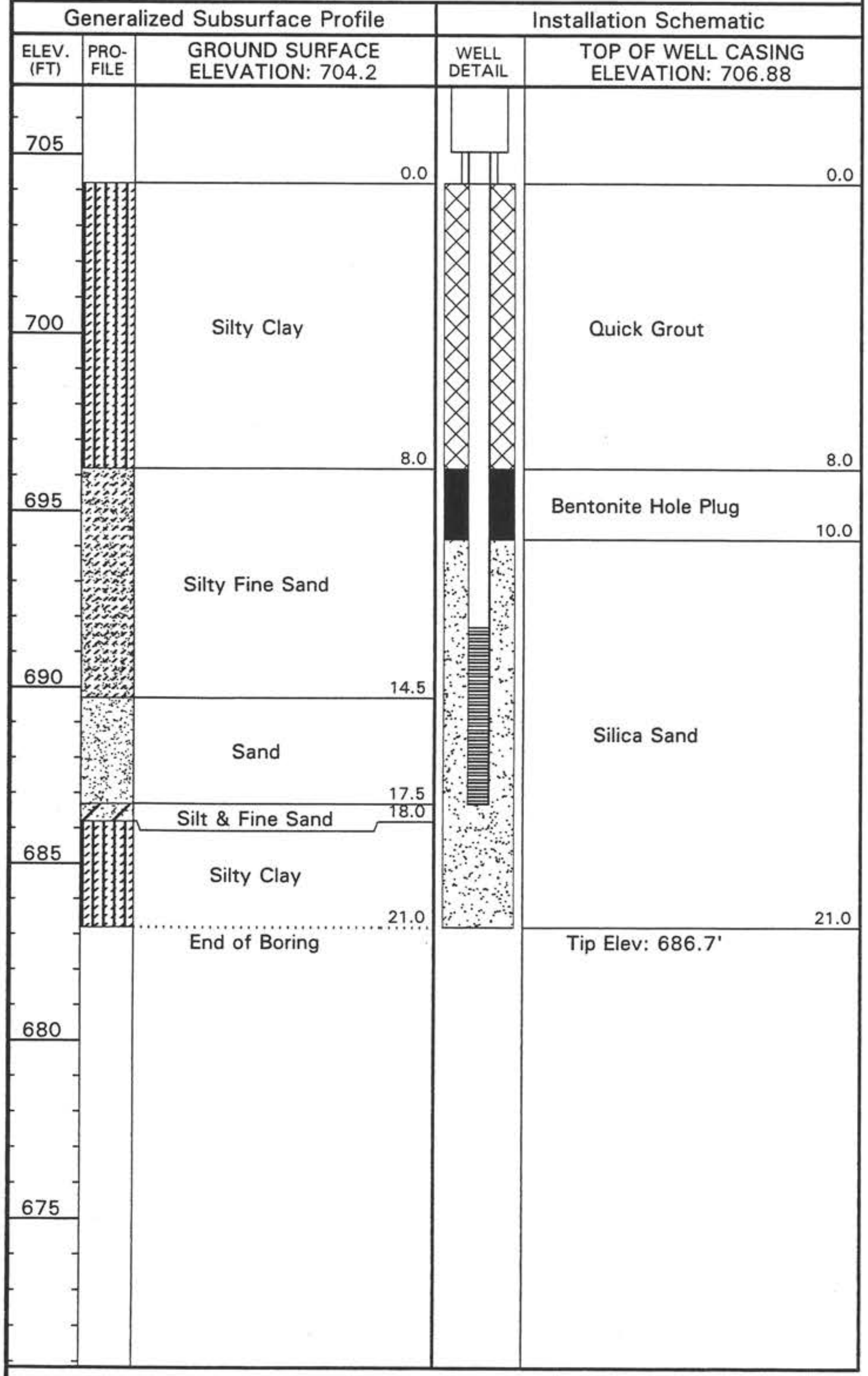
Project Name: *EQ-Site #2 - Southeast Container Storage Area*

Project Location: *Belleville, Michigan*

NTH Proj. No: *13-990953-00*

Checked By: DLH

LOG OF MONITORING WELL



GROUNDWATER DATA

DATE	ELEV. (ft.)	COMMENTS
12/07/99	688.31	(depth @ 18.57 ft)

NOTES

[1] For details of subsurface strata, see Log of Test Boring No. P-3.

Started:	*12/07/99*
Completed:	*12/07/99*
Inspector:	*D. Hohner*
Contractor:	*Alliance Environmental, Inc.*
Driller:	*J. Ward*
Equipment:	
Well Type:	*monitoring*

Casing Diameter:	*2.0 inches*
Casing Length:	*15.68 feet*
Casing Type:	*PVC*
Screen Diameter:	*2.0 inches*
Screen Length:	*5.0 feet*
Screen Mesh:	*0.007 inch*
Screen Type:	*PVC*

FIGURE NO. 9

MONITORING WELL NO: P-4

NTH CONSULTANTS, LTD.

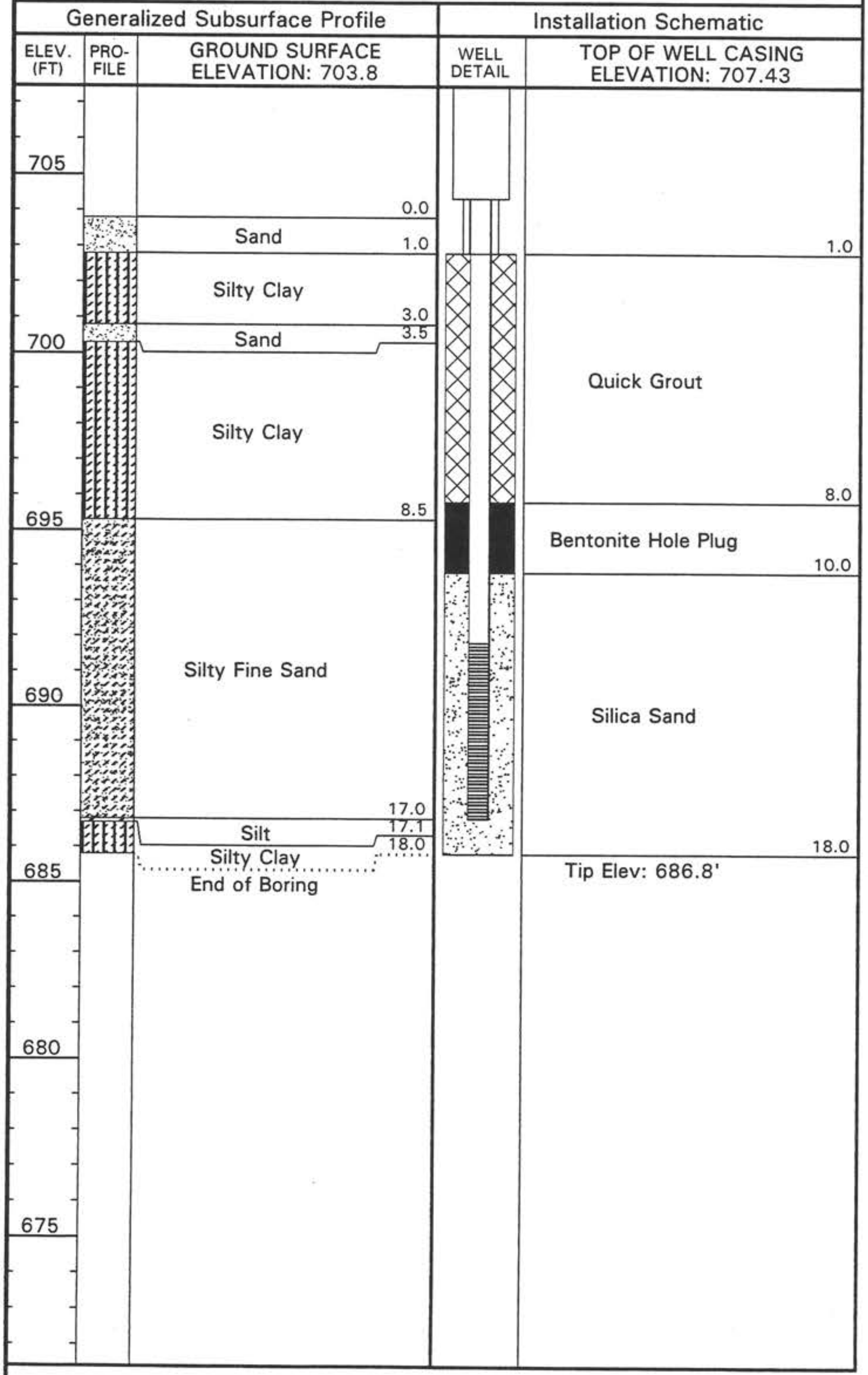
Project Name: *EQ-Site #2 - Southeast Container Storage Area*

Project Location: *Belleville, Michigan*

NTH Proj. No: *13-990953-00*

Checked By: DLH

LOG OF MONITORING WELL



GROUNDWATER DATA

DATE	ELEV. (ft.)	COMMENTS
12/06/99	690.32	(depth @ 17.11 ft)

NOTES

[1] For details of subsurface strata, see Log of Test Boring No. P-4.

Started:	*12/06/99*
Completed:	*12/06/99*
Inspector:	*D. Hohner*
Contractor:	*Alliance Environmental, Inc.*
Driller:	*J. Ward*
Equipment:	
Well Type:	*monitoring*

Casing Diameter:	*2.0 inches*
Casing Length:	*15.63 feet*
Casing Type:	*PVC*
Screen Diameter:	*2.0 inches*
Screen Length:	*5.0 feet*
Screen Mesh:	*0.007 inch*
Screen Type:	*PVC*

FIGURE NO. 10

MONITORING WELL NO: P-5

NTH CONSULTANTS, LTD.

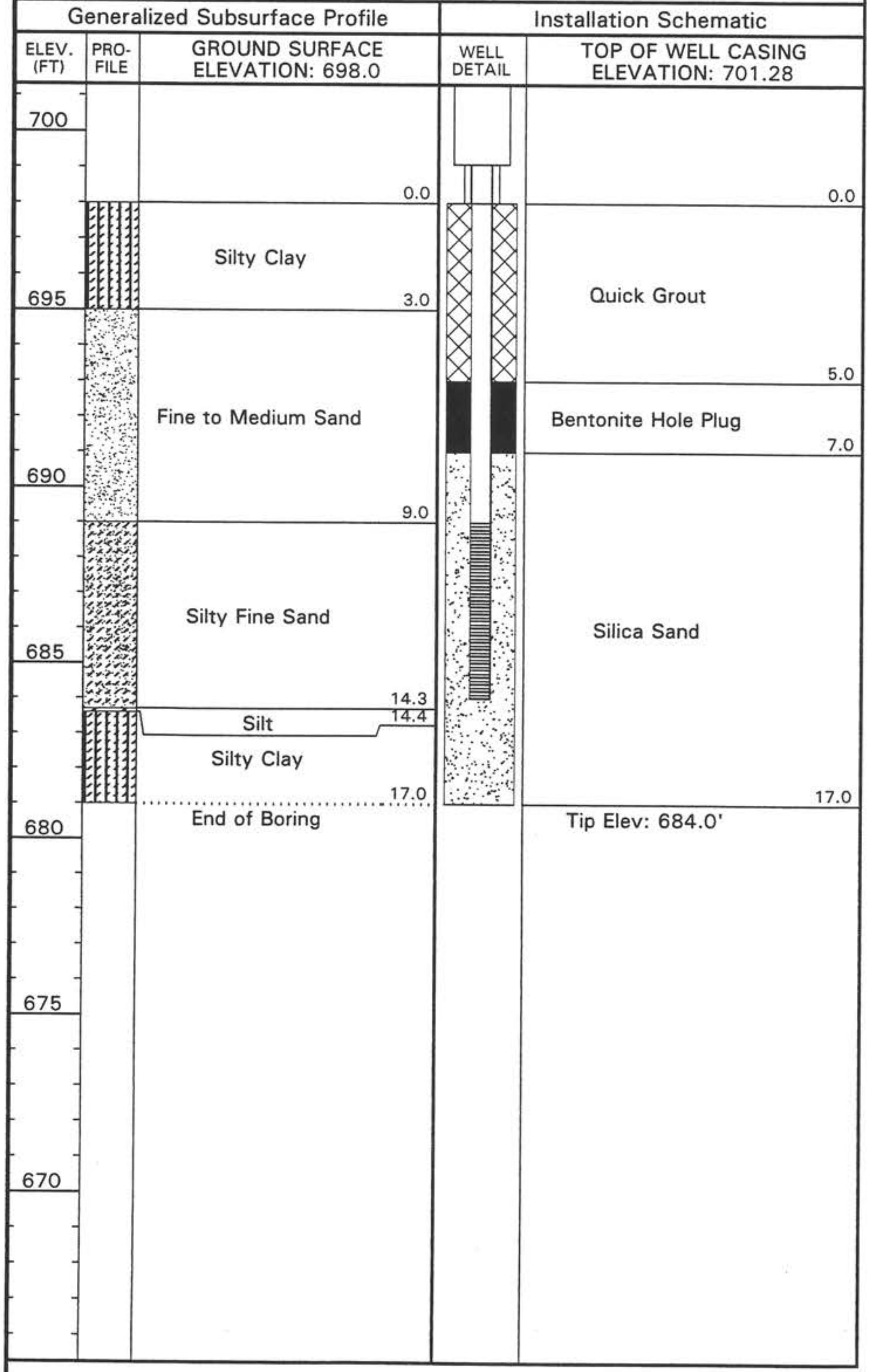
Project Name: *EQ-Site #2 - Southeast Container Storage Area*

Project Location: *Belleville, Michigan*

NTH Proj. No: *13-990953-00*

Checked By: DLH

LOG OF MONITORING WELL



GROUNDWATER DATA

DATE	ELEV. (ft.)	COMMENTS
12/06/99	686.68	(depth @ 14.60 ft)

NOTES

[1] For details of subsurface strata, see Log of Test Boring No. P-5.

Started: *12/06/99*
Completed: *12/06/99*
Inspector: *D. Hohner*
Contractor: *Alliance Environmental, Inc.*
Driller: *J. Ward*
Equipment:
Well Type: *monitoring*

Casing Diameter: *2.0 inches*
Casing Length: *12.28 feet*
Casing Type: *PVC*
Screen Diameter: *2.0 inches*
Screen Length: *5.0 feet*
Screen Mesh: *0.007 inch*
Screen Type: *PVC*

FIGURE NO. 11

MONITORING WELL NO: P-6

NTH CONSULTANTS, LTD.

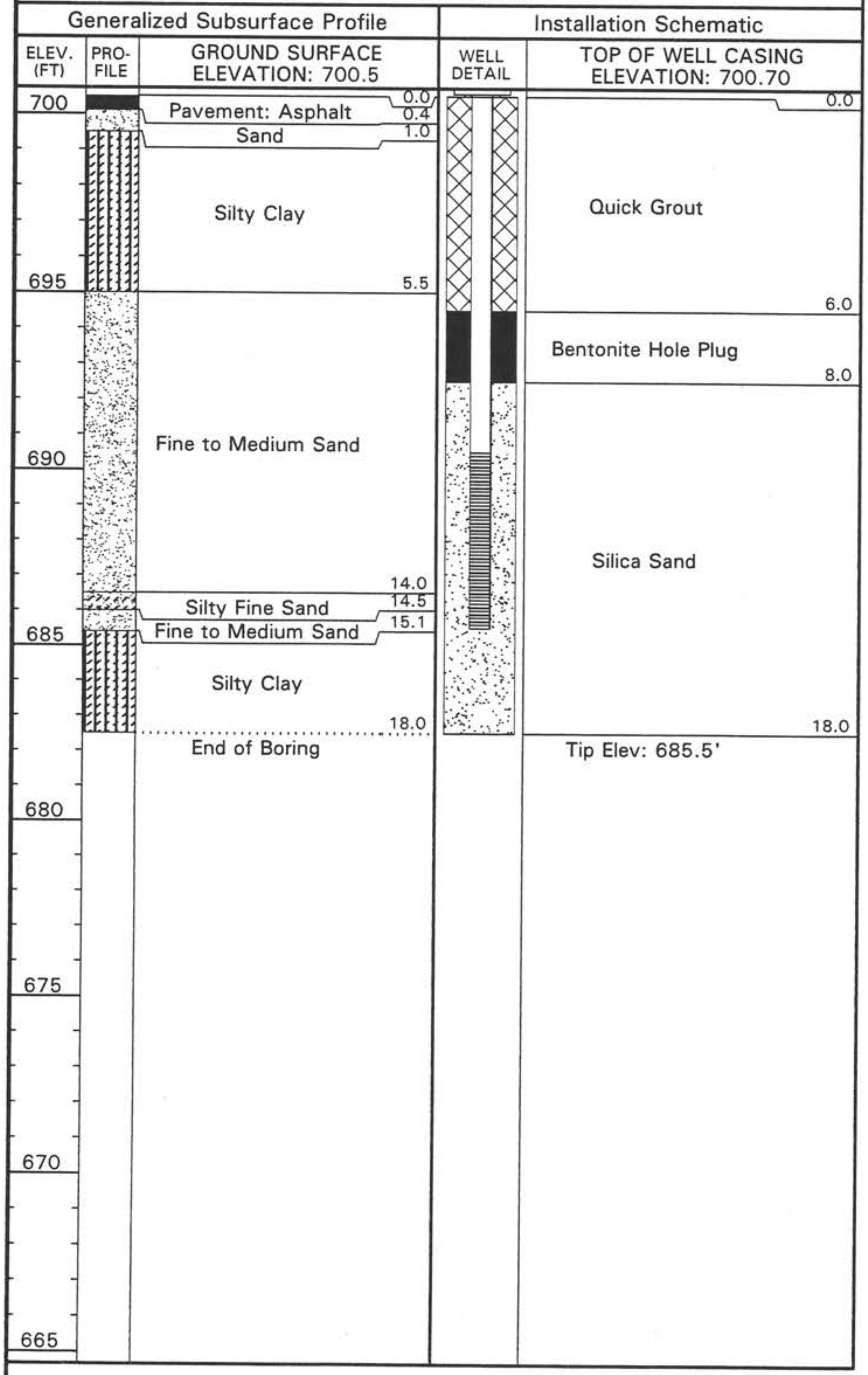
Project Name: *EQ-Site #2 - Southeast Container Storage Area*

Project Location: *Belleville, Michigan*

NTH Proj. No: *13-990953-00*

Checked By:

LOG OF MONITORING WELL



GROUNDWATER DATA

DATE	ELEV. (ft.)	COMMENTS
12/07/99	689.24	(depth @ 11.46 ft)

NOTES

[1] For details of subsurface strata, see Log of Test Boring No. P-6.

Started: *12/07/99*
Completed: *12/07/99*
Inspector: *D. Hohner*
Contractor: *Alliance Environmental, Inc.*
Driller: *J. Ward*
Equipment:
Well Type: *monitoring*

Casing Diameter: *2.0 inches*
Casing Length: *10.2 feet*
Casing Type: *PVC*
Screen Diameter: *2.0 inches*
Screen Length: *5.0 feet*
Screen Mesh: *0.007 inch*
Screen Type: *PVC*

FIGURE NO. 12

PROJECT NO. 13-990953-00 NTH CONSULTANTS, LTD. SHEET 1 OF 1

TABULATION OF LABORATORY TEST DATA

BORING / TEST PIT / PROBE DESIGNATION	SAMPLE NUMBER	DEPTH OF SAMPLE TIP (FT)	ELEVATION OF SAMPLE TIP (FT)	UNCONFINED COMPRESSIVE STRENGTH (PSF)	FAILURE STRAIN (%)	NATURAL WATER CONTENT (% OF DRY WEIGHT)	IN-PLACE DRY DENSITY (LBS/CU.FT)	PERMEABILITY (CM/SEC)	PARTICLE SIZE DISTRIBUTION (%)							ATTERBERG LIMITS (%)			APPARENT SPECIFIC GRAVITY	LOSS ON IGNITION (%)	UNIFIED SOIL CLASSIFICATION
									COLLOIDS	CLAY	SILT	FINE SAND	MEDIUM SAND	COARSE SAND	GRAVEL	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX			
P-1	S-5	15.0	686.0	--	--	--	--	-----		← 14.3 →		29.3	45.5	8.9	2.0	--	--	--	--	--	--
P-2	S-6	16.0	687.6	--	--	--	--	-----		← 8.6 →		86.8	4.3	0.1	0.2	--	--	--	--	--	--
P-4	S-5/6	16.0	687.8	--	--	--	--	-----		← 30.2 →		67.8	1.9	0.1	0.0	--	--	--	--	--	--
P-6	S-5	14.0	686.5	--	--	--	--	-----		← 30.3 →		50.2	16.8	2.5	0.2	--	--	--	--	--	--

FIGURE NO. 13

NTH Consultants, Ltd.

GRAIN SIZE DISTRIBUTION CURVE

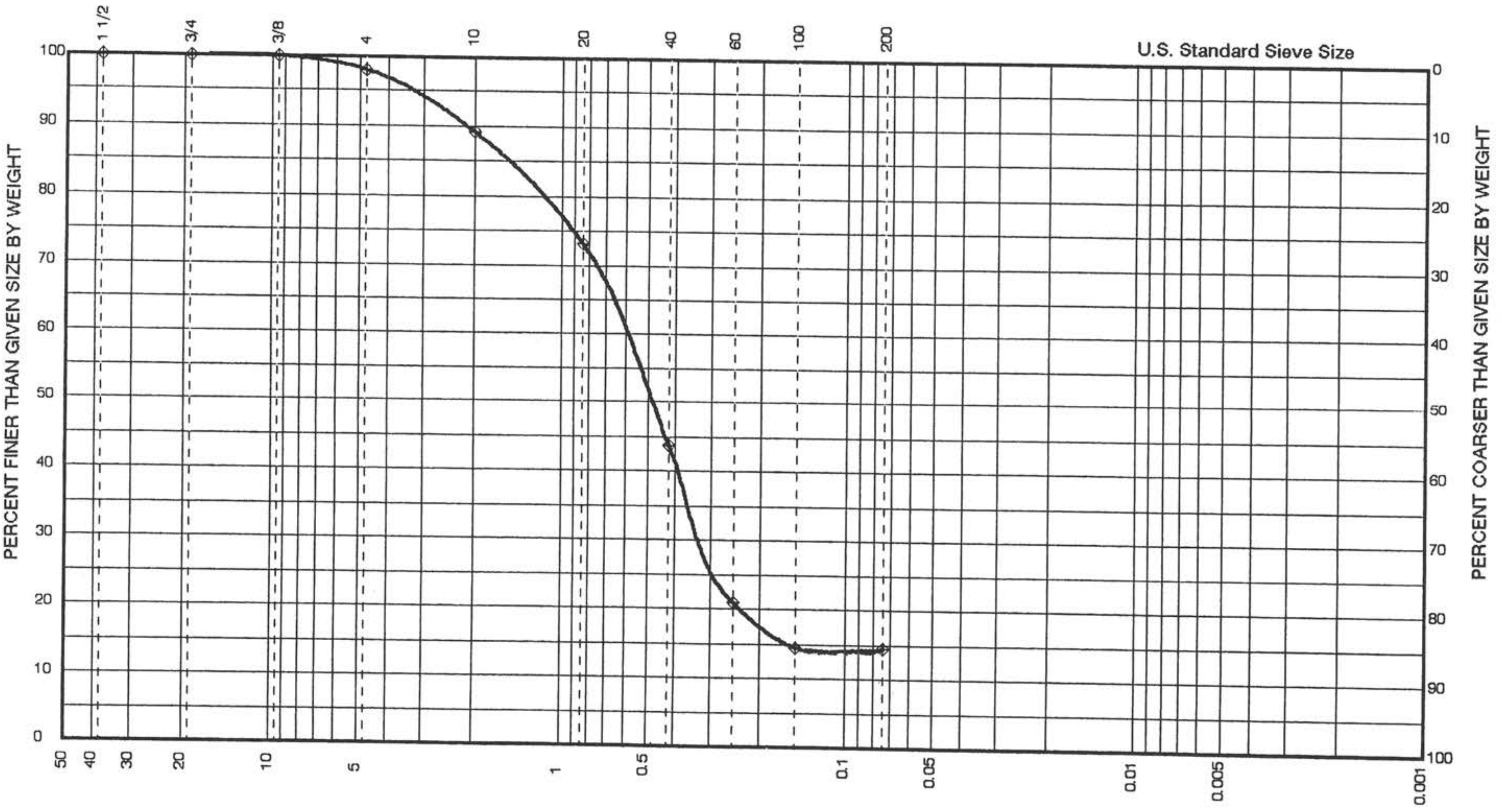
Project No. 99-0953 00 Project Name WDI Site #2

Project Location Van Buren Twp., Wayne Co., Michigan Source

LWO No. Boring No. P-1 Sample No. S-5 Sample Depth 15.0 Sample Elev. (Tip)

Sample Description

Sampled By Date Tested By SR Date 12-13-99



Grain Size in MM.

Gravel		Sand			Fines		
Coarse	Fine	Coarse	Medium	Fine	Silt	Clay	Colloids

FIGURE NO. 14

NTH Consultants, Ltd.

GRAIN SIZE DISTRIBUTION CURVE

Project No. 99-0953 00 Project Name WDI Site #2
Project Location Van Buren Twp., Wayne Co., Michigan Source
LWO No. Boring No. P-2 Sample No. S-6 Sample Depth 16.0 Sample Elev. (Tip)
Sample Description
Sampled By Date Tested By SR Date 12-13-99

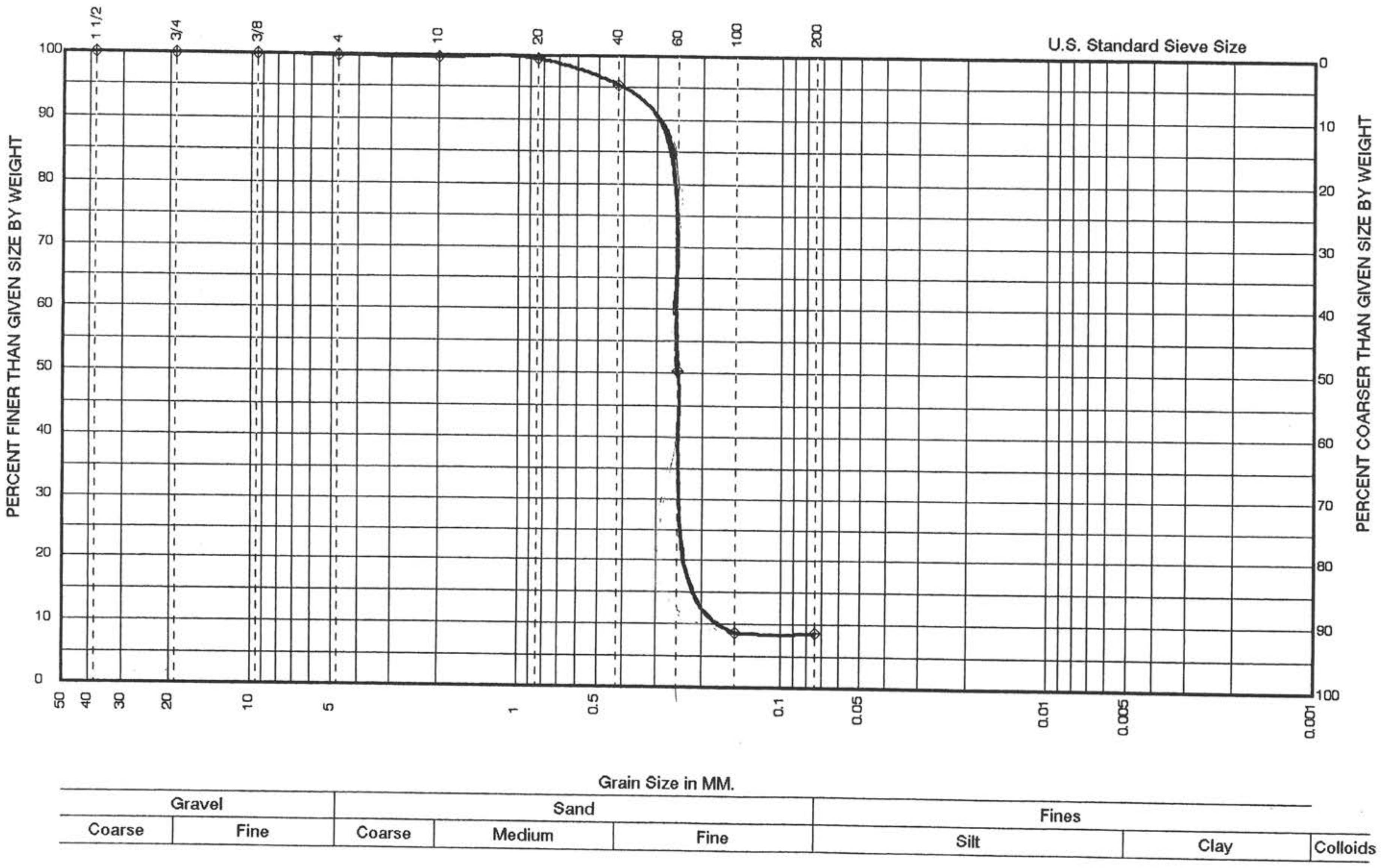


FIGURE NO. 15

NTH Consultants, Ltd.

GRAIN SIZE DISTRIBUTION CURVE

Project No. 99-0953 00 Project Name WDI Site #2

Project Location Van Buren Twp., Wayne Co., Michigan Source

LWO No. Boring No. P-4 Sample No. S-5/6 Sample Depth 16.0 Sample Elev. (Tip)

Sample Description

Sampled By Date Tested By SR Date 12-13-99

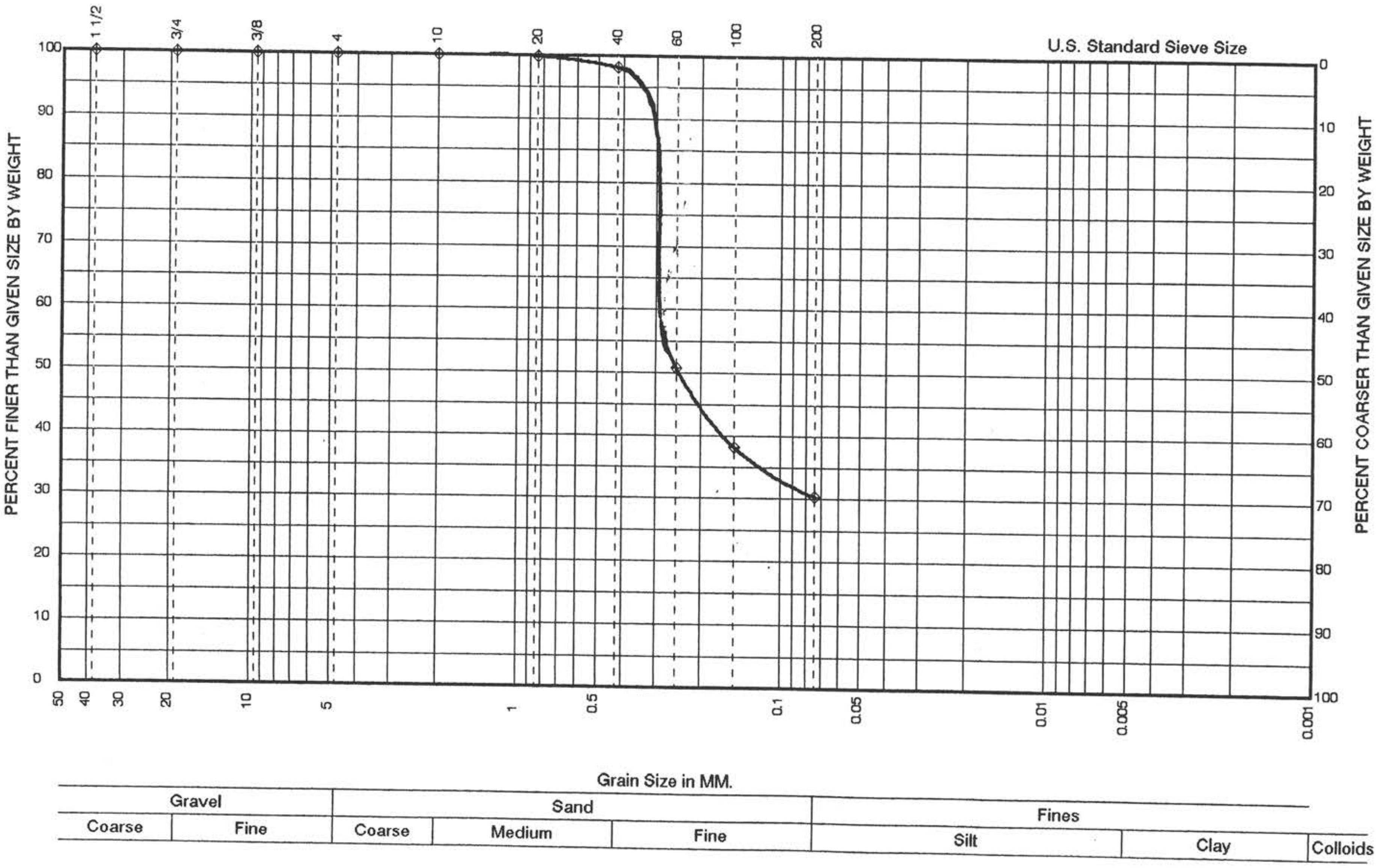


FIGURE NO. 16

NTH Consultants, Ltd.

GRAIN SIZE DISTRIBUTION CURVE

Project No. 99-0953 00 Project Name WDI Site #2

Project Location Van Buren Twp., Wayne Co., Michigan Source

LWO No. Boring No. P-6 Sample No. S-5 Sample Depth 14.0 Sample Elev. (Tip)

Sample Description

Sampled By Date Tested By SR Date 12-13-99

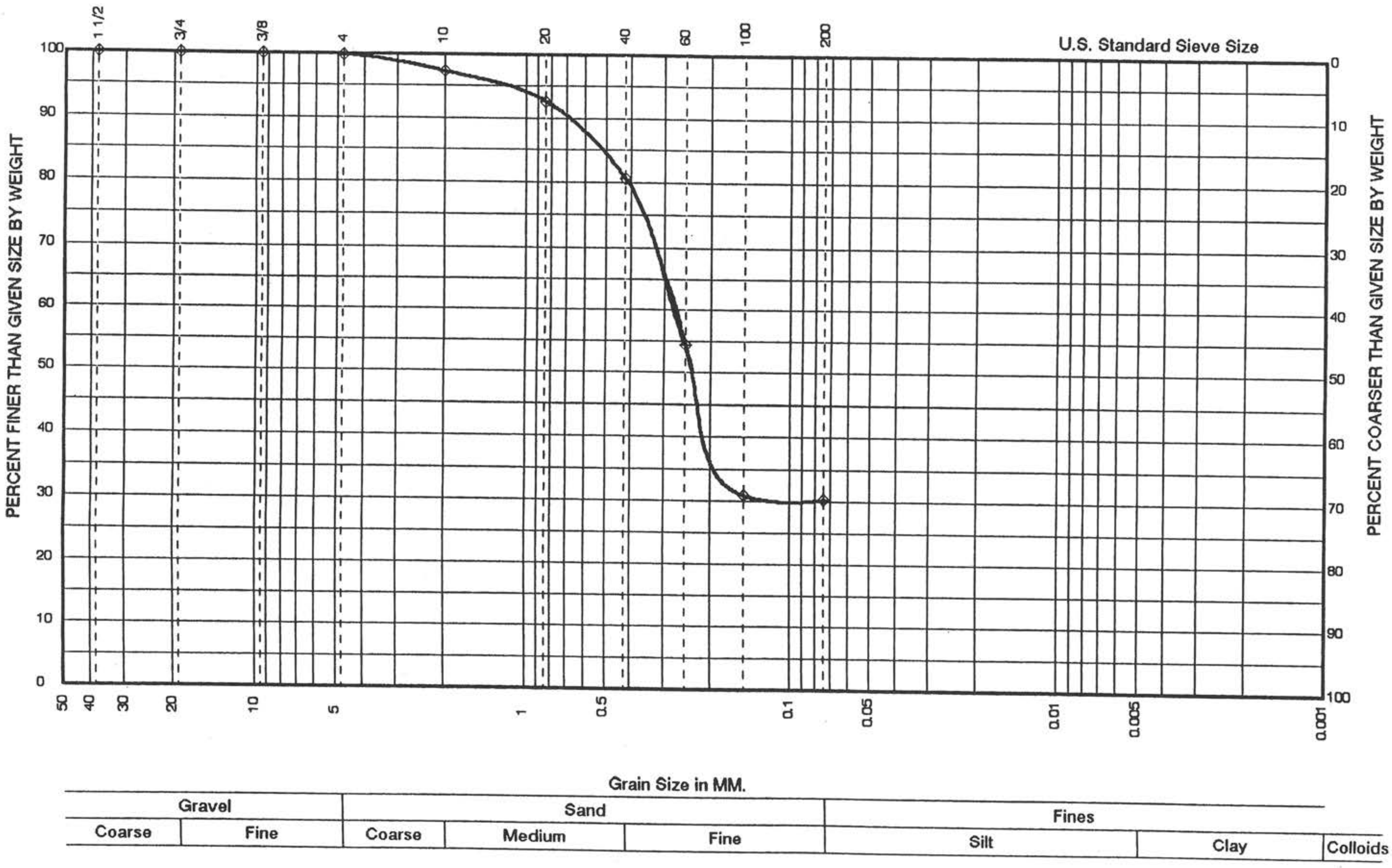


FIGURE NO. 17