

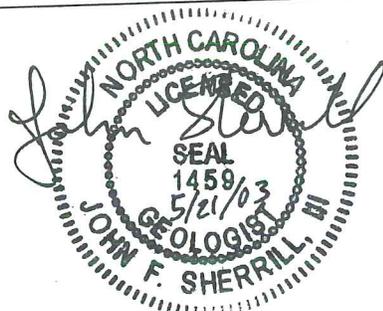
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**Site Investigation
Swift Creek Project
Highway 301**

**ReUse Technology, Inc.
Nash County
Rocky Mount, North Carolina**

Prepared for:
**REUSE TECHNOLOGY, INC.
WOODSTOCK, GEORGIA**

8002 E -
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Prepared by:
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1.0 INTRODUCTION

Sherrill Environmental, Inc. (Sherrill) was contracted by ReUse Technology, Inc. (ReUse) to investigate groundwater concerns addressed in a letter from the Division of Waste Management dated August 19, 2002. The letter referred to a Notice of Violation issued April 4, 2002 for the Coal Combustion By-Product (CCBP) Structural Fill Site on the Highway 301 Swift Creek Property. This report was prepared to address the Division's concerns about the site.

2.0 LOCATION AND CLOSURE OF CONCRETE DRAIN PIPE

One of the stated concerns of the letter was the location of a 24-inch reinforced concrete pipe (RCP). On October 18, 2002 Sherrill directed J&L Drilling, Inc. in performing geotechnical borings to identify the location of a 24-inch reinforced concrete pipe (RCP). Two lines were set approximately perpendicular to the east-west oriented RCP. The borings were performed with 2.25 inch ID hollow-stem augers using a center plug to keep the inner portion of the augers clear while drilling. The augers were drilled to a depth of approximately 11 feet and then continuous split spoon sampling was performed to collect samples until the coal ash/soil contact was identified.

Analysis of the split spoon samples indicate that the RCP was placed in a shallow trench (approximately 1.5 feet deep) that was dug approximately 20 feet to the north of the original surface water drainage ditch. The borings indicate that the original surface water drainage ditch was backfilled with site soil material to a level that was at least even with the adjacent soil surface. The recollection of site workers that were on site at the time of the RCP installation was that the soil material excavated for the pipe trench was placed into the original surface water drainage ditch.

On January 2, 2003 ReUse personnel completed closure activities on the RCP. One section of pipe was removed from the west end and four sections of pipe were removed from the east end. The RCP was blocked off by placing cement in both ends of the pipe.

3.0 GEOLOGY

Figure 1 shows the location of the site on Sheet 1 of the Soil Survey of Nash County produced by the US Department of Agriculture, Soil Conservation Service. The soils underlying the coal ash fill project are largely Altavista with a smaller portion of Norfolk in the area of higher topography on the southern end of the site.

Altavista soils are alluvial deposits that formed on flood plains. These old flood plains were erosionally dissected and the remaining terrace areas are now topographically higher than the surrounding stream and swamps. The soil formation on these terraces can endure only rare and brief flooding. The seasonal high water table for Altavista is 1.5 to 2.5 feet below the top of the soil surface and occurs during December through March.

The Soil Survey describes Altavista sandy loam (AaA) as moderately well drained and nearly level to gently sloping. It is on low terraces along large streams. Typically, the surface layer is grayish brown sandy loam 12 inches thick. The next layer, to a depth of 14 inches is olive yellow sandy loam that has yellow mottles. The subsoil extends to a depth of 44 inches. It is yellow sandy clay loam in the upper part. The middle part is yellowish brown clay loam that has mottles of light gray, red, and yellowish red. The lower part of the subsoil is light yellowish brown clay loam that has mottles of red, yellowish red, strong brown and light gray. The underlying material to a depth of 60 inches is mottled brownish yellow, light gray, strong brown and yellowish red sandy clay loam.

The Norfolk soils underlie the site along the western and southern sides in the topographically higher portions of the site. The percentage of Norfolk soil underlying the coal ash fill is relatively small compared to the Altavista. The seasonal high water table for Norfolk is 4 to 6 feet below ground surface and occurs during January through March.

The Soil Survey describes Norfolk loamy sand (NoB) as well drained and gently sloping. It is on convex ridges and side slopes of the Coastal Plain uplands. Typically the surface layer is grayish brown loamy sand about 10 inches thick. The subsurface layer is very pale brown sandy loam to a depth of about 19 inches. The subsoil extends to a depth of at least 79 inches. It is brownish yellow sandy clay loam in the upper part. The middle part is brownish yellow sandy clay loam that has red and very pale brown mottles, and the lower part is a mottled brownish yellow, yellow, red and gray sandy loam.

4.0 SOIL SAMPLING AND TESTING

Twenty two soil borings were performed for the piezometer study. Nineteen of the borings were performed in the area of the coal ash fill. Split-spoon samplers were driven to sample the coal ash fill and the underlying soil and evaluate the ash/soil contact. A map showing the approximate elevation of the underlying soil surface is shown in Figure 2. All borings in the fill area encountered a stiff, mottled yellowish-brown and gray sandy clay consistent with the Altavista soil. The soil borings indicated that a dense soil unit was present beneath the coal ash fill that consisted of intervals of clay, sandy clay and clayey sand.

Five samples were collected for laboratory permeability tests. The tests were performed by GeoTechnologies, Inc. and the laboratory report is included in Appendix A. The locations of the samples are shown on Figure 3. The following is a summary table of the results.

TABLE 1
SUMMARY OF LABORATORY PERMEABILITY TESTS

Location	Material	Depth (ft)	Elevation (ft)	Permeability (cm/sec)
P-12	Coal Ash	2 - 4.3	102-100	8×10^{-4}
P-12	Light Gray, Yellow, Fine Sandy Silty CLAY	13.8-16.1	90-88	7×10^{-8}
P-19	Light Gray, Red, Orange Fine Sandy, Silty CLAY	15-17	93-91	7×10^{-8}
B-11	Light Gray, Yellow fine Sandy Silty CLAY	11.5-13.8	90-88	1×10^{-7}
NE Retention Pond	Gray Slightly Fine Sandy CLAY	0-2	90-88	1×10^{-8}

5.0 PIEZOMETER STUDY

During the advancement of the borings used to identify the location of the RCP, water was identified in the coal ash fill. A study was initiated by Sherrill to characterize the water conditions at the site. A total of 22 piezometers were installed at the site. Field boring logs are presented in Appendix A. A summary of piezometer data is shown on Table 2. Piezometers P-1 through P-6 are considered shallow groundwater piezometers and screen the interval of 20 to 30 feet below the surface of the project. Piezometers P-7 and P-8 are slightly deeper piezometers screening the interval from of 30 to 40 feet. Piezometers P-9, P-10, P-11 and P-22 were installed at the site but outside the area of the coal ash fill. Piezometers P-12 through P-21 are shallow and were installed to measure water levels within the coal ash fill.

As shown on Table 2, the measurement of water levels in the piezometers was initiated on September 25, 2002 and has continued with May 4, 2003 being the last measurement data included in this report. The following list of charts were constructed to show the fluctuations of water levels over the studied time period:

- Chart 1: Elevation of Groundwater – Shallow Piezometers (Screens 20-30 ft)
- Chart 2: Elevation of Groundwater – Deeper Piezometers (Screens 30-40 ft)
- Chart 3: Elevation of Groundwater – Outside of Structural Fill Area
- Chart 4: Elevation of Water in Coal Ash
- Chart 5: Feet of Water in Coal Ash
- Chart 6: Group “A” Nested Piezometers
- Chart 7: Group “B” Nested Piezometers

The piezometer data for the studied time period was reviewed and the data from January 27, 2003 was selected to represent general existing conditions for the purpose of constructing figures and making evaluations.

The piezometric surface of shallow groundwater is shown in Figure 4 and a chart of water elevations versus time is presented as Chart 1. The water level data used to construct the map was obtained from piezometers P-1 through P-6. These piezometers are screened in marine sediments approximately 20 to 30 ft below the project surface. The direction of shallow groundwater flow is to the northeast with a general gradient of 0.0125 ft/ft.

The piezometric surface of water in the coal ash fill is shown in Figure 5 and a chart of water elevations versus time is presented as Chart 4. The water level data used to construct the map was obtained from piezometers P-12 through P-21 and B-1. These piezometers have screens in the coal ash fill. The map indicates that water is mounded beneath the site and has the potential to flow radially. The majority of the flow within the ash is to the north and northeast.

An isopach map of the vertical thickness of water present above the natural ground/coal ash contact and within the coal ash fill is shown in Figure 6 and a chart showing the vertical thickness of water versus time is presented as Chart 5. The water level data used to construct the map was measured in piezometers P-12 through P-21 and B-1. The map shows a north-south trending mound of water in the coal ash fill that has a maximum vertical thickness of approximately 7 feet. The area of maximum saturated material is roughly coincident with the groundwater mound shown on Figure 5.

Two sets of nested piezometers, Group A and Group B were installed to measure vertical hydraulic gradient. Both of the groups have one piezometer screened in the coal ash fill, and two piezometers screened in marine sediments at the intervals of 20 to 30 feet and 30 to 40 feet below the project surface. The coal ash is separated from the underlying marine sediments by 6.5 ft of alluvial soil of low hydraulic conductivity. All of the 30 to 40 foot piezometers were completed with a sand pack that extended to one foot above the 10 foot screen section and then bentonite chips to the level of the soil/coal ash contact. Vertical cross sections of Groups A and B are shown on Figures 4 and 5, respectively. Water level measurements shown in the figures and discussed in the following paragraphs were obtained on January 27, 2003.

The Group A of nested piezometers (Figure 6) show approximately 5 feet of water present in the coal ash fill as measured at P-12. The piezometers P-4 and P-8, screened in the underlying marine sediments, show a water level approximately 2.5 feet above the soil/coal ash contact. The measured water levels in these piezometers are presented in Chart 6.

The Group B of nested piezometers (Figure 7) show approximately 6 feet of water present in the coal ash fill as measured at B-1. The piezometers P-1 and P-7 show water

levels approximately equal with the soil/coal ash contact. The measured water levels in these piezometers are presented in Chart 7.

6.0 HYDROGEOLOGIC CONDITIONS

Prior to construction of the structural fill the site was underlain by soils that were mapped as a soil unit that had a seasonal high water table 1.5 or more feet below ground surface. Placement of the ash would not have been possible with a water table any higher because trucks and heavy equipment would not have been able to travel across the site with a water table less than 1.5 ft below ground surface.

Based on water level measurements in piezometers (Table 2) and the potentiometric and thickness maps shown in Figures 4, 5 and 6 it is clear that water has been accumulating in the structural fill. This may be a transient situation caused by trapping of precipitation and water applied for dust suppression within the structural fill. The higher than normal precipitation during the winter 2002/2003, including one 7 inch rainfall event, would certainly have contributed to this situation.

The dense sandy clay alluvial material that underlies the ash has a very low permeability of about 7×10^{-8} cm/sec. This material is about 6.5 ft thick and will act as barrier to vertical migration of groundwater because of the very slow travel time through this confining bed. Using the B-1/P-1 (Group A, Figure 7) pair as an example of vertical migration and groundwater data from January 27, 2003, the calculated vertical travel time is about 28 years. The lower head in P-12 in the P-12/P-4 pair (Group B, Figure 8) leads to an even longer calculated travel time of 67 years. These calculations are based on the equation for seepage velocity, as follows:

$$v = (K * dH/dL) / n_e$$

Where v = seepage velocity
 K = permeability (measured in lab tests)
 dH = difference in head
 dL = vertical distance between piezometer screens
 n_e = effective porosity

And
 $t = d/v$

Where t = travel time
 d = distance (thickness of the alluvial material in this case)
 v = seepage velocity

As the water level in the ash becomes lower, the vertical travel time increases because of the lower head value. At five feet of head over the coal ash/alluvial contact the

calculated travel time is 35 years through a 6.5 ft thick layer of the alluvial soil. This length of time increases to 175 years with one foot of head.

The travel time calculations are summarized in the following table. All calculations assume 30% effective porosity, an estimate based on values provided in the Standard Handbook for Solid and Hazardous Waste Facility Assessments (Sara, 1993).

TABLE 3
SUMMARY OF VERTICAL SEEPAGE VELOCITIES AND TRAVEL TIMES

EXAMPLE	PHYSICAL PARAMETERS				AVERAGE LINEAR VELOCITY		TRAVEL TIME
	K (cm/sec)	K (ft/day)	Dh (ft)	dL (ft)	V _e (ft/day)	V _e (ft/year)	t (years)
Group A, B-1 to P-1	7E-08	0.000198	6.3	6.5	0.00064	0.23	28
Group B, P-12 to P-4	7E-08	0.000198	2.6	6.5	0.00026	0.10	67
Hypothetical, 1 ft head	7E-08	0.000198	1	6.5	0.00010	0.04	175
Hypothetical, 2 ft head	7E-08	0.000198	2	6.5	0.00020	0.07	88
Hypothetical, 3 ft head	7E-08	0.000198	3	6.5	0.00030	0.11	58
Hypothetical, 4 ft head	7E-08	0.000198	4	6.5	0.00041	0.15	44
Hypothetical, 5 ft head	7E-08	0.000198	5	6.5	0.00051	0.19	35

Not only will the alluvial material act as a barrier to vertical downward movement of water, but water level data indicate that groundwater may actually be moving vertically up into the alluvial layer in at least some areas of the site. Figure 8 shows the Group B set of piezometers where the water level in the deeper screened well (P-7) is higher than the water level in the well screened in the shallower level of this marine deposit of clayey, shelly sand (P-1). This relationship is indicative of an upward vertical gradient. Prior to the construction of the structural fill it is probable that the small volume of water that could have seeped up into the alluvial material was naturally drained by horizontal flow through the sandier surficial material or removed by evapotranspiration.

7.0 SURFACE WATER ANALYSIS

Sherrill collected surface water samples at the Swift Creek on March 4, 2003. The surface water samples were analyzed for the 8 RCRA metals, iron, manganese, sulfate and total dissolved solids (TDS). Specific conductivity and pH measurements were collected using field instruments.

Two upstream surface water samples were collected to represent background conditions. Surface water sampling station SW-1 is located at the nearest Swift Creek bridge on Highway 301 and surface water sampling station SW-2 is located at the nearest culvert for Lane Swamp at Highway 301. Two downstream sampling stations were selected to test for any potential impact to surface water quality from the coal ash fill project. Surface water sampling station SW-3 is located east of the former concrete pipe and SW-4 is located east of piezometer P-15. Both SW-3 and SW-4 are approximately 100 feet into the swamp as measured from the project silt fence. Both sampling stations are clearly marked on adjacent trees with pink surveyor flagging tape.

The analyses of the surface water samples are summarized on Table 2 and the laboratory report is included in Appendix B. No RCRA metals were detected in any of the surface water samples. Concentrations of sulfate and TDS were low and well below 2B Surface Water Standards. Iron was the only parameter that exceeded a 2B Action Level.

In summary, the analyses show no discernable difference between the upstream samples and the downstream sample. No impact to surface water quality from the coal ash fill project is apparent.

8.0 DISCUSSION AND SUMMARY

Prior to construction of the coal ash structural fill the water table was at least 1.5 ft below ground surface. After placement of the ash was complete, water was found to be present within the fill. This water appears to be hydraulically separated from the underlying aquifer because:

- A very low permeability layer of about 6.5 ft thickness is present between the base of the ash and the top of the marine sediments of the aquifer.
- Water levels in the ash and in the underlying marine sediments are distinctly different.
- Water levels in the marine sediments indicate that there is an upward groundwater gradient in at least some portions of the site.
- Calculated travel times through the alluvial soil confining layer are longer than 28 years.
- Ash was placed topographically above the land surrounding three sides of the site, so water in the ash can readily flow laterally to an outlet.
- The relatively high water level in the coal ash may not reflect steady state water level conditions. It is thought that closure of the site with the vegetated soil cap may reduce infiltration and help lower water levels within the coal ash fill.
- Surface water sampling and analysis showed no apparent impact to surface water quality from the project.

TABLES

**TABLE 2
SUMMARY OF PIEZOMETER DATA
REUSE - SWIFT CREEK PROJECT**

Piezo meter	Top of Casing Elev.	Ground Surface Elev.	Screen Interval	Ash/Soil Contact	Ash/Soil Contact Elev.	9/25/2002		9/30/2002		10/7/2002		10/18/2002	
						Depth to Water TOC	Water Elev.						
P-1	108.19	105.6	20-30	14.4	91.2	16.45	91.74	16.67	91.52	17.01	91.18	16.45	91.74
P-2	109.53	106.7	20-30	16.1	90.6	17.69	91.84	17.86	91.67	17.88	91.65	17.63	91.90
P-3	106.18	104.4	18-28	12.5	91.9	14.10	92.08	14.35	91.83	14.65	91.53	14.13	92.05
P-4	106.57	104.0	20-30	14.0	90.0	14.04	92.53	14.09	92.48	14.34	92.23	13.88	92.69
P-5	108.39	105.9	20-30	13	92.9	15.77	92.62	15.75	92.64	15.74	92.65	15.57	92.82
P-6	109.79	107.5	20-30	13.5	94.0	15.36	94.43	15.32	94.47	15.27	94.52	14.95	94.84
P-7	107.77	105.9	30-40	14.3	91.6					18.47	89.30	15.99	91.78
P-8	106.53	103.9	30-40	13.3	90.7					15.28	91.25	14.19	92.34
P-9	103.32	100.9	20-30	Soil						9.61	93.71	7.17	96.15
P-10	108.17	106.1	20-30	Soil						18.14	90.03	14.04	94.13
P-11	101.88	99.2	13-23	Soil						12.58	89.30	7.93	93.95
P-12	107.04	104.0	6-16	13.8	90.2								
P-13	108.99	105.9	6-16	13.3	92.7								
P-14	105.38	101.9	4-14	11.5	90.4								
P-15	103.76	101.0	4-14	11.1	89.9								
P-16	105.28	102.1	4-14	11.5	90.6								
P-17	105.31	101.8	4-14	11.5	90.3								
P-18	111.21	107.5	5-15	13.5	94.0								
P-19	111.86	108.3	7-17	15.2	93.1								
P-20	107.00	104.2	7-17	15.0	89.2								
P-21	104.99	99.5	4.5-11.5	9.5	90.0								
P-22	103.60	101.8	17-27	Soil									
B-1	107.66	105.7	14-19	13.5	92.2	13.24	94.42	13.20	94.46	13.20	94.46	13.09	94.57
NE Pond													
Swamp													
NW Ditch													

TABLE 2
SUMMARY OF PIEZOMETER DATA
REUSE - SWIFT CREEK PROJECT

Piezo meter	10/24/2002		11/27/2002		12/31/2002		1/13/2003		1/27/2003		2/25/2003		4/8/2003		5/4/2003	
	Depth to Water TOC	Water Elev.														
P-1	16.14	92.05	16.09	92.10	16.37	91.82	16.80	91.39	17.01	91.18	16.11	92.08	Damaged			
P-2	17.50	92.03	17.12	92.41	16.85	92.68	17.00	92.53	17.37	92.16	16.99	92.54	16.90	92.63	17.17	92.36
P-3	13.76	92.42	13.46	92.72	13.73	92.45	14.23	91.95	14.64	91.54	13.74	92.44	13.99	92.19	14.15	92.03
P-4	13.57	93.00	13.18	93.39	13.10	93.47	13.32	93.25	13.65	92.92	13.20	93.37	13.05	93.52	13.32	93.25
P-5	15.41	92.98	14.80	93.59	14.36	94.03	14.30	94.09	13.80	94.59	13.20	95.19	12.96	95.43	13.16	95.23
P-6	14.61	95.18	12.75	97.04	12.02	97.77	12.13	97.66	12.90	96.89	12.39	97.40	12.19	97.60	12.62	97.17
P-7	15.79	91.98	15.58	92.19	15.85	91.92	16.20	91.57	16.15	91.62	15.60	92.17	15.78	91.99	15.86	91.91
P-8	13.95	92.58	13.56	92.97	13.54	92.99	13.86	92.67	14.05	92.48	13.53	93.00	13.69	92.84	13.95	92.58
P-9	6.23	97.09	6.29	97.03	5.88	97.44	6.41	96.91	6.87	96.45	5.13	98.19	Removed	Removed	6.30	97.02
P-10	13.81	94.36	13.58	94.59	14.03	94.14	Removed									
P-11	7.52	94.36	7.62	94.26	7.91	93.97	8.50	93.38	Removed		Removed		Removed		Removed	
P-12					10.44	96.60	10.81	96.23	11.52	95.52	11.26	95.78	11.23	95.81	11.44	95.60
P-13					12.40	96.59	12.11	96.88	12.09	96.90	11.67	97.32	11.18	97.81	11.22	97.77
P-14					10.66	94.72	11.09	94.29	12.06	93.32	11.25	94.13	11.48	93.90	11.96	93.42
P-15					7.95	95.81	8.33	95.43	11.17	92.59	9.84	93.92	10.03	93.73	11.02	92.74
P-16					10.63	94.65	10.92	94.36	11.36	93.92	11.02	94.26	11.20	94.08	11.41	93.87
P-17					10.57	94.74	10.64	94.67	11.02	94.29	10.57	94.74	10.60	94.71	10.72	94.59
P-18					13.21	98.00	13.37	97.84	14.04	97.17	13.78	97.43	13.47	97.74	13.83	97.38
P-19					9.51	102.35	10.15	101.71	11.78	100.08	10.59	101.27	10.73	101.13	11.44	100.42
P-20					11.90	95.10	12.12	94.88	12.49	94.51	12.48	94.52	12.48	94.52	12.55	94.45
P-21					9.01	95.98	7.59	97.40	9.41	95.58	8.51	96.48	9.14	95.85	9.71	95.28
P-22											10.56	93.04	3.41	100.19	6.80	96.80
B-1	12.97	94.69	11.22	96.44	9.68	97.98	9.68	97.98	10.18	97.48	9.26	98.40	9.07	98.59	9.33	98.33
NE Pond																
Swamp																
NW Ditch																

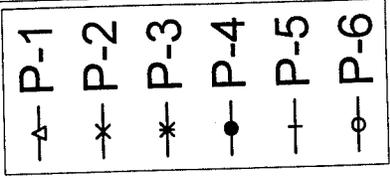
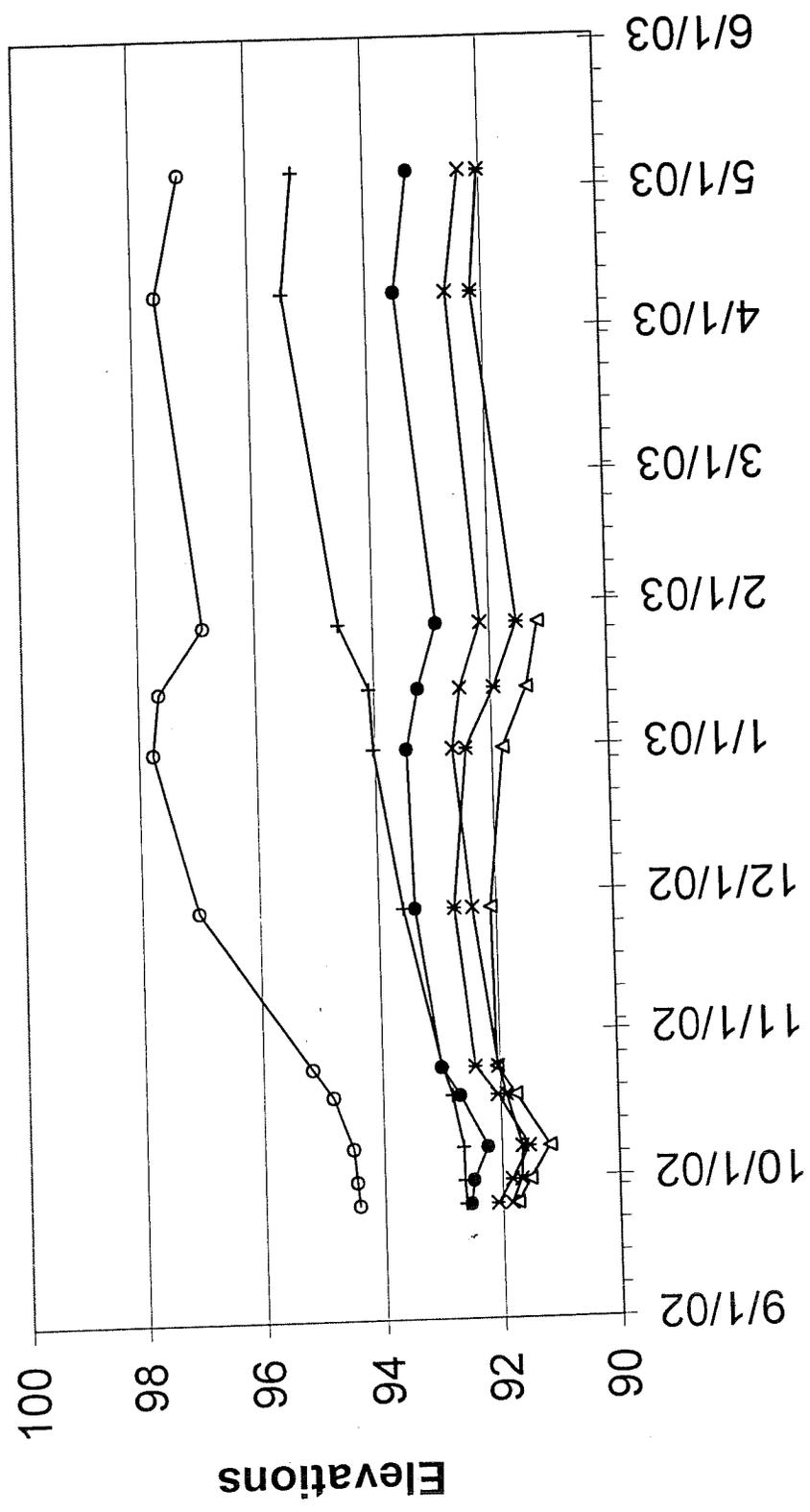
TABLE 4
 SUMMARY OF SURFACE WATER ANALYSIS
 REUSE - SWIFT CREEK PROJECT
 ROCKY MOUNT, NC

	NCAC 2B STD.	UPSTREAM		DOWNSTREAM	
		SW-1 Swift Creek	SW-2 Lane Swamp	SW-3 East Swamp	SW-4 Northeast Swamp
		3/4/2003	3/4/2003	3/4/2003	3/4/2003
Sulfate	250 (WS)	12	15	13	13
TDS	500 (WS)	52	76	48	60
Arsenic	0.05	<0.01	<0.01	<0.01	<0.01
Barium	1	<0.1	<0.1	<0.1	<0.1
Cadmium	0.002	<0.001	<0.001	<0.001	<0.001
Chromium	0.05	<0.01	<0.01	<0.01	<0.01
Iron	1 (AL)	1.3	0.78	1.1	1.2
Lead	0.025	<0.005	<0.005	<0.005	<0.005
Manganese	0.2 (WS)	0.033	0.015	0.041	0.043
Mercury	0.000012	<0.0002	<0.0002	<0.0002	<0.0002
Selenium	0.005	<0.01	<0.01	<0.01	<0.01
Silver	0.00006 (AL)	<0.01	<0.01	<0.01	<0.01
Specific Cond.	NL	56	81	56	66
pH	6.0-9.0	8.82	8.50	8.53	8.80
SW-1 Swift Creek Bridge at HWY 301					
SW-2 Lane Swamp Culvert at HWY 301					
SW-3 East (100 ft) of former pipe location					
SW-4 Northeast Swamp, 100 ft east of silt fence					

Bold values are at or exceed a 15A NCAC 2B Surface Water Standard or Action Level
 AL = Action Level WS = Water Supply Class

CHARTS

ELEVATION OF GROUNDWATER - SHALLOW PIEZOMETERS



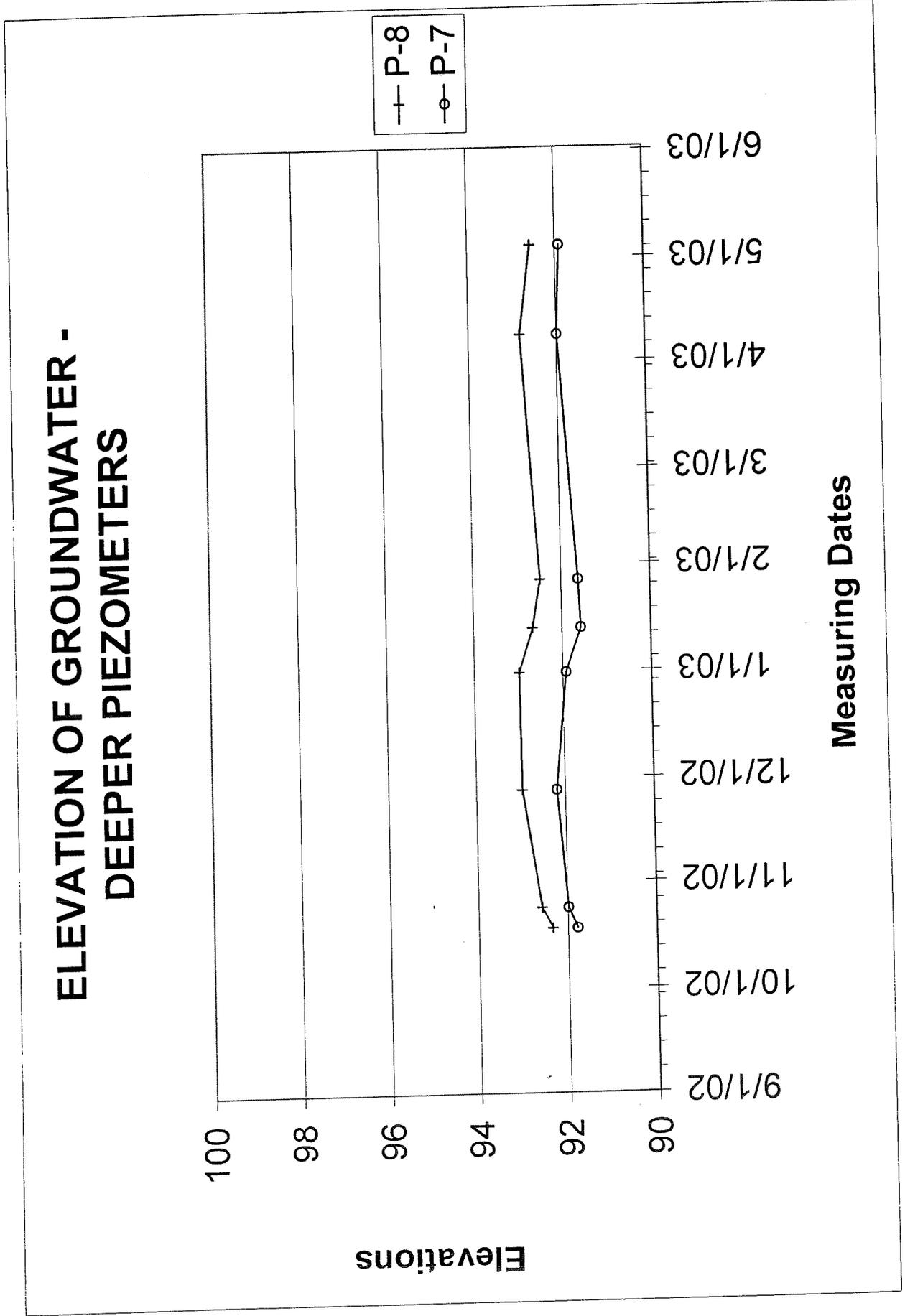
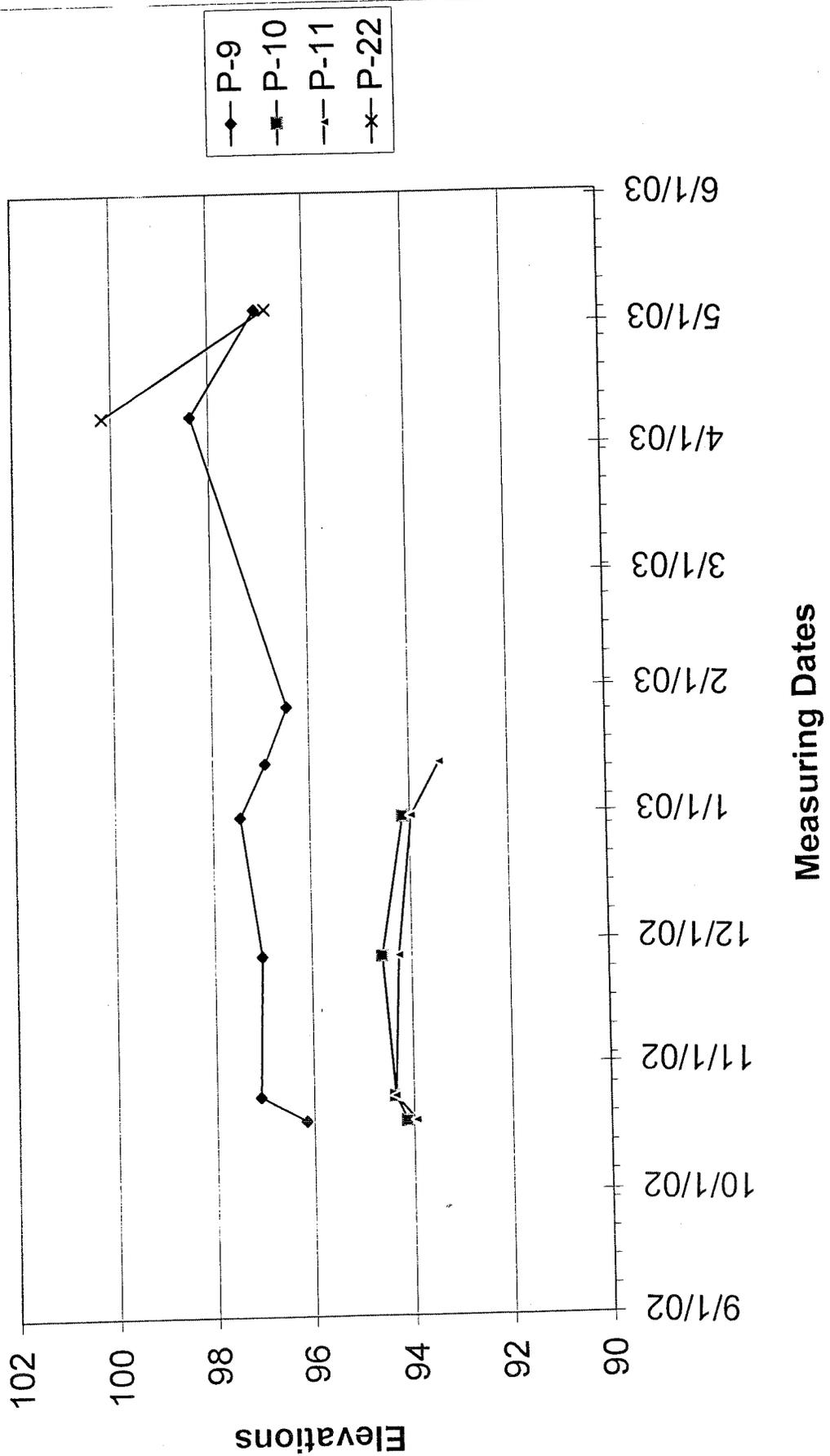


CHART 2

ELEVATION OF GROUNDWATER OUTSIDE OF FILL AREA



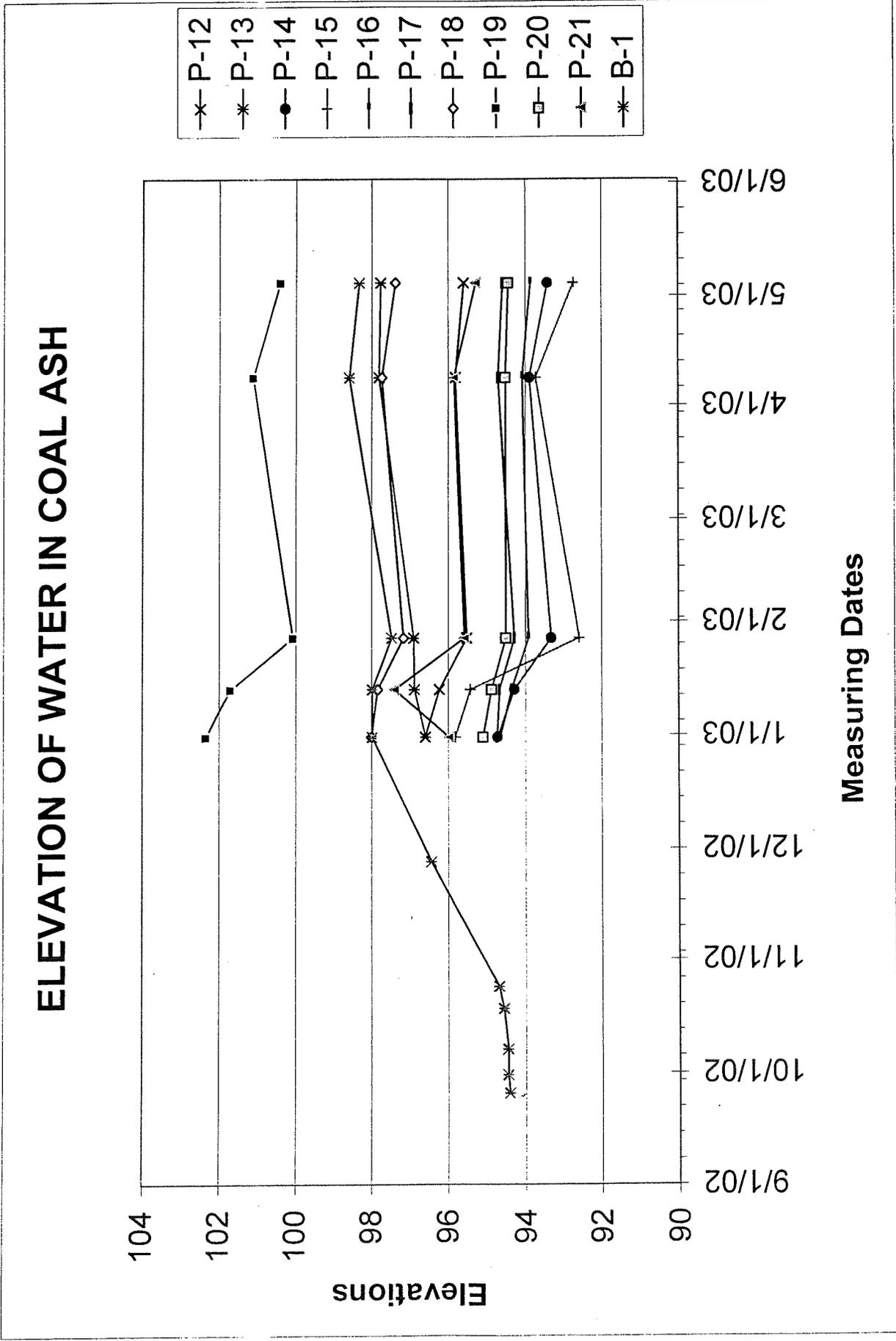
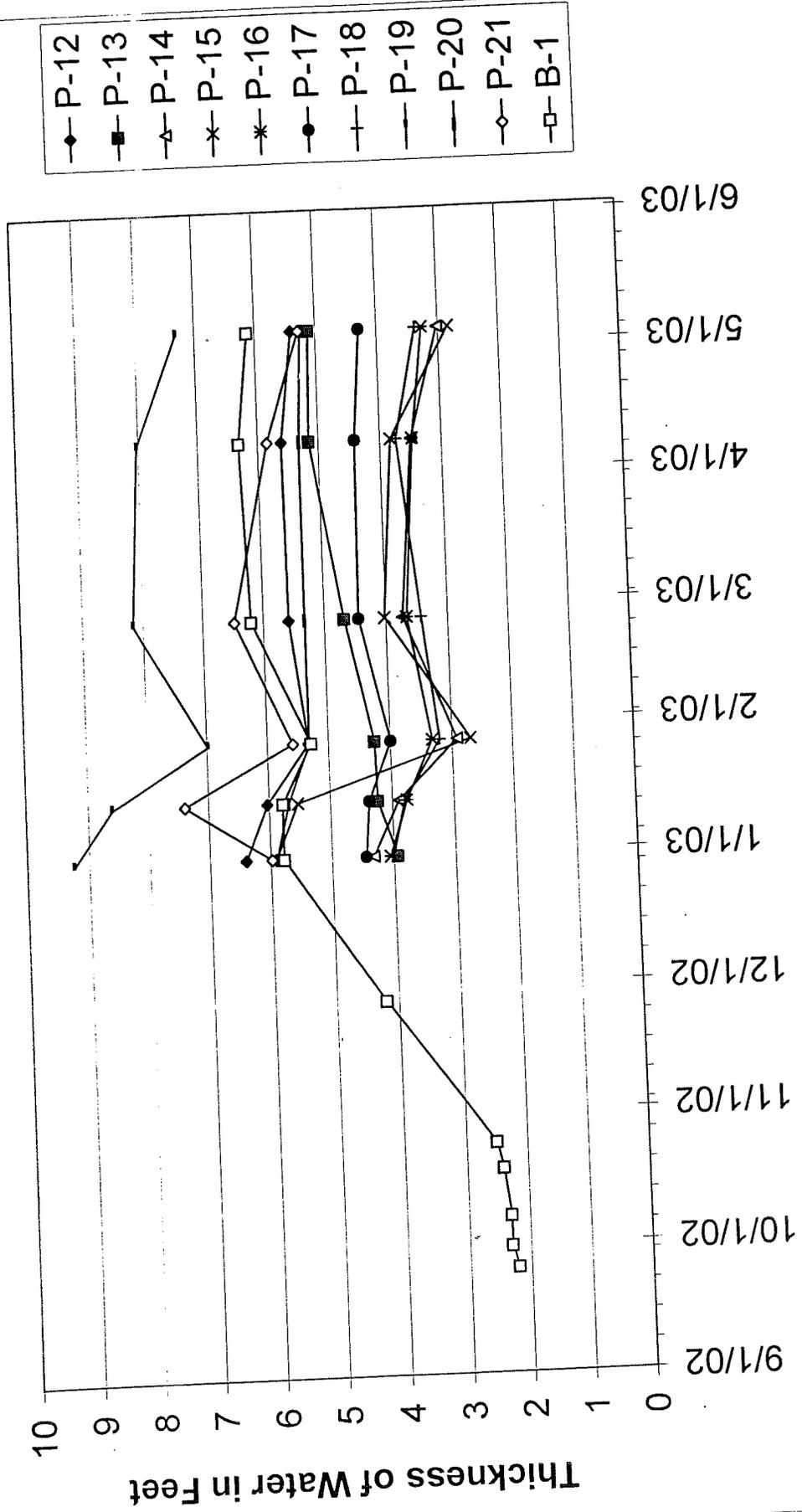
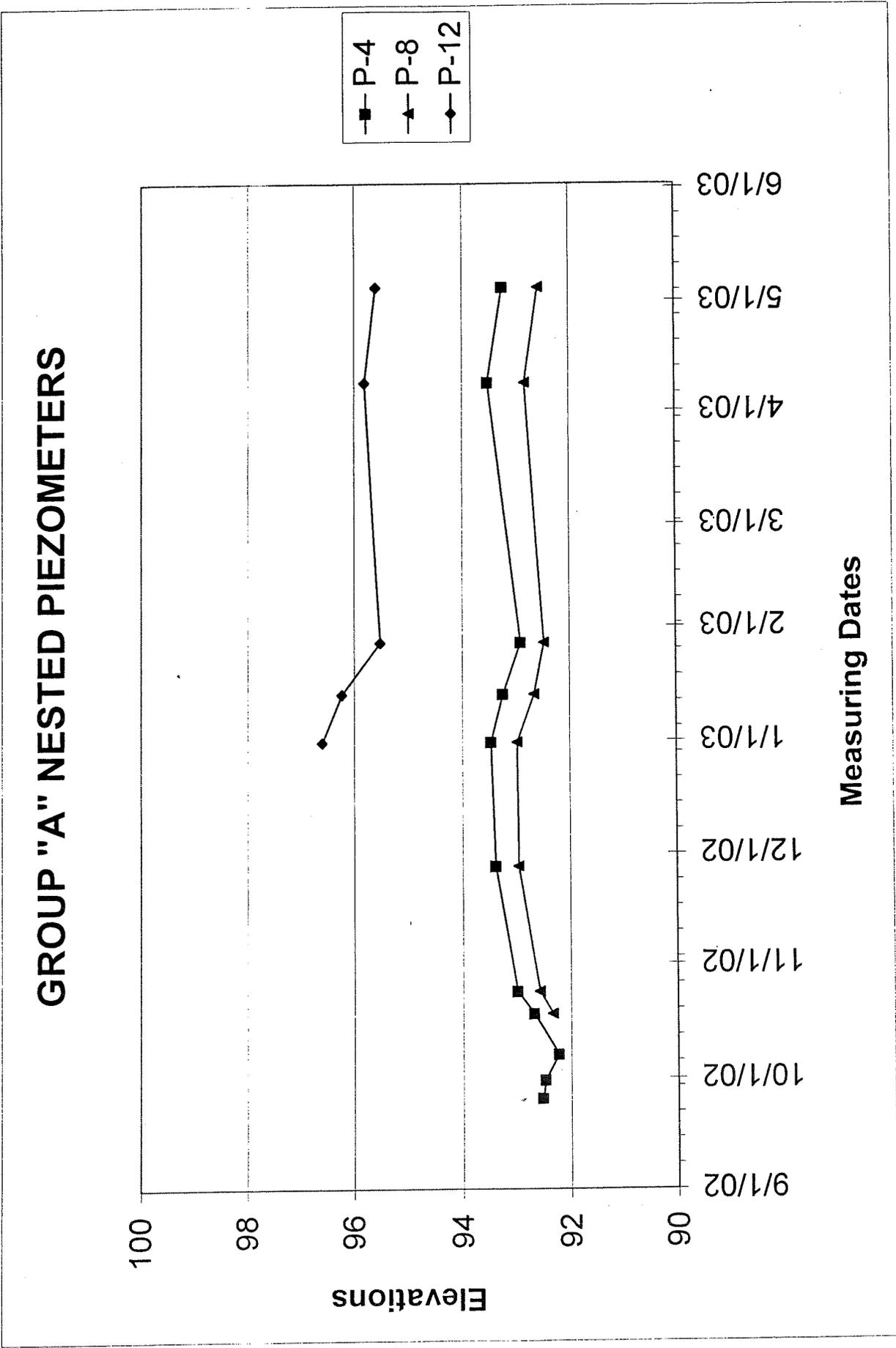


CHART 4

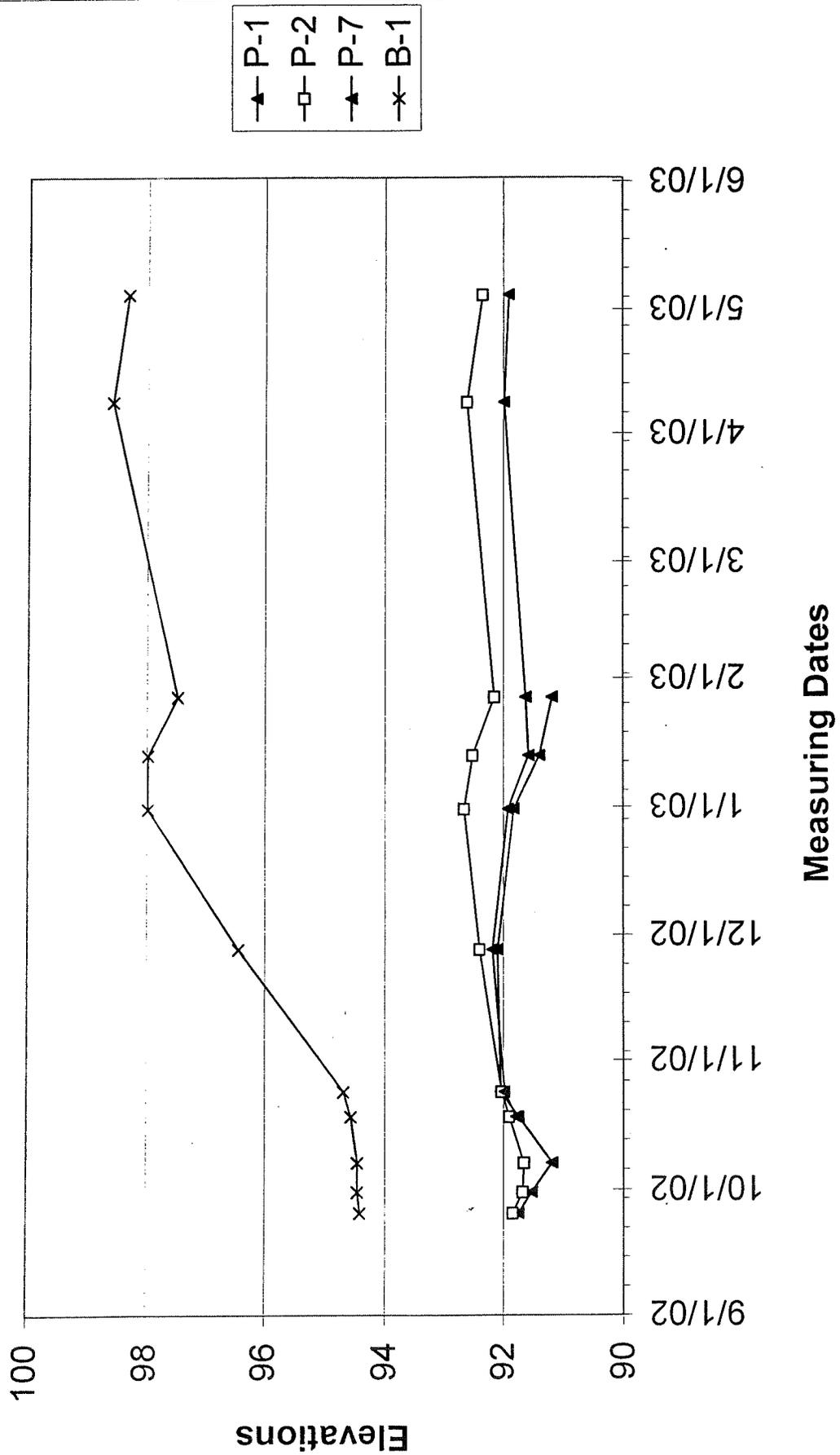
FEET OF WATER IN COAL ASH



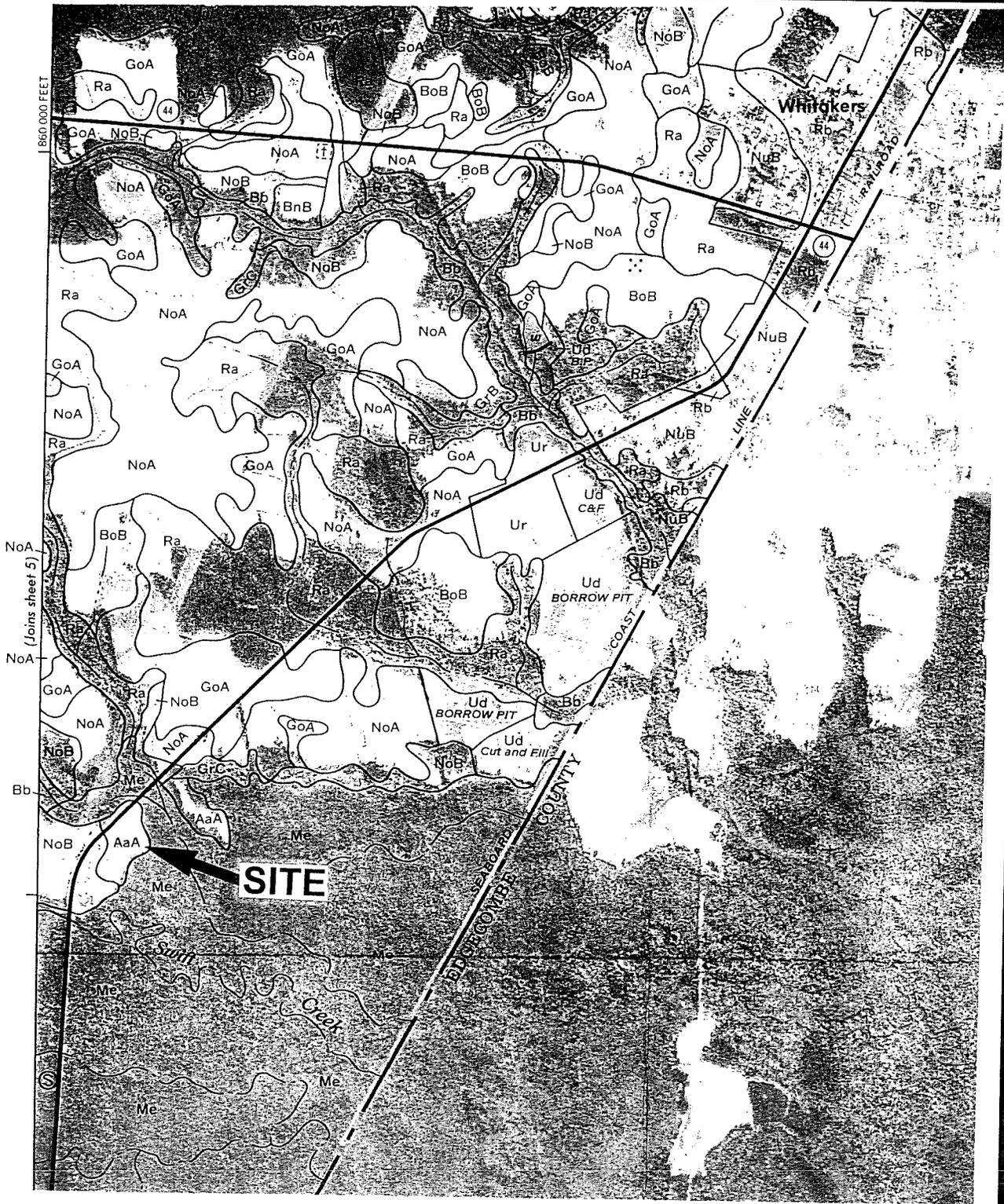
Measuring Dates



GROUP "B" NESTED PIEZOMETERS



FIGURES



SWIFT CREEK-11003

SCALE:

DATE: MAY 1, 2003

DESIGN by: J.S.

DWG by: L.O.T.

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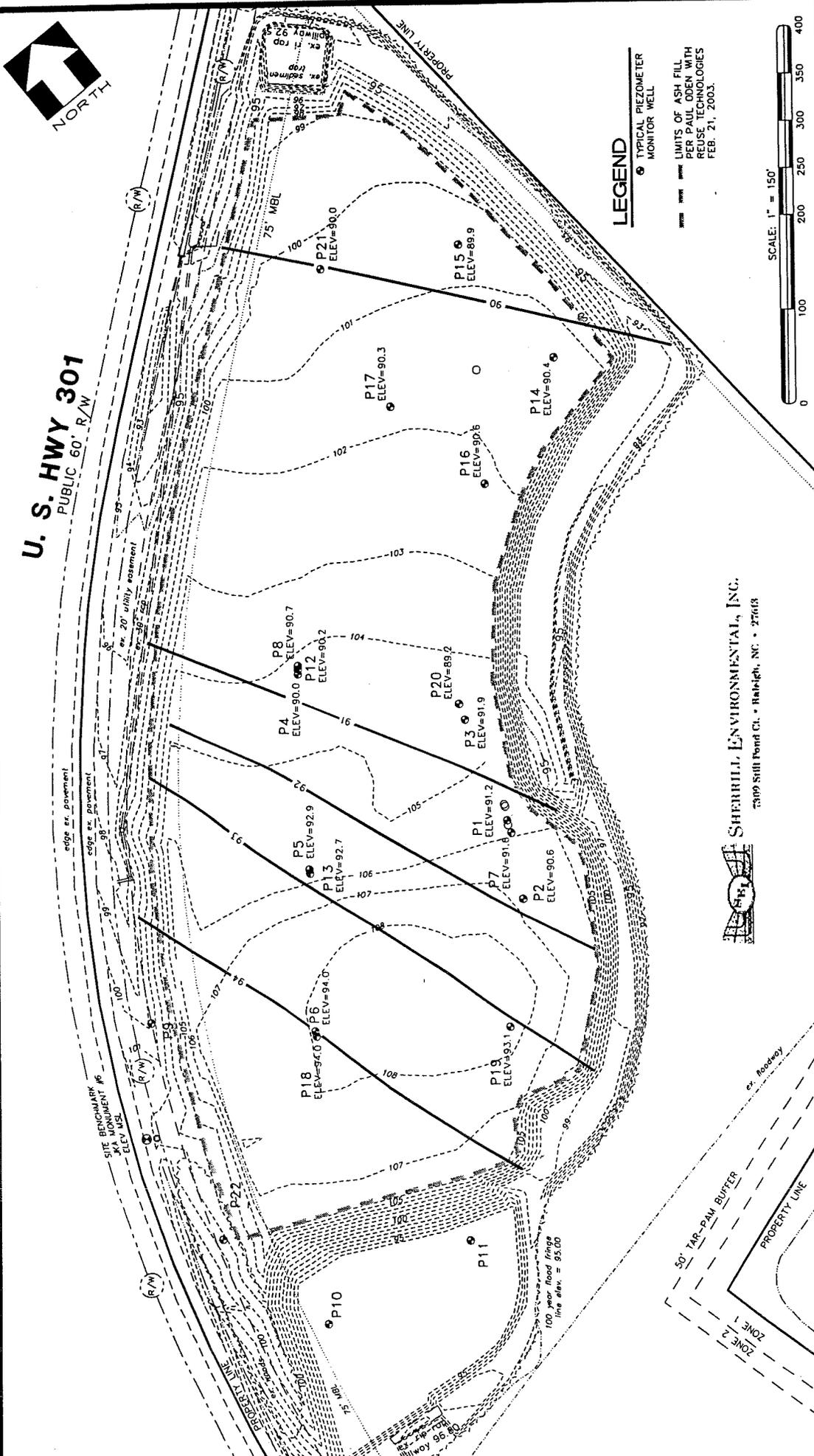
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SWIFT CREEK Project, ReUse Technology, Inc.

FIGURE 1
SOIL SURVEY MAP

C:\mike\657--reuse-swiftcreek\os-buills-geological-5-12-03\01016-g1.dwg 05/14/2003 -- 8:58:54 AM -- Plot by M.C.Jr.



U. S. HWY 301
PUBLIC 60' R/W



LEGEND

- LIMITS OF ASH FILL PER PAUL ODEN WITH REUSE TECHNOLOGIES FEB. 21, 2003.
- TYPICAL PIEZOMETER MONITOR WELL



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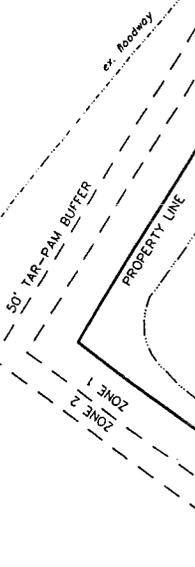
DRAWN BY:	Mike Gallina Jr.	J.N.	01016
SCALE:	1" = 150'	FILE NAME:	
DATE:	01/27/2003	SHEET #:	OF

FIGURE 2
APPROXIMATE ELEVATION OF
COAL ASH/SOIL CONTACT
ReUSE TECHNOLOGY

BEFORE CALL TEL.FAX 1-800-332-3005 CANYONVA 09-CAL CENTER

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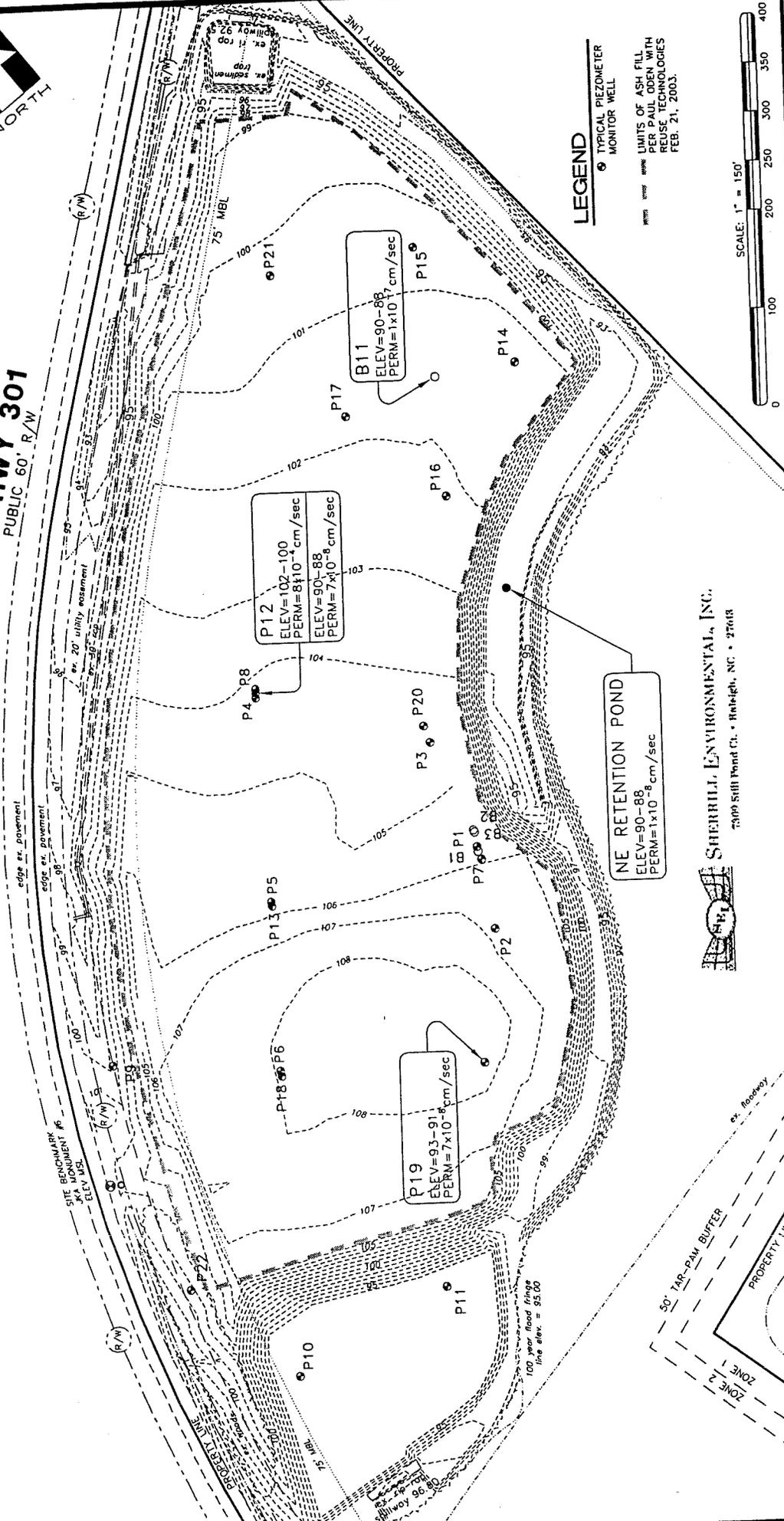
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\\mike\id-657-reuse-swiftcreek\os-buils-geological-5-12-03\01016-gl.dwg 05/14/2003 - 6:59:15 AM - Plot by M.G.Jr.



U. S. HWY 301
PUBLIC 60' R/W



LEGEND
 ○ TYPICAL PIEZOMETER
 ● MONITOR WELL
 LIMITS OF ASH FILL PER PAUL ODEN WITH REUSE TECHNOLOGIES FEB. 21, 2003.



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DRAWN BY	Mike Gallina Jr.	JUN. 01016
SCALE:	1" = 150'	FILE NAME
DATE:	01/27/2003	SHEET #

FIGURE 3
LOCATION MAP of PIEZOMETERS
and SOIL SAMPLES
ReUSE TECHNOLOGY

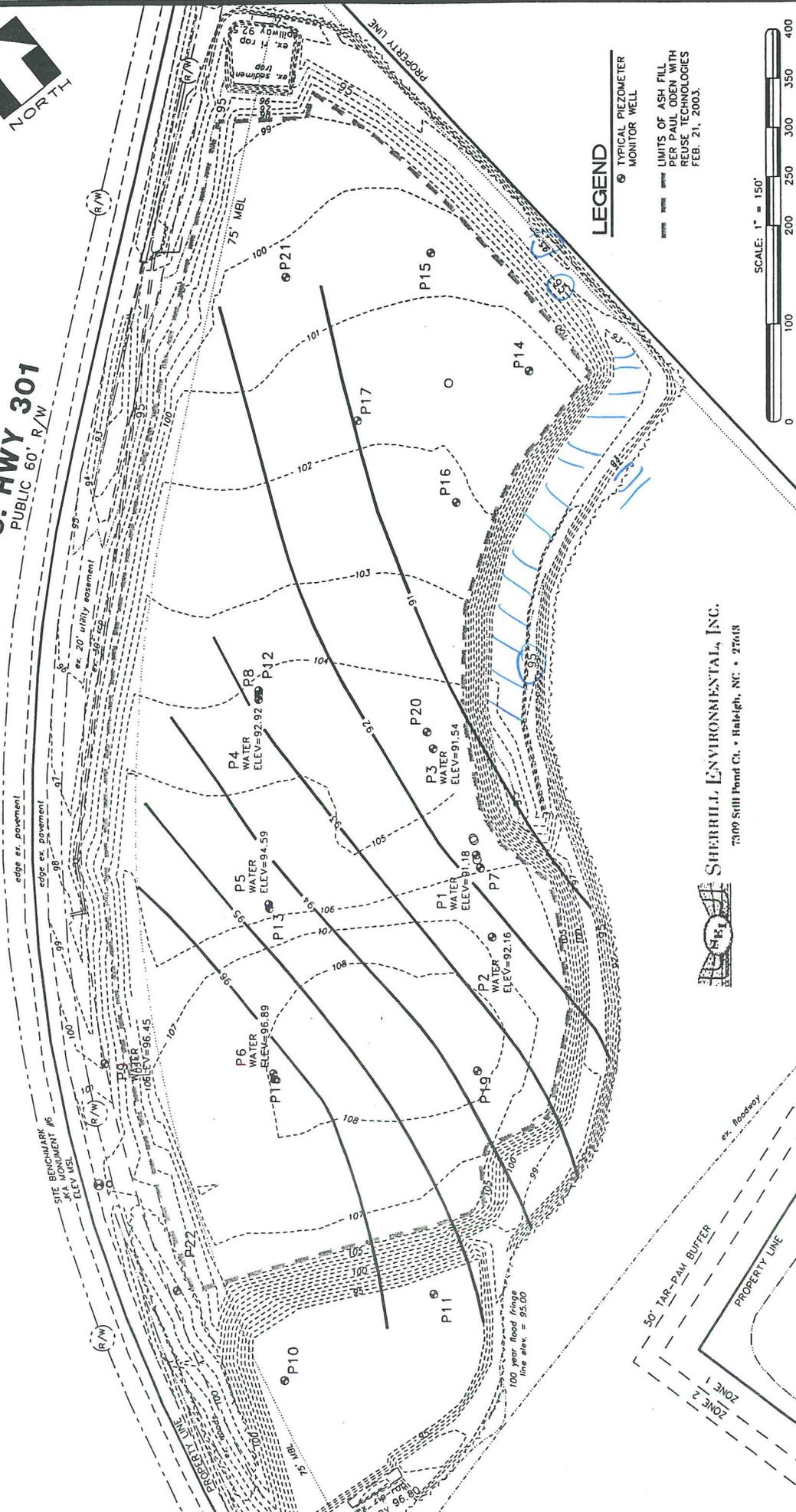


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\\mike\4-657-reuse-switcreek\as-buils-geological-5-12-03\01016-g1.dwg 05/14/2003 - 6:59:37 AM - Plot by M.C.Jr.



LEGEND

- TYPICAL PIEZOMETER MONITOR WELL
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Mike Gallina Jr.	FILE NAME	
SCALE: 1" = 150'	SHEET #	OF
DATE: 01/27/2003		

**FIGURE 4
PIEZOMETRIC SURFACE OF SHALLOW
GROUNDWATER 01/27/2003
REUSE TECHNOLOGY**



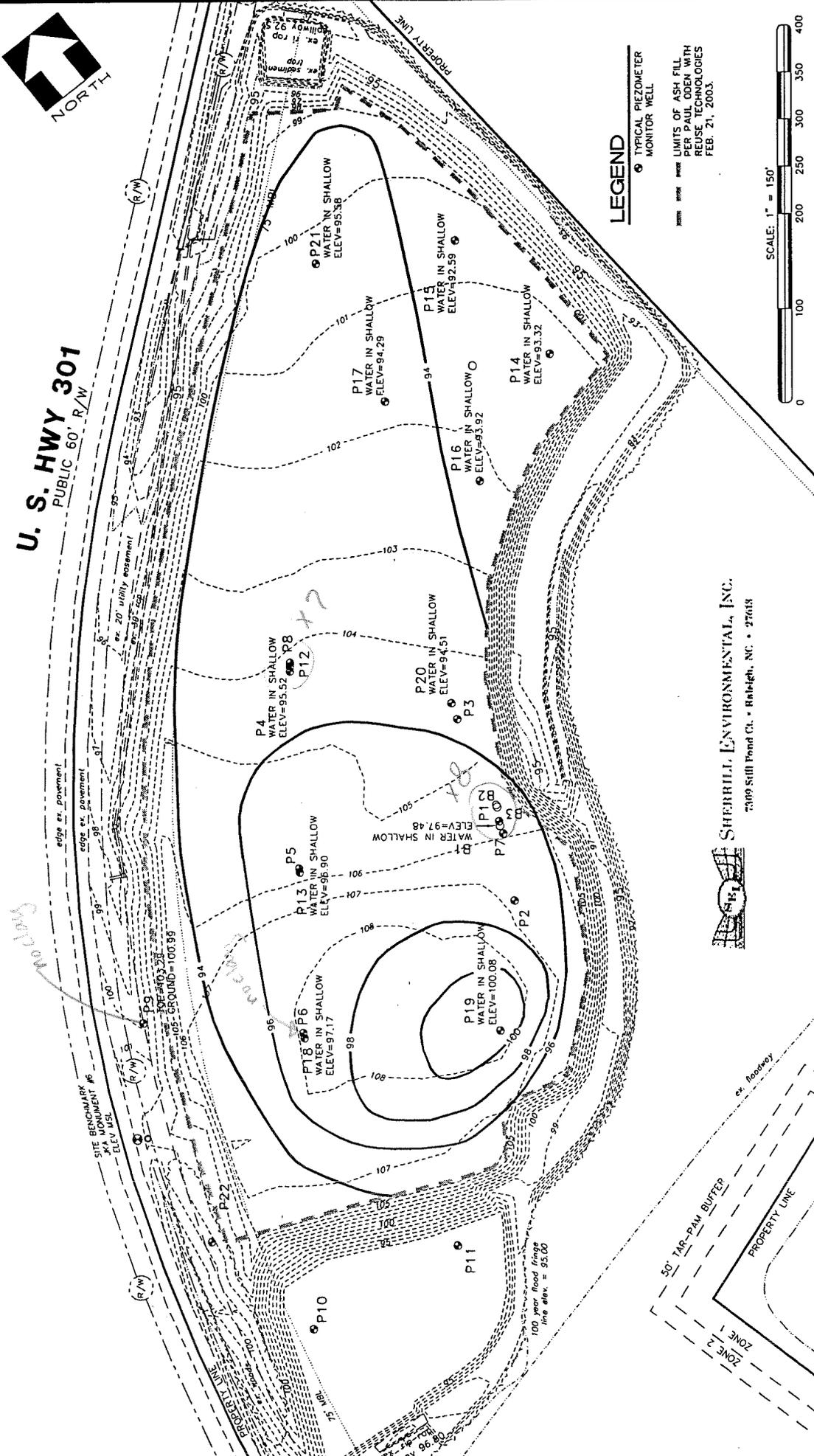
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LEGEND

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**FIGURE 5
PIEZOMETRIC SURFACE OF
WATER IN COAL ASH FILL
REUSE TECHNOLOGY**



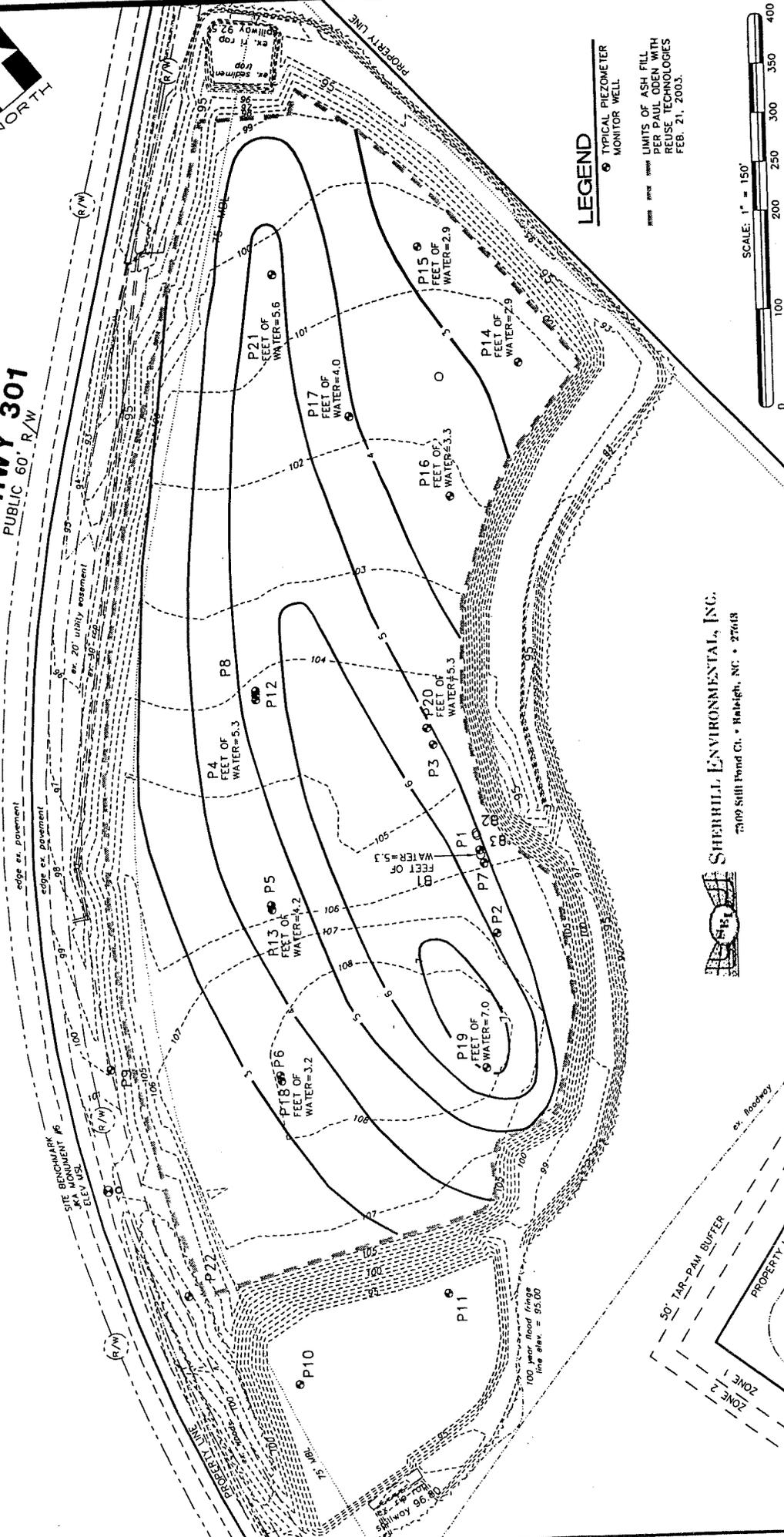
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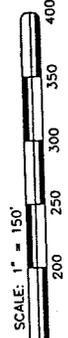
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\\mike\657-reuse-swiftcreek\as-buils-geological-5-12-03\01016-g1.dwg 05/14/2003 - 7:00:23 AM - Plot by M.G.Jr.



LEGEND
● TYPICAL PIEZOMETER
○ MONITOR WELL

LIMITS OF ASH FILL
PER PAUL ODEN WITH
REUSE TECHNOLOGIES
FEB. 21, 2003.



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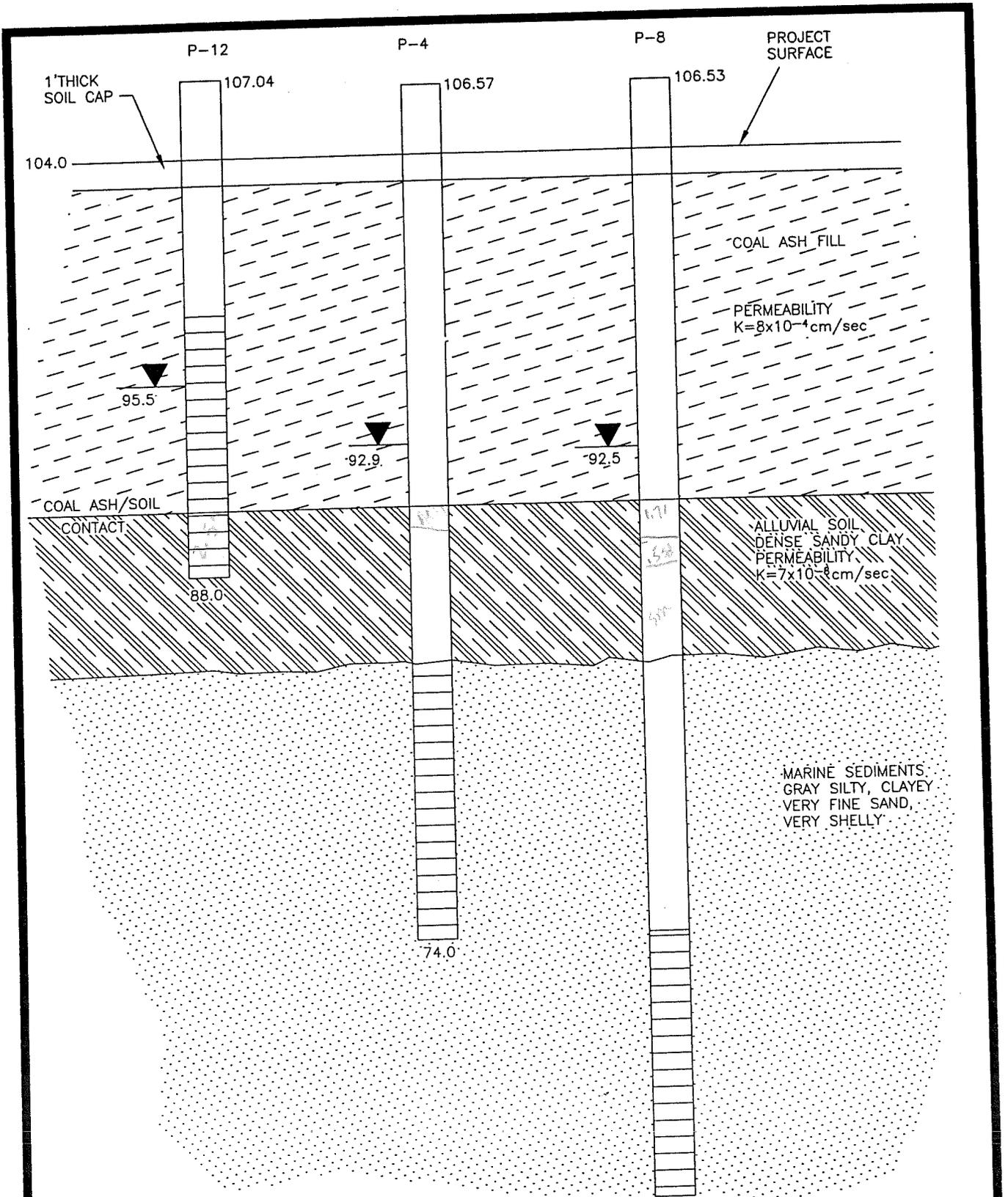
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FIGURE 6
ISOPACH MAP OF WATER
IN COAL ASH FILL
REUSE TECHNOLOGY

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WATER LEVELS
MEASURED 1/27/03

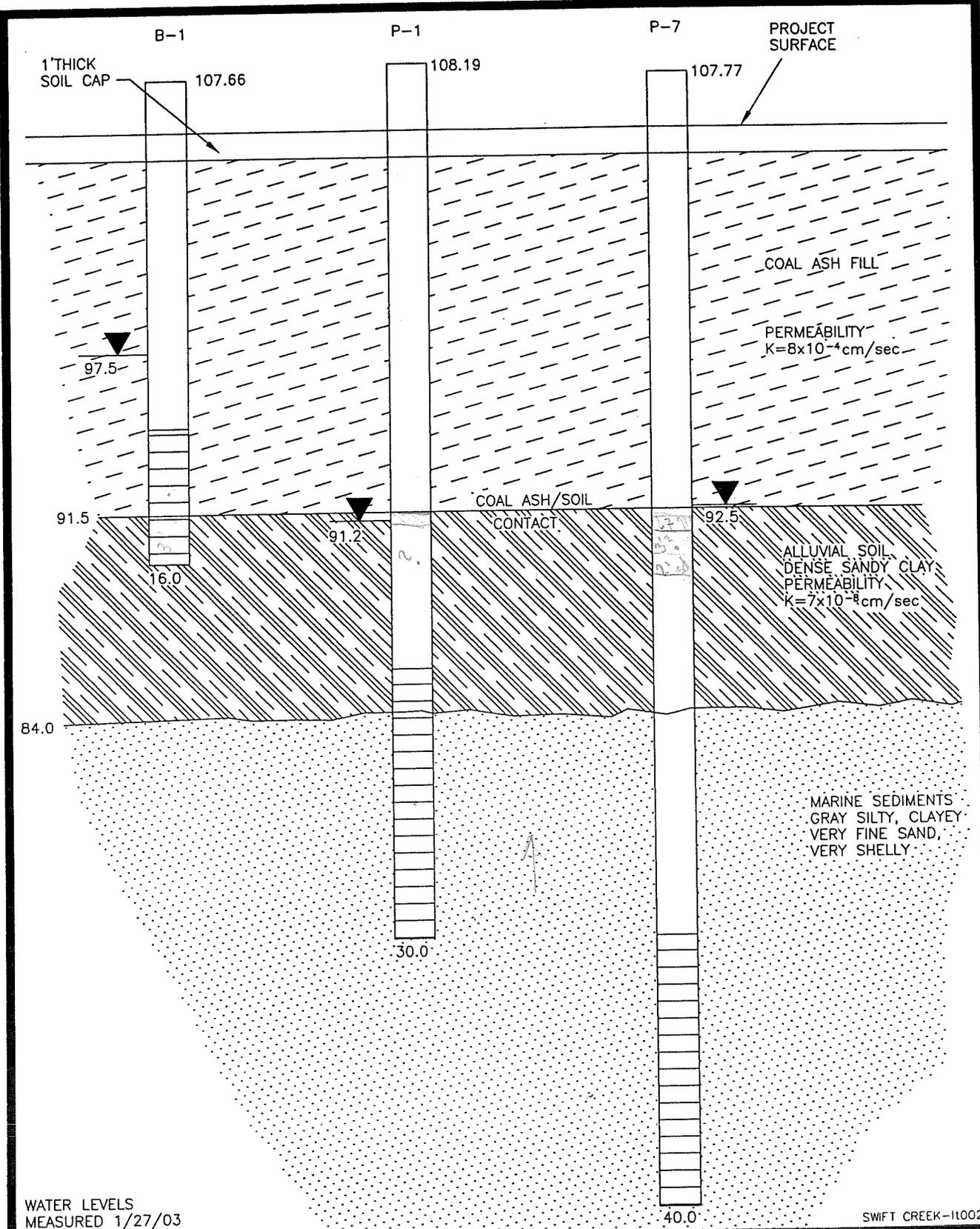
SWIFT CREEK-11001

SWIFT CREEK Project, ReUse Technology, Inc.

VERTICAL
SCALE: 1" = 5'
DATE: MAY 1, 2003
DESIGN by: J.S.
DWG by: L.O.T.

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FIGURE 7
NESTED PIEZOMETERS
P-4, P-8 and P-12



WATER LEVELS
MEASURED 1/27/03

VERTICAL
SCALE: 1" = 5'
DATE: MAY 3, 2003
DESIGN by: J.S.
DWG by: L.O.T.

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SWIFT CREEK Project, ReUse Technology, Inc.

FIGURE 8
NESTED PIEZOMETERS
B-1, P-1 and P-7

FIELD BOREHOLE LOG

PROJECT:	SWIFT CREEK, HWY 301	BORING NO.:	P-1
LOCATION:	BATTLEBORO, NC	STATION: x	x
TYPE OF BORING:	Hollow Stem Auger	DATE STARTED:	9/20/02
DRILLING FIRM:	J & L Drilling, Inc.	DATE FINISHED:	9/20/02
DRILLER:	Lee Charbonneau	GROUND ELEV.:	105.6
DRILL RIG:	CME-450	LOGGED BY: J Sherrill, L.G.	TOTAL DEPTH: 30.0 ft

DEPTH (ft)	ELEV. (ft)	BLOWS/6"	N-VALUE	SAMPLE # CORE RUN #	RECOVERY (%)	RQD (%)	STRATUM	CLASSIFI- CATION	FIELD CLASSIFICATION AND PHYSICAL DESCRIPTION	REMARKS
	104.6							SM	0-1.5 ft: Soil Cover, Silty Sand (SM), light brownish-gray	
2	102.6								1.5-14.4 ft: Coal Ash	
4	100.6									
6	98.6									
8	96.6							Coal Ash		
10	94.6									
12	92.6									
14		11 7 7 5	14	SS-1					14.4-15.0 ft: Fine sandy CLAY (CL)	
16	88.6								?	
18	86.6								No samples collected from 15.0 to 30.0 ft.	
20	84.6									
22	82.6									
24	80.6									
26	78.6									
28	76.6									
30									30.0 ft: End of Boring, Set screen at 20.0-30.0 ft, sand from 20.0 to 30.0 ft, bentonite from 15.0 to 19.0 ft	

FIELD BOREHOLE LOG

PROJECT:	SWIFT CREEK, HWY 301	BORING NO.:	P-2
LOCATION:	BATTLEBORO, NC	STATION: x	x
TYPE OF BORING:	Hollow Stem Auger	DATE STARTED:	9/20/02
DRILLING FIRM:	J & L Drilling, Inc.	DATE FINISHED:	9/20/02
DRILLER:	Lee Charbonneau	GROUND ELEV.:	106.7
DRILL RIG:	CME-450	LOGGED BY:	J Sherrill, L.G.
		COORDINATES:	
		NORTHING:	ft
		EASTING:	ft
		TOTAL DEPTH:	30.0 ft

DEPTH (ft)	ELEV. (ft)	BLOWS/6"	N-VALUE	SAMPLE #. CORE RUN #	RECOVERY (%)	RQD (%)	STRATUM	CLASSIFI- CATION	FIELD CLASSIFICATION AND PHYSICAL DESCRIPTION	REMARKS
	105.7							SM	0-1.5 ft: Soil Cover, Silty SAND (SM), light brownish gray	
2	103.7							Coal Ash	1.5- 16.1 ft: Coal Ash	
4	101.7									
6	99.7									
8	97.7									
10	95.7	5	11	SS-1						
12	93.7	5 8	25	SS-2						
14	91.7	12 17 16	46	SS-3						
16	89.7	11 16 17 19	33	SS-4				CL	16.1- 18.0 ft: fine sandy CLAY (CL), mottled	
18	87.7									
20	85.7								No samples collected from 18.0 to 30.0 ft.	
22	83.7									
24	81.7									
26	79.7									
28	77.7									
30									30.0 ft: End of Boring, Set screen at 20.0-30.0 ft, sand from 20.0 to 30.0 ft, bentonite from 15.0 to 19.0 ft	

FIELD BOREHOLE LOG

PROJECT:	SWIFT CREEK, HWY 301	BORING NO.:	P-3
LOCATION:	BATTLEBORO, NC	STATION:	x x
TYPE OF BORING:	Hollow Stem Auger	DATE STARTED:	9/20/02
DRILLING FIRM:	J & L Drilling, Inc.	DATE FINISHED:	9/20/02
DRILLER:	Lee Charbonneau	GROUND ELEV.:	104.4
DRILL RIG:	CME-450	LOGGED BY:	J Sherrill, L.G.
		COORDINATES:	
		NORTHING:	ft
		EASTING:	ft
		TOTAL DEPTH:	28.0 ft

DEPTH (ft)	ELEV. (ft)	BLOWS/6"	N-VALUE	SAMPLE #. CORE RUN #	RECOVERY (%)	RQD (%)	STRATUM	CLASSIFICATION	FIELD CLASSIFICATION AND PHYSICAL DESCRIPTION	REMARKS
	103.4							SM	0-1.5 ft: Soil Cover, Silty SAND (SM), light brownish gray	
2	101.4							Coal Ash	1.5-12.5 ft: Coal Ash	
4	99.4									
6	97.4									
8	95.4									
10	93.4	4 5 32 46	37	SS-1						
12		5 6 12 16	18	SS-2				CL	12.5-14.0 ft: Mottled brownish-yellow and gray Sandy CLAY, very stiff	
14	89.4									
16	87.4									
18	85.4									
20	83.4									
22	81.4									
24	79.4									
26	77.4									
28	75.4								28.0 ft: End of Boring, Set screen at 18.0-28.0 ft, sand from 17.0 to 28.0 ft, bentonite from 17.0 to 12.0 ft	
30										

FIELD BOREHOLE LOG

PROJECT:	SWIFT CREEK, HWY 301	BORING NO.:	P-4
LOCATION:	BATTLEBORO, NC	STATION:	x _____ x
TYPE OF BORING:	Hollow Stem Auger	DATE STARTED:	9/20/02
DRILLING FIRM:	J & L Drilling, Inc.	DATE FINISHED:	9/20/02
DRILLER:	Lee Charbonneau	GROUND ELEV.:	104.0
DRILL RIG:	CME-75	LOGGED BY:	J Sherrill, L.G.
		COORDINATES:	
		NORTHING:	_____ ft
		EASTING:	_____ ft
		TOTAL DEPTH:	30.0 ft

DEPTH (ft)	ELEV. (ft)	BLOWS/6"	N-VALUE	SAMPLE #. CORE RUN #	RECOVERY (%)	RQD (%)	STRATUM	CLASSIFI- CATION	FIELD CLASSIFICATION AND PHYSICAL DESCRIPTION	REMARKS
	103.0							SM	0-1.5 ft: Soil Cover, Silty SAND (SM), light brownish gray	
2	101.0								1.5-14.0 ft: Coal Ash	
4	99.0									
6	97.0									
8	95.0									
10	93.0									
12	91.0									
14		6 8 11 12	19	SS-1				CL	14.0-15.0 ft: Mottled brownish-yellow and gray Sandy CLAY, very stiff	
16	87.0									
18	85.0									
20	83.0									
22	81.0									
24	79.0									
26	77.0									
28	75.0									
30									30.0 ft: End of Boring, Set screen at 20.0-30.0 ft, sand from 19.0 to 30.0 ft, bentonite from 14.0 to 19.0 ft	

FIELD BOREHOLE LOG

PROJECT:	SWIFT CREEK, HWY 301	BORING NO.:	P-5
LOCATION:	BATTLEBORO, NC	STATION: x	x
TYPE OF BORING:	Hollow Stem Auger	DATE STARTED:	9/24/02
DRILLING FIRM:	J & L Drilling, Inc.	DATE FINISHED:	9/24/02
DRILLER:	Lee Charbonneau	GROUND ELEV.:	105.9
DRILL RIG:	CME-75	LOGGED BY: J Sherrill, L.G.	TOTAL DEPTH: 30.0
		COORDINATES:	
		NORTHING:	ft
		EASTING:	ft

DEPTH (ft)	ELEV. (ft)	BLOWS/6"	N-VALUE	SAMPLE #. CORE RUN #	RECOVERY (%)	RQD (%)	STRATUM	CLASSIFI- CATION	FIELD CLASSIFICATION AND PHYSICAL DESCRIPTION	REMARKS
	104.9							SM	0-1.5 ft: Soil Cover, Silty SAND (SM), light brownish gray	
2	102.9								1.5-13.0 ft; Coal Ash	
4	100.9									
6	98.9									
8	96.9									
10	94.9	7		45						
		38	83	SS-1						
		20								
12	92.9	7		10						
		10	20	SS-2						
		10								
14	90.9	3		6				CL	13.0-16.0 ft: Mottled brownish-yellow and gray Sandy CLAY, stiff	
		6	13	SS-3						
		7								
		10								
16	88.9									
18	86.9									
20	84.9								No samples collected from 16.0 to 30.0 ft.	
22	82.9									
24	80.9									
26	78.9									
28	76.9									
30									30.0 ft: End of Boring, Set screen at 20.0-30.0 ft, sand from 19.0 to 30.0 ft, bentonite from 14.0 to 19.0 ft	

FIELD BOREHOLE LOG

PROJECT:	SWIFT CREEK, HWY 301	BORING NO.:	P-6
LOCATION:	BATTLEBORO, NC	STATION: x	x
TYPE OF BORING:	Hollow Stem Auger	DATE STARTED:	9/24/02
DRILLING FIRM:	J & L Drilling, Inc.	DATE FINISHED:	9/24/02
DRILLER:	Lee Charbonneau	GROUND ELEV.:	107.5
DRILL RIG:	CME-75	LOGGED BY:	J Sherrill, L.G.
		COORDINATES:	
		NORTHING:	ft
		EASTING:	ft
		TOTAL DEPTH:	30.0 ft

DEPTH (ft)	ELEV. (ft)	BLOWS/6"	N-VALUE	SAMPLE #. CORE RUN #	RECOVERY (%)	ROD (%)	STRATUM	CLASSIFI- CATION	FIELD CLASSIFICATION AND PHYSICAL DESCRIPTION	REMARKS
	106.5							SM	0-1.5 ft: Soil Cover, Silty SAND (SM), light brownish gray	
2	104.5							Coal Ash	1.5-13.5 ft: Coal Ash	
4	102.5									
6	100.5									
8	98.5									
10	96.5									
12	94.5									
14	92.5	3 10 13 14	23	SS-1				SC	13.5-15.0 ft: Mottled yellowish-brown and gray Clayey fine to medium SAND	
16	90.5									
18	88.5									No samples collected from 15.0 to 30.0 ft.
20	86.5									
22	84.5									
24	82.5									
26	80.5									
28	78.5									
30										30.0 ft: End of Boring, Set screen at 20.0-30.0 ft, sand from 19.0 to 30.0 ft, bentonite from 14.0 to 19.0 ft

FIELD BOREHOLE LOG

PROJECT:	SWIFT CREEK, HWY 301	BORING NO.:	P-7
LOCATION:	BATTLEBORO, NC	STATION:	x x
TYPE OF BORING:	Hollow Stem Auger	DATE STARTED:	10/6/02
DRILLING FIRM:	J & L Drilling, Inc.	DATE FINISHED:	10/6/02
DRILLER:	Lee Charbonneau	GROUND ELEV.:	105.9
DRILL RIG:	CME-75	LOGGED BY:	J Sherrill, L.G.
		COORDINATES:	1 of 2
		NORTHING:	ft
		EASTING:	ft
		TOTAL DEPTH:	40.0 ft

DEPTH (ft)	ELEV. (ft)	BLOWS/6"	N-VALUE	SAMPLE #. CORE RUN #	RECOVERY (%)	ROD (%)	STRATUM	CLASSIFI- CATION	FIELD CLASSIFICATION AND PHYSICAL DESCRIPTION	REMARKS
0	104.9							SM	0-1.5 ft: Soil Cover, Silty SAND (SM), light brownish gray	
2	102.9						Coal Ash		1.5-14.3 ft: Coal Ash	
4	100.9									
6	98.9									
8	96.9									
10	94.9									
12	92.9									
14	90.9	3 3 3 10	11	SS-1				CL	14.3-15.0 ft: Mottled yellowish-brown and gray Sandy CLAY, stiff	
16	88.9									
18	86.9	8 13 19 24	32	SS-2				SC	18.0-20.0 ft: Mottled brownish-yellow and gray Clayey, fine to coarse SAND, very stiff	
20	84.9									
22	82.9									
24	80.9	1 1 3 4	4	SS-3				SM	23.0-24.0 ft: Medium gray Silty fine SAND, 24.0-25.0 ft: Medium gray Silty very fine SAND, very Shelly, loose	
26	78.9									
28	76.9	2 2 3 3	5	SS-4					28.0-30.0 ft: Medium gray Silty very fine SAND, very Shelly, loose	
30										

FIELD BOREHOLE LOG

PROJECT:	SWIFT CREEK, HWY 301	BORING NO.:	P-7
LOCATION:	BATTLEBORO, NC	SHEET:	2 of 2
TYPE OF BORING:	Hollow Stem Auger	DATE STARTED:	10/6/02
DRILLING FIRM:	J & L Drilling, Inc.	DATE FINISHED:	10/6/02
DRILLER:	Lee Charbonneau	GROUND ELEV.:	105.9
DRILL RIG:	CME-75	LOGGED BY:	J Sherrill, L.G.
		COORDINATES:	0
		NORTHING:	0.0 ft
		EASTING:	0.0 ft
		TOTAL DEPTH:	40.0 ft

DEPTH (ft)	ELEV. (ft)	BLOWS/6"	N-VALUE	SAMPLE #.	CORE RUN	RECOVERY	RQD (%)	STRATUM	CLASSIFICATION	FIELD CLASSIFICATION AND PHYSICAL DESCRIPTION	REMARKS
32	74.9									33.0-35.0 ft: Medium gray Silty very fine SAND, very shelly, loose	
34	72.9	2	6	SS-5							
36	70.9	5								38.0-40.0 ft: Medium gray Silty very fine SAND, very shelly, loose	
38	68.9	5	8	SS-6							
40	66.9	5								40.0 End of Boring	
42	64.9									Set screen at 30.0-40.0 ft, sand from 29.0 to 40.0 ft, bentonite from 14.0 to 29.0 ft	
44	62.9										
46	60.9										
48	58.9										
50	56.9										
52	54.9										
54	52.9										
56	50.9										
58	48.9										
60	46.9										

FIELD BOREHOLE LOG

PROJECT:	SWIFT CREEK, HWY 301	BORING NO.:	P-8
LOCATION:	BATTLEBORO, NC	STATION:	x _____ x
TYPE OF BORING:	Hollow Stem Auger	DATE STARTED:	10/6/02
DRILLING FIRM:	J & L Drilling, Inc.	DATE FINISHED:	10/6/02
DRILLER:	Lee Charbonneau	GROUND ELEV.:	103.9
DRILL RIG:	CME-75	LOGGED BY:	J Sherrill, L.G.
		COORDINATES:	
		NORTHING:	ft
		EASTING:	ft
		TOTAL DEPTH:	40.0 ft

DEPTH (ft)	ELEV. (ft)	BLOWS/6"	N-VALUE	SAMPLE #. CORE RUN #	RECOVERY (%)	ROD (%)	STRATUM	CLASSIFI- CATION	FIELD CLASSIFICATION AND PHYSICAL DESCRIPTION	REMARKS
	102.9							SM	0-1.5 ft: Soil Cover, Silty SAND (SM), light brownish gray	
2	100.9								1.5-13.3 ft: Coal Ash	
4	98.9									
6	96.9									
8	94.9									
10	92.9									
12	90.9									
14		4 6 7 9	13	SS-1				CL	13.3-15.0 ft: Mottled yellowish -brown and gray Sandy CLAY, stiff	
16	86.9									
18	84.9	7 10 18 21	28	SS-2				SC	18.0-19.5 ft: Light gray Clayey SAND, stiff	
20	82.9							SM	19.5-20.0 ft: Yellowish-brown Silty SAND, compact	
22	80.9									
24	78.9	1 2 3 3	5	SS-3				SM	23.0-25.0 ft: Medium gray Silty very fine SAND, very Shelly, loose	
26	76.9									
28	74.9	2 2 3 4	5	SS-4					28.0-30.0 ft: Medium gray Silty very fine SAND, very Shelly, loose	
30										

FIELD BOREHOLE LOG

PROJECT:	SWIFT CREEK, HWY 301	BORING NO.:	P-8
LOCATION:	BATTLEBORO, NC	SHEET:	2 of 2
TYPE OF BORING:	Hollow Stem Auger	DATE STARTED:	10/6/02
DRILLING FIRM:	J & L Drilling, Inc.	DATE FINISHED:	10/6/02
DRILLER:	Lee Charbonneau	GROUND ELEV.:	103.9
DRILL RIG:	CME-75	LOGGED BY:	J Sherrill, L.G.
		COORDINATES:	0
		NORTHING:	0.0 ft
		EASTING:	0.0 ft
		TOTAL DEPTH:	40.0 ft

DEPTH (ft)	ELEV. (ft)	BLOWS/6"	N-VALUE	SAMPLE #. CORE RUN	RECOVERY	RQD (%)	STRATUM	CLASSIFI- CATION	FIELD CLASSIFICATION AND PHYSICAL DESCRIPTION	REMARKS
32	72.9						SM		33.0-35.0 ft: Medium gray Silty very fine Sand, very Shelly, loose	
34	70.9	2 2 2 4	4	SS-5						
36	68.9									
38	66.9									
40	64.9	2 3 4 4	7	SS-6					38.0-40.0 ft: Greenish-gray Silty very fine SAND, very Shelly, loose	
40	62.9								40.0 End of Boring	
42	60.9								Set screen at 30.0-40.0 ft, sand from 29.0 to 40.0 ft, bentonite from 14.0 to 29.0 ft	
44	58.9									
46	56.9									
48	54.9									
50	52.9									
52	50.9									
54	48.9									
56	46.9									
58	44.9									
60										

FIELD BOREHOLE LOG

PROJECT:	SWIFT CREEK, HWY 301	BORING NO.:	P-10
LOCATION:	BATTLEBORO, NC	STATION:	x x
TYPE OF BORING:	Hollow Stem Auger	DATE STARTED:	10/7/02
DRILLING FIRM:	J&L Drilling, Inc.	DATE FINISHED:	10/7/02
DRILLER:	Lee Charbonneau	GROUND ELEV.:	106.1
DRILL RIG:	CME-75	LOGGED BY:	J Sherrill, L.G.
		COORDINATES:	
		NORTHING:	ft
		EASTING:	ft
		TOTAL DEPTH:	30.0 ft

DEPTH (ft)	ELEV. (ft)	BLOWS/6"	N-VALUE	SAMPLE #. CORE RUN #	RECOVERY (%)	ROD (%)	STRATUM	CLASSIFICATION	FIELD CLASSIFICATION AND PHYSICAL DESCRIPTION	REMARKS	
2	105.1						SM				
4	103.1	9 12 13 15	25	SS-1					3.0-5.0 ft: Yellowish-brown Silty Clayey SAND, Firm		
6	99.1										
8	97.1	6 8 7 10	15	SS-2					8.0-10.0 ft: Yellowish-brown Silty Clayey medium to coarse SAND, firm		
10	95.1										
12	93.1										
14	91.1	4 2 3 2 2	5	SS-3					13.0-14.5 ft: Yellowish-brown Silty medium to coarse SAND with gravel at base		
16	89.1							CL		14.5-15.0 ft: Yellowish-brown fine Sandy CLAY	
18	87.1	2 2 4 4	6	SS-4						18.0-20.0 ft: Medium gray Silty very fine SAND, very shelly, loose	
20	85.1										
22	83.1										
24	81.1	1 2 3 3	5	SS-5			SM		23.0-25.0 ft: Greenish-gray Silty very fine SAND, very shelly, loose		
26	79.1									Screen 20.0 to 30.0 ft, sand from 19.0 to 30 ft, bentonite from 10.0 to 19.0 ft	
28	77.1	3 3 4 5	7	SS-6					28.0-30.0 ft: Greenish-gray Silty very fine SAND, very shelly, loose		
30									30.0 End of Boring		

FIELD BOREHOLE LOG

PROJECT:	SWIFT CREEK, HWY 301		BORING NO.:	P-11
LOCATION:	BATTLEBORO, NC	STATION:	x	x
TYPE OF BORING:	Hollow Stem Auger	DATE STARTED:	10/7/02	SHEET: 1 of 1
DRILLING FIRM:	J&L Drilling, Inc.	DATE FINISHED:	10/7/02	COORDINATES:
DRILLER:	Lee Charbonneau	GROUND ELEV.:	99.2	NORTHING: ft
DRILL RIG:	CME-75	LOGGED BY:	J Sherrill, L.G.	EASTING: ft
			TOTAL DEPTH:	23.0 ft

DEPTH (ft)	ELEV. (ft)	BLOWS/6"	N-VALUE	SAMPLE #: CORE RUN #	RECOVERY (%)	RQD (%)	STRATUM	CLASSIFI- CATION	FIELD CLASSIFICATION AND PHYSICAL DESCRIPTION	REMARKS
2	98.2									
4	96.2	5 10	19	SS-1				SM	3.0-5.0 ft: Reddish-yellow Silty medium to coarse SAND	
6	94.2	7								
8										
10		3 6 7	12	SS-2				CL	8.0-10.0 ft: Mottled yellowish-brown and gray fine Sandy CLAY	
12										
14	86.2	1 1 2	2	SS-3					13.0-15.0 ft: Light yellowish-brown Silty fine SAND, very loose	
16	84.2									
18	82.2									
20	80.2	1 2 3 3	5	SS-4				SM	18.0-20.0 ft: Greenish-gray Silty fine SAND,	
22	78.2									
24	76.2									
26									23.0 ft: End of Boring	
28	74.2								Screen 13 to 23 ft Sand from 12 to 23 ft Bentonite from 2 to 12 Soil Cuttings from 0 to 2 ft	
30	72.2									
	70.2									

FIELD BOREHOLE LOG

PROJECT:	SWIFT CREEK, HWY 301	BORING NO.:	P-13
LOCATION:	BATTLEBORO, NC	STATION: x	x
TYPE OF BORING:	Hollow Stem Auger	DATE STARTED:	12/23/02
DRILLING FIRM:	J&L Drilling, Inc.	DATE FINISHED:	12/23/02
DRILLER:	Lee Charbonneau	GROUND ELEV.:	105.9
DRILL RIG:	CME-75	LOGGED BY:	J Sherrill, L.G.
		COORDINATES:	
		NORTHING:	ft
		EASTING:	ft
		TOTAL DEPTH:	16.0 ft

DEPTH (ft)	ELEV. (ft)	BLOWS/6"	N-VALUE	SAMPLE # CORE RUN #	RECOVERY (%)	RQD (%)	STRATUM	CLASSIFI- CATION	FIELD CLASSIFICATION AND PHYSICAL DESCRIPTION	REMARKS
	104.9						SM	SM	0-1.5 ft: Soil Cover, Silty SAND, Light brownish-gray	
2	102.9						Coal Ash	Coal Ash	1.5-13.2 ft: Coal Ash	
4	100.9						Coal Ash	Coal Ash		
6	98.9						Coal Ash	Coal Ash		
8	96.9						Coal Ash	Coal Ash		
10	94.9						Coal Ash	Coal Ash		
12	92.9	3		SS-1			CL	CL	13.2-14.0 ft: Yellowish-gray Sandy CLAY, stiff	
14		3	7				CL	CL		
		4					CL	CL		
		7					CL	CL		
16	88.9								16.0 ft: End of Boring	
18	86.9								Screen from 6 to 16	
20	84.9								Sand from 5 to 16	
22	82.9								Bentonite from 2.5 to 5 ft	
24	80.9								Soil Cuttings from 0 to 2.5 ft	
26	78.9									
28	76.9									
30										

FIELD BOREHOLE LOG

PROJECT:	SWIFT CREEK, HWY 301	BORING NO.:	P-14
LOCATION:	BATTLEBORO, NC	STATION:	x x
TYPE OF BORING:	Hollow Stem Auger	DATE STARTED:	12/23/02
DRILLING FIRM:	J&L Drilling, Inc.	DATE FINISHED:	12/23/02
DRILLER:	Lee Charbonneau	GROUND ELEV.:	101.0
DRILL RIG:	CME-75	LOGGED BY:	J Sherrill, L.G.
		COORDINATES:	
		NORTHING:	ft
		EASTING:	ft
		TOTAL DEPTH:	14.0 ft

DEPTH (ft)	ELEV. (ft)	BLOWS/6"	N-VALUE	SAMPLE #. CORE RUN #	RECOVERY (%)	RQD (%)	STRATUM	CLASSIFI- CATION	FIELD CLASSIFICATION AND PHYSICAL DESCRIPTION	REMARKS	
	100.0							SM	0-1.5 ft: Soil Cover, Silty SAND, light brownish gray		
2	98.0							Coal Ash	1.5 - 11.5 ft: Coal Ash		
4	96.0										
6	94.0	30 60	90	SS-1							
8	92.0	8 17 19 19	36	SS-2							
10	90.0	13 17 8 7	25	SS-3							
12	88.0							CL	11.5-12.0 ft: Grayish-yellow Sandy CLAY, stiff		
14	86.0								14.0 ft: End of Boring		
16	84.0								Screen from 4 to 14 ft Sand from 3 to 14 ft Bentonite from 1 to 3 ft Soil Cuttings from 0 to 1 ft		
18	82.0										
20	80.0										
22	78.0										
24	76.0										
26	74.0										
28	72.0										
30											

FIELD BOREHOLE LOG

PROJECT:	SWIFT CREEK, HWY 301	BORING NO.:	P-15
LOCATION:	BATTLEBORO, NC	STATION: x	x
TYPE OF BORING:	Hollow Stem Auger	DATE STARTED:	12/23/02
DRILLING FIRM:	J&L Drilling, Inc.	DATE FINISHED:	12/23/02
DRILLER:	Lee Charbonneau	GROUND ELEV.:	101.0
DRILL RIG:	CME-75	LOGGED BY:	J Sherrill, L.G.
		COORDINATES:	
		NORTHING:	ft
		EASTING:	ft
		TOTAL DEPTH:	14.0 ft

DEPTH (ft)	ELEV. (ft)	BLOWS/6"	N-VALUE	SAMPLE #. CORE RUN #	RECOVERY (%)	RQD (%)	STRATUM	CLASSIFI- CATION	FIELD CLASSIFICATION AND PHYSICAL DESCRIPTION	REMARKS
0	100.0							SM	0-1.5 ft: Soil Cover, Silty SAND, light brownish gray	
2	98.0								1.5-11.1 ft: Coal Ash	
4	96.0							Coal Ash		
6	94.0									
8	92.0									
10	90.0	15	35	SS-1					11.1-12.0 ft: Yellowish-gray Sandy CLAY, very stiff	
12		21						CL		
14		14								
16	86.0								14.0 ft: End of Boring	
18	84.0								Screen from 4 to 14 ft	
20	82.0								Sand from 3 to 14 ft	
22	80.0								Bentonite from 1 to 3 ft	
24	78.0								Soil Cuttings from 0 to 1 ft	
26	76.0									
28	74.0									
30	72.0									

FIELD BOREHOLE LOG

PROJECT:	SWIFT CREEK, HWY 301	BORING NO.:	P-17
LOCATION:	BATTLEBORO, NC	STATION:	x x
TYPE OF BORING:	Hollow Stem Auger	DATE STARTED:	12/24/02
DRILLING FIRM:	J&L Drilling, Inc.	DATE FINISHED:	12/24/02
DRILLER:	Lee Charbonneau	GROUND ELEV.:	101.8
DRILL RIG:	CME-75	LOGGED BY:	J Sherrill, L.G.
		NORTHING:	ft
		EASTING:	ft
		TOTAL DEPTH:	14.0 ft

DEPTH (ft)	ELEV. (ft)	BLOWS/6"	N-VALUE	SAMPLE # CORE RUN #	RECOVERY (%)	ROD (%)	STRATUM	CLASSIFI- CATION	FIELD CLASSIFICATION AND PHYSICAL DESCRIPTION	REMARKS
0	100.8							SM	0-1.5 ft: Soil Cover, Silty SAND, light brownish gray	
2	98.8							Coal Ash	1.5-11.5 ft: Coal Ash	
4	96.8									
6	94.8									
8	92.8									
10	90.8	13 12 6 8	18	SS-1				CL	11.5-12.0 ft: Yellowish-gray Sandy, Silty CLAY, stiff	
12										
14	86.8								14.0 ft : End of Boring Screen from 4 to 14 ft Sand from 3 to 14 ft Bentonite from 1 to 3 ft Soil Cuttings from 0 to 1 ft	
16	84.8									
18	82.8									
20	80.8									
22	78.8									
24	76.8									
26	74.8									
28	72.8									
30										

FIELD BOREHOLE LOG

PROJECT:	SWIFT CREEK, HWY 301	BORING NO.:	P-18
LOCATION:	BATTLEBORO, NC	STATION: x	x
TYPE OF BORING:	Hollow Stem Auger	DATE STARTED:	12/24/02
DRILLING FIRM:	J&L Drilling, Inc.	DATE FINISHED:	12/24/02
DRILLER:	Lee Charbonneau	GROUND ELEV.:	107.5
DRILL RIG:	CME-75	LOGGED BY:	J Sherrill, L.G.
		COORDINATES:	
		NORTHING:	ft
		EASTING:	ft
		TOTAL DEPTH:	15.0 ft

DEPTH (ft)	ELEV. (ft)	BLOWS/6"	N-VALUE	SAMPLE #. CORE RUN #	RECOVERY (%)	RQD (%)	STRATUM	CLASSIFI- CATION	FIELD CLASSIFICATION AND PHYSICAL DESCRIPTION	REMARKS
	106.5						SM	SM	0-1.5 ft: Soil Cover, Silty SAND, light brownish gray	
2	104.5						Coal Ash	Coal Ash	1.5-11.7 ft: Coal Ash	
4	102.5						Coal Ash	Coal Ash		
6	100.5						Coal Ash	Coal Ash		
8	98.5						Coal Ash	Coal Ash		
10	96.5	4					Coal Ash	Coal Ash		
		7	18	SS-1			Coal Ash	Coal Ash		
		11					Coal Ash	Coal Ash		
		14					Coal Ash	Coal Ash		
12	94.5	Push		SS-2			CL	CL	11.7- 13.5 ft: FILL, Sandy Silty CLAY	
14	92.5						CL	CL	13.5- 15.0 ft: Yellowish-gray fine Sandy CLAY	
16	90.5								15.0 ft: End of Boring	
18	88.5								Screen from 5 to 15 ft	
20	86.5								Sand from 4 to 15 ft	
22	84.5								Bentonite from 2 to 4 ft	
24	82.5								Soil Cuttings from 0 to 2 ft	
26	80.5									
28	78.5									
30										

FIELD BOREHOLE LOG

PROJECT:	SWIFT CREEK, HWY 301	BORING NO.:	P-19
LOCATION:	BATTLEBORO, NC	STATION:	x x
TYPE OF BORING:	Hollow Stem Auger	DATE STARTED:	12/24/02
DRILLING FIRM:	J&L Drilling, Inc.	DATE FINISHED:	12/24/02
DRILLER:	Lee Charbonneau	GROUND ELEV.:	108.3
DRILL RIG:	CME-75	LOGGED BY:	J Sherrill, L.G.
		COORDINATES:	
		NORTHING:	ft
		EASTING:	ft
		TOTAL DEPTH:	17.0 ft

DEPTH (ft)	ELEV. (ft)	BLOWS/6"	N-VALUE	SAMPLE #. CORE RUN #	RECOVERY (%)	RQD (%)	STRATUM	CLASSIFI- CATION	FIELD CLASSIFICATION AND PHYSICAL DESCRIPTION	REMARKS
	107.3							SM	0-1.5 ft: Soil Cover, Silty SAND, light brownish gray	
2	105.3							Coal Ash	1.5-15.2 ft: Coal Ash	
4	103.3									
6	101.3									
8	99.3	2 3 4 4	7	SS-1						
10	97.3	1 2 12 13	14	SS-2						
12	95.3	2 4 7 14	11	SS-3						
14	93.3	3 4 7 13	11	SS-4				CL	15.2-16.0 ft: Yellowish-gray fine Sandy CLAY, very stiff	
16	91.3								16.0 ft: End of Boring	
18	89.3								Screen from 7 to 17 ft Sand from 6 to 17 ft Bentonite from 4 to 6 ft Soil Cuttings from 0 to 4 ft	
20	87.3									
22	85.3									
24	83.3									
26	81.3									
28	79.3									
30										

FIELD BOREHOLE LOG

PROJECT:	SWIFT CREEK, HWY 301	BORING NO.:	P-20
LOCATION:	BATTLEBORO, NC	STATION:	x x
TYPE OF BORING:	Hollow Stem Auger	DATE STARTED:	12/26/02
DRILLING FIRM:	J&L Drilling, Inc.	DATE FINISHED:	12/26/02
DRILLER:	Lee Charbonneau	GROUND ELEV.:	104.2
DRILL RIG:	CME-75	LOGGED BY:	J Sherrill, L.G.
		COORDINATES:	
		NORTHING:	ft
		EASTING:	ft
		TOTAL DEPTH:	17.0 ft

DEPTH (ft)	ELEV. (ft)	BLOWS/6"	N-VALUE	SAMPLE #. CORE RUN #	RECOVERY (%)	RQD (%)	STRATUM	CLASSIFI- CATION	FIELD CLASSIFICATION AND PHYSICAL DESCRIPTION	REMARKS
	103.2							SM	0-1.5 ft: Soil Cover, Silty SAND, light brownish gray	
2	101.2						Coal Ash		1.5- 15.0 ft: Coal Ash	
4	99.2									
6	97.2									
8	95.2									
10	93.2	3 12 37 46	49	SS-1						
12	91.2	4 10 12 8	22	SS-2						
14	89.2	6 11 15 23	26	SS-3						
16							CL	15.0-16.0 ft: Yellowish-gray fine Sandy CLAY, very stiff		
18								17.0 ft: End of Boring		
20	85.2							Screen from 7 to 17 ft Sand from 6 to 17 ft Bentonite from 4 to 6 ft Soil Cuttings from 0 to 4 ft		
22	83.2									
24	81.2									
26	79.2									
28	77.2									
30	75.2									

FIELD BOREHOLE LOG

PROJECT:	SWIFT CREEK, HWY 301	BORING NO.:	P-21
LOCATION:	BATTLEBORO, NC	STATION: x _____ x	SHEET: 1 of 1
TYPE OF BORING:	Hollow Stem Auger	DATE STARTED:	12/26/02
DRILLING FIRM:	J&L Drilling, Inc.	DATE FINISHED:	12/26/02
DRILLER:	Lee Charbonneau	GROUND ELEV.:	99.5
DRILL RIG:	CME-75	LOGGED BY:	J Sherrill, L.G.
		TOTAL DEPTH:	11.5 ft

DEPTH (ft)	ELEV. (ft)	BLOWS/6"	N-VALUE	SAMPLE #. CORE RUN #	RECOVERY (%)	RQD (%)	STRATUM	CLASSIFI- CATION	FIELD CLASSIFICATION AND PHYSICAL DESCRIPTION	REMARKS
2	98.5								0-9.5 ft: Coal Ash	
4	96.5							Coal Ash		
6	94.5									
		11								
		20	48	SS-1						
		28								
		50								
	92.5	50/1								
				SS-2						
	90.5									
		2								
		5								
		6	11	SS-3				CL	9.5-11.0 ft: Mottled gray and yellowish-brown fine Sandy CLAY, stiff	
		10								
12									11.5 ft: End of Boring	
	86.5								Screen from 4.5 to 11.5 ft	
									Sand from 3.5 to 11.5 ft	
									Bentonite from 1.5 to 3.5 ft	
									Soil Cuttings from 0 to 1.5 ft	
	84.5									
	82.5									
	80.5									
20	78.5									
	76.5									
	74.5									
	72.5									
	70.5									
30										

FIELD BOREHOLE LOG

PROJECT:	SWIFT CREEK, HWY 301	BORING NO.:	B-1
LOCATION:	BATTLEBORO, NC	STATION: <u>x</u>	SHEET: <u>1 of 1</u>
TYPE OF BORING:	Geoprobe	DATE STARTED:	9/12/02
DRILLING FIRM:	Regional Probing	DATE FINISHED:	9/12/02
DRILLER:	Stuart Outten	GROUND ELEV.:	105.7
DRILL RIG:		LOGGED BY:	J Sherrill, L.G.
		NORTHING:	ft
		EASTING:	ft
		TOTAL DEPTH:	19.0 ft

DEPTH (ft)	ELEV. (ft)	BLOWS/6"	N-VALUE	SAMPLE #.	CORE RUN #	RECOVERY (%)	RQD (%)	STRATUM	CLASSIFI-CATION	FIELD CLASSIFICATION AND PHYSICAL DESCRIPTION	REMARKS
	104.7							FILL	FILL	0-1.5 ft: Soil Cover, Silty SAND (SM), light brownish-gray	
2	102.7							COAL ASH	COAL ASH	1.5-13.5 ft: Coal Ash	
4	100.7							COAL ASH	COAL ASH		
6	98.7							COAL ASH	COAL ASH		
8	96.7							COAL ASH	COAL ASH		
10	94.7							COAL ASH	COAL ASH		
12	92.7							COAL ASH	COAL ASH		
14	90.7							CL	CL	13.5- 16.8 ft: fine sandy CLAY (CL) mottled yellowish-brown and light gray	
16	88.7							SC	SC	16.8-19.0 ft: clayey fine SAND (SC), shelly, mottled yellowish-brown and gray	
18	86.7							SC	SC		
20	84.7									19.0 End of Boring Screen set at 14-19 ft	
22	82.7										
24	80.7										
26	78.7										
28	76.7										
30											

FIELD BOREHOLE LOG

PROJECT:	SWIFT CREEK, HWY 301	BORING NO.:	B-2
LOCATION:	BATTLEBORO, NC	STATION:	x x
TYPE OF BORING:	Geoprobe	DATE STARTED:	9/12/02
DRILLING FIRM:	Regional Probing Service	DATE FINISHED:	9/12/02
DRILLER:	Stuart Outten	GROUND ELEV.:	105.4
DRILL RIG:		LOGGED BY:	J Sherrill, L.G.
		COORDINATES:	
		NORTHING:	ft
		EASTING:	ft
		TOTAL DEPTH:	13.0 ft

DEPTH (ft)	ELEV. (ft)	BLOWS/6"	N-VALUE	SAMPLE #. CORE RUN #	RECOVERY (%)	ROD (%)	STRATUM	CLASSIFI- CATION	FIELD CLASSIFICATION AND PHYSICAL DESCRIPTION	REMARKS
	104.4							SM	0-1.5 ft: Soil Cover, Silty SAND (SM), light brownish-gray	
2	102.4								1.5-10.2 ft: Coal Ash, dense	
4	100.4							Coal Ash		
6	98.4									
8	96.4									
10	94.4							CL	10.2-11.6 ft: fine sandy Clay (CL), fill	
12	92.4							Coal Ash	11.6-13.0 ft: Coal Ash, coarse, sandy	
14	90.4								13.0 ft End of Boring on Refusal	Refusal on concrete pipe
16	88.4								Top of concrete pipe = 92.4 ft	
18	86.4									
20	84.4									
22	82.4									
24	80.4									
26	78.4									
28	76.4									
30										

FIELD BOREHOLE LOG

PROJECT:	SWIFT CREEK, HWY 301	BORING NO.:	B-3
LOCATION:	BATTLEBORO, NC	STATION:	x x
TYPE OF BORING:	Geoprobe	DATE STARTED:	9/12/02
DRILLING FIRM:	Regional Probing Service	DATE FINISHED:	9/12/02
DRILLER:	Stuart Outten	GROUND ELEV.:	105.4
DRILL RIG:		LOGGED BY:	J Sherrill, L.G.
		COORDINATES:	
		NORTHING:	ft
		EASTING:	ft
		TOTAL DEPTH:	19.5 ft

DEPTH (ft)	ELEV. (ft)	BLOWS/6"	N-VALUE	SAMPLE #.	CORE RUN #	RECOVERY (%)	RQD (%)	STRATUM	CLASSIFI- CATION	FIELD CLASSIFICATION AND PHYSICAL DESCRIPTION	REMARKS
	104.4								SM	0-1.5 ft: Soil Cover, Silty SAND (SM), light brownish-gray	
2	102.4								Coal Ash	1.5-10.4 ft: Coal Ash	
4	100.4								Coal Ash		
6	98.4								Coal Ash		
8	96.4								Coal Ash		
10	94.4								SC	10.4-11.4 ft: Clayey fine SAND (SC), fill	
12	92.4								Coal Ash	11.4-14.2 ft: Coal Ash, coarse, sandy	
14	90.4								SC	14.2- 15.0 ft: Clayey fine SAND (SC), fill	
16	88.4								Coal	15.0-15.8 ft: Coal Ash, coarse, sandy	
18	86.4								CL	15.8- 19.5 ft: fine sandy Clay (CL), in place soil, mottled yellowish-brown and gray	
20	84.4									19.5 ft: End of Boring	
22	82.4										
24	80.4										
26	78.4										
28	76.4										
30											

APPENDIX A



3200 Wellington Court, Suite G
Raleigh, North Carolina 27615
919-954-1514
Fax 919-954-1428

February 18, 2003

Sherrill Environmental
7309 Still Pond Court
Raleigh, NC 27613

Attn: Mr. Jack Sherrill

Re: Report of Laboratory Testing
Samples from Swift Creek Project Delivered 12/31/02
GeoTechnologies Project No. 1-03-0143-CA

Gentlemen:

GeoTechnologies, Inc. has completed the authorized permeability testing of undisturbed samples obtained from the Swift creek Project by Sherrill Environmental and delivered to our office on 12/31/02 for laboratory permeability testing. The permeability samples were prepared and tested in accordance with ASTM D-5084, Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter. As indicated by the attached test results, the coal ash has a permeability on the order of 8×10^{-4} cm/sec whereas the clay materials beneath the coal ash exhibited permeability results from 1×10^{-7} cm/sec to 7×10^{-8} cm/sec with an average of 8×10^{-8} cm/sec for the three clay samples

We have retained the samples subjected to permeability testing if you desire to have gradation and/or Atterberg limits testing performed on those samples. If you do desire additional testing, please notify us at your earliest convenience.

GeoTechnologies, Inc. appreciates the opportunity to be of service on this phase of the project. Please contact us if you have any questions concerning this letter or if we may be of additional service on this or other projects.

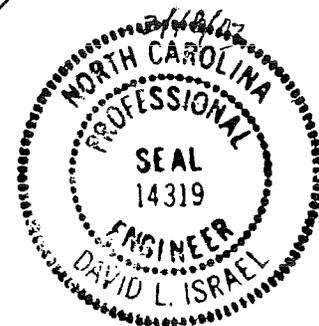
Very Truly Yours,

GeoTechnologies, Inc.

Edward B. Hearn, P.E.
NC Registration No. 9520

EBH/lam
Attachments

David L. Israel, P.E.
NC Registration No. 14319



SUMMARY OF TEST RESULTS

Samples from Swift Creek Project Delivered 12/31/02

Material	Location	Depth (ft.)	Permeability
Coal Ash Sample	P-12	2 – 4.3	8×10^{-4} cm/sec
Light Grey, Yellow Fine Sandy Silty CLAY	P-12	13.8 – 16.1	7×10^{-8} cm/sec
Light Grey, Red, Orange Fine Sandy Silty CLAY	P-19	15 – 17	7×10^{-8} cm/sec
Light Grey, Yellow Fine Sandy Silty CLAY	B-11	11.5 – 13.8	1×10^{-7} cm/sec

GeoTechnologies, Inc.

PERMEABILITY TEST

Job Number: 1-03-0143-CA Job Name: Swift Creek Project
 Date: 24-Jan-03 Sample I.D. P-19 UD Depth: 15' - 17'

Soil Description: Light Gray, Red, Orange Fine Sandy Silty CLAY

SAMPLE DATA

Type			Standard Proctor (ASTM D-698)	
Remolded	()		Maximum Dry Density	lbs/cu.ft.
Undisturbed	(X)		Opt. Moisture Content	%
			Compaction	%
			Initial Moisture Content	19.3 %
			Wet Density	130.2 lbs./cu.ft.
			Dry Density	109.2 lbs./cu.ft.
			Initial Saturation	92.7 %
			Final Saturation	100.0 %
			Initial Void Ratio	0.57
			Porosity	36.4 %
			Specific Gravity	2.75 apparent
	Inches	cm.		
Length	3.210	8.153		
Diameter	2.856	7.254		
Area	6.406	41.331		
Volume	20.564	336.986		
Wet Mass	1.550	703.03	grams	
Dry Mass	1.2992	589.3	grams	

TEST DATA

h_i = inflow burette
 h_o = outflow burette
 t = time
 L = 8.15 cm. length of sample
 A = 41.331 sq.cm. area of sample
 a = 0.852 sq.cm. area of burettes
 h_1 = head loss across specimen at t_1
 h_2 = head loss across specimen at t_2

t1	t2	ho1	hi1	h1	ho2	hi2	h2
0	57480	92.2	2.0	90.2	90.1	4.1	86
0	102780	90.1	4.1	86.0	86.9	7.3	79.6
0	64980	86.9	7.3	79.6	84.5	9.7	74.8

ASTM D 5084
 $k = ((aL)/(At(a+a))) * \ln(h_1/h_2)$

NOTE:			Percent
5 PSI Confining Pressure	1	k = 7.0E-08	Deviation 1.99%
1 PSI Driving Head	2	k = 6.3E-08	11.10%
	3	k = 8.0E-08	13.09%
Average		k = 7.1E-08 cm/sec	

GeoTechnologies, Inc.

PERMEABILITY TEST

Job Number: 1-03-0143-CA Job Name: Swift Creek Project
 Date: 24-Jan-03 Sample I.D. P-12 UD Depth: 2.0' - 4.3'

Soil Description: Coal Ash (From Bottom 6" of Tube)

SAMPLE DATA

Type			Standard Proctor (ASTM D-698)	
Remolded ()			Maximum Dry Density	lbs/cu.ft.
Undisturbed (X)			Opt. Moisture Content	%
			Compaction	%
			Initial Moisture Content	107.8 %
			Wet Density	79.2 lbs./cu.ft.
			Dry Density	38.1 lbs./cu.ft.
			Initial Saturation	85.0 %
			Final Saturation	100.0 %
			Initial Void Ratio	3.42
			Porosity	77.4 %
			Specific Gravity	2.7 apparent
	Inches	cm.		
Length	3.373	8.567		
Diameter	2.860	7.264		
Area	6.424	41.447		
Volume	21.669	355.091		
Wet Mass	0.993	450.25	grams	
Dry Mass	0.4777	216.7	grams	

TEST DATA

h_i = inflow burette
 h_o = outflow burette
 t = time
 L = 8.57 cm. length of sample
 A = 41.447 sq.cm. area of sample
 a = 0.852 sq.cm. area of burettes
 h_1 = head loss across specimen at t_1
 h_2 = head loss across specimen at t_2

t1	t2	ho1	hi1	h1	ho2	hi2	h2
0	60	94.6	0.6	94.0	75.0	20.2	54.8
0	60	95.0	0.7	94.3	75.2	20.5	54.7
0	60	94.9	0.3	94.6	74.0	21.2	52.8

ASTM D 5084

$$k = \frac{aaL}{(At(a+a))} \ln(h_1/h_2)$$

Percent Deviation

NOTE:

5 PSI Confining Pressure	1	k =	7.9E-04	2.91%
1 PSI Driving Head	2	k =	8.0E-04	2.01%
	3	k =	8.6E-04	4.92%

Average k = 8E-04 cm/sec

GeoTechnologies, Inc.

PERMEABILITY TEST

Job Number: 1-03-0143-CA Job Name: Swift Creek Project
 Date: 24-Jan-03 Sample I.D. P-12 UD Depth: 13.8' - 16.1'

Soil Description: Light Gray, Yellow Fine Sandy Silty CLAY Bottom 6" of Tube

SAMPLE DATA

Type			Standard Proctor (ASTM D-698)	
Remolded ()			Maximum Dry Density	lbs/cu.ft.
Undisturbed (X)			Opt. Moisture Content	%
			Compaction	%
			Initial Moisture Content	21.3 %
	Inches	cm.	Wet Density	129.3 lbs./cu.ft.
Length	3.376	8.575	Dry Density	106.6 lbs./cu.ft.
Diameter	2.854	7.249	Initial Saturation	95.9 %
Area	6.397	41.273	Final Saturation	100.0 %
Volume	21.597	353.917	Initial Void Ratio	0.61
Wet Mass	1.616	733.06 grams	Porosity	37.9 %
Dry Mass	1.3323	604.3 grams	Specific Gravity	2.75 apparent

TEST DATA

L = 8.58 cm. length of sample
 A = 41.273 sq.cm. area of sample
 a = 0.852 sq.cm. area of burettes
 hi = inflow burette
 ho = outflow burette
 t = time
 h1 = head loss across specimen at t1
 h2 = head loss across specimen at t2

t1	t2	ho1	hi1	h1	ho2	hi2	h2
0	5280	115.1	2.4	112.7	114.8	2.6	112.2
0	9480	114.8	2.6	112.2	114.4	3.0	111.4
0	102720	113.7	6.2	107.5	109.6	10.3	99.3

ASTM D 5084.

$$k = ((aL/(At(a+a))) * \ln(h1/h2))$$

Percent
Deviation

NOTE:	1	k =	7.5E-08	6.63%
5 PSI Confining Pressure	2	k =	6.7E-08	4.43%
1 PSI Driving Head	3	k =	6.8E-08	2.20%

Average k = 7.0E-08 cm/sec

GeoTechnologies, Inc.

PERMEABILITY TEST

Job Number: 1-03-0143-CA Job Name: Swift Creek Project
 Date: 12-Feb-03 Sample I.D. B-11 UD Depth: 11.5' - 13.8'
 Soil Description: Light Gray, Yellow Fine Sandy Silty CLAY Bottom 6" of Tube

SAMPLE DATA

			Standard Proctor (ASTM D-698)	
Type			Maximum Dry Density	lbs/cu.ft.
Remolded ()			Opt. Moisture Content	%
Undisturbed (X)			Compaction	%
			Initial Moisture Content	18.3 %
Length	Inches	cm.	Wet Density	131.4 lbs./cu.ft.
	2.989	7.592	Dry Density	111.1 lbs./cu.ft.
Diameter	2.852	7.244	Initial Saturation	92.2 %
Area	6.388	41.215	Final Saturation	100.0 %
Volume	19.095	312.908	Initial Void Ratio	0.55
Wet Mass	1.452	658.57 grams	Porosity	35.3 %
Dry Mass	1.2273	556.7 grams	Specific Gravity	2.75 apparent

TEST DATA

hi = inflow burette
 ho = outflow burette
 t = time

L = 7.59 cm. length of sample
 A = 41.215 sq.cm. area of sample
 a = 0.852 sq.cm. area of burettes
 h1 = head loss across specimen at t1
 h2 = head loss across specimen at t2

t1	t2	ho1	hi1	h1	ho2	hi2	h2
0	32400	90.2	4.5	85.7	88.3	6.4	81.9
0	21900	85.0	9.3	75.7	83.7	10.6	73.1
0	25380	79.6	14.5	65.1	78.1	16.0	62.1

ASTM D 5084
 $k = ((aL)/(At(a+a))) * \ln(h1/h2)$

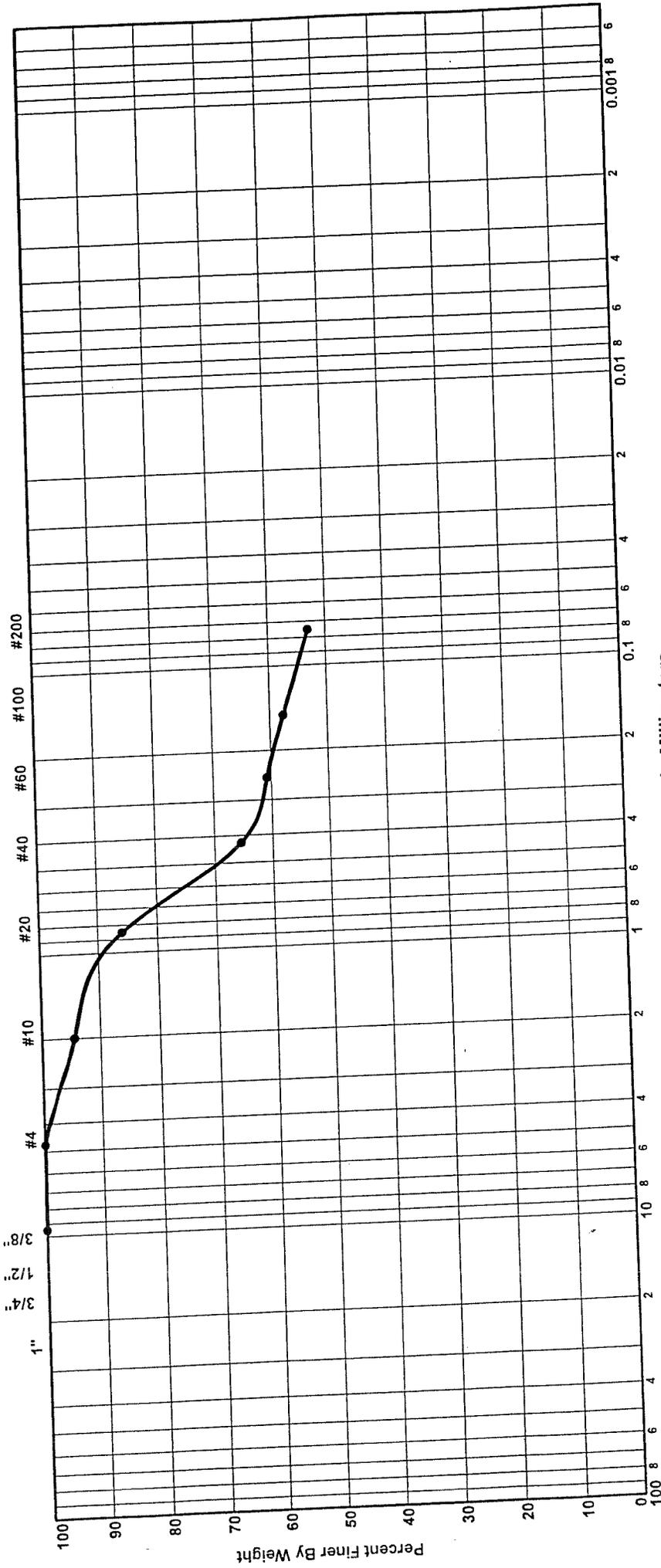
NOTE:

5 PSI Confining Pressure
 1 PSI Driving Head

	k =	1.1E-07	Percent Deviation	13.50%
1	k =	1.3E-07		1.38%
2	k =	1.5E-07		14.87%
3	k =			

Average k = 1.3E-07 cm/sec

U.S. Standard Sieve Sizes



Grain Size in Millimeters

GRAVEL		SAND			FINES	
COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

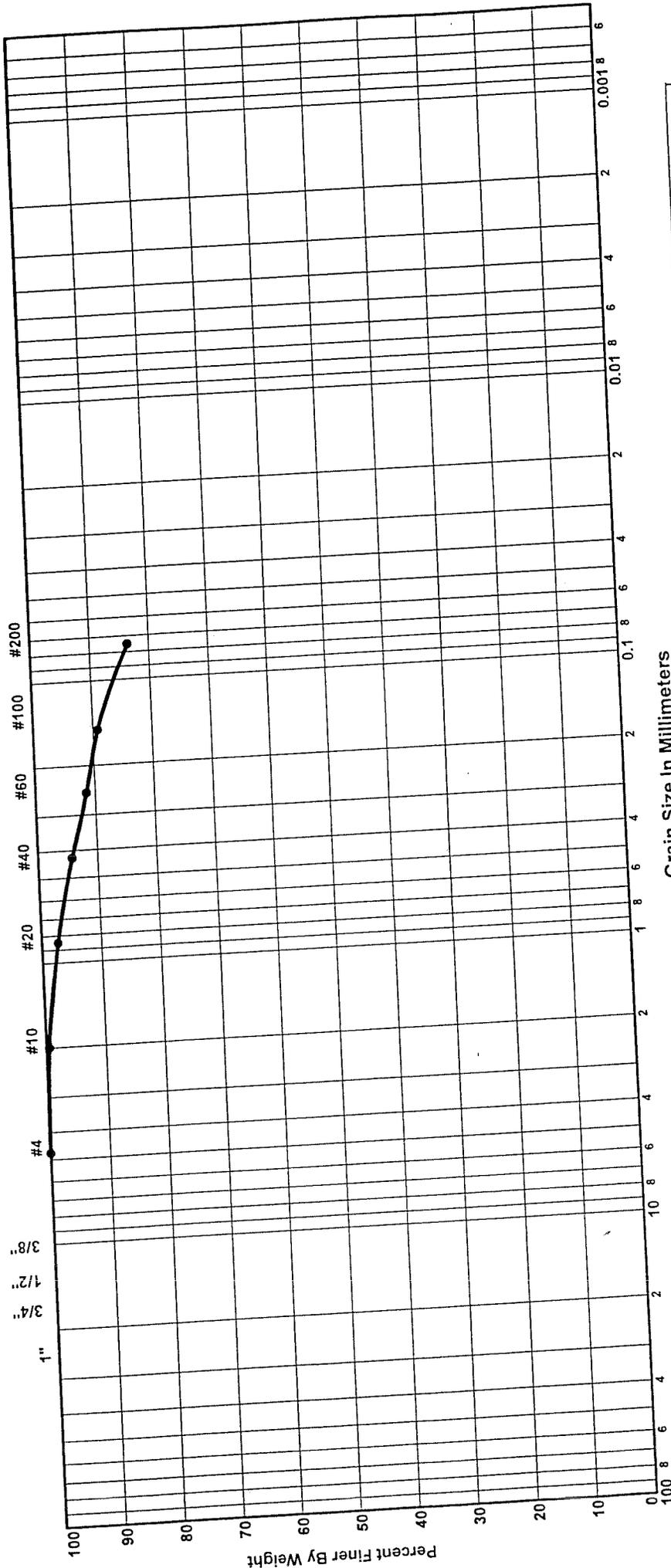
GRAIN SIZE DISTRIBUTION



GeoTechnologies, Inc.

Boring No.	Elev./Depth	Nat. W.C.	L.L.	P.L.	P.I.	Soil Description or Classification
P-12	2-4.3'					Coal Ash
Project:						Job No.: 1-03-0143-CA
Swift Creek Wake County, NC						Date: 1/29/03

U.S. Standard Sieve Sizes



Grain Size In Millimeters

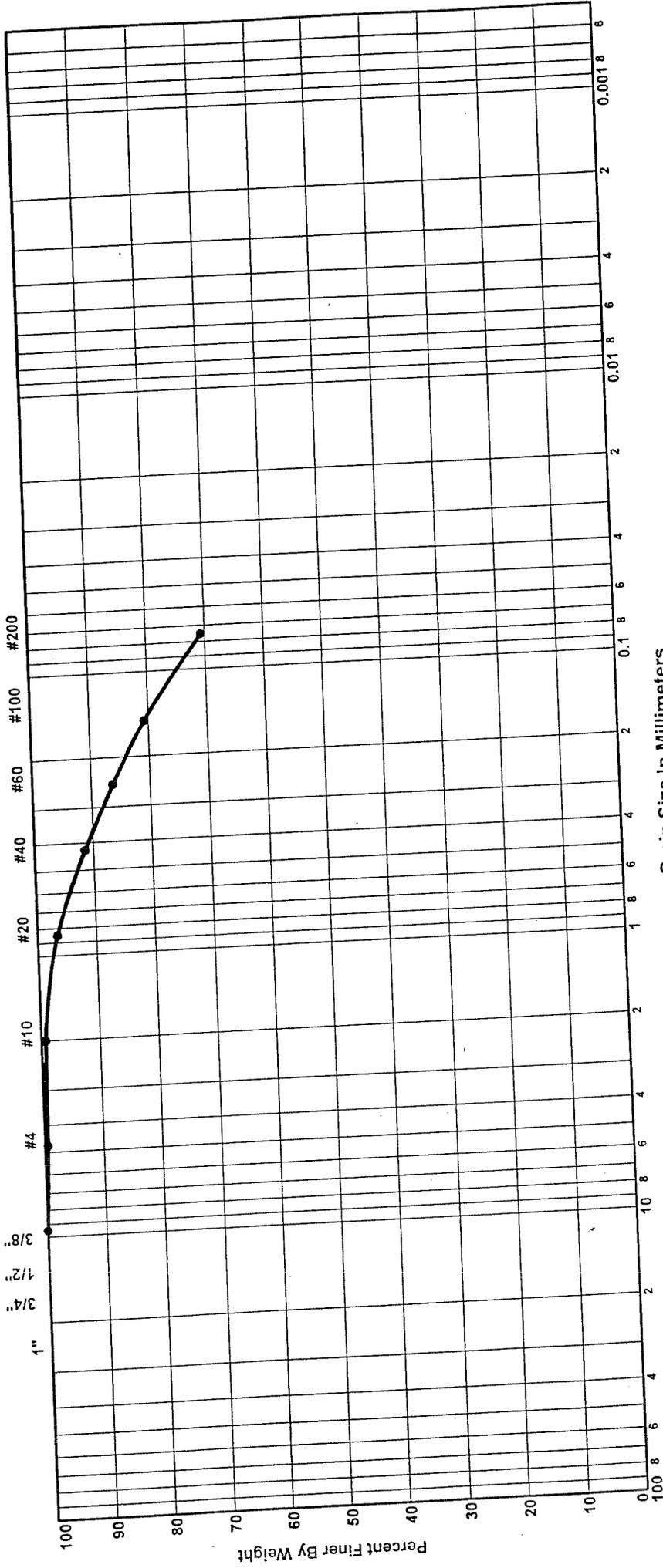
GRAVEL		SAND		FINES	
COARSE	FINE	COARSE	MEDIUM	FINE	CLAY SIZES

GRAIN SIZE DISTRIBUTION



Boring No.	Elev./Depth	Nat. W.C.	L.L.	P.L.	P.I.	Soil Description or Classification
P-12 UD	13.8-16.1'					Light Grayish Yellow Fine Sandy Silty CLAY
Project:						Job No.: 1-03-0143-CA
Swift Creek Wake County, NC						Date: 1/29/03

U.S. Standard Sieve Sizes



Grain Size in Millimeters

GRAVEL		SAND		FINES	
COARSE	FINE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

GRAIN SIZE DISTRIBUTION



Soil Description or Classification

Light Gray, Red, & Orange Sandy Silty CLAY

Nat. W.C. L.L. P.L. P.I.

Elev./Depth

15-17'

Job No.: 1-03-0143-CA

Project:

Swift Creek
Wake County, NC

Date: 1/29/03



3200 Wellington Court, Suite G
Raleigh, North Carolina 27615
919-954-1514
Fax 919-954-1428

May 19, 2003

Sherrill Environmental
7309 Still Pond Court
Raleigh, NC 27613

Attn: Mr. Jack Sherrill

Re: Report of Laboratory Testing
Samples from Swift Creek Project Delivered 04-02-03
GeoTechnologies Project No. 1-03-0143-CA

Gentlemen:

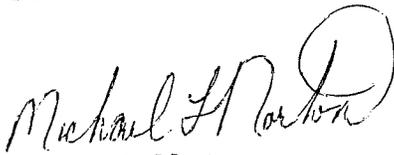
GeoTechnologies, Inc. has completed the authorized permeability testing of undisturbed samples obtained from the North East Retention Pond for the Swift creek Project by Sherrill Environmental and delivered to our office on 04-02-03. The permeability samples were prepared and tested in accordance with ASTM D-5084, Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter. As indicated by the attached test results, the clay materials exhibited permeability results of 1.77×10^{-8} cm/sec.

We also conducted a grain size analysis test on the sample. The results of the grain size analysis are also included.

GeoTechnologies, Inc. appreciates the opportunity to be of service on this phase of the project. Please contact us if you have any questions concerning this letter or if we may be of additional service on this or other projects.

Very Truly Yours,

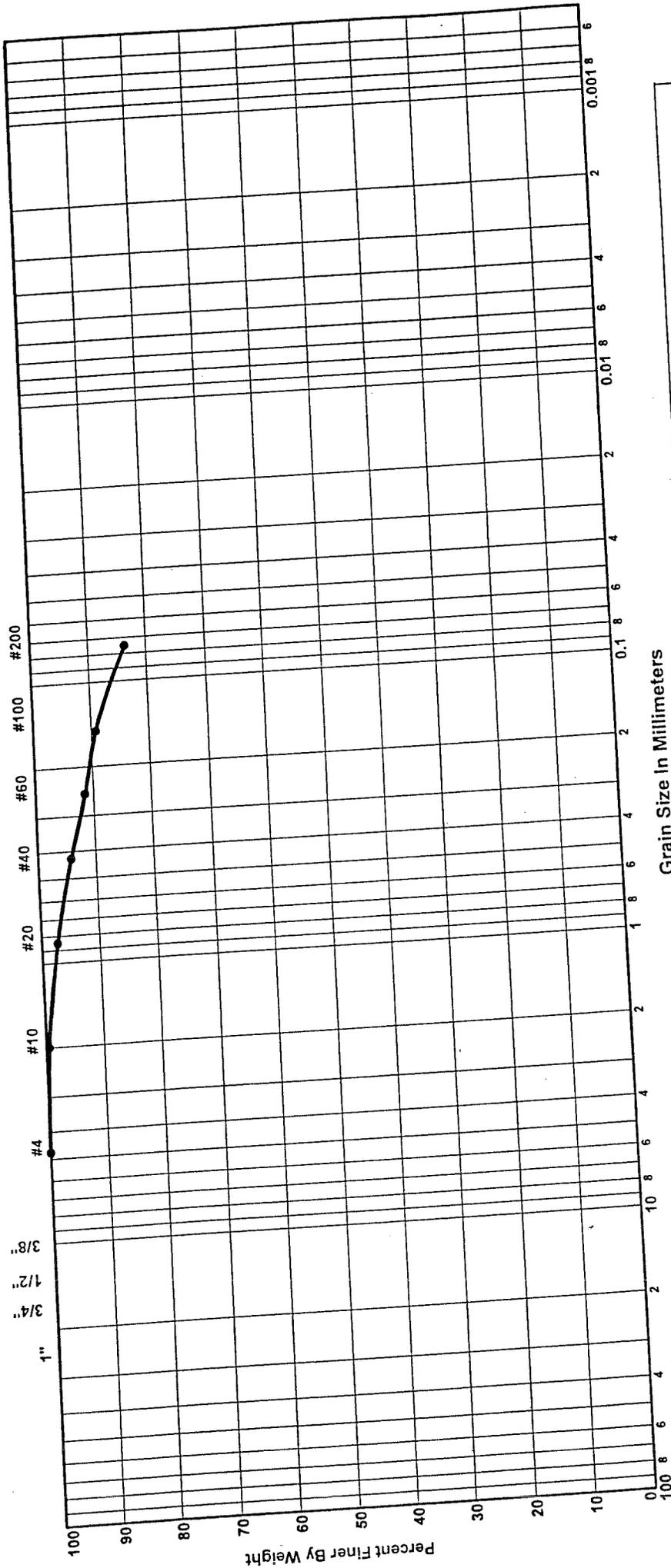
GeoTechnologies, Inc.


Michael L. Norton
Laboratory Manager


Toby Mallik, P.E.
NC Registration No. 26472



U.S. Standard Sieve Sizes



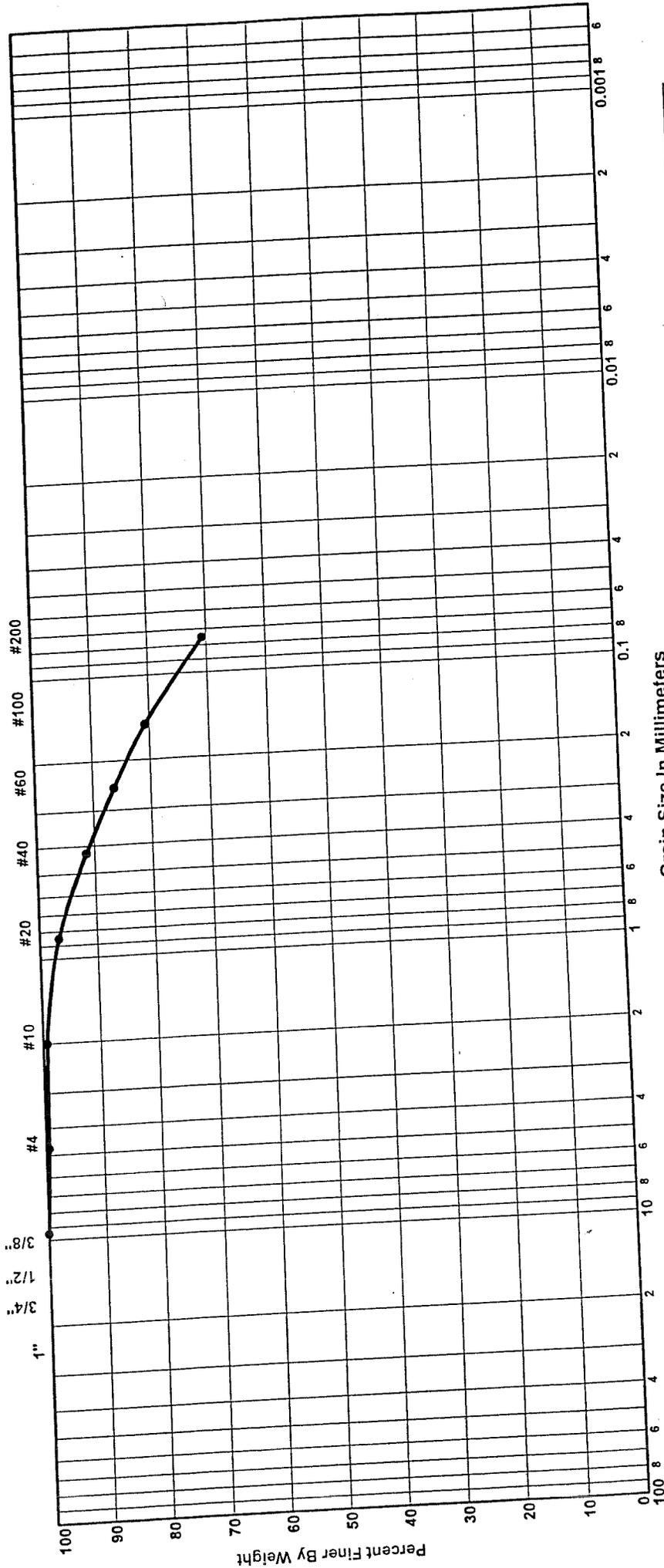
GRAVEL		SAND		FINES	
COARSE	FINE	COARSE	MEDIUM	FINE	CLAY SIZES

GRAIN SIZE DISTRIBUTION



Boring No.	Elev./Depth	Nat. W.C.	L.L.	P.L.	P.I.	Soil Description or Classification
P-12 UD	13.8-16.1'					Light Grayish Yellow Fine Sandy Silty CLAY
Project:		Job No.: 1-03-0143-CA				
Swift Creek Wake County, NC		Date: 1/29/03				

U.S. Standard Sieve Sizes



Grain Size In Millimeters

GRAVEL		SAND			FINES	
COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

GRAIN SIZE DISTRIBUTION



Boring No.	Elev./Depth	Nat. W.C.	L.L.	P.L.	P.I.	Soil Description or Classification
P-19 UD	15-17'					Light Gray, Red, & Orange Sandy Silty CLAY
Project:		Job No.: 1-03-0143-CA				
Swift Creek Wake County, NC		Date: 1/29/03				



3200 Wellington Court, Suite G
Raleigh, North Carolina 27615
919-954-1514
Fax 919-954-1428

May 19, 2003

Sherrill Environmental
7309 Still Pond Court
Raleigh, NC 27613

Attn: Mr. Jack Sherrill

Re: Report of Laboratory Testing
Samples from Swift Creek Project Delivered 04-02-03
GeoTechnologies Project No. 1-03-0143-CA

Gentlemen:

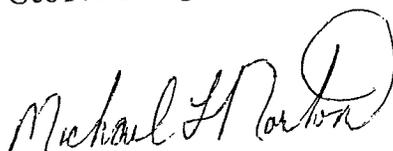
GeoTechnologies, Inc. has completed the authorized permeability testing of undisturbed samples obtained from the North East Retention Pond for the Swift creek Project by Sherrill Environmental and delivered to our office on 04-02-03. The permeability samples were prepared and tested in accordance with ASTM D-5084, Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter. As indicated by the attached test results, the clay materials exhibited permeability results of 1.77×10^{-8} cm/sec.

We also conducted a grain size analysis test on the sample. The results of the grain size analysis are also included.

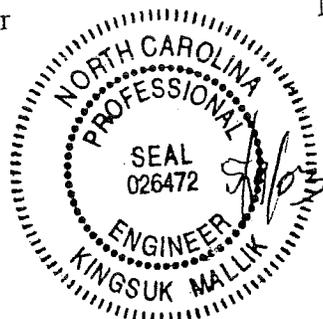
GeoTechnologies, Inc. appreciates the opportunity to be of service on this phase of the project. Please contact us if you have any questions concerning this letter or if we may be of additional service on this or other projects.

Very Truly Yours,

GeoTechnologies, Inc.


Michael L. Norton
Laboratory Manager


Toby Mallik, P.E.
NC Registration No. 26472



GeoTechnologies, Inc.

PERMEABILITY TEST

Job Number: 1-03-0143 CA Job Name: Swift Creek
 Date: 8-Apr-03 Sample I.D. UD Tube Depth: 0 - 2'

Soil Description: Gray Slightly Fine Sandy CLAY

SAMPLE DATA

Type			Standard Proctor (ASTM D-698)	
Remolded ()			Maximum Dry Density	lbs/cu.ft.
Undisturbed (X)			Opt. Moisture Content	%
			Compaction	#DIV/0! %
			Actual Moisture Content	21.7 %
	Inches	cm.	Wet Density	128.0 lbs./cu.ft.
Length	3.064	7.783	Dry Density	105.2 lbs./cu.ft.
Diameter	2.856	7.254	Initial Saturation	97.3 %
Area	6.406	41.331	Final Saturation	100.0 %
Volume	19.629	321.659	Initial Void Ratio	0.60
Wet Mass	1.454	659.76 grams	Porosity	37.6 %
Dry Mass	1.1951	542.1 grams	Specific Gravity	2.7 apparent

TEST DATA

hi = inflow burette
 ho = outflow burette
 t = time
 L = 7.78 cm. length of sample
 A = 41.331 sq.cm. area of sample
 a = 0.852 sq.cm. area of burettes
 h1 = head loss across specimen at t1
 h2 = head loss across specimen at t2

t1	t2	ho1	hi1	h1	ho2	hi2	h2
0	18300	91	2.8	88.2	90.9	3	87.9
0	241200	90.9	3	87.9	88.7	5.2	83.5
0	27600	88.7	5.2	83.5	88.4	5.5	82.9
0				0			0

ASTM D 5084

$$k = ((aL/(At(a+a))) * \ln(h1/h2))$$

Percent
Deviation

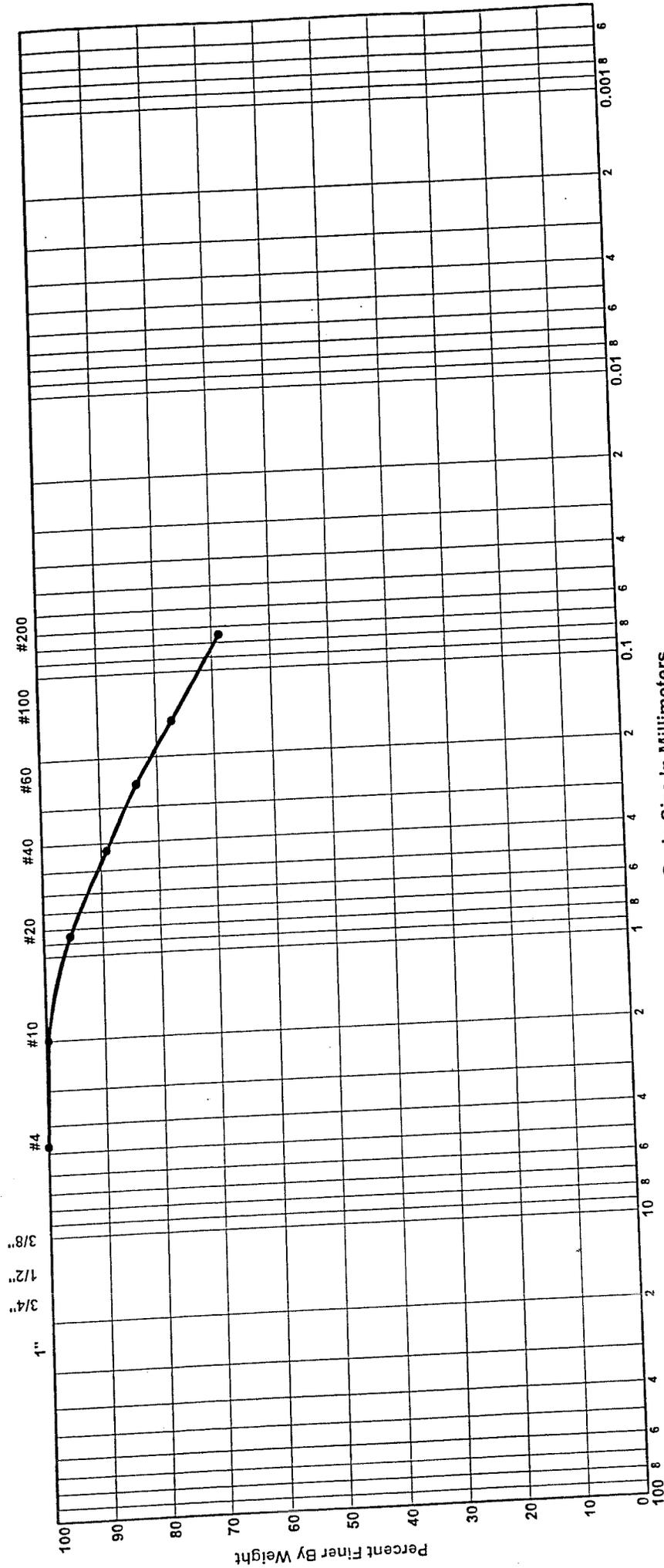
NOTE:

5 PSI Confining Pressure
1 PSI Driving Head

1	k =	1.49E-08	15.42%
2	k =	1.71E-08	3.28%
3	k =	2.10E-08	18.70%

Average k = 1.77E-08 cm/sec

U.S. Standard Sieve Sizes



Grain Size in Millimeters

GRAVEL		SAND		FINES	
COARSE	FINE	COARSE	MEDIUM	FINE	CLAY SIZES

GRAIN SIZE DISTRIBUTION



Boring No.	Elev./Depth	Nat. W.C.	L.L.	P.L.	P.I.	Soil Description or Classification
	0-2'					Gray Slightly Fine Sandy CLAY
Project:						Job No.: 1-03-0143-CA
Swift Creek Wake County, NC						Date: 5/19/03

APPENDIX B

Environmental Conservation Laboratories, Inc.
1015 Passport Way
Cary, North Carolina 27513
919 / 677-1669
Fax 919 / 677-9846
www.encolabs.com



CLIENT : Sherrill Environmental, Inc.
ADDRESS: 7309 Still Pond Road
Raleigh, NC 27613

REPORT # : CRY13733
DATE SUBMITTED: March 5, 2003
DATE REPORTED : March 12, 2003

PAGE 1 OF 9

ATTENTION: Mr. Jack Sherrill

SAMPLE IDENTIFICATION

Samples submitted and
identified by client as:

REFERENCE: 03-07

Swift Creek

03/04/03

#1 - SW-1 @ 12:05
#2 - SW-2 @ 12:30
#3 - SW-3 @ 14:50
#4 - SW-4 @ 14:20

Unless otherwise noted in an attached project narrative, all samples were received in acceptable condition and processed in accordance with the referenced methods/procedures. This data has been produced in accordance with NELAC Standards (July, 1999). This report shall not be reproduced except in full, without the written approval of the laboratory. Results for these procedures apply only to the samples as submitted.

PROJECT MANAGER

Handwritten signature of Amy R. Harris in cursive script.

Amy R. Harris

ENCO LABORATORIES
 REPORT # : CRY13733
 DATE REPORTED: March 12, 2003
 REFERENCE : 03-07
 PROJECT NAME : Swift Creek

PAGE 2 OF 9

RESULTS OF ANALYSIS

EPA METHOD 300 - <u>Anions by IC</u>	<u>SW-1</u>	<u>SW-2</u>	<u>Units</u>
Sulfate	12	15	mg/L
Date Analyzed	03/08/03 20:45	03/08/03 21:05	

<u>MISCELLANEOUS</u>	<u>METHOD</u>	<u>SW-1</u>	<u>SW-2</u>	<u>Units</u>
Total Dis. Solids	160.1	52	76	mg/L
Date Analyzed		03/10/03 15:00	03/10/03 15:00	

ENCO LABORATORIES
 REPORT # : CRY13733
 DATE REPORTED: March 12, 2003
 REFERENCE : 03-07
 PROJECT NAME : Swift Creek

PAGE 3 OF 9

RESULTS OF ANALYSIS

<u>TOTAL METALS</u>	<u>METHOD</u>	<u>SW-1</u>	<u>SW-2</u>	<u>Units</u>
Arsenic	200.7	0.010 U	0.010 U	mg/L
Date Analyzed		03/10/03 17:18	03/10/03 19:11	
Barium	200.7	0.10 U	0.10 U	mg/L
Date Analyzed		03/10/03 17:18	03/10/03 19:11	
Cadmium	200.7	0.0010 U	0.0010 U	mg/L
Date Analyzed		03/10/03 17:18	03/10/03 19:11	
Chromium	200.7	0.010 U	0.010 U	mg/L
Date Analyzed		03/10/03 17:18	03/10/03 19:11	
Cobalt	200.7	1.3	0.78	mg/L
Date Analyzed		03/10/03 17:18	03/10/03 19:11	
Lead	200.7	0.0050 U	0.0050 U	mg/L
Date Analyzed		03/10/03 17:18	03/10/03 19:11	
Manganese	200.7	0.033	0.015	mg/L
Date Analyzed		03/10/03 17:18	03/10/03 19:11	
Selenium	200.7	0.010 U	0.010 U	mg/L
Date Analyzed		03/10/03 17:18	03/10/03 19:11	
Silver	200.7	0.010 U	0.010 U	mg/L
Date Analyzed		03/10/03 17:18	03/10/03 19:11	
Mercury	245.1	0.00020 U	0.00020 U	mg/L
Date Analyzed		03/07/03 16:00	03/07/03 16:00	

U = Compound was analyzed for but not detected to the level shown.

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RESULTS OF ANALYSIS

EPA METHOD 300 - <u>Anions by IC</u>	<u>SW-3</u>	<u>SW-4</u>	<u>Units</u>
Sulfate	13	13	mg/L
Date Analyzed	03/08/03 21:26	03/08/03 21:46	

<u>MISCELLANEOUS</u>	<u>METHOD</u>	<u>SW-3</u>	<u>SW-4</u>	<u>Units</u>
Total Dis. Solids	160.1	48	60	mg/L
Date Analyzed		03/10/03 15:00	03/10/03 15:00	

u = Compound was analyzed for but not detected to the level shown.

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RESULTS OF ANALYSIS

<u>TOTAL METALS</u>	<u>METHOD</u>	<u>SW-3</u>	<u>SW-4</u>	<u>Units</u>
Arsenic Date Analyzed	200.7	0.010 U 03/10/03 19:20	0.010 U 03/10/03 19:28	mg/L
Barium Date Analyzed	200.7	0.10 U 03/10/03 19:20	0.10 U 03/10/03 19:28	mg/L
Cadmium Date Analyzed	200.7	0.0010 U 03/10/03 19:20	0.0010 U 03/10/03 19:28	mg/L
Chromium Date Analyzed	200.7	0.010 U 03/10/03 19:20	0.010 U 03/10/03 19:28	mg/L
Iron Date Analyzed	200.7	1.1 03/10/03 19:20	1.2 03/10/03 19:28	mg/L
Lead Date Analyzed	200.7	0.0050 U 03/10/03 19:20	0.0050 U 03/10/03 19:28	mg/L
Manganese Date Analyzed	200.7	0.041 03/10/03 19:20	0.043 03/10/03 19:28	mg/L
Selenium Date Analyzed	200.7	0.010 U 03/10/03 19:20	0.010 U 03/10/03 19:28	mg/L
Silver Date Analyzed	200.7	0.010 U 03/10/03 19:20	0.010 U 03/10/03 19:28	mg/L
Mercury Date Analyzed	245.1	0.00020 U 03/07/03 16:00	0.00020 U 03/07/03 16:00	mg/L

= Compound was analyzed for but not detected to the level shown.

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RESULTS OF ANALYSIS

EPA METHOD 300 -
Anions by IC

Chloride
Sulfate
Date Analyzed

LAB BLANK

0.50 U
2.0 U
03/08/03 18:13

Units

mg/L
mg/L

MISCELLANEOUS
Total Dis. Solids
Date Analyzed

METHOD

160.1

LAB BLANK

2.0 U
03/10/03 15:00

Units

mg/L

U Compound was analyzed for but not detected to the level shown.

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RESULTS OF ANALYSIS

<u>TOTAL METALS</u>	<u>METHOD</u>	<u>LAB BLANK</u>	<u>Units</u>
Arsenic Date Analyzed	200.7	0.010 U 03/10/03 16:54	mg/L
Barium Date Analyzed	200.7	0.10 U 03/10/03 16:54	mg/L
Cadmium Date Analyzed	200.7	0.0010 U 03/10/03 16:54	mg/L
Chromium Date Analyzed	200.7	0.010 U 03/10/03 16:54	mg/L
Iron Date Analyzed	200.7	0.050 U 03/10/03 16:54	mg/L
Lead Date Analyzed	200.7	0.0050 U 03/10/03 16:54	mg/L
Manganese Date Analyzed	200.7	0.010 U 03/10/03 16:54	mg/L
Selenium Date Analyzed	200.7	0.010 U 03/10/03 16:54	mg/L
Silver Date Analyzed	200.7	0.010 U 03/10/03 16:54	mg/L
Mercury Date Analyzed	245.1	0.00020 U 03/07/03 16:00	mg/L

U = Compound was analyzed for but not detected to the level shown.

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LABORATORY CERTIFICATIONS

Laboratory Certification: NCDENR:591

All analyses reported with this project were analyzed by the facility indicated unless identified below.

<u>PARAMETER</u>	<u>LAB CERT #'s</u>
Sulfate, EPA Method 300	NCDENR:424
Total Dissolved Solids, EPA Method 160.1	NCDENR:424

ENCO LABORATORIES

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QUALITY CONTROL DATA

<u>Parameter</u>	<u>% RECOVERY MS/MSD/LCS</u>	<u>ACCEPT LIMITS</u>	<u>% RPD MS/MSD</u>	<u>ACCEPT LIMITS</u>
<u>EPA Method 300</u>				
Chloride	122/122/ 97	51-149	<1	26
Sulfate	112/112/100	47-148	<1	25
<u>MISCELLANEOUS</u>				
Total Dis. Solids, 160.1	NA/ NA/101	73-121	NA	NA
<u>TOTAL METALS</u>				
Arsenic, 200.7	107/107/ 94	64-126	<1	12
Barium, 200.7	106/107/ 96	74-119	<1	11
Cadmium, 200.7	109/108/ 95	68-121	<1	12
Chromium, 200.7	109/108/ 95	73-120	<1	17
Copper, 200.7	115/110/106	48-144	4	23
Lead, 200.7	110/109/ 95	68-126	<1	19
Manganese, 200.7	109/108/ 96	55-146	<1	19
Selenium, 200.7	112/113/ 99	65-129	<1	10
Silver, 200.7	104/101/ 87	69-121	3	12
Mercury, 245.1	106/108/113	70-136	2	12

< = Less Than
 MS = Matrix Spike
 MSD = Matrix Spike Duplicate
 LCS = Laboratory Control Standard
 RPD = Relative Percent Difference

