115248

RECORD OF DRILLHOLE 311

SHEET 6 of 7

LOCATION Modern Landfill - N232082.13 E232577.30
PROJECT No. 883-6158
INCLINATION 60 AZIMUTH 330

DRILLING DATE 02/06/89
DRILL RIG Soil Sentry

DATUM MSL

DEPTH SCALE FEET	DESCRIPTION (Ref. Elevation 532.06)	GRAPHIC LOG	ELEV. DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w/r/t CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (mPa)	NOTES WATER LEVELS INSTRUMENTATION
125			423.8											
	80.5-134.8 ft. Slightly weathered to fresh, weakly foliated and cleaved, nodular to massive and brecciated, locally cut by calcite veinlets, fine grained to crystalline, gray PHYLLITIC NODULAR DOLOSTONE with MARBLEIZED DOLOSTONE zones.		125.0	12	100				J,SM,Cal					
									J,ST,Cal					
130														Packer Test 7 129.5 - 150.5 6.6 x 10-6 cm/s
									J,ST,Cal					
									J,ST,Cal					
			415.3						J,ST,Cal					
135	134.8-145.8 ft. Fresh, massive to weakly banded, jointed, cut by calcite veinlets, light gray, fine grained accessory pyrite and biotite, PHYLLITIC DOLOSTONE.		134.8	13	100				J,ST,Cal					
140														
145				14	100				J,ST,Cal,FeO					
			405.8						J,SM,Chl					
	145.8-152.3 ft. Fresh, brecciated with superimposed calcite filled joints, light gray with green chloritic infillings, crystalline, MARBLEIZED DOLOSTONE. (FAULT BRECCIA)		145.8						F,SM,Chl					
									F,IRR,Chl					
									F,IRR,Chl					
									F,IRR,Chl					
150	Continued on the next page.		402.2											
			150.0											

DEPTH SCALE 1 inch to 3 feet
DRILLING CONTRACTOR Hydro Group
DRILLER F. Cornell

Golder Associates

LOGGED SHM
CHECKED RCFK
DATE 04/19/89

AR303290

RECORD OF DRILLHOLE 311

SHEET 7 of 7

LOCATION Modern Landfill - N232082.13 E232577.30
PROJECT No. 883-6168
INCLINATION 60 AZIMUTH 330

DRILLING DATE 02/06/89
DRILL RIG Soil Sentry

DATUM MSL

DEPTH SCALE FEET	DESCRIPTION Ref. Elevation 632.06	GRAPHIC LOG	ELEV. DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (Is50)	NOTES WATER LEVELS INSTRUMENTATION
150			402.2											
	145.8-152.3 ft. Fresh, brecciated with superimposed calcite filled joints, light gray with green chloritic infillings, crystalline.		150.0	14	100				J,SM,Cal,FeO					Packer Test 8 149.5 - 170.5 3.1×10^{-7} cm/s
			400.2						F,IRR,Chl					
	MARBLEIZED DOLOSTONE. (FAULT BRECCIA)		152.3						J,ST,Chl CL,SM,Chl CL,SM,Chl					
155									CL,SM,Chl					
	152.3-170.5 ft. Fresh, locally brecciated, foliated and cleaved, cut by calcite veinlets, very fine grained, gray green, CHLORITIC DOLOMITIC CEMENTED (META) SILTSTONE.			15	100				CL,SM,Chl					
									CL,SM,Chl					
160									F,Sm,Cal					
	160.3-160.8 ft. Chlorite and calcite breccia zone.								J,SM,Cal J,SM,Cal					
165				16	95				J,ST,FeO,Cal					
									CL,SM,Cal					
									CL,SM,Chl					
									CL,SM,Chl					
170			384.4											
	BORING TERMINATED AT 170.5 FT. BELOW GROUND SURFACE.		170.5											
175														

DEPTH SCALE 1 inch to 3 feet
DRILLING CONTRACTOR Hydro Group
DRILLER F. Cornell

Golder Associates

LOGGED SHM
CHECKED RCFK
DATE 04/19/89

RECORD OF DRILLHOLE 312

SHEET 1 of 10

LOCATION Modern Landfill - N231960.16 E2325806.26
PROJECT No. 883-6158
INCLINATION 60. AZIMUTH 330

DRILLING DATE 1/09/89
DRILL RIG Acker

DATUM MSL

DEPTH SCALE FEET	DESCRIPTION (Ref. Elevation 540.0)	GRAPHIC LOG	ELEV. / DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DIP w.r.t. CORE AXIS	TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX	NOTES WATER LEVELS INSTRUMENTATION
0			540.0 / 0.0											
	Augered to 22.0 ft. 0.0 - 2.0: Soft, loose, trace organics, SILT (Soil) 2.0 -22.0: Compact to Dense, mottled, conglomerate pieces of dolostone in orange brown SILTY CLAY (ML).													
5														
10														
15														
20	22.0-41.5 ft. Slightly weathered, foliated, locally cleaved, banded with lenses of Dolomite and Phyllite, locally nodular, light gray, fine grained, DOLOMITIC PHYLLITE. Carbonate content ~ 40 %. Water bearing joint at 22.3 ft.		520.9 / 22.0	1	73				FOL,ST / U,SM,Fe					
									CL,ST / CL,SM					
									CL,ST / CL,ST,Fe					
25			518.3 / 25.0											

DEPTH SCALE 1 inch to 3 feet
DRILLING CONTRACTOR Hydro Group
DRILLER F. Cornell

Golder Associates

LOGGED SHM
CHECKED RCFK
DATE 1/31/89

RECORD OF DRILLHOLE 312

SHEET 2 of 10

LOCATION Modern Landfill - N231960.19 E2325805.26
PROJECT No. 883-6163
INCLINATION 60. AZIMUTH 330

DRILLING DATE 1/09/89
DRILL RIG Acker

DATUM MSL

DEPTH SCALE FEET	DESCRIPTION (Ref. Elevation 540.0)	GRAPHIC LOG	ELEV. / DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP W.R.T. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (psi)	NOTES: WATER LEVELS, INSTRUMENTATION
25			518.3											
	22.0-41.5 ft. Slightly weathered, foliated, locally cleaved, banded with lenses of Dolomite and Phyllite, locally nodular, light gray, fine grained, DOLOMITIC PHYLLITE. Carbonate content - 40%.		25.0	1	73				FOL,ST FOL,SM FOL,SM FOL,IRR					Packer Test 14 27.5 - 38.17 5.3×10^{-7} cm/s
30														Packer Test 13 29.5 - 40.17 3.7×10^{-7} cm/s
	At 32.3 ft. iron stained voids 0.5 inch long, 0.2 inch high, at 80 deg. to core axis, dipping 40 deg. south. Locally contains fresh pyrite grains.			2	100				FOL,SM FOL,SM FOL,ST CL,S CL,SM CL,SM CL,SM CL,SM CL,ST CL,ST CL,ST					
40			504.1						CL,SM J,SM,CAL					Packer Test 12 39.5 - 50.0 5.9×10^{-4} cm/s
	41.5-61.5 ft. Fresh, closely cleaved (Healed with quartz or calcite) weakly foliated, locally layered, light gray, fine grained, PHYLLITIC DOLOSTONE. Carbonate > 50% Contains abundant quartz veinlets which have been folded isoclinally. Phyllite lense at 48.7-49.0 ft.		41.5						CL,ST CL,ST CL,SM,CAL CL,ST,CAL CL,ST,CAL					
45				3	100				CL,SM CL,ST CL,SM					
									FOL,SM					
50	Continued on the next page.		496.7 50.0						CL,SM					

DEPTH SCALE 1 inch to 3 feet
DRILLING CONTRACTOR Hydro Group
DRILLER F. Cornell

Golder Associates

LOGGED SHM
CHECKED RCFK
DATE 1/31/89

RECORD OF DRILLHOLE 312

SHEET 3 of 10

LOCATION Modern Landfill - N23960.10 E232580.26
PROJECT No. 883-6158
INCLINATION 90. AZIMUTH 330

DRILLING DATE 1/09/89
DRILL RIG Acker

DATUM MSL

DEPTH SCALE FEET	DESCRIPTION Ref. Elevation 540.0	GRAPHIC LOG	ELEV. DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w/i CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (MPa)	NOTES WATER LEVELS INSTRUMENTATION
50			496.7 50.0											
	41.5-61.5 ft. Fresh, closely cleaved (Healed with quartz or calcite) weakly foliated, locally layered, light gray, fine grained, PHYLLITIC DOLOSTONE.			3	100%				F,IRR,1/8 Gouge J,SM,CAL CL,SM CL,ST J,IRR,FeO					W.L. 01/11/89 - 7:20am 19.4 ft. below G.S. Packer Test 11 49.5 - 60.0 1.1×10^{-3} cm/s
55	58.7-59.0 ft. Moderately weathered zone cut by open joints lined with calcite crystals, weathered zone also parallels foliation. Strike and dip of joint at 58.7 ft. N60E 30N			4	100				GLSBM FOL,ST CL,ST J,IRR:CAL/FeO J,IRR:CAL/FeO J,ST,FeO					W.L. 1/11/89- 1:15 p.m 18.27 ft. below G.S.
60			486.7 61.5						FOL,ST					Packer Test 10 59.5 - 70.0 4.8×10^{-4} cm/s
	61.5-88.0 ft. Fresh to slightly weathered (along joints), strongly foliated and cleaved, locally jointed, light gray to dark gray with bands of white quartz and calcite. DOLOMITIC PHYLLITE; Carbonate < 30% At 64.6 and 64.9 ft. water bearing joints, with FeO staining adjacent.								CL,SM J,SM,FeO,CAL J,SM,FeO,CAL					
65				5	100									
70									J,SM CL,SM,Gray Clay					Packer Test 9 69.5 - 90.5 1.1×10^{-6} cm/s
				6	98				GLSF,CAL GLSM,CAL					
75	Continued on the next page.		475.0 75.0											

DEPTH SCALE 1 inch to 2 feet
DRILLING CONTRACTOR Hydro Group
DRILLER F. Cornell

Golder Associates

LOGGED SHM
CHECKED RCFK
DATE 1/31/89

AR303294

RECORD OF DRILLHOLE 312

SHEET 4 of 10

LOCATION Modern Landfill - N231960.19 E232580.26
PROJECT No. 883.6158
INCLINATION 60. AZIMUTH 330

DRILLING DATE 1/09/89
DRILL RIG Acker

DATUM MSL

DEPTH SCALE FEET	DESCRIPTION	GRAPHIC LOG	ELEV. DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (psi)	NOTES WATER LEVELS INSTRUMENTATION
	Ref. Elevation 540.0													
75			475.0											
	81.5-88.0 ft. Fresh to slightly weathered (along joints), strongly foliated and cleaved, locally jointed, light gray to dark gray with bands of white quartz and calcite.		76.0						J,ST,CAL					
									J,SM,CAL					
									J,ST					
				6	98				J,IRR,CAL					
	76.3-77.3 Breccia zone infilled with calcite.													
80														
									J,IRR,CAL					
	83.1-83.7 ft. Open void running along fracture roughly parallel to cleavage and foliation.								J,SM,CAL					
				7	100									
85														
			463.8											
	88.0-110.0 ft. Fresh, alternating nodular to foliated to massive to locally brecciated MARBLEIZED DOLOSTONE (healed with calcite).		88.0						J,SM,CAL					
				8	100				FOL,SM					
90									J,SM					
														Packer Test 1 89.5 - 110.5 8.0×10^{-7} cm/s
									J,IRR,CAL					
	88.0-91.5 ft. Some small nodules. At 88.8 ft. open fracture lined with euhedral calcite crystals. Foliation at 54 deg. to core axis, dipping 66 deg. to south. Clay filled fractures at 89.1 ft.								J,SM,CAL					
									CL,ST,CAL					
									FOL,SM,Clay					
95									CL,ST					
				9	100									
	94.0-98.0 ft. Some silicification of carbonate.													
100	Continued on the next page.		453.4											
			100.0											

DEPTH SCALE 1 inch to 3 feet
DRILLING CONTRACTOR Hydro Group
DRILLER F. Cornell

Golder Associates

LOGGED SHM
CHECKED RCFK
DATE 1/31/89

RECORD OF DRILLHOLE 312

SHEET 6 of 10

LOCATION Modern Landfill - N231960.18 E2325806.26
PROJECT No. 883-6168
INCLINATION 90. AZIMUTH 330

DRILLING DATE 1/09/89
DRILL RIG Acker

DATUM MSL

DEPTH SCALE FEET	DESCRIPTION	GRAPHIC LOG	ELEV. / DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (MPa)	NOTES: WATER LEVELS, INSTRUMENTATION
	Ref. Elevation 540.0		453.4											
100	88.0-110.0 ft. Fresh, alternating nodular to foliated to massive to locally brecciated MARBLEIZED DOLOSTONE (healed with calcite).		100.0	9	100				CL,ST,CAL					
									FOL,ST					
105	101.5-110.0 ft. Small lenses of Marcasite/Pyrite up to 1 in long, 1/8 in. wide.			10	84				CL,ST					W.L. 01/13/89 - 7:15 AM 17.7 ft. below G.S.
110			444.7											
	110.0-170.0 ft. Fresh, locally, cut by abundant calcite filled gash fractures, foliated and cleaved, locally nodular, light to dark gray, PHYLLITIC DOLOSTONE.		110.0											Packer Test 2 109.5 - 130.5 1.1×10^{-6} cm/s
									CL,ST					
115	At 116.7-117.2 ft. Stylolite at 12 deg. to core axis with deformed calcite and black micas, it is cut by foliation and gash fractures.			11	100				J,IRR					
120														
	129.7-130.0 ft. Nodular dolostone is cut by closely spaced calcite filled fractures. Spacing as tight as 1/8 inch.								J,ST,CAL					
				12	100									
125	Continued on the next page.		431.7											
			125.0											

DEPTH SCALE 1 inch to 3 feet
DRILLING CONTRACTOR Hydro Group
DRILLER F. Cornell

Golder Associates

LOGGED SHM
CHECKED RCFK
DATE 1/31/89

RECORD OF DRILLHOLE 312

SHEET 6 of 10

LOCATION Modern Landfill - N231960.19 E2325805.26
PROJECT No. 883-6158
INCLINATION 60. AZIMUTH 330

DRILLING DATE 1/9/89
DRILL RIG Acker

DATUM MSL

Ref. Elevation 540.0

431.7
125.0

110.0-170.0 ft. Fresh, locally, cut by abundant calcite filled gash fractures, foliated and cleaved, locally nodular, light to dark gray, PHYLLITIC DOLOSTONE.

Small scale breccia zone at 141.2 ft, healed with mica and calcite.
Carbonate near 60%.
Gash fractures healed with calcite at 142.0-145.0 ft. and 149.0 ft.

Silicified zones at 146.2 and 146.5 ft.

Continued on the next page.

410.1
150.0

RUN No.	CORE RECOVERY	R.Q.D.
12	100	
13	99	
14	100	

DISCONTINUITY DATA

DIP w.r.t. CORE AXIS	TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG
	FOL, IRR, CAL	
	CL, IRR, CAL	
	FOL, IRR, CAL	
	FOL, IRR	
	FOL, IRR	
	FOL, IRR	
	CL, SM, CAL	

NOTES
WATER LEVELS
INSTRUMENTATION

W.L.
01/16/89 - 7:15 AM
17.6 ft. below G.S.

Packer Test 3
129.5 - 150.5
8.5×10^{-8} cm/s

DEPTH SCALE 1 inch to 3 feet
DRILLING CONTRACTOR Hydro Group
DRILLER F. Cornell

Golder Associates

LOGGED SHM
CHECKED RCFK
DATE 1/31/89

RECORD OF DRILLHOLE 312

SHEET 7 of 10

LOCATION Modern Landfill - N23980.19 E2325806.26
PROJECT No. 883-6168
INCLINATION 90. AZIMUTH 330

DRILLING DATE 1/09/89
DRILL RIG Acker

DATUM MSL

DEPTH SCALE FEET	DESCRIPTION (Ref. Elevation 540.0)	GRAPHIC LOG	ELEV. / DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (psi)	NOTES: WATER LEVELS, INSTRUMENTATION
150			410.1											
	110.0-170.0 ft. Fresh, locally, cut by abundant calcite filled gash fractures, foliated and cleaved, locally nodular, light to dark gray, PHYLLITE DOLOSTONE.		150.0											Packer Test 4 149.5 - 170.5 1.7×10^{-6} cm/s
	Nodular dolostone 150.0-153.5 ft.								Cl: IRR					
									Cl: IRR					
									FOL. IRR					
155	153.5-160.0 ft. Massive marbleized dolostone with calcite gash fractures.			15	100									W.L. 01/17/89 - 7:15 AM 18.3 ft.below G.S.
	Open fractures at 152.9-153.1 ft.													
									Vs SM/CS&L					
160														
									F.S.CAL					
165				16	100									
170			392.8											
	170.0-195.0 ft. Fresh, massive to weakly foliated and cleaved, locally banded with biotite rich zones, some calcite filled gash fractures, pyritic, light gray, MARBLIZED SANDY DOLOSTONE. (Possible recrystallized fault zone)		170.0	17	100									Packer Test 5 169.5 - 190.5 5.8×10^{-8} cm/s
175	Continued on the next page.		388.4											
			176.0											

DEPTH SCALE 1 inch to 3 feet
DRILLING CONTRACTOR Hydro Group
DRILLER F. Cornell

Golder Associates

LOGGED SHM
CHECKED RCFK
DATE 1/31/89

RECORD OF DRILLHOLE 312

SHEET 8 of 10

LOCATION Modern Landfill - N231960.19 E2325805.26
PROJECT No. 883-6158
INCLINATION 60. AZIMUTH 330

DRILLING DATE 1/09/89
DRILL RIG Acker

DATUM MSL

DEPTH SCALE, FEET	DESCRIPTION (Ref. Elevation 540.0)	GRAPHIC LOG	ELEV. / DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (psi)	NOTES: WATER LEVELS, INSTRUMENTATION
175	170.0-195.0 ft. Fresh, massive to weakly foliated and cleaved, locally banded with biotite rich zones, some calcite filled gash fractures, pyritic, light gray, SANDY DOLOSTONE.		388.4 175.0	17	100			90	CL, SM					
								90	CL, SM					
180														W.L. 01/18/89 - 7:15 AM 18.4 ft. below G.S.
								90	J, SM, PY, CAL					
								90	J, SM, CAL					
								90	J, ST, CAL					
185	187.0-190.0 ft. Myriad of healed fractures with microbreccia zones, filled with calcite. Carbonate < 70% increasing phyllite content.			18	100			90	CL; ST, MICA CL; SM, MICA					
								90	CL, SM, MICA					
190	Fractured zone continues from 190.0-193.2 ft. Fault breccia zone 1/2 in. thick at 45 deg. to core axis.							90	F, IRR, Gouge					Packer Test 6 189.5 - 210.5 1.3×10^{-8} cm/s
								90	CL, SM, CAL					
195	195.0-220.0 ft. Fresh, massive marbleized to weakly banded with small elliptical pods of pyrite grains, locally fracture healed by calcite, some weak cleavage DOLOSTONE.		371.1 195.0	19	100									
200	Continued on the next page.		366.8 200.0											

DEPTH SCALE 1 inch to 5 feet
DRILLING CONTRACTOR Hydro Group
DRILLER F. Cornell

Golder Associates

LOGGED SHM
CHECKED RCFK
DATE 1/31/89

RECORD OF DRILLHOLE 312

SHEET 9 of 10

LOCATION Modern Landfill - N231960.18 E2325805.28
PROJECT No. 883-6168
INCLINATION 90. AZIMUTH 330

DRILLING DATE 1/09/89
DRILL RIG Acker

DATUM MSL

DEPTH SCALE FEET	DESCRIPTION	GRAPHIC LOG	ELEV. DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP W.R.T. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (mpa)	NOTES WATER LEVELS INSTRUMENTATION
	Ref. Elevation 540.0		366.8											
200	196.0-220.0 ft. Fresh, massive marbleized to weakly banded with small elliptical pods of pyrite grains, locally fracture healed by calcite, some weak cleavage DOLOSTONE.		200.0											
	202.7-204.0 ft. healed fracture zone parallel to core axis.			20	100				CL,SM					W.L. 01/19/89 - 7:15am 18.7 ft. below G.S.
205									CL,ST					
									CL,ST,CAL					
210	210.0-220.0 ft. Water bearing fractures at 216.3,217.1, 217.3,217.4 ft. These joints are approximately perpendicular to fracture cleavage in dolostone.													Packer Test 7 209.5 - 230.5 7.9×10^{-4} cm/s
	Fracture cleavage at 210.0-212.0 ft. Massive dolostone with calcite stringers 212.0-216.0 ft. Fracture cleavage 216.0-218.0 ft.													
215				21	93				J,IRR,VUGGY					
	Water bearing fractures relative to regional cleavage planes are horizontal.								J,IRR,CAL					
									J,ST					
									J,ST,VUGGY					
	220.0-240.0 ft. Fresh, massive to weakly banded, locally fracture cleavage, light gray to brownish gray, locally silicified, very fine sulfides mixed with calcite gives banded texture, DOLOSTONE.		349.5											
220			220.0											
	221.7-222.0 ft. fracture cleavage at 42 deg. to core axis.			22	100				CL,IRR,CAL					
			345.1											
225			225.0											

DEPTH SCALE 1 inch to 3 feet
DRILLING CONTRACTOR Hydro Group
DRILLER F. Cornell

Golder Associates

LOGGED SHM
CHECKED RCFK
DATE 1/31/89

RECORD OF DRILLHOLE 312

SHEET 10 of 10

LOCATION Modern Landfill - N231960.19 E2325805.26
PROJECT No. 883-6158
INCLINATION 60. AZIMUTH 330

DRILLING DATE 1/09/89
DRILL RIG Acker

DATUM MSL

Ref. Elevation 540.0

DEPTH SCALE FEET	DESCRIPTION	ELEV. DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (psi)	NOTES WATER LEVELS INSTRUMENTATION
225	220.0-240.0 ft. Fresh, massive to weakly banded, locally fracture cleavage, light gray to brownish gray, locally silicified, very fine sulfides mixed with calcite gives banded texture, DOLOSTONE.	345.1 225.0	22	100				J,SM,CAL Gouge				W.L. 01/20/89 - 7:15 AM 18.6 ft. below G.S.
230								CL,SM				Packer Test 8 229.5 - 250.5 5.8×10^{-4} cm/s
235			23	100				CL,SM CL,SM,MICA CL,ST CL,C,CAL CL,C CL,SM CL,ST,CAL CL,SM,CAL				
240	240.0-250.0 ft. Fresh, myriad of healed fracture cleavage, locally brecciated weakly foliated, light gray with dark greenish gray partings, minor silification DOLOSTONE. At 249.6 ft. chlorite filled breccia zone at 17 deg. to core axis, dipping 83 deg. to north.	332.2 240.0						CL,SM CL,SM,MICA CL,S,MICA J,SM,CAL CL,SM,CAL				W.L. 1/23/89 - 7:30am 19.38 ft. below G.S.
245			24	99				J,S,CAL				
250	BORING TERMINATED AT 250.0 FT. BELOW GROUND SURFACE.	323.5 250.0						CL,S,MICA				

DEPTH SCALE 1 inch to 3 feet
DRILLING CONTRACTOR Hydro Group
DRILLER F. Cornell

Golder Associates

LOGGED SHM
CHECKED RCFK
DATE 1/31/89

AR303301

RECORD OF DRILLHOLE 316

SHEET 1 OF 7

LOCATION Modern Landfill - N230668.73 E236087.79
PROJECT No. 883-6152
INCLINATION 90 AZIMUTH 330

DRILLING DATE 03/14/89
DRILL RIG Acker

DATUM MSL

DEPTH SCALE FEET	DESCRIPTION	GRAPHIC LOG	ELEV. DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (psi)	NOTES WATER LEVELS INSTRUMENTATION
	Ref. Elevation 580.11													
0			580.1											
			0.0											
	Augered to 36.0 ft. below ground surface.													
	0.0 - 4.5: Soft, loose trace organics, SILTY CLAY (CL)													
	4.5 - 36.0 : Compact to dense foliated orange brown SILTY CLAY with PHYLLITE GRAVEL													
10														
20														
	Continued on the next page.		558.5											
			25.0											

DEPTH SCALE 1 inch to 5 feet
DRILLING CONTRACTOR Hydro Group
DRILLER F. Cornell

Golder Associates

LOGGED SHM
CHECKED RCFK
DATE 11/16/89

RECORD OF DRILLHOLE 316

SHEET 2 of 7

LOCATION Modern Landfill - N230686.73 E236087.79
PROJECT No. 883-6158
INCLINATION 60 AZIMUTH 330

DRILLING DATE 03/14/89
DRILL RIG Acker

DATUM MSL

DEPTH SCALE FEET	DESCRIPTION (Ref. Elevation 583.11)	GRAPHIC LOG	ELEV. DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (mPa)	NOTES: WATER LEVELS, INSTRUMENTATION
25	Continued from previous page.		558.9 25.0											
	4.5-36.0 ft. Compact to dense foliated orange brown SILTY CLAY with PHYLLITE GRAVEL													
30														
35			548.9											
	36.0-68.0 ft. Moderately to slightly weathered, banded, strongly foliated, locally folded by two generations (first generation isoclinal axial planes parallel to foliation, second small kink folds perpendicular to foliation) jointed with some quartz/calcite veinlets, light green, fine to medium grained, CHLORITIC PHYLLITE.		38.0						J,Vuggy,FeO J,ST,FeO J,SM,FeO Fo,SM,FeO Fo,SM,FeO Fo,SM,FeO Fo,SM,FeO					
40				1	89				Fo,SM,FeO J,SM,FeO Fo,SM					Packer Test 1 39.5 - 56.0 1.5×10^{-3} cm/s
									Fo,SM,FeO Fo,SM,FeO					
45	Isoclinal folds at 44.0-46.0 ft.								J,ST,FeO J,SM,FeO J,ST,FeO Fo,SM Fo,Vuggy,FeO Fo,SM,FeO J,SM,FeO					
				2	81				J,ST,FeO J,ST,FeO					
50	Continued on the next page.		536.8 60.0						CL,ST,FeO CL,ST,FeO					

DEPTH SCALE 1 inch to 3 feet
DRILLING CONTRACTOR Hydro Group
DRILLER F. Cornet

Golder Associates

LOGGED SHM
CHECKED RCFK
DATE 04/15/89

AR303303

RECORD OF DRILLHOLE 316

SHEET 3 of 7

LOCATION Modern Landfill - N230586.73 E2328087.79
PROJECT No. 883-6168
INCLINATION 90 AZIMUTH 330

DRILLING DATE 03/14/89
DRILL RIG Acker

DATUM MSL

DEPTH SCALE FEET	DESCRIPTION (Ref. Elevation 480.11)	GRAPHIC LOG	ELEV. DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (MPa)	NOTES: WATER LEVELS, INSTRUMENTATION
50			536.8											
	38.0-88.0 ft. Moderately to slightly weathered, banded, strongly foliated, locally folded by two generations (first generation isoclinal axial planes parallel to foliation, second small kink folds perpendicular to foliation) jointed with some quartz/calcite veinlets, light green, fine to medium grained, CHLORITIC PHYLLITE.		50.0						Fol,SM,FeO					Packer Test 2 49.5 - 76.5 6.6 x 10 $^{-7}$ cm/s
				2	81									
55	50.0-55.3 ft. 3 inch thick quartz vein mixed with chlorite, some voids up to 1/2 inch in diameter.								Fol,SM J,ST					W.L. 03/16/89 - 7:15am 23.67 ft. below G.S.
	58.0-60.0 ft. Calcite/ quartz veins parallel to foliation with voids after calcite generally less than 1/4 inch thick.								Fol,SM Fol,SM,FeO Fol,ST,FeO J,SM J,ST Fo,INR,FeO Fol,SM					
60				3	70									
	88.0-88.6 ft. Slightly weathered to fresh, banded, some isoclinal folds, strongly foliated, joints with some moderately weathered rock (voids after calcite) adjacent to joints, locally cleaved. Banded light green to white, fine grained, calcite banded, CHLORITIC PHYLLITE (up to 20% carbonate). Locally very fine grained garnets. Increasing proportion of quartz veins (8% of quartz veins generally calcite).		521.2 88.0						CL,SM,Cal					
65														
70				4	96				J,ST,FeO CL,ST					Packer Test 3 68.5 - 95.5 6.7 x10 $^{-6}$ cm/s
									J,SM					
									Fol,SM					
75	Continued on the next page.		515.2 75.0											

DEPTH SCALE 1 inch to 5 feet
DRILLING CONTRACTOR Hydro Group
DRILLER F. Cornell

Golder Associates

LOGGED SHM
CHECKED RCFK
DATE 04/16/89

RECORD OF DRILLHOLE 316

SHEET 4 of 7

LOCATION Modern Landfill - N2306885.73 E2326087.70
PROJECT No. 883-6158
INCLINATION 60 AZIMUTH 330

DRILLING DATE 03/14/89
DRILL RIG Acker

DATUM MSL

DEPTH SCALE FEET	DESCRIPTION (Ref. Elevation 580.11)	ELEV. DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP WRT CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (tsi)	NOTES WATER LEVELS INSTRUMENTATION
75		515.2											
		76.0	4	65				J,C					W.L. 03/17/89 - 7:00am 21.71 ft. below G.S
	78.0-80.6 ft. Slightly weathered to fresh, banded, some isoclinal folds, strongly foliated, joints with some moderately weathered rock (voids after calcite) adjacent to joints, locally cleaved. Banded light green to white, fine grained, calcite banded, CHLORITIC PHYLLITE (up to 20% carbonate). Locally very fine grained garnets.							J,SM,FeO					
								Fol,SM J,ST					
80								Fol,SM J,ST					
			5	74				Vn,SM J,ST,FeO Fol,ST,FeO Vn,IRR,Vuggy					
	Moderately weathered zone 80.7-83.1 ft.							Vn,ST,FeO Fol,SM,FeO					
	Core loss 83.1-85.5 ft.							Vn,SM,FeO Fol,SM,FeO					
85	85.7-86.8 ft. Milky white quartz vein with irregular cross-cutting contacts on top and bottom.							Fol,SM,FeO					
								Vn,IRR					
								Fol,SM					
								Fol,SM J,IRR,FeO J,SM,FeO Fol,ST,FeO					
90		501.7	6	95									Packer Test 4 88.5 - 115.5 5.8×10^{-5} cm/s
	90.5-104.5 ft. Fresh, strongly foliated, locally banded with calcite and quartz lenses parallel to foliation, locally kinked, folded perpendicular to foliation plane, dark green to light green, fine grained, chloritic, sericitic PHYLLITE.	90.6											
95								Fol,SM,Chl,PY					W.L. 3/20/89 9:45 a.m 21.79 ft. bewlow G.S.
			7	7.8									
100	Continued on the next page.	493.5											
		100.0											

DEPTH SCALE 1 inch to 3 feet
DRILLING CONTRACTOR Hydro Group
DRILLER F. Cornell

Golder Associates

LOGGED SHM
CHECKED RCFK
DATE 04/15/89

RECORD OF DRILLHOLE 316

SHEET 5 of 7

LOCATION Modern Landfill - N230565.73 E2326087.79
PROJECT No. 883-6158
INCLINATION 90 AZIMUTH 330

DRILLING DATE 03/14/89
DRILL RIG Acker

DATUM MSL

W.L.
03/20/89 - 7:00am
25.16 ft.

DEPTH SCALE FEET	DESCRIPTION Ref. Elevation 630.11	GRAPHIC LOG	ELEV. DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (MPa)	NOTES WATER LEVELS INSTRUMENTATION
100			493.5											
	90.6-104.6 ft. Fresh, strongly foliated, locally banded with calcite and quartz lenses parallel to foliation, locally kinked folded perpendicular to foliation plane, dark green to light green, fine grained, chloritic, sericitic PHYLLITE.		100.0	7	7.8				J,SM					
			489.6											
105	Run seven containing abundant mechanical fractures parallel to foliation. Foliation at 42 deg. to 48 deg. to core axis.		104.5						CL,IRR,Chl					W.L. 03/22/89 - 7:00am 21.04 ft. B.G.S.
			487.0						F,SM,S Vn,SM					
	104.6-107.6 ft. Fresh, 0.2 ft. bands, strongly foliated and cleaved, locally cut by veinlets, alternating light green and white lenses and pods, fine to medium grained calcitic, chloritic, sericitic PHYLLITE.		107.6											
110				8	96									Packer Test 5 108.5-135.5
			483.5						J,SM,FeO					W.L. 3/23/89 21.04 ft. B.G.S.
			111.5						Fol,SM,FeO					
									S,Fol,SM					
	107.6-111.5 ft. Fresh, locally concoidal fracture, jointed, massive, white quartz vein.		481.9						Vn,SM					
			113.4						S,Vn,IRR					
115									S,CL,SM					
	111.5-113.4 ft. Slightly weathered to fresh, strongly foliated, banded with calcite and quartz, locally cleaved, minor kink folds, light green and white, fine grained chloritic PHYLLITE.								Fol,SM					
									S,Fol,SM					
									Vn,SM					
									Vn,SM					
	113.4-114.6 ft. Quartz vein.													
120	114.6-155.5 ft. Fresh, strongly foliated, banded, locally isoclinely folded, minor quartz veins, dark green, medium grained, CHLORITIC PHYLLITE.			9	75				Fol,SM					
									Fol,SM					
	117.0-118.0 ft. Lenses of pure chlorite.													
125	Continued on the next page.		471.9											
			125.0											

DEPTH SCALE 1 inch to 3 feet
DRILLING CONTRACTOR Hydro Group
DRILLER F. Cornell

Golder Associates

LOGGED SHM
CHECKED RCFK
DATE 04/15/89

RECORD OF DRILLHOLE 3[illegible]

SHEET 6 of 7

LOCATION Modern Landfill - N230586.73 E2326087.79
PROJECT No. 883-6168
INCLINATION 60 AZIMUTH 330

DRILLING DATE 03/14/89
DRILL RIG Acker

DATUM MSL

DEPTH SCALE FEET	DESCRIPTION (Ref. Elevation 680.11)	GRAPHIC LOG	ELEV. / DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (psi)	NOTES: WATER LEVELS, INSTRUMENTATION
125	114.6-155.5 ft. Fresh, strongly foliated, banded, locally isoclinely folded, minor quartz veins, dark green, medium grained, CHLORITIC PHYLLITE.		471.9 / 125.0						CL, ST					
									J, ST					
130									Fol, SM					
				10	100				CL, IRR					W.L. 03/27/89 - 7:00am 19.75 ft. below G.S.
									J, SM / Fol, SM					
									Fol, SM					Packer Test 6 128.5 - 155.5 1.8×10^{-6} cm/s
	Abundant mechanical fractures along foliation.								CL, SM / Fol, SM					
135														
									CL, SM					
									Fol, SM					
	137.8-139.5 ft. Calcite band increases $CaCO_3$ content up to 30% of rock.								Fol, SM					
140									CL, SM					
				11	88				Fol, SM					
									Fol, SM					
									CL, SM					
	143.0-155.5 ft. Calcite/ quartz bands become less than 5% of rock volume.								CL, SM					
145														
									CL, SM					
				12	100									
150	Continued on the next page.		450.2 / 150.0											

DEPTH SCALE 1 inch to 3 feet
DRILLING CONTRACTOR Hydro Group
DRILLER F. Cornell

Golder Associates

LOGGED SHM
CHECKED RCFK
DATE 04/16/89

AR303387

RECORD OF DRILLHOLE 316

LOCATION Modern Landfill - N230686.73 E2328087.79
PROJECT No. 883-6152
INCLINATION 60 AZIMUTH 330

DRILLING DATE 03/14/89
DRILL RIG Acker

DATUM MSL

DEPTH SCALE FEET	DESCRIPTION Ref. Elevation	GRAPHIC LOG	ELEV. DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: SP w.r.t. BOREHOLE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (psi)	NOTES WATER LEVELS INSTRUMENTATION
160			450.2											
	114.8-155.5 ft. Fresh, strongly foliated, banded, locally isoclinely folded, minor quartz veins, dark green, medium grained, CHLORITIC PHYLLITE.		160.0	12	100				Fol.SM					W.L. 03/28/89 - 7:00am 19.99 ft. below G.S.
165			445.4											
	BORING TERMINATED AT 155.5 FT. BELOW GROUND SURFACE.		155.5											
180														
185														
170														

DEPTH SCALE 1 inch to 3 feet
DRILLING CONTRACTOR Hydro Group
DRILLER F. Carnell

Golder Associates

LOGGED SHM
CHECKED RCFK
DATE 04/15/89

AR303308

RECORD OF DRILLHOLE 318

SHEET 1 of 6

LOCATION Modern Landfill - N229278.23 E232576137
PROJECT No. 883-6158
INCLINATION 60 AZIMUTH 330

DRILLING DATE 03/20/89
DRILL RIG GP Brat 22R

DATUM MSL

DEPTH SCALE FEET	DESCRIPTION Ref. Elevation 639.68	GRAPHIC LOG	ELEV. DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w/r CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (psi)	NOTES WATER LEVELS INSTRUMENTATION
0			639.7											
	Augered to 49.0 ft. below ground surface.		0.0											
	0.0 - 4.0: Soft, loose, trace organics, SILTY CLAY CLAY (Soil) (ML)													
5	4.0 - 49.0: Compact to Dense, foliated, orange brown, completely weathered PHYLLITE													
10														
15														
20														
25	Continued on the next page.		618.0 25.0											

DEPTH SCALE 1 inch to 5 feet
DRILLING CONTRACTOR Hydro Group
DRILLER J. Arnett

Golder Associates

LOGGED ALC
CHECKED RCFK
DATE 11/16/89

RECORD OF DRILLHOLE 318

SHEET 2 of 8

LOCATION Modern Landfill - N229278.23 E232576.37
PROJECT No. 883-6158
INCLINATION 60 AZIMUTH 330

DRILLING DATE 03/20/89
DRILL RIG GP Brat 22R

DATUM MSL

DEPTH SCALE FEET	DESCRIPTION Ref. Elevation 639.68	GRAPHIC LOG	ELEV. / DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP W.R.T. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (tsf)	NOTES WATER LEVELS INSTRUMENTATION
25	Continued from previous page.		618.0 25.0											
30	4.0-49.0 ft. Compact to dense, foliated, orange brown, completely weathered PHYLLITE													
35														
40														
45														
50	49.0-69.2 ft. Slightly to moderately weathered, strongly foliated, locally banded, greenish-gray, fine grained, PHYLLITE. Water bearing zone with FeO staining along foliation and joint surfaces.		596.4 50.0											

DEPTH SCALE 1 inch to 5 feet
DRILLING CONTRACTOR Hydro Group
DRILLER J. Arnett

Golder Associates

LOGGED ALC
CHECKED RCFK
DATE 11/16/89

RECORD OF DRILLHOLE 318

SHEET 3 of 6

LOCATION Modern Landfill - N229279.23 E232576.37
PROJECT No. 883-6168
INCLINATION 60 AZIMUTH 000

DRILLING DATE 03/20/89
DRILL RIG GP Brat 22R

DATUM MSL

DEPTH SCALE FEET	DESCRIPTION (Ref. Elevation 639.68)	GRAPHIC LOG	ELEV. DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP W.R.T. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (psi)	NOTES: WATER LEVELS, INSTRUMENTATION
50			596.4											
	49.0-69.2 ft. Slightly to moderately weathered, strongly foliated, locally banded, greenish-gray, f grained, PHYLLITE. Water bearing zone with FeO staining along foliation and joint surfaces.		50.0						Fol,PL,SM,FeO Fol,PL,SM,FeO Fol,PL,SM,FeO					W.L. 03/20/89 - 12:30pm 10.52 ft. below G.S. Packer Test 1 52.0 - 69.0 6.7×10^{-5} cm/s
55	Core Loss 53.7-59.0 ft. 63.6-69.0 ft. Rock becomes less fractured at 69.2 ft.			1 47										
60									Fol,PL,SM,FeO Fol,PL,SM,FeO Fol,PL,SM,FeO Fol,PL,SM,FeO Fol,PL,SM,FeO					W.L. 03/21/89 - 8:30am 17.62 ft. below G.S. Packer Test 2 68.0 - 89.0 3.3×10^{-5} cm/s
65	69.2-133.2 ft. Fresh, strongly foliated, locally banded, greenish-gray, fine grained, PHYLLITE with calcite and quartz veins. No evidence of water bearing zones.		579.8 69.2	2 48					Fol,PL,SM,FeO					
70				3 58					Fol,I,SM Fol,PL,SM Fol,PL,SM					
75	Continued on the next page.		574.7 75.0											W.L. 3/21/89-2:20 p.m 17.51 ft. below G.S.

DEPTH SCALE 1 inch to 5 feet
DRILLING CONTRACTOR Hydro Group
DRILLER J. Arnett

Golder Associates

LOGGED ALC
CHECKED SHM
DATE 04/14/89

RECORD OF DRILLHOLE 318

SHEET 4 of 6

LOCATION Modern Landfill - N8292783.23 E2326761.37
PROJECT No. 883-6168
INCLINATION 90 AZIMUTH 000

DRILLING DATE 03/20/89
DRILL RIG GP Brat 22R

DATUM MSL

DEPTH SCALE FEET	DESCRIPTION	ELEV. DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (psi)	NOTES: WATER LEVELS, INSTRUMENTATION
	Ref. Elevation 649.05	574.7											
75	69.2-133.2 ft. Fresh, strongly foliated, locally banded, greenish-gray, fine grained, PHYLLITE with calcite and quartz veins. No evidence of water bearing zones.	75.0											
	Core Loss 74.8-79.0 ft.		3	68				Fol,PL,SM					W.L. 03/22/89 - 8:09am 17.88 ft. below G.S.
80								Fol,U,SM					
								Fol,PL,SM					
			4	95									
85								Fol,I,SM,FeO					
													Packer Test 3 88.0 - 109.0 9.3×10^{-6} cm/s
90								Fol,PL,SM					
								Fol,ST,SM					
								Fol,PL,SM					
								Fol,PL,SM					
			5	100									
95													
								Fol,PL,SM					
								Fol,PL,SM					
			6	97									
100	Continued on the next page.	553.1 100.0											

DEPTH SCALE 1 inch to 3 feet
DRILLING CONTRACTOR Hydro Group
DRILLER J. Arnett

Golder Associates

LOGGED ALC
CHECKED SHM
DATE 04/14/89

RECORD OF DRILLHOLE 318

SHEET 5 of 6

LOCATION Modern Landfill - N229278.23 E229277.48
PROJECT No. 883-6168
INCLINATION 60 AZIMUTH 000

DRILLING DATE 03/20/89
DRILL RIG GP Brat 22R

DATUM MSL

DEPTH SCALE FEET	DESCRIPTION Ref. Elevation 639.68	GRAPHIC LOG	ELEV. DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (MPa)	NOTES WATER LEVELS INSTRUMENTATION
100	89.2-133.2 ft. Fresh, strongly foliated, locally banded, greenish-gray, fine grained, PHYLLITE with calcite and quartz veins. No evidence of water bearing zones.		553.1 100.0						Fol,I,SM Fol,PL,SM					
105				6 97					Fol,PL,SM,P Fol,PL,SM					
110	111.1-111.5 ft. Quartz and calcite veins. 112.4-114.0 ft. Isoclinal folds. 113.8-114.3 ft. Quartz and calcite veins. 117.0-119.0 ft. Quartz and calcite veins. 120.6-123.7 ft. Quartz and calcite veins, isoclinal folds.								Fol,PL,SM Fol,C,SM Fol,PL,SM Fol,ST,SM					Packer Test 4 108.0 - 129.0 2.8×10^{-5} cm/s
115									Fol,PL,SM					
120				7 98					Fol,PL,SM J,P CL,P					
125	Continued on the next page.		531.4 125.0											

DEPTH SCALE 1 inch to 3 feet
DRILLING CONTRACTOR Hydro Group
DRILLER J. Arnett

Golder Associates

AR303313

LOGGED ALC
CHECKED SHM
DATE 04/14/89

RECORD OF DRILLHOLE 318

SHEET 6 of 6

LOCATION Modern Landfill - N22927823 E2326761.37
PROJECT No. 883-6158
INCLINATION 90 AZIMUTH 000

DRILLING DATE 03/20/89
DRILL RIG GP Brat 22R

DATUM MSL

DEPTH SCALE FEET	DESCRIPTION (Ref. Elevation 639.68)	GRAPHIC LOG	ELEV. DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (MPa)	NOTES WATER LEVELS INSTRUMENTATION
125			531.4											
	69.2-133.2 ft. Fresh, strongly foliated, locally banded, greenish-gray, fine grained, PHYLLITE with calcite and quartz veins. No evidence of water bearing zones.		125.0	8	98				Fol,PL,SM					
									Fol,C,SM					
									Fol,PL,SM					
130									J,ST,SM					
									Fol,PL,SM					
				9	100				Fol,PL,SM					
									CL,C,SM					
			524.3						Fol,PL,SM					
			133.2											
	BORING TERMINATED AT 133.2 FT. BELOW GROUND SURFACE.													
135														
140														
145														
150														

DEPTH SCALE 1 inch to 3 feet
DRILLING CONTRACTOR Hydro Group
DRILLER J. Arnett

Golder Associates

LOGGED ALC
CHECKED SHM
DATE 04/14/89

RECORD OF DRILLHOLE C-12

SHEET 1 of 3

LOCATION Modern Landfill - N231647.46 E2324495.61
PROJECT No. 883-6168
INCLINATION -90 AZIMUTH 000

DRILLING DATE
DRILL RIG

DATUM MSL

DEPTH SCALE FEET	DESCRIPTION	GRAPHIC LOG	ELEV. / DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. COREAXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (Is50)	NOTES WATER LEVELS INSTRUMENTATION
	Ref. Elevation 545													
0			545.0 / 0.0											
	0.0-49.3 ft. Overburden													
5														
10														
15														
20														
25	Continued on the next page.		520.0 / 25.0											

DEPTH SCALE 1 inch to 3 feet
DRILLING CONTRACTOR R. E. Wright
DRILLER

Golder Associates

LOGGED SHM
CHECKED RCFK
DATE 11/17/89

RECORD OF DRILLHOLE C-12

SHEET 2 of 3

LOCATION Modern Landfill - N231647.48 E2324496.81
PROJECT No. 883-6158
INCLINATION -90 AZIMUTH 000

DRILLING DATE
DRILL RIG

DATUM MSL

DEPTH SCALE FEET	DESCRIPTION	GRAPHIC LOG	ELEV. DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (psi)	NOTES WATER LEVELS INSTRUMENTATION
	Ref. Elevation 545.0													
25	0-49.0 ft. Overburden		520.0 25.0											
30														
35														
40														
45	49.3-60.0 ft. Slightly to moderately weathered, massive to weakly banded, cut by discordant calcite stringers and veins, light orange to tan, fine grained, micaceous DOLOMITIC SILTSTONE.			1	2.4									
50	Continued on the next page.		495.0 50.0											

DEPTH SCALE 1 inch to 3 feet
DRILLING CONTRACTOR R. E. Wright
DRILLER

Golder Associates

LOGGED SHM
CHECKED RCFK
DATE 11/17/89

RECORD OF DRILLHOLE C-12

SHEET 3 of 3

LOCATION Modern Landfill - N231647.46 E2324495.61
PROJECT No. 883-6158
INCLINATION -90 AZIMUTH 000

DRILLING DATE
DRILL RIG

DATUM MSL

DEPTH SCALE FEET	DESCRIPTION Ref. Elevation 545	GRAPHIC LOG	ELEV. DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (tsf)	NOTES WATER LEVELS INSTRUMENTATION
50	Coring started at 49.3 ft. below ground surface. 49.3-60.0 ft. Slightly to moderately weathered, massive to weakly banded, cut by discordant calcite stringers and veins, light orange to tan, fine grained, micaceous DOLOMITIC SILTSTONE.		495.0 50.0	1	2.4									
55									CL, SM CL, ST J, SM, FeO CL, SM					
60			485.0 60.0	2	60									
	BORING TERMINATED AT 60.0 FT. BELOW GROUND SURFACE.													
65														
70														
75														

DEPTH SCALE 1 inch to 3 feet
DRILLING CONTRACTOR R. E. Wright
DRILLER

Golder Associates

LOGGED SHM
CHECKED RCFK
DATE 1/23/89

RECORD OF DRILLHOLE C-13

SHEET 1 of 4

LOCATION Modern Landfill - N23634.45 E2324908.90
PROJECT No. 883-6168
INCLINATION -90 AZIMUTH 000

DRILLING DATE
DRILL RIG

DATUM MSL

DEPTH SCALE FEET	DESCRIPTION Ref. Elevation 536.1	GRAPHIC LOG	ELEV. DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (psi)	NOTES WATER LEVELS INSTRUMENTATION
0			536.1											
	0.0-29.0 ft. OVERBURDEN		0.0											
5														
10														
15														
20														
25	Continued on the next page.		511.1 25.0											

DEPTH SCALE 1 inch to 3 feet
DRILLING CONTRACTOR R. E. Wright
DRILLER

Golder Associates

AR303318

LOGGED SHM
CHECKED RCFK
DATE 1/23/89

RECORD OF DRILLHOLE C-13

SHEET 2 of 4

LOCATION Modern Landfill - N251634.45 E2324906.90 | DRILLING DATE | DATUM MSL

PROJECT No. 883-6158 | DRILL RIG

INCLINATION -90 AZIMUTH 000

DEPTH SCALE FEET	DESCRIPTION (Ref. Elevation 536.1)	ELEV. / DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP W.R.T. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (psi)	NOTES: WATER LEVELS, INSTRUMENTATION
25	Continued from previous page. 0-29.0 ft. Overburden	511.1 / 25.0											
		507.1 / 29.0											
30	29.0-40.0 ft. Moderately weathered, slatey cleavage, locally brecciated, very light gray to dark gray, very fine grained, SLATE.		1	50									
			2	100			•	J, SM, FeO					
			3	100			•	J, SM, FeO					
35													
			4	75									
40		496.1 / 40.0											
	40.0-43.0 ft. NO RECOVERY		5	0									
		493.1 / 43.0											
45	43.0-50.8 ft. Moderately to highly weathered, finely laminated to massive, closely jointed, gray to dark orange brown, fine grained, SLATE.		6	50									
			7	.6									
50	Continued on the next page.	496.1 / 50.0											

DEPTH SCALE 1 inch to 3 feet

DRILLING CONTRACTOR R. E. Wright

DRILLER

Golder Associates

LOGGED SHM

CHECKED RCFK

DATE 1/23/89

RECORD OF DRILLHOLE C-13

SHEET 3 of 4

LOCATION Modern Landfill
PROJECT No. 883-6158
INCLINATION -90 AZIMUTH 000

DRILLING DATE
DRILL RIG

DATUM MSL

DEPTH SCALE FEET	DESCRIPTION	GRAPHIC LOG	ELEV. DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (psi)	NOTES WATER LEVELS INSTRUMENTATION
40	40.0-43.0 ft. NO RECOVERY		40.0	5	0									
45	43.0-60.8 ft. Moderately to highly weathered, finely laminated to massive, closely jointed, gray to dark orange brown, fine grained, SLATE.		43.0	6	60									
				7	.8									
55				8	0									
60	Continued on the next page.		60.0											

DEPTH SCALE 1 inch to 5 feet
DRILLING CONTRACTOR R. E. Wright
DRILLER

Golder Associates

AR303320

LOGGED SHM
CHECKED RCFK
DATE 1/23/89

RECORD OF DRILLHOLE C-13

SHEET 4 of 4

LOCATION Modern Landfill - N231634.45 E2324906.90
PROJECT No. 883-6158
INCLINATION -90 AZIMUTH 000

DRILLING DATE
DRILL RIG

DATUM MSL

DEPTH SCALE FEET	DESCRIPTION (Ref. Elevation 536.1)	GRAPHIC LOG	ELEV. DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (psi)	NOTES WATER LEVELS INSTRUMENTATION
50			486.1											
	43.0-60.8 ft. Moderately to highly weathered, finely laminated to massive, closely jointed, gray to dark orange brown, fine grained, SLATE.		60.0	7	6									
55				8	0									
60			475.3											
	BORING TERMINATED AT 60.8 FT. BELOW GROUND SURFACE.		60.8											
65														
70														
75														

DEPTH SCALE 1 inch to 3 feet
DRILLING CONTRACTOR R. E. Wright
DRILLER

Golder Associates

LOGGED SHM
CHECKED RCFK
DATE 1/23/89

AR303321

RECORD OF DRILLHOLE C-18D

SHEET 1 of 3

LOCATION Modern Landfill - N231347.30 E2324040.15 DRILLING DATE

DATUM MSL

PROJECT No. 883-6168 DRILL RIG

INCLINATION -90 AZIMUTH 000

DEPTH SCALE FEET	DESCRIPTION	GRAPHIC LOG	ELEV. DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRIAL POINT LOAD INDEX (psi)	NOTES WATER LEVELS INSTRUMENTATION
	Ref. Elevation 516.6		516.6											
0			0.0											
	0.0-34.0 ft. OVERBURDEN													
5														
10														
15														
20	Continued on the next page.		496.6 20.0											

DEPTH SCALE 1 inch to 3 feet

DRILLING CONTRACTOR R. E. Wright

DRILLER

Golder Associates

LOGGED SHM

CHECKED RCFK

DATE 1/24/89

RECORD OF DRILLHOLE C-18D

SHEET 2 of 3

LOCATION Modern Landfill - N231347.30 E2324040.15 DRILLING DATE
PROJECT No. 883-6158 DRILL RIG
INCLINATION -90 AZIMUTH 000
DATUM MSL

DEPTH SCALE FEET	DESCRIPTION	GRAPHIC LOG	ELEV. DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w/ L COREAXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (psi)	NOTES WATER LEVELS INSTRUMENTATION
	Ref. Elevation 516.6													
20			496.6											
	0-34.0 ft. Overburden		20.0											
25														
30														
			482.6											
			34.0											
35	Coring started at 34.0 ft. below ground surface.								J,ST,FeO					
	34.0-45.5 ft. Moderately to slightly weathered, massive, closely jointed, white to tan with iron staining, medium grained, MARBLEIZED DOLOSTONE.								J,ST,FeO					
				1	100				J,SM,FeO					
									J,SM,FeO					
									J,SM,Cal					
									J,ST,FeO					
				2	100									
40	Continued on the next page.		476.6											
			40.0											

DEPTH SCALE 1 inch to 3 feet
DRILLING CONTRACTOR R. E. Wright
DRILLER

Golder Associates

LOGGED SHM
CHECKED RCFK
DATE 1/24/89

RECORD OF DRILLHOLE C-18D

SHEET 3 of 3

LOCATION Modern Landfill - N231347.30 E2324040.15 DRILLING DATE DATUM MSL

PROJECT No. 883-8152 DRILL RIG

INCLINATION -88 AZIMUTH 000

DEPTH SCALE FEET	DESCRIPTION	GRAPHIC LOG	ELEV. / DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (MPa)	NOTES WATER LEVELS INSTRUMENTATION
	Ref. Elevation 516.6													
40			476.6											
	At 40.3 ft., vuggy voids formed along vertical joints.		40.0						VOID, IRR, FeO					
									J,ST,FeO					
									J,ST					
				2	100				J,SM,Cal					
									J,SM,Cal					
									J,ST,Cal					
									J,SM,Cal,Mica					
45			471.1											
	45.5-46.9 ft. Moderately weathered, weakly foliated, closely jointed, discordant calcite veinlets, medium grained, rusty brown, micaceous. CALCAREOUS SANDSTONE.		45.5	3	66									
			469.7											
			46.9											
			467.6											
	BORING TERMINATED AT 49.0 FT. BELOW GROUND SURFACE.		49.0											
50														
55														
60														

DEPTH SCALE 1 inch to 3 feet

DRILLING CONTRACTOR R. E. Wright

DRILLER

Golder Associates

LOGGED SHM

CHECKED RCFK

DATE 1/24/89

RECORD OF DRILLHOLE C-19-S

SHEET 1 of 2

LOCATION Modern Landfill - N23142L71 E2324356.16
PROJECT No. 883-6158
INCLINATION -90 AZIMUTH 000

DRILLING DATE
DRILL RIG

DATUM MSL

DEPTH SCALE FEET	DESCRIPTION Ref. Elevation 622.7	GRAPHIC LOG	ELEV. / DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (Is50)	NOTES WATER LEVELS INSTRUMENTATION
0			622.7											
	0.0-19.0 ft. OVERBURDEN		0.0											
5														
10														
15			503.7											
20	Coring started at 19.0 ft. below ground surface. 19.0-34.0 ft. Moderately to slightly weathered, cleaved to massive jointed, light gray with rusty brown weathered along some cleavages. PHYLLITIC to SILTY DOLOSTONE. Carbonate content <30%.		19.0	1	82				CL,ST,FeO J,SM,Cal CL,ST,FeO,Cal CL,ST					
25			497.7 25.0	2	100									

DEPTH SCALE 1 inch to 5 feet
DRILLING CONTRACTOR R. E. Wright
DRILLER

Golder Associates

LOGGED SHM
CHECKED RCFK
DATE 1/24/89

RECORD OF DRILLHOLE C-19-S

SHEET 2 of 2

LOCATION Modern Landfill - N2314217.1 E2324355.16 | DRILLING DATE | DATUM MSL

PROJECT No. 883-6168 | DRILL RIG

INCLINATION -90 AZIMUTH 000

DEPTH SCALE FEET	DESCRIPTION (Ref. Elevation 522.70)	GRAPHIC LOG	ELEV. DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w/r/t CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (psi)	NOTES WATER LEVELS INSTRUMENTATION
25			497.7											
	19.0-34.0 ft. Slightly to moderately weathered, very closely cleaved and foliated, closely jointed, light gray with rusty brown weathering along cleavage planes, PHYLLITIC COLOSTONE.		25.0	2	100			E	J,SM,Cal					
									J,SM,Cal					
									J,ST,FeO					
30									J,ST,Cal					
				3	84				J,SM,FeO					
									J,SM,FeO					
			488.7											
	BORING TERMINATED AT 34.0 FT. BELOW GROUND SURFACE.		34.0											
35														
40														
45														
50														

DEPTH SCALE 1 inch to 5 feet

DRILLING CONTRACTOR R. E. Wright

DRILLER

Golder Associates

AR303326

LOGGED SHM

CHECKED RCFK

DATE 1/24/89

RECORD OF DRILLHOLE C-20

SHEET 1 of 6

LOCATION Modern Landfill - N231616.83 E2325035.85
PROJECT No. 883-6158
INCLINATION -90 AZIMUTH 000

DRILLING DATE
DRILL RIG

DATUM MSL

DEPTH SCALE FEET	DESCRIPTION (Ref. Elevation 544.80)	GRAPHIC LOG	ELEV. DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (psi)	NOTES WATER LEVELS INSTRUMENTATION
0			544.8											
	0.0-82.5 ft. Overburden		0.0											
5														
10														
15														
20														
25	Continued on the next page.		519.8 25.0											

DEPTH SCALE 1 inch to 3 feet
DRILLING CONTRACTOR R. E. Wright
DRILLER

Golder Associates

LOGGED SHM
CHECKED RCFK
DATE 1/24/89

RECORD OF DRILLHOLE C-20

SHEET 2 of 8

LOCATION Modern Landfill - N23516.83 E2325035.85
PROJECT No. 883-6158
INCLINATION -90 AZIMUTH 000

DRILLING DATE
DRILL RIG

DATUM MSL

DEPTH SCALE FEET	DESCRIPTION Ref. Elevation 644.8Q	GRAPHIC LOG	ELEV. DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (Is)	NOTES WATER LEVELS INSTRUMENTATION
25	Continued from previous page. 0-82.5 ft. Overburden		619.8 25.0											
30														
35														
40														
45														
50			494.8 50.0											

DEPTH SCALE 1 inch to 5 feet
DRILLING CONTRACTOR R. E. Wright
DRILLER

Golder Associates

AR303328

LOGGED SHM
CHECKED RCFK
DATE 1/24/89

RECORD OF DRILLHOLE C-20

SHEET 3 of 6

LOCATION Modern Landfill - N231516.83 E2326035.85
PROJECT No. 893-6168
INCLINATION -90 AZIMUTH 000

DRILLING DATE
DRILL RIG

DATUM MSL

DEPTH SCALE FEET	DESCRIPTION (Ref. Elevation 544.80)	GRAPHIC LOG	ELEV. DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (psi)	NOTES WATER LEVELS INSTRUMENTATION
50	Continued from previous page.		494.8 50.0											
	0-82.5 ft. Overburden													
55														
60														
65														
70														
75			469.8 75.0											

DEPTH SCALE 1 inch to 3 feet
DRILLING CONTRACTOR R. E. Wright
DRILLER

Golder Associates

LOGGED SHM
CHECKED RCFK
DATE 1/24/89

RECORD OF DRILLHOLE C-20

SHEET 4 of 6

LOCATION Modern Landfill - N231518.83 E2325036.85 | DRILLING DATE | DATUM MSL

PROJECT No. 883-8168 | DRILL RIG

INCLINATION -90 AZIMUTH 000

DEPTH SCALE FEET	DESCRIPTION Ref. Elevation 644.80	GRAPHIC LOG	ELEV. DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (psi)	NOTES WATER LEVELS INSTRUMENTATION
75	0-82.5 ft. Overburden		75.0											
80														
	Coring started at 82.5 ft.		82.5											
	82.5-84.5 ft. Moderately weathered, spletchy weathering, with white calcite spletches surrounded by rusty brown weathered zones, entire mass cut by irregular pattern of calcite stringers. Entire rock (weathered and unweathered reacts with HCL). Some brecciated portions, marblized LIMESTONE BRECCIA with calcite cemented silty brown zones.			1	1.3			•	J,Sm,Clay,Calc					
85			84.5											
	84.5-93.8 ft. VOID, no return													
90														
	93.8-95.8 ft. Moderately to slightly weathered, cleaved and jointed, some spletchy weathering with white marble and rusty brown silt zones. Increasing dolomite content.		93.8	2	2			•	J,Sm,Cal J,Sm,Clay,Cal					
95			95.8											
	95.8-118.5 ft. VOID, no recovery.													
100	Continued on the next page.		100.0											

DEPTH SCALE 1 inch to 3 feet

DRILLING CONTRACTOR R. E. Wright

DRILLER

Golder Associates

LOGGED SHM

CHECKED RCFK

DATE 1/24/89

RECORD OF DRILLHOLE C-20

SHEET 5 of 6

LOCATION Modern Landfill - N231516.83 E2325035.85 DRILLING DATE 1/24/89 DATUM MSL

PROJECT No. 883-6168 DRILL RIG

INCLINATION AZIMUTH

DEPTH SCALE FEET	DESCRIPTION	GRAPHIC LOG	ELEV. DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (psi)	NOTES WATER LEVELS INSTRUMENTATION
	Ref. Elevation 544.80													
100	95.8-119.5 ft. Void No recovery		444.8 100.0											
105														
110														
115														
120	119.6-127.7 ft. Slightly weathered to fresh; jointed, locally nodular, white mica bearing MARBLIZED DOLOSTONE.		425.3 119.6	3	94				J, SM, MICA					
125			419.8 125.0											

DEPTH SCALE 1 inch to 3 feet

DRILLING CONTRACTOR R. E. Wright Associates, Inc.

DRILLER

Golder Associates

LOGGED SHM

CHECKED RCFK

DATE 1/31/89

AR303331

RECORD OF DRILLHOLE C-20

SHEET 6 of 6

LOCATION Modern Landfill - N231516.83 E2325035.85 DRILLING DATE 1/24/89 DATUM MSL

PROJECT No. 883-6153 DRILL RIG

INCLINATION AZIMUTH

DEPTH SCALE FEET	DESCRIPTION	GRAPHIC LOG	ELEV. DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (psi)	NOTES WATER LEVELS INSTRUMENTATION
126	Ref. Elevation 544.80		419.8											
	119.5-127.7 ft. Slightly weathered to fresh; jointed, locally nodular, white mica bearing MARBLISED DOLOSTONE		126.0						CL.ST.CAL.MICA					
									CL.SM.PY.MICA					
				3	94				CL;ST.PYRITE					
			417.1						J.SM.MICA					
	127.7-146.0 ft. Fresh, nodular to massive weakly cleaved, jointed, white, fine grained, mica bearing NODULAR DOLOSTONE locally silicified along stringers. Cleavage at 50 deg. to core axis.		127.7						J.ST.MICA					
130									J;SM;ST;CAL					
									J.ST.CALCITE					
				4	100									
									CL;ST;PY;CAL					
136														
	Water bearing fractures at 131.1, 133.4, and 133.6 ft.													
140				5	100									
			399.8						J.SM.MICA					
146	BORING TERMINATED AT 145.0 FT. BELOW GROUND SURFACE.		146.0											
150														

DEPTH SCALE 1 inch to 3 feet

DRILLING CONTRACTOR R. E. Wright Associates, Inc.

DRILLER

Golder Associates

LOGGED SHM

CHECKED RCFK

DATE 1/31/89

RECORD OF DRILLHOLE C-21

SHEET 1 of 5

LOCATION Modern Landfill - N231555.38 E2324963.48
PROJECT No. 883-6158
INCLINATION AZIMUTH 000

DRILLING DATE 01/24/89
DRILL RIG

DATUM MSL

DEPTH SCALE FEET	DESCRIPTION Ref. Elevation 630	GRAPHIC LOG	ELEV. DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (Is)	NOTES WATER LEVELS INSTRUMENTATION
0			630.0											
	0.0-90.0 ft. Overburden		0.0											
5														
10														
15														
20														
25	Continued on the next page.		505.0 25.0											

DEPTH SCALE 1 inch to 3 feet
DRILLING CONTRACTOR R. E. Wright Associates, Inc.
DRILLER

Golder Associates

AR303333

LOGGED SHM
CHECKED RCFK
DATE 1/31/89

RECORD OF DRILLHOLE C-21

SHEET 2 of 5

LOCATION Modern Landfill - N231656.38 E2324963.48
PROJECT No. 883-6168
INCLINATION AZIMUTH 000

DRILLING DATE 01/24/89
DRILL RIG

DATUM MSL

DEPTH SCALE FEET	DESCRIPTION (Ref. Elevation 630)	GRAPHIC LOG	ELEV. DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP W.R.T. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (MPa)	NOTES WATER LEVELS INSTRUMENTATION
25	Continued from previous page.		605.0 25.0											
	0-90.0 ft. Overburden													
30														
35														
40														
45														
50			580.0 60.0											

DEPTH SCALE 1 inch to 3 feet
DRILLING CONTRACTOR R. E. Wright Associates, Inc.
DRILLER

Golder Associates

LOGGED SHM
CHECKED RCFK
DATE 1/31/89

AR303334

RECORD OF DRILLHOLE C-21

SHEET 3 of 5

LOCATION Modern Landfill - N231665.38 E2324963.48
PROJECT No. 883-6158
INCLINATION AZIMUTH 000

DRILLING DATE 01/24/89
DRILL RIG

DATUM MSL

DEPTH SCALE FEET	DESCRIPTION (Ref. Elevation 630)	GRAPHIC LOG	ELEV. DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX Is(D)	NOTES WATER LEVELS INSTRUMENTATION
50	Continued from previous page.		480.0											
			50.0											
	0-90.0 ft. Overburden													
55														
60														
65														
70														
75			466.0											
			75.0											

DEPTH SCALE 1 inch to 3 feet
DRILLING CONTRACTOR R. E. Wright Associates, Inc.
DRILLER

Golder Associates

LOGGED SHM
CHECKED RCFK
DATE 1/31/89

RECORD OF DRILLHOLE C-21

SHEET 4 of 5

LOCATION Modern Landfill - N231656.38 E2324963.48
PROJECT No. 883-6168
INCLINATION AZIMUTH 000

DRILLING DATE 1/24/89
DRILL RIG

DATUM MSL

DEPTH SCALE FEET	DESCRIPTION (Ref. Elevation 530.0)	GRAPHIC LOG	ELEV. DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w/ CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (psi)	NOTES WATER LEVELS INSTRUMENTATION
75			455.0											
	0-90.0 ft. Overburden		75.0											
80														
85														
	Coring started at 90.0 ft.													
	90.0-110.0 ft. moderately weathered, strongly foliated and cleaved, (at 6 deg. to core axis) altered rusty brown with gray PHYLLITIC DOLOSTONE; leaves silt FeO stained residue.		440.0											
90			90.0						J,ST,FeO					
									J,SM,FeO					
									J,ST,FeO					
									J,SM,CAL					
									J,SM,CAL					
									J,SM,FeO,CAL					
	Strongly deformed with well developed cleavage and sheared out dolomite nodules.			1	8.2									
95									J,ST					
									J,SM,CAL					
									J,SM,CAL					
	Water bearing joints at 104.0 and 104.5 ft.								CL,ST					
	Cleavage at 14 deg. to core.								CL,ST					
				2										
100			430.0											
			100.0											

DEPTH SCALE 1 inch to 3 feet
DRILLING CONTRACTOR R. E. Wright Associates, Inc.
DRILLER

Golder Associates

AR303336

LOGGED SHM
CHECKED RCFK
DATE 1/31/89

RECORD OF DRILLHOLE C-21

SHEET 5 of 5

LOCATION Modern Landfill - N231555.38 E2324963.48
PROJECT No. 883-6158
INCLINATION AZIMUTH 000

DRILLING DATE 1/24/89
DRILL RIG

DATUM MSL

DEPTH SCALE FEET	DESCRIPTION (Ref. Elevation 530.00)	GRAPHIC LOG	ELEV. DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w/r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (psi)	NOTES WATER LEVELS INSTRUMENTATION
100			430.0											
	90.0-110.0 ft. Moderately weathered, strongly foliated and cleaved, (at 6 deg. to core axis) altered rusty brown with gray PHYLLITIC DOLOSTONE; leaves slit FeO stained residue.		100.0	2					J, SM, CAL J, SM, CAL J, SM, CAL J, SM, FeO					
105			425.0											
	105.0-110.0 ft. Same as above. Water bearing joints at 105.0, 106.3, 106.8, 108.9, 107.0, and 109.9 ft. At 108.0 ft. thin lenses of dark phyllite distributed through core (1/8 inches)		105.0	3					CL, SM J, SM, CAL J, SM, FeO, CAL					
110			420.0						J, SM, CAL					
	BORING TERMINATED AT 110.0 FT. BELOW GROUND SURFACE.		110.0											
115														
120														
125														

DEPTH SCALE 1 inch to 3 feet
DRILLING CONTRACTOR R. E. Wright Associates, Inc.
DRILLER

Golder Associates

LOGGED SHM
CHECKED
DATE 1/31/89

RECORD OF DRILLHOLE C-22

SHEET 1 of 8

LOCATION Modern Landfill - N231666.16 E2325137.96 | DRILLING DATE | DATUM MSL

PROJECT No. 881-6158 | DRILL RIG

INCLINATION -90 AZIMUTH 000

DEPTH SCALE FEET	DESCRIPTION	GRAPHIC LOG	ELEV. / DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (Is50)	NOTES WATER LEVELS INSTRUMENTATION
	Ref. Elevation 529.80		529.8											
0	0.0-67.0 ft. OVERBURDEN		0.0											
5														
10														
15														
20	Continued on the next page.		509.8 / 20.0											

DEPTH SCALE 1 inch to 3 feet

DRILLING CONTRACTOR R. E. Wright

DRILLER

Golder Associates

LOGGED SHM

CHECKED RCFK

DATE 1/30/89

RECORD OF DRILLHOLE C-22

SHEET 2 of 8

LOCATION Modern Landfill - N231666.16 E2325137.96 DRILLING DATE DATUM MSL

PROJECT No. 933-6158 DRILL RIG

INCLINATION -90 AZIMUTH 000

DEPTH SCALE FEET	DESCRIPTION Ref. Elevation 629.80'	GRAPHIC LOG	ELEV. DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (MPa)	NOTES WATER LEVELS INSTRUMENTATION
20	Continued from previous page. 0-67.0 ft. Overburden		609.8 20.0											
25														
30														
35														
40			589.8 40.0											

DEPTH SCALE 1 inch to 3 feet

DRILLING CONTRACTOR R. E. Wright

DRILLER

Golder Associates

LOGGED [redacted]

CHECKED [redacted]

DATE 1/[redacted]

RECORD OF DRILLHOLE C-22

LOCATION Modern Landfill - N231668.16 E2325137.95
PROJECT No. 883-6152
INCLINATION -90 AZIMUTH 000

DRILLING DATE
DRILL RIG

DATUM MSL

DEPTH SCALE FEET	DESCRIPTION (Ref. Elevation 529.80)	GRAPHIC LOG	ELEV. / DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DIP W.R.T. CORE AXIS	TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX	NOTES WATER LEVELS INSTRUMENTATION
40	Continued from previous page. 0-67.0 ft. Overburden		489.8 / 40.0											
45														
50														
55														
60			469.8 / 60.0											

DEPTH SCALE 1 inch to 3 feet
DRILLING CONTRACTOR R. E. Wright
DRILLER

Golder Associates

LOGGED SHM
CHECKED RCFK
DATE 1/30/89

AR303340

RECORD OF DRILLHOLE C-22

SHEET 4 of 8

LOCATION Modern Landfill - N231666.16 E2325137.85 | DRILLING DATE | DATUM MSL

PROJECT No. 883-6168 | DRILL RIG

INCLINATION -90 AZIMUTH 000

DEPTH SCALE FEET	DESCRIPTION (Ref. Elevation 529.80)	GRAPHIC LOG	ELEV. DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (tsf)	NOTES WATER LEVELS INSTRUMENTATION
60			469.8											
	0-67.0 ft. Overburden		60.0											
65														
			462.8											
	Coring stared at 67.0 ft. below ground surface.		462.4						J,S,FeO					
			67.4											
70	67.0-67.4 ft. Slightly to moderately weathered, massive, closely jointed, very light gray to white, locally quartz veinlets, MARBLEIZED DOLOSTONE													
	67.4-75.0 ft. VOID, no recovery.			1	1.4									
75			454.8											
	75.0-76.0 ft. Slightly to moderately weathered, massive, closely jointed, very light gray to white, locally quartz veinlets. MARBLEIZED DOLOSTONE		75.0	2	1.3									
			453.8											
	76.0-95.0 ft. Slightly weathered, closely cleaved, local breccia zones, abundant calcite veinlets, dark gray, very fine grained, PHYLLITIC DOLOSTONE.		76.0	3	16.8				Cl, IRR, Mica					
									J, Sm, Cal					
									Cl, Sm, Mica					
80			449.8											
			90.0											

DEPTH SCALE 1 inch to 3 feet

DRILLING CONTRACTOR R. E. Wright

DRILLER

Golder Associates

LOGGED SHM

CHECKED RCFK

DATE 1/30/89

AR303314

RECORD OF DRILLHOLE C-22

SHEET 5 of 8

LOCATION Modern Landfill - N231666.16 E2326137.95 | DRILLING DATE | DATUM MSL

PROJECT No. 883-6158 | DRILL RIG

INCLINATION -90 AZIMUTH 000

DEPTH SCALE FEET	DESCRIPTION	GRAPHIC LOG	ELEV. / DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (tsf)	NOTES: WATER LEVELS, INSTRUMENTATION
	Ref. Elevation 529.8													
80			449.8											
	75.0-95.0 ft. Slightly weathered, closely cleaved, local breccia zones, abundant calcite veinlets, dark gray, very fine grained, PHYLLITIC DOLOSTONE.		80.0	3	98				J,ST,Cal					
									J,ST,Cal					
85									J,Sm,FeO					
									J,ST,Cal					
									CL,ST,Cal					
									J,ST					
				4	100				CL,Sm,Cal					
90									CL,ST,Cal					
95			434.8											
	95.0-120.5 ft. Slightly weathered to fresh, banded, closely cleaved, cut by discordant calcite veinlets, light gray to medium gray, with alternating bands of cleaved PHYLLITIC DOLOSTONE and MASSIVE DOLOSTONE. Locally the bands of massive dolostone are deformed into nodules.		95.0	5	98.5				CL,Sm					
100	Continued on the next page.		429.8											
			100.0											

DEPTH SCALE 1 inch to 3 feet

DRILLING CONTRACTOR R. E. Wright

DRILLER

Golder Associates

LOGGED SHM

CHECKED RCFK

DATE 1/30/89

RECORD OF DRILLHOLE C-22

SHEET 6 of 8

LOCATION Modern Landfill - N231666.16 E2325137.95
PROJECT No. 883-6158
INCLINATION -90 AZIMUTH 000

DRILLING DATE
DRILL RIG

DATUM MSL

DEPTH SCALE FEET	DESCRIPTION	ELEV. DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (MPa)	NOTES WATER LEVELS INSTRUMENTATION
	Ref. Elevation 629.80	429.8									
100		100.0									
	95.0-120.5 ft. Slightly weathered to fresh, banded, closely cleaved, cut by discordant calcite veinlets, light gray to medium gray, with alternating bands of cleaved PHYLLITIC DOLOSTONE and MASSIVE DOLOSTONE. Locally the bands of massive dolostone are deformed into nodules.		6	100			Vn, Sm, Cal F, IRR, Gouge				
							F, IRR, Gouge				
105							J, ST				
			7	100			CL, ST, Mica				
							CL, ST, Mica				
							CL, Sm, Cal CL, ST, Mica				
110											
							CL, Sm				
			8	100			CL, Sm				
							F, Sm, Gouge				
							CL, Sm				
							J, ST				
							J, Sm, Cal				
115											
			9	100							
120	Continued on the next page.	409.8									
		120.0									

DEPTH SCALE 1 inch to 3 feet
DRILLING CONTRACTOR R. E. Wright
DRILLER

Golder Associates

LOGGED SHM
CHECKED RCFK
DATE 1/30/89

RECORD OF DRILLHOLE C-22

SHEET 7 of 8

LOCATION Modern Landfill - N231666.16 E2325137.96
PROJECT No. 883-6168
INCLINATION -90 AZIMUTH 000

DRILLING DATE
DRILL RIG

DATUM MSL

DEPTH SCALE FEET	DESCRIPTION	GRAPHIC LOG	ELEV. DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (psi)	NOTES WATER LEVELS INSTRUMENTATION
120	Ref. Elevation 529.80		409.8											
			120.0 409.5											
	120.5-150.0 ft. Fresh to slightly weathered along closely spaced joints, very closely cleaved, locally nodular to massive, gray with black micaceous lenses, very fine grained DOLOSTONE.		120.5											
				10	100				J, SM, Cal					
									Gt, Sm, Cal J, SM					
125									J, Sm, Cal					
									J, Sm, FeO, Cal					
									J, Sm, FeO, Cal					
130														
									CL, IRR, Cal					
				11	100									
135														
				12	100									
140	Continued on the next page.		389.8											
			140.0											

DEPTH SCALE 1 inch to 3 feet
DRILLING CONTRACTOR R. E. Wright
DRILLER

Golder Associates

LOGGED SHM
CHECKED RCFK
DATE 1/30/89

AR303344

RECORD OF DRILLHOLE C-22

SHEET 8 of 8

LOCATION Modern Landfill - N231666.16 E2325137.95 | DRILLING DATE | DATUM MSL

PROJECT No. 883-6158 | DRILL RIG

INCLINATION -90 AZIMUTH 000

DEPTH SCALE FEET	DESCRIPTION Ref. Elevation 529.80	GRAPHIC LOG	ELEV. DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (psi)	NOTES WATER LEVELS INSTRUMENTATION
140			389.8											
	120.6-150.0 ft. Fresh to slightly weathered along closely spaced joints, very closely cleaved, locally nodular to massive, gray with black micaceous lenses, very fine grained DOLOSTONE.		140.0											
									J,ST,Cal					
									J,IRR,Cal					
				12	100									
145									J,IRR,Cal					
				13	100				J,Sm,Cal					
									J,Sm,Cal					
									J,Sm,Cal					
									J,Sm,Cal,FeO					
150			379.8						J,Sm,Cal,FeO					
	BORING TERMINATED AT 150.0 FT. BELOW GROUND SURFACE.		150.0											
155														
160														

DEPTH SCALE 1 inch to 3 feet

DRILLING CONTRACTOR R. E. Wright

DRILLER

Golder Associates

LOGGED SHM

CHECKED RCFK

DATE 1/30/89

AR303345

RECORD OF DRILLHOLE C-28-A

SHEET 1 of 4

LOCATION Modern Landfill - N231203.59 E2323555.02 | DRILLING DATE | DATUM MSL

PROJECT No. 883-6158 | DRILL RIG

INCLINATION -90 AZIMUTH 000

DEPTH SCALE FEET	DESCRIPTION	GRAPHIC LOG	ELEV. / DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (psi)	NOTES / WATER LEVELS / INSTRUMENTATION
0	Ref. Elevation 533.0		533.0											
			0.0											
	0.0-45.0 ft. OVERBURDEN													
5														
10														
15														
20	Continued on the next page.		513.0											
			20.0											

DEPTH SCALE 1 inch to 3 feet

DRILLING CONTRACTOR R. E. Wright

DRILLER

Golder Associates

LOGGED AMT

CHECKED RCFK

DATE

AR303346

RECORD OF DRILLHOLE C-28-A

SHEET 2 of 4

LOCATION Modern Landfill - N231203.59 E2323555.02
PROJECT No. 883-6158
INCLINATION -90 AZIMUTH 000

DRILLING DATE
DRILL RIG

DATUM MSL

DEPTH SCALE FEET	DESCRIPTION	GRAPHIC LOG	ELEV. / DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (Is)	NOTES WATER LEVELS INSTRUMENTATION
20	Ref. Elevation 533.0		513.0 / 20.0											
	Continued from previous page.													
	0-45.0 ft. Overburden													
25														
30														
35														
40			493.0 / 40.0											

DEPTH SCALE 1 inch to 3 feet
DRILLING CONTRACTOR R. E. Wright
DRILLER

Golder Associates

LOGGED AMT
CHECKED RCFK
DATE

RECORD OF DRILLHOLE C-28-A

SHEET 3 of 4

LOCATION Modern Landfill - N231203.59 E2323555.02 | DRILLING DATE | DATUM MSL

PROJECT No. 883-6158 | DRILL RIG

INCLINATION -90 AZIMUTH 000

DEPTH SCALE FEET	DESCRIPTION	GRAPHIC LOG	ELEV. DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (psi)	NOTES WATER LEVELS INSTRUMENTATION
	Ref. Elevation 533.0													
40			493.0											
	0-45.0 ft. Overburden		40.0											
45			488.0											
	Coring started at 45.0 ft. below ground surface.		45.0											
	45.0-48.6 ft. Moderately weathered, locally laminated, massive to nodular, white to light gray, MARBLEIZED DOLOSTONE.			1	100									
			484.5											
	48.6-50.1 ft. VOID filled with orange brown, silty sand.		48.6	2	0									
50			482.9											
	50.1-56.6 ft. Moderately to slightly weathered, massive, closely jointed, white to light gray, MARBLIZED DOLOSTONE.		50.1	3	89									
55				4										
			476.5											
	56.6-72.0 ft. Slightly weathered to fresh, very closely cleaved, closely jointed with vuggy filled voids forming along joints, locally nodular, bluish gray, medium grained, SANDY DOLOSTONE.		56.6											
60			473.0											
			60.0											

DEPTH SCALE 1 inch to 5 feet

DRILLING CONTRACTOR R. E. Wright

DRILLER

Golder Associates

LOGGED AMT

CHECKED RCFK

DATE

RECORD OF DRILLHOLE C-28-A

SHEET 4 of 4

LOCATION Modern Landfill - N231203.59 E2323555.02
PROJECT No. 883-6158
INCLINATION -90 AZIMUTH 000

DRILLING DATE
DRILL RIG

DATUM MSL

DEPTH SCALE FEET	DESCRIPTION (Ref. Elevation 533.0)	GRAPHIC LOG	ELEV. / DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRIAL POINT LOAD INDEX (tsf)	NOTES WATER LEVELS INSTRUMENTATION
60	56.5-72.0 ft. Slightly weathered to fresh, very closely cleaved, closely jointed with vuggy filled voids forming along joints, locally nodular, bluish gray, medium grained, SANDY DOLOSTONE.		473.0 / 60.0											
				6	100				Cl,UE,Calcite					
65									Cl,UE					
									Cl,UE					
									Cl,Sm					
				7	100				Cl,Sm					
70									Cl,Sm					
			461.0 / 72.0											
	BORING TERMINATED AT 72.0 FT. BELOW GROUND SURFACE.													
75														
80														

DEPTH SCALE 1 inch to 3 feet
DRILLING CONTRACTOR R. E. Wright
DRILLER

Golder Associates

LOGGED AMT
CHECKED RCFK
DATE

AR303349

RECORD OF DRILLHOLE C-29

SHEET 1 of 8

LOCATION M. dera Landfill - N231627.86 E2324806.23 DRILLING DATE DATUM MSL

PROJECT No. 383-6158 DRILL RIG

INCLINATION -90 AZIMUTH 000

DEPTH SCALE FEET	DESCRIPTION	GRAPHIC LOG	ELEV. / DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRIAL POINT LOAD INDEX (MPa)	NOTES WATER LEVELS INSTRUMENTATION
	Ref. Elevation 626.90		626.9											
0	0.0-130.0 ft. OVERBURDEN		0.0											
5														
10														
15														
20	Continued on the next page.		506.9 / 20.0											

DEPTH SCALE 1 inch to 3 feet

DRILLING CONTRACTOR R. E. Wright

DRILLER

Golder Associates

LOGGED AMT

CHECKED RCFK

DATE

AR303350

RECORD OF DRILLHOLE C-29

SHEET 2 of 8

LOCATION Modern Landfill - N231527.66 E2324806.23
PROJECT No. 883-6158
INCLINATION -90 AZIMUTH 000

DRILLING DATE
DRILL RIG

DATUM MSL

DEPTH SCALE FEET	DESCRIPTION Ref. Elevation 526.90	GRAPHIC LOG	ELEV. / DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (Is50)	NOTES WATER LEVELS INSTRUMENTATION
20	Continued from the previous page. 0-130.0 ft. Overburden		506.9 20.0											
25														
30														
35														
40			486.9 40.0											

DEPTH SCALE 1 inch to 3 feet
DRILLING CONTRACTOR R. E. Wright
DRILLER

Golder Associates

LOGGED AMT
CHECKED RCFK
DATE

AR303351

RECORD OF DRILLHOLE C-29

SHEET 3 of 8

LOCATION Modern Landfill - N231527.86 E2324806.23
PROJECT No. 883-6158
INCLINATION -90 AZIMUTH 000

DRILLING DATE
DRILL RIG

DATUM MSL

DEPTH SCALE FEET	DESCRIPTION Ref. Elevation 526.90	GRAPHIC LOG	ELEV. / DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (MPa)	NOTES WATER LEVELS INSTRUMENTATION
40	Continued from previous page. 0-130.0 ft. Overburden		486.9 40.0											
45														
50														
55														
60			446.9 80.0											

DEPTH SCALE 1 inch to 3 feet
DRILLING CONTRACTOR R. E. Wright
DRILLER

Golder Associates

LOGGED AMT
CHECKED RCFK
DATE

RECORD OF DRILLHOLE C-29

LOCATION Modern Landfill - N231627.66 E2324806.23
PROJECT No. 883-6158
INCLINATION -90 AZIMUTH 000

DRILLING DATE
DRILL RIG

DATUM MSL

DEPTH SCALE FEET	DESCRIPTION Ref. Elevation 526.90	GRAPHIC LOG	ELEV. DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (MPa)	NOTES WATER LEVELS INSTRUMENTATION
60	Continued from previous page. 0-130.0 ft. Overburden		466.9 60.0											
65														
70														
75														
80			446.9 80.0											

DEPTH SCALE 1 inch to 5 feet
DRILLING CONTRACTOR R. E. Wright
DRILLER

Golder Associates

LOGGED AMT
CHECKED RCFK
DATE

RECORD OF DRILLHOLE C-29

SHEET 5 of 8

LOCATION Modern Landfill - N231527.66 E2324806.23 | DRILLING DATE | DATUM MSL

PROJECT No. 883-6158 | DRILL RIG

INCLINATION -90 AZIMUTH 000

Depth Scale	DESCRIPTION Ref. Elevation 526.90	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (psi)	NOTES WATER LEVELS INSTRUMENTATION
0			446.9											
			80.0											
	Continued from previous page.													
	0-130.0 ft. Overburden													
15														
10														
95														
1.0			426.9											
			100.0											

DEPTH SCALE 1 inch to 3 feet

DRILLING CONTRACTOR R. E. Wright

DRILLER

Golder Associates

LOGGED AMT

CHECKED RCFK

DATE

AR303354

RECORD OF DRILLHOLE C-29

SHEET 6 of 8

LOCATION Modern Landfill - N231527.66 E2324806.23
PROJECT No. 883-6158
INCLINATION -90 AZIMUTH 000

DRILLING DATE _
DRILL RIG

DATUM MSL

DEPTH SCALE FEET	DESCRIPTION (Ref. Elevation 526.90)	GRAPHIC LOG	ELEV. DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (psi)	NOTES WATER LEVELS INSTRUMENTATION
100	Continued from previous page.		428.9											
			100.0											
	0-130.0 ft. Overburden													
105														
110														
115														
120			406.9											
			120.0											

DEPTH SCALE 1 inch to 3 feet
DRILLING CONTRACTOR R. E. Wright
DRILLER

Golder Associates

LOGGED AMT
CHECKED RCFK
DATE

RECORD OF DRILLHOLE C-29

SHEET 7 of 8

LOCATION Modern Landfill - N231527.86 E2324806.23
PROJECT No. 883-6158
INCLINATION -90 AZIMUTH 000

DRILLING DATE
DRILL RIG

DATUM MSL

DEPTH SCALE FEET	DESCRIPTION Ref. Elevation 526.90	GRAPHIC LOG	ELEV. DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (psi)	NOTES WATER LEVELS INSTRUMENTATION
120	Continued from previous page. 0-130.0 ft. Overburden		406.9 120.0											
125														
130	Coring started at 130.0 ft. below ground surface. 130.0-150.0 ft. Slightly weathered to fresh, finely laminated with brecciated *zones parallel to cleavage*, white calcite veinlets, light to dark gray, very fine grained to crystalline, massive, DOLOSTONE interlayered with SLATEY DOLOSTONE.		396.9 130.0	1	97				CL, Sm J, ST, Cal J, ST, Cal J, IRR, Cal CL, Sm J, IRR, Cal, FeO J, Sm CL, Sm CL, Sm					
140	Continued on the next page.		386.9 140.0											

DEPTH SCALE 1 inch to 5 feet
DRILLING CONTRACTOR R. E. Wright
DRILLER

Golder Associates

LOGGED AMT
CHECKED RCFK
DATE

AR303356

RECORD OF DRILLHOLE C-29

SHEET 3 of 8

LOCATION Modern Landfill ~ N231527.66 E2324806.23
PROJECT No. 883-6158
INCLINATION -90 AZIMUTH 000

DRILLING DATE
DRILL RIG

DATUM MSL

DEPTH SCALE FEET	DESCRIPTION (Ref. Elevation 526.90)	GRAPHIC LOG	ELEV. DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (psi)	NOTES WATER LEVELS INSTRUMENTATION
140			386.9											
	130.0-150.0 ft. Slightly weathered to fresh, finely laminated with brecciated zones parallel to cleavage, white calcite veinlets, light to dark gray, very fine grained to crystalline, massive, DOLOSTONE interlayered with SLATEY DOLOSTONE.		140.0	2	4.2				CL, Sm J, ST, Cal J, ST, Cal J, IRR, Cal J, Sm, Cal, FeO					
145				3					F, IRR, Gouge J, ST, Cal F, ST, Gouge					
150			376.9											
	BORING TERMINATED AT 150.0 FT. BELOW GROUND SURFACE.		150.0											
155														
160														

DEPTH SCALE 1 inch to 3 feet
DRILLING CONTRACTOR R. E. Wright
DRILLER

Golder Associates

LOGGED AMT
CHECKED RCFK
DATE

RECORD OF DRILLHOLE C-30

SHEET 1 of 4

LOCATION Modern Landfill - N231372.56 E2324254.65
PROJECT No. 883-6158
INCLINATION -90 AZIMUTH 000

DRILLING DATE
DRILL RIG

DATUM MSL

DEPTH SCALE FEET	DESCRIPTION (Ref. Elev. = 524.10)	GRAPHIC LOG	ELEV. / DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (ISRM)	NOTES / WATER LEVELS / INSTRUMENTATION
0			524.1											
	0.0-19.0 ft. OVERBURDEN		0.0											
5														
10														
15	Coring started at 19.0 ft. below ground surface.													
	19.0-24.5 ft. Moderately to highly weathered, massive, closely cleaved, calcite veinlets, light gray to orange brown, medium to fine grained, DOLOSTONE.		505.1											
			19.0	1	95.2				J.UE.Fe					
20			504.1											
			20.0											

DEPTH SCALE 1 inch to 3 feet
DRILLING CONTRACTOR R. E. Wright
DRILLER

Golder Associates

LOGGED AMT
CHECKED RCFK
DATE

RECORD OF DRILLHOLE C-30

SHEET 2 of 4

LOCATION Modern Landfill - N23137.56 E2324254.65
PROJECT No. 883-6158
INCLINATION -90 AZIMUTH 000

DRILLING DATE
DRILL RIG

DATUM MSL

DEPTH SCALE FEET	DESCRIPTION (Ref. Elevation 524.10)	GRAPHIC LOG	ELEV. / DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (psi)	NOTES: WATER LEVELS, INSTRUMENTATION
20			504.1											
	19.0-34.5 ft. Moderately to highly weathered, massive, closely cleaved, calcite veinlets, light gray to orange brown, medium to fine grained, DOLOSTONE.		20.0	1	95.2				J, Sm, Fe					
									J, Sm, Fe					
25				2	95.7									
									J, Sm, Fe					
30				3	100				J, UE, Fe					
									UE, Fe					
			490.6											
35	34.5-72.0 ft. Slightly to moderately weathered, massive to nodular, very closed, cleaved, light gray, medium to fine grained, DOLOSTONE.		34.5	4	100									
40			484.1											
			40.0											

DEPTH SCALE 1 inch to 3 feet
DRILLING CONTRACTOR R. E. Wright
DRILLER

Golder Associates

LOGGED AMT
CHECKED RCFK
DATE

RECORD OF DRILLHOLE C-30

SHEET 3 of 4

LOCATION Modern Landfill - N231372.56 E2324254.85 | DRILLING DATE | DATUM MSL

PROJECT No. 883-6158 | DRILL RIG

INCLINATION -90 AZIMUTH 000

DEPTH SCALE FEET	DESCRIPTION (Ref. Elevation 524.10)	GRAPHIC LOG	ELEV. / DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (psi)	NOTES: WATER LEVELS, INSTRUMENTATION
40			484.1											
	34.5-72.0 ft. Slightly to moderately weathered, massive to nodular, very closed, cleaved, light gray, medium to fine grained, DOLOSTONE.		40.0	4	100									
45				5	85									
50				6	100									
55				7	80									
60	Continued on the next page.		464.1 / 60.0											

DEPTH SCALE 1 inch to 3 feet

DRILLING CONTRACTOR R. E. Wright

DRILLER

Golder Associates

LOGGED AMT

CHECKED RCFK

DATE

AR303360

RECORD OF DRILLHOLE C-30

SHEET 4 of 4

LOCATION Modern Landfill - N231372.56 E2324254.85 DRILLING DATE DATUM MSL

PROJECT No. 383-6158 DRILL RIG

INCLINATION -90 AZIMUTH 000

DEPTH SCALE FEET	DESCRIPTION Ref. Elevation 524.10	GRAPHIC LOG	ELEV. / DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (Is)50	NOTES WATER LEVELS INSTRUMENTATION
60			484.1											
	34.5-72.0 ft. Slightly to moderately weathered, massive to nodular, very closed, cleaved, light gray, medium to fine grained, DOLOSTONE.		60.0	7	80									
65				8	93									
70				9	88									
			452.1											
	BORING TERMINATED AT 72.0 FT. BELOW GROUND SURFACE.		72.0											
75														
80														

DEPTH SCALE 1 inch to 3 feet

DRILLING CONTRACTOR R. E. Wright

DRILLER

Golder Associates

LOGGED AMT

CHECKED RCFK

DATE

RECORD OF DRILLHOLE HC-32

SHEET 1 of 8

LOCATION Modern Landfill - N2321232.72 E2323944.21 | DRILLING DATE | DATUM MSL

PROJECT No. 883-6168 | DRILL RIG

INCLINATION -90 AZIMUTH 000

DEPTH SCALE FEET	DESCRIPTION Ref. Elevation 520.60	GRAPHIC LOG	ELEV. / DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (MPa)	NOTES WATER LEVELS INSTRUMENTATION
0			520.5											
	0.0-111.5 ft. OVERBURDEN		0.0											
5														
10														
15														
20	Continued on the next page.		500.5 20.0											

DEPTH SCALE 1 inch to 3 feet

DRILLING CONTRACTOR R. E. Wright

DRILLER

Golder Associates

LOGGED SHM

CHECKED RCFK

DATE

AR303362

RECORD OF DRILLHOLE HC-32

LOCATION Modern Landfill - N231232.72 E2323944.21 DRILLING DATE DATUM MSL

PROJECT No. 883-6158 DRILL RIG

INCLINATION -90 AZIMUTH 000

DEPTH SCALE FEET	DESCRIPTION (Ref. Elevation 520.5)	GRAPHIC LOG	ELEV. / DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (psi)	NOTES WATER LEVELS INSTRUMENTATION
20	Continued from previous page.		500.5 / 20.0											
	0.0-111.5 ft. Overburden													
25														
30														
35														
40			480.5 / 40.0											

DEPTH SCALE 1 inch to 3 feet

DRILLING CONTRACTOR R. E. Wright

DRILLER

Golder Associates

LOGGED SHM

CHECKED RCFK

DATE

RECORD OF DRILLHOLE HC-32

SHEET 3 of 8

LOCATION Modern Landfill - N231232.72 E2323944.21
PROJECT No. 883-6158
INCLINATION -90 AZIMUTH 000

DRILLING DATE
DRILL RIG

DATUM MSL

DEPTH SCALE FEET	DESCRIPTION (Ref. Elevation 520.50)	GRAPHIC LOG	ELEV. DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (MPa)	NOTES: WATER LEVELS, INSTRUMENTATION
40	Continued from previous page.		480.5											
			40.0											
	0.0-111.5 ft. Overburden													
45														
50														
55														
60			460.5											
			60.0											

DEPTH SCALE 1 inch to 3 feet
DRILLING CONTRACTOR R. E. Wright
DRILLER

Golder Associates

LOGGED SHM
CHECKED RCFK
DATE

RECORD OF DRILLHOLE HC-32

SHEET 4 of 8

LOCATION Modern Landfill - N231232.72 E2323944.21 DRILLING DATE DATUM MSL

PROJECT No. 883-6158 DRILL RIG

INCLINATION -90 AZIMUTH 000

DEPTH SCALE FEET	DESCRIPTION Ref. Elevation 620.60	GRAPHIC LOG	ELEV. / DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (MPa)	NOTES WATER LEVELS INSTRUMENTATION
60	Continued from previous page. 0.0-111.5 ft. Overburden		460.5 60.0											
65														
70														
75														
80			440.5 80.0											

DEPTH SCALE 1 inch to 3 feet

DRILLING CONTRACTOR R. E. Wright

DRILLER

Golder Associates

LOGGED SHM

CHECKED RCFK

DATE

RECORD OF DRILLHOLE HC-32

SHEET 5 of 8

LOCATION Modern Landfill - N231232.72 E2323944.21 | DRILLING DATE | DATUM MSL

PROJECT No. 883-6158 | DRILL RIG

INCLINATION -90 AZIMUTH 000

SCALE FEET	DESCRIPTION	GRAPHIC LOG	ELEV. / DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP W.R.T. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (psi)	NOTES WATER LEVELS INSTRUMENTATION
	Ref. Elevation 20.60													
80			440.5											
			80.0											
	Continued from previous page.													
	0.0-111.5 ft. Overburden													
85														
90														
95														
100			420.5											
			100.0											

DEPTH SCALE 1 inch to 3 feet

DRILLING CONTRACTOR R. E. Wright

DRILLER

Golder Associates

LOGGED SHM

CHECKED RCFK

DATE

AR303366

RECORD OF DRILLHOLE HC-32

SHEET 6 of 9

LOCATION Modern Landfill - N231232.72 E2323944.21 DRILLING DATE DATUM MSL

PROJECT No. 883-6158 DRILL RIG

INCLINATION -90 AZIMUTH 000

DEPTH SCALE FEET	DESCRIPTION (Ref. Elevation 520.60)	GRAPHIC LOG	ELEV. / DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (psi)	NOTES WATER LEVELS INSTRUMENTATION
100	Continued from previous page.		420.5 / 100.0											
	0.0-111.5 ft. Overburden													
105														
110			409.0											
	Coring started at 111.5 ft. below ground surface.		111.5						J, Sm, FeO					
	111.5-130.0 ft. Moderately to highly weathered, closely jointed, very closely cleaved, small vuggy voids formed along joints, calcite veinlets discordant to cleavage, light brown, medium to fine grained, CALCAREOUS SILTSTONE.			1	2.5									
115				2	2.5									
120	Continued on the next page.		400.5 / 120.0											

DEPTH SCALE 1 inch to 3 feet

DRILLING CONTRACTOR R. E. Wright

DRILLER

Golder Associates

LOGGED SHM

CHECKED RCFK

DATE

RECORD OF DRILLHOLE HC-32

SHEET 7 of 8

LOCATION Modern Landfill - N23232.72 E2323944.21 | DRILLING DATE | DATUM MSL

PROJECT No. 283-6168 | DRILL RIG

INCLINATION -90 AZIMUTH 000

DEPTH SCALE FEET	DESCRIPTION (Ref. Elevation 520.50)	GRAPHIC LOG	ELEV. / DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP / ALL CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (MPa)	NOTES: WATER LEVELS, INSTRUMENTATION
120			400.5											
	111.5-130.0 ft. Moderately to highly weathered, closely jointed, very closely cleaved, small vuggy voids formed along joints, calcite veinlets discordant to cleavage, light brown, medium to fine grained, CALCAREOUS SILTSTONE.		120.0	2	26									
125									J,S,Gouge					
				3	80									
130			390.5											
	130.0-140.0 ft. Slightly weathered to fresh, closely jointed, weakly foliated with discordant calcite veinlets, locally micaceous, dark gray, fine grained, DOLOMITIC SILTSTONE.		130.0						J,Sm,Cal					
									J,Sm,Cal					
				4	82				J,S,Chl					
									J,S,Cal					
135									J,Sm,Cal					
									J,ST,Cal,Pyrite					
				5	96				J,Sm,Cal					
									J,ST,Cal					
140	Continued on the next page.		380.5											
			140.0											

DEPTH SCALE 1 inch to 3 feet

DRILLING CONTRACTOR R. E. Wright

DRILLER

Golder Associates

LOGGED SHM

CHECKED RCFK

DATE

AR303368

RECORD OF DRILLHOLE HC-32

SHEET 8 of 8

LOCATION Modern Landfill - N231232.72 E2323944.21 DRILLING DATE DATUM MSL

PROJECT No. 883-6158 DRILL RIG

INCLINATION -90 AZIMUTH 000

DEPTH SCALE FEET	DESCRIPTION (Ref. Elevation 520.60)	GRAPHIC LOG	ELEV. DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (psi)	NOTES WATER LEVELS. INSTRUMENTATION
140			380.5											
	130.0-149.0 ft. Slightly weathered to fresh, closely jointed, weakly foliated with discordant calcite veinlets, locally micaceous, dark gray, fine grained, DOLOMITIC SILTSTONE.		140.0						CL,Sm.Cal					
									CL,ST.Cal					
									J,IRR,Cal					
									J,ST,Cal					
				6	8.4				J,ST,Cal					
145									F,S,Cal					
									J,ST,Cal					
			371.5						J,IRR,Cal					
	BORING TERMINATED AT 149.0 FT. BELOW GROUND SURFACE.		149.0											
150														
155														
160														

DEPTH SCALE 1 inch to 3 feet

DRILLING CONTRACTOR R. E. Wright

DRILLER

Golder Associates

LOGGED SHM

CHECKED RCFK

DATE

RECORD OF DRILLHOLE HC-34

SHEET 1 of 6

LOCATION Modern Landfill - N2314888.89 E2324933.39 | DRILLING DATE | DATUM MSL

PROJECT No. 883-6158 | DRILL RIG

INCLINATION -90 AZIMUTH 000

DEPTH SCALE FEET	DESCRIPTION (Ref. Elevation 533.30)	GRAPHIC LOG	ELEV. / DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (Is50)	NOTES WATER LEVELS INSTRUMENTATION
0			533.3											
	0.0-52.5 ft. OVERBURDEN		0.0											
5														
10														
15														
20	Continued on the next page.		513.3 / 20.0											

DEPTH SCALE 1 inch to 5 feet

DRILLING CONTRACTOR R. E. Wright

DRILLER

Golder Associates

AR303370

LOGGED SHM

CHECKED RCFK

DATE 1/26/89

RECORD OF DRILLHOLE HC-34

SHEET 2 of 5

LOCATION Modern Landfill - N231488.39 E2324933.39
PROJECT No. 883-6158
INCLINATION -90 AZIMUTH 000

DRILLING DATE
DRILL RIG

DATUM MSL

DEPTH SCALE FEET	DESCRIPTION (Ref. Elevation 533.30)	GRAPHIC LOG	ELEV. / DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP W.R.T. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (Is(50))	NOTES WATER LEVELS INSTRUMENTATION
20			513.3 / 20.0											
	Continued from previous page.													
	0.0-52.5 ft. Overburden													
25														
30														
35														
40			493.3 / 40.0											

DEPTH SCALE 1 inch to 3 feet
DRILLING CONTRACTOR R. E. Wright
DRILLER

Golder Associates

AR303371

LOGGED SHM
CHECKED RCFK
DATE 1/28/89

RECORD OF DRILLHOLE HC-34

SHEET 4 of 5

LOCATION Modern Landfill - N231488.89 E2324933.39 | DRILLING DATE | DATUM MSL

PROJECT No. 883-6152 | DRILL RIG

INCLINATION -90 AZIMUTH 000

DEPTH SCALE FEET	DESCRIPTION	GRAPHIC LOG	ELEV. DEPTH (FT)	RUN NO.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP W.R.T. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (MPa)	NOTES WATER LEVELS INSTRUMENTATION
	Ref. Elevation 533.30													
60			473.3											
	Continued from previous page.		60.0											
	57.5-64.0 ft. VOID, no recovery			2	12									
			469.3											
	64.0-78.0 ft. Moderately weathered, weakly foliated, massive, closely jointed, light tan to rusty brown, fine grained, SILTY DOLOSTONE.		64.0											
65														
				3	3.8									
70														
				4	61									
75														
			455.3											
	78.0-80.2 ft. VOID, no recovery.		78.0	5										
80			453.3											
			80.0											

DEPTH SCALE 1 inch to 3 feet

DRILLING CONTRACTOR R. E. Wright

DRILLER

Golder Associates

AR303372

LOGGED SHM

CHECKED RCFK

DATE

RECORD OF DRILLHOLE HC-34

SHEET 3 of 5

LOCATION Modern Landfill N231488.89 E2324933.39 | DRILLING DATE | DATUM MSL

PROJECT No. 833-6158 | DRILL RIG

INCLINATION -90 AZIMUTH 000

DEPTH SCALE FEET	DESCRIPTION (Ref. Elevation 533.30)	GRAPHIC LOG	ELEV. / DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (psi)	NOTES: WATER LEVELS, INSTRUMENTATION
40			493.3											
	Continued from previous page.		40.0											
	0.0-52.5 ft. Overburden													
45														
50			480.8											
	Coring started at 52.6 ft. below ground surface.		52.6											
55	52.5-57.5 ft. Moderately to highly weathered, weakly foliated, closely jointed, locally brecciated, light tan to light gray, CLAYEY MICACEOUS SILTSTONE.			1	28									
			476.8											
	57.5-64.0 ft. VOID, no recovery.		57.6											
				2	12									
60	Continued on the next page.		473.3											
			60.0											

DEPTH SCALE 1 inch to 3 feet

DRILLING CONTRACTOR R. E. Wright

DRILLER

Golder Associates

LOGGED SHM

CHECKED RCFK

DATE 1/26/89

RECORD OF DRILLHOLE HC-34

SHEET 5 of 5

LOCATION Modern Landfill - N231488.89 E2324933.39 DRILLING DATE DATUM MSL

PROJECT No. 883-6158 DRILL RIG

INCLINATION -90 AZIMUTH 000

DEPTH SCALE FEET	DESCRIPTION Ref. Elevation 533.30	GRAPHIC LOG	ELEV. DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (psi)	NOTES WATER LEVELS INSTRUMENTATION
80			453.3 452.7 452.0 80.2											
	80.2-86.0 ft. Moderately weathered, weakly foliated to massive, closely jointed, light tan to rusty brown, fine grained, SILTY DOLOSTONE.			6	96									
85			447.3 86.0											
	BORING TERMINATED AT 86.0 FT. BELOW GROUND SURFACE.													
90														
95														
100														

DEPTH SCALE 1 inch to 3 feet

DRILLING CONTRACTOR R. E. Wright

DRILLER

Golder Associates

LOGGED SHM

CHECKED RCFK

DATE

RECORD OF DRILLHOLE W-26-D

SHEET 1 of 2

LOCATION *Modern Landfill - N231874.70 E232533.30* DRILLING DATE DATUM MSL

PROJECT No. 883-6158 DRILL RIG

INCLINATION -90. AZIMUTH 000

DEPTH SCALE FEET	DESCRIPTION	GRAPHIC LOG	ELEV. / DEPTH (FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (psi)	NOTES WATER LEVELS INSTRUMENTATION
	Ref. Elevation 523.0				0 20 40 60 80 100	0 20 40 60 80 100	0 10 20 30	0 30 60 90						
225			298.0											
			225.0											
	Rotary to 248.0 ft.													
230														
235														
240														
	248.0-268.0 ft. Fresh, foliated and highly fractured (fractures infilled with calcite), grayish green, locally chloritic and or biotitic with some pyrite, carbonate cemented META SILTSTONE. Foliation is 55 deg. from core axis at 250.0-250.5 ft. Dolomite lense interbedded. Carbonate content ranges up to 30%.		275.0											
245			248.0						Vn, IRR					
				1	94				FOL, ST					
									FOL, SM					
									FOL, ST					
250			273.0						CO; SM, CHL					
			260.0											

DEPTH SCALE 1 inch to 3 feet

DRILLING CONTRACTOR

DRILLER

Golder Associates

AR303375

LOGGED SHM

CHECKED RCFK

DATE 1/31/89

RECORD OF DRILLHOLE W-26-D

SHEET 2 of 2

LOCATION Modern Landfill - N231874.70 E232533.30
PROJECT No. 883-6158
INCLINATION -90. AZIMUTH 000

DRILLING DATE
DRILL RIG

DATUM MSL

DEPTH SCALE FEET	DESCRIPTION (Ref. Elevation 523.0)	GRAPHIC LOG	ELEV. (DEPTH FT)	RUN No.	CORE RECOVERY	R.Q.D.	FRACTURE INDEX PER FT	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX	STRENGTH INDEX	DIAMETRAL POINT LOAD INDEX (psi)	NOTES: WATER LEVELS, INSTRUMENTATION
260			273.0											
	248.0-268.0 ft. Fresh, foliated and highly fractured (fractures infilled with calcite), grayish green, locally chloritic and or biotitic with some pyrite, carbonate cemented META SILTSTONE. Foliation is 55 deg. from core axis at 250.0-250.5 ft. Dolimite lense interbedded. Carbonate content ranges up to 30%.		250.0	1	94				CL, IRR CL, SM CL, ST FOL, ST FOL, ST FOL, SM FOL, ST FOL, SM FOL, SM, CAL FOL, SM FOL, SM Vn, SM, CAL FOL, ST, CHL					
265														
	At 259.1-259.6 ft. open void with white crystals of calcite and red crystals of dolomite precipitated on void walls.			2	37				CL, OPEN, DOLO FOL, SM CL, OPEN, DOLO CL, ST, CAL DOLO					
270	At 264.0 ft. one inch thick voids along joints.			3	60				CL, SM CL, SM FOL, SM CL, OPEN, CAL FOL, SM Vn, F, S, CHL, CAL FOL, IRR FOL, SM					
	Brecciated calcite vein with slicken-sided chlorite surfaces.		255.0											
	BORING TERMINATED AT 268.0 FT. BELOW GROUND SURFACE.		268.0											
275														

DEPTH SCALE 1 inch to 3 feet
DRILLING CONTRACTOR R. E. Wright Associates, Inc.
DRILLER

Golder Associates

LOGGED BBM
CHECKED RCFK
DATE 1/31/89

AR303376

MONITORING WELL INSTALLATION LOG

JOB NO. 883-6158 PROJECT WMI/RIFS/MODERN WELL NO. MD313 SHEET 1 OF 2

GA INSP. AMT/ALC DRILLING METHOD NQ Core / 6" Reaming GROUND ELEV. 527.59 WATER DEPTH 5.17'

WEATHER Overcast DRILLING COMPANY Hydro Group COLLAR ELEV. 530.67 DATE/TIME 3/13/89 0837

TEMP. 35°F DRILL RIG Gus Pech Brat 22R DRILLER J. Arnett STARTED 0730 TIME / 3/13/89 DATE COMPLETED 1700 TIME / 3/13/89 DATE

LOCATION/COORDINATES N231699.55 E2325565.46

MATERIALS INVENTORY

WELL CASING 2 in. dia. 108.0 l.f. WELL SCREEN 2 in. dia. 10.0 l.f. BENTONITE SEAL 3/4" pellets, 50 lbs.

CASING TYPE Tri-Lock SCREEN TYPE PVC continuous wrap INSTALLATION METHOD Gravity

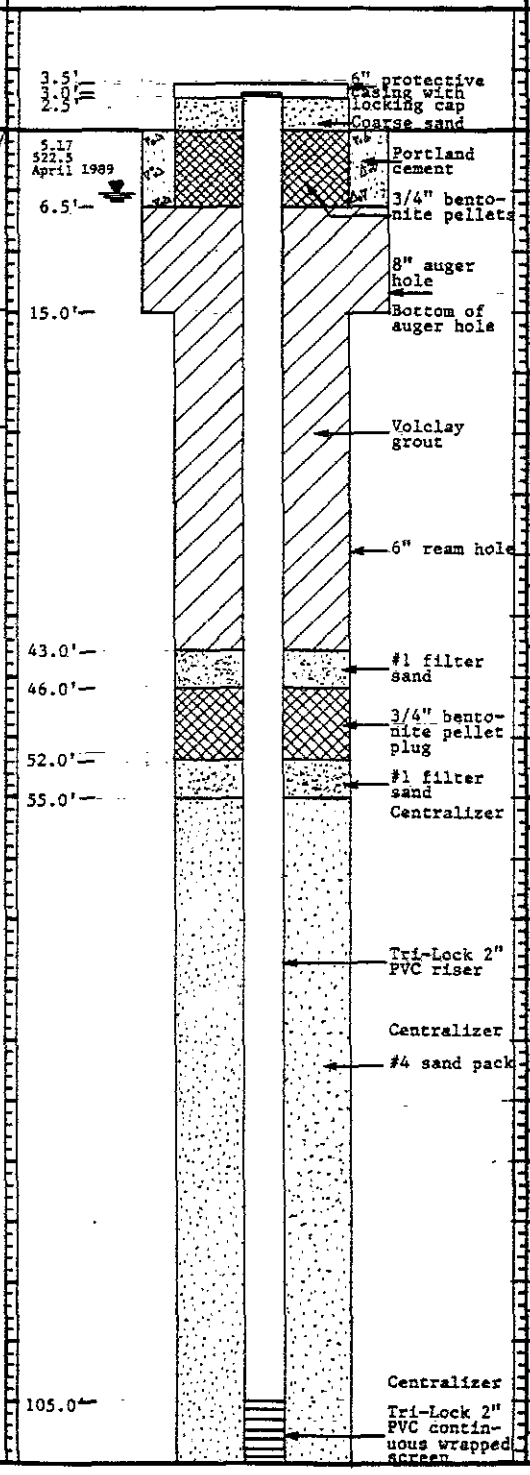
JOINT TYPE Flush threaded, teflon tape SLOT SIZE 0.20" FILTER PACK QTY 1250 lbs.

GROUT QUANTITY 130 gallons CENTRALIZERS Stainless steel FILTER PACK TYPE #4 sand

GROUT TYPE Volclay DRILLING MUD TYPE Water INSTALLATION METHOD Gravity

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
	GROUND SURFACE
0.0	0.0-3.5 Soft, loose, trace organics, brown SANDY SILT (SM)
5	3.5-14.9 Compact to dense, bonded, brown to gray SILTY SAND with SANDSTONE gravel
10	
15	14.9 -24.7 ft. Moderately weathered, closely cleaved, weakly foliated with minor banding, some elliptical pods of coarse sand and carbonate cement, locally brecciated with chlorite matrix, some calcite veinlets, medium grained, BIOTITIC CARBONATE
20	
25	24.7-200.0 ft. Slightly weathered to fresh, closely cleaved, weakly foliated with elliptical pods of coarse sand and carbonate cement, locally brecciated with chlorite matrix, some calcite veinlets, medium grained, BIOTITIC CARBONATE CEMENTED (META) SANDSTONE.
30	
35	
40	
45	
50	
55	
60	
65	
70	
75	
80	
85	
90	
95	
100	
105	
110	

WELL SKETCH



INSTALLATION NOTES

Volclay Estimate 130.0' - 200.0'

$V_1 = \pi(.25)^2 \times 70 = 3.43$ cu. ft.

1 + .3 lbs VOlclay x 1 cu. ft. = 49 lbs.

1 Bag Volclay used Grouted to 136.0'

WELL DEVELOPMENT NOTES

The well was developed for 4 hours using bottled nitrogen.

Golder Associates

AR303377

MONITORING WELL INSTALLATION LOG

JOB NO. 883-6158 PROJECT WMI/RIFS/MODERN WELL NO. MD313 SHEET 2 OF 2

GA WSP AMT/ALC DRILLING METHOD NQ Core/6" Reaming Both/w Potable Water GROUND ELEV. 527.59 WATER DEPTH 5.17'

WEATHER Overcast DRILLING COMPANY Hydro Group COLLAR ELEV. 530.67 DATE/TIME 3/13/89 0837

TEMP 35°F DRILL RIG GUS Pech DRILLER Jesse Arnett STARTED 0730 (TIME) 3/13/89 (DATE) COMPLETED 1700 (TIME) 3/13/89 (DATE)

LOCATION/COORDINATES NZ31699.55 E2325565.46

MATERIALS INVENTORY

WELL CASING 2 in. dia. ____ l.f. WELL SCREEN 2 in. dia. 10.0 l.f. BENTONITE SEAL 3.5 gals.

CASING TYPE Tri-Lock Monitoring Pipe (PVC) SCREEN TYPE PVC continuous wrap INSTALLATION METHOD Gravity

JOINT TYPE Tri-Lock Flush Threaded SLOT SIZE 20 FILTER PACK QTY. 5 gal/4 gal

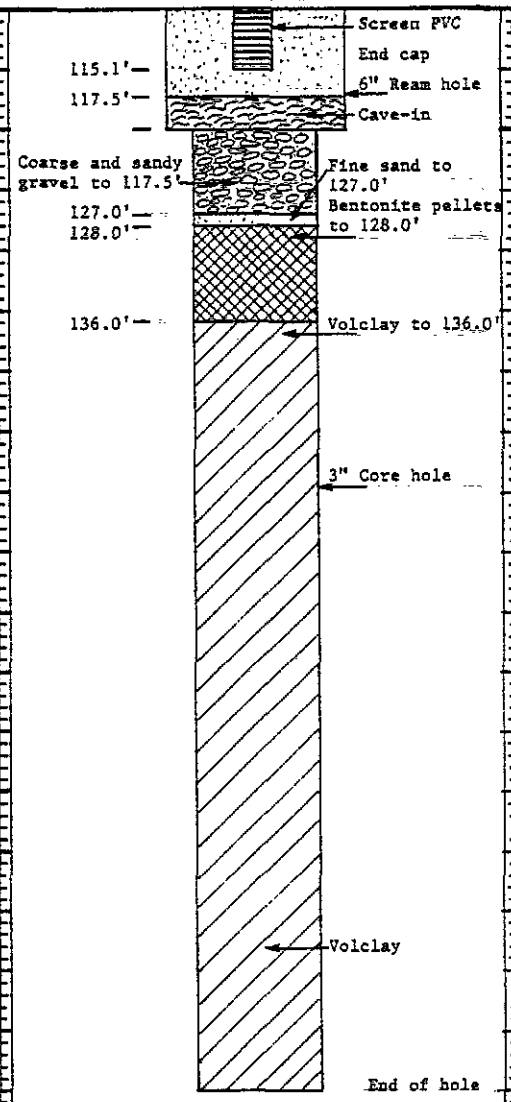
GROUT QUANTITY 1 Bag CENTRALIZERS Stainless Steel FILTER PACK TYPE Fine Sand/U.S. Silica**

GROUT TYPE Volclay DRILLING MUD TYPE Water INSTALLATION METHOD Gravity

** 4-O-ROK

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
110	24.7-200.0 ft. Slightly weathered to fresh, closely cleaved, weakly foliated with elliptical pods of coarse sand and carbonate cement, locally brecciated with chlorite matrix, some calcite veinlets, medium grained, BIOTITIC CARBONATE CEMENTED (META) SANDSTONE.
115	
120	
125	
130	
135	
140	
145	
150	
155	
160	
165	
170	
175	
180	
185	
190	
195	
200	

WELL SKETCH



INSTALLATION NOTES

Volclay Estimate 130.0'-200.0'

$V_1 = \pi (.25)^2 \times 70 - 3.43$ cu. ft.

1 +.3 lbs Volclay x 1 cu. ft. = 49 lbs

1 Bag Volclay used Grouted to 136.0'

WELL DEVELOPMENT NOTES

The well was developed for 4 hours using bottled nitrogen.

Golder Associates

AR303378

MONITORING WELL INSTALLATION LOG

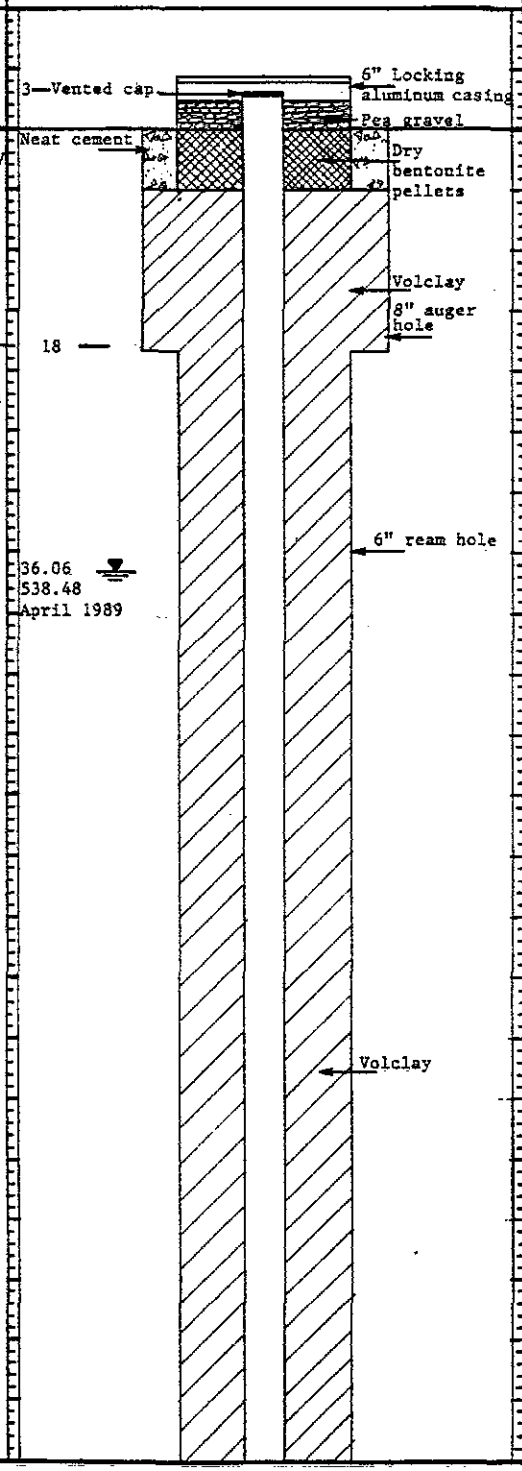
JOB NO. 883-6158 PROJECT WMI/RIFS/MODERN WELL NO. MD314 SHEET 1 OF 2
GA REP. AMT DRILLING METHOD NQ Wireline Core/6" Reaming Both with Potable Water GROUND ELEV. 571.68 WATER DEPTH 36.06'
WEATHER DRILLING COMPANY Hydro Group COLLAR ELEV. 574.54 DATE/TIME 3/16/89 0900
TEMP. DRILL RIG GUS Pech DRILLER Jesse Arnett STARTED 0700 TIME / 2/15/89 DATE COMPLETED 1600 TIME / 2/15/89 DATE
LOCATION/COORDINATES N231276.20 E2326370.82

MATERIALS INVENTORY

WELL CASING 2 in. dia. 151.0 l.f. WELL SCREEN 2 in. dia. 10.0 l.f. BENTONITE SEAL Baroid Bentonite Pellets
CASING TYPE Tri-Lock PVC SCREEN TYPE Tri-Lock INSTALLATION METHOD Gravity
JOINT TYPE Tri-Lock, Flush Threaded, Teflon Taped SLOT SIZE 20 FILTER PACK QTY 4 Bags/1 Bag
GROUT QUANTITY 13 Bags CENTRALIZERS Stainless Steel (3) FILTER PACK TYPE U.S. Silica 4-O-ROK/**
GROUT TYPE Volclay DRILLING MUD TYPE Water INSTALLATION METHOD Gravity
** U.S. Silica #1 Dry

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
	GROUND SURFACE
0.0	0.0-2.0: Soft to loose, orange brown, trace organics, SILTY CLAY (CL)
5	2.0-18.0: Compact to dense, foliated, SILTY CLAY (CL) with PHYLLITE gravel.
10	
15	18.0-135.0 ft. Slightly to moderately weathered closely fractured, strongly foliated, greenish-gray, very fine grained with calcium carbonate elliptical lenses bounded by foliation planes, SERICITIC, very fine black porphoblasts (possible chlorite). PHYLLITE.
20	
25	
30	
35	
40	
45	
50	
55	
60	
65	
70	
75	
80	
85	
90	
95	
100	
105	
110	

WELL SKETCH



INSTALLATION NOTES

Volclay Estimates

$V_1 = \pi[(0.5)^2 - (0.166)^2] \times 113 \text{ ft}$ / 4

$V_1 = 19.73 \text{ ft}^3$

$V_2 = \pi[(.833)^2 - (0.166)^2] \times 13 \text{ ft}$ / 4

$V_2 = 6.8 \text{ ft}^3$

$6.8 + 19.73 = 26.53 \text{ ft}^3$

198.44 gallons

14.3 lb Volclay = 1 cu. ft. = 7.58 Bags

Used 13 Bags

WELL DEVELOPMENT NOTES

The well was developped for 4 hours using bottled nitrogen.

Golder Associates

AR303379

MONITORING WELL INSTALLATION LOG

JOB NO. 883-6156 PROJECT WMI/RIFS/MODERN WELL NO. MD314 SHEET 2 OF 2

SA MSP AMT DRILLING METHOD NQ Wireline Core/6" Reaming Both with Potable Water GROUND ELEV. 571.68 WATER DEPTH 36.06'

WEATHER _____ DRILLING COMPANY Hydro Group COLLAR ELEV. 574.54 DATE/TIME 3/16/89 0900

TEMP. _____ DRIL RIG GUS Pach DRILLER Jesse Arnett STARTED 0700 TIME / 2/15/89 DATE COMPLETED 1600 TIME / 2/15/89 DA

LOCATION/COORDINATES N231276.20 E2326370.82

MATERIALS INVENTORY

WELL CASING 2 in. dia. 151.0 l.f. WELL SCREEN 2 in. dia. 10.0 l.f. BENTONITE SEAL Baroid Bentonite Pellets

CASING TYPE Tri-Lock PVC SCREEN TYPE Tri-Lock INSTALLATION METHOD Gravity

JOINT TYPE Tri-Lock, Flush Threaded SLOT SIZE 20 FILTER PACK QTY 4 Bags/1 Bag

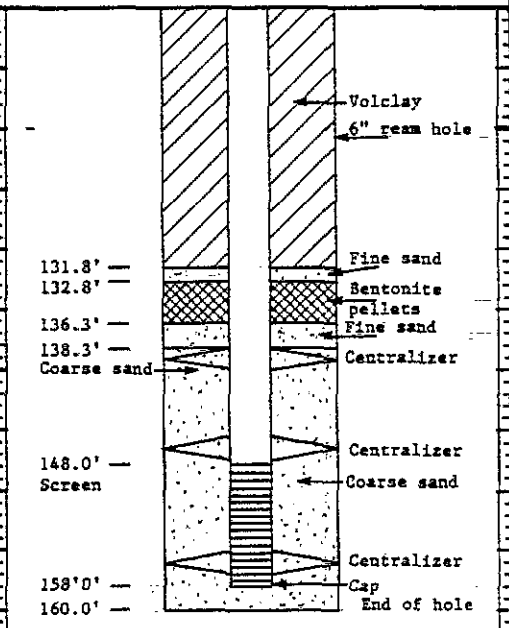
GROUT QUANTITY 13 Bags CENTRALIZERS Stainless Steel (3) FILTER PACK TYPE U.S. Silica 4-Q-ROK/**

GROUT TYPE Volclay DRILLING MUD TYPE Water INSTALLATION METHOD Gravity

** U.S. Silica #1 Dry

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
110	18.0-125.0 ft. Slightly to moderately weathered, closely fractured, strongly foliated, greenish-gray, very fine grained with calcium carbonate elliptical lenses bounded by foliation planes, SERICITIC, very fine black porphoblasts (possible chlorite). PHYLLITE.
115	
120	
125	125.0-160.0 ft. Fresh, strongly foliated and cleaved greenish gray, very fine to fine grained, locally contains small lenses and ellipses of carbonate cemented silt, chlorite, sericite, minor biotite and pyrite, PHYLLITE.
130	
135	
140	
145	
150	
155	
160	

WELL SKETCH



INSTALLATION NOTES

WELL DEVELOPMENT NOTES

Golder Associates

AR303380

MONITORING WELL INSTALLATION LOG

JOB NO. 883-6158 PROJECT UNI/RIFS/MODERN WELL NO. MD317 SHEET 1 OF 2

GA INSP. AMT DRILLING METHOD NQ Wireline Core/Potable Water Rotary (6") GROUND ELEV. 624.96 WATER DEPTH 36.6'

WEATHER Cloudy DRILLING COMPANY Hydro Group COLLAR ELEV. 627.83 DATE/TIME 3/2/89 6:00pm

TEMP. 40°F DRILL RIG Gus Pech DRILLER L. Shearz STARTED 1:00pm (TIME) 2/20/89 (DATE) COMPLETED 10:30am (TIME) 2/21/89 (DATE)

LOCATION/COORDINATES N230218.21 E2326821.83

MATERIALS INVENTORY

WELL CASING 2.0" in. dia. 143.0 l.f. WELL SCREEN 2" in. dia. 10.0 l.f. BENTONITE SEAL Piezometer research and devl. 3/8" pellets

CASING TYPE Tri-lock monitoring pipe SCREEN TYPE Tri-lock INSTALLATION METHOD Gravity

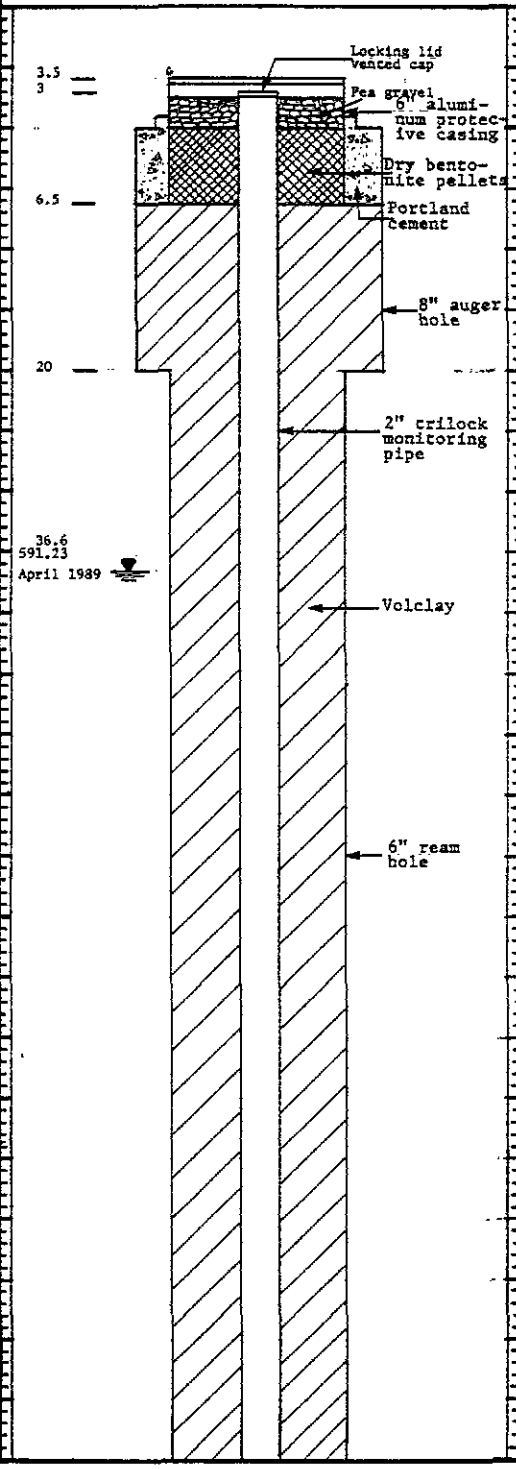
JOINT TYPE Tri-lock flush threaded SLOT SIZE 20 FILTER PACK QTY 4 bags / 1 bag

GROUT QUANTITY 8 bags CENTRALIZERS Stainless steel (3) FILTER PACK TYPE U.S. Silica 4-0 rok / U.S. Silica #1 dry penn sand

GROUT TYPE Volclay DRILLING MUD TYPE Water INSTALLATION METHOD Gravity

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
	GROUND SURFACE
0.0	0-1.5 ft. Soft to loose, roots, trace of organics SILTY CLAY (CL)
5	1.5-10.0 ft. Compact to dense, trace organics, SILTY CLAY (CL) with PHYLLITE gravel.
10	10.0-83.5 ft. Slightly weathered, strongly foliated, closely cleaved, with abundant concordant and discordant quartz veining with quartzose sand lenses 1/4 in. thick, light green, very fine grained, CHLORITIC PHYLLITE.
15	
20	
25	
30	
35	
40	
45	
50	
55	
60	
65	
70	
75	
80	83.5-150.9 ft. Fresh, strongly foliated and closely cleaved with abundant quartz veining, and quartzose lenses (1/4 to 1/8 in. thick), greenish-gray CHLORITIC PHYLLITE. Contains veins from mixed calcite and quartz (locally pyritic).
85	
90	
95	
100	
105	
110	

WELL SKETCH



INSTALLATION NOTES

Volclay Estimates

$V_1 = \pi \frac{[(.5)^2-(0.166)^2]}{4} .87$ ft.

$V_2 = \pi \frac{[(.833)^2-(0.166)^2]}{4} .19$ ft.

$V_1(13.48) + V_2(9.94) = 23.42$

Estimate 6.7 bags

Used 8.0 bags

WELL DEVELOPMENT NOTES

The well was developped for 4 hours using bottled nitrogen and bailing method.

Golder Associates

AR303381

MONITORING WELL INSTALLATION LOG

JOB NO. 883-6158 PROJECT WMI/RIFS/MODERN WELL NO. MD317 SHEET 2 OF 2

SA INSP. AMT DRILLING METHOD NQ Core/6" ream both with potable water GROUND ELEV. 624.96 WATER DEPTH 36.6'

WEATHER Cloudy DRILLING COMPANY Hydro Group COLLAR ELEV. 627.83 DATE/TIME 3/2/89 6:00pm

TEMP. 40°F DRILL RIG Gus Pech DRILLER J. Sheatz STARTED 3:00pm 2/20/89 COMPLETED 10:30am 2/21/89

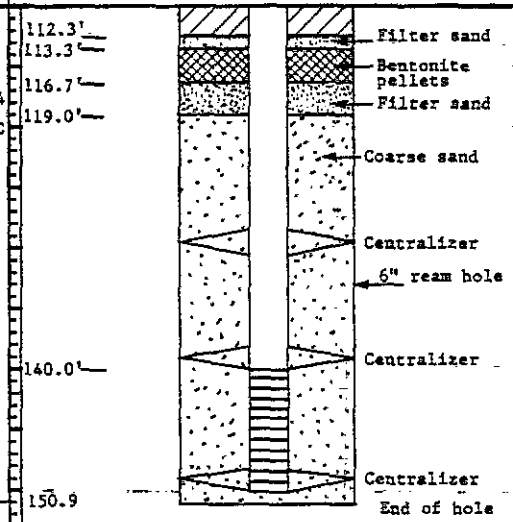
LOCATION/COORDINATES N230218.21 E2326821.83

MATERIALS INVENTORY

WELL CASING	2.0" in. dia. 143.0 l.f.	WELL SCREEN	2" in. dia. 10.0' l.f.	BENTONITE SEAL	Piezometer Research and Development
CASING TYPE	Tri-lock monitoring pipe	SCREEN TYPE	Tri-lock	INSTALLATION METHOD	Gravity
JOINT TYPE	Tri-lock flush threaded	SLOT SIZE	20	FILTER PACK QTY	4 bags
GROUT QUANTITY	8 bags	CENTRALIZERS	Stainless steel (3)	FILTER PACK TYPE	U.S. Silica #4-0 rok / U.S. Silica #1 dry penn sand
GROUT TYPE	Volclay	DRILLING MUD TYPE	Water	INSTALLATION METHOD	Gravity

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
110	83.5–150.9 ft. Fresh, strongly foliated and closely cleaved with abundant quartz veining, and quartzose, lenses, (1/4 to 1/8 in. (thick), greenish-gray CHLORITIC PHYLLITE. Contains veins from mixed calcite and quartz (locally pyrite).
115	
120	
125	
130	
135	
140	
145	
150	

WELL SKETCH



INSTALLATION NOTES

WELL DEVELOPMENT NOTES

Golder Associates

AR303382

MONITORING WELL INSTALLATION LOG

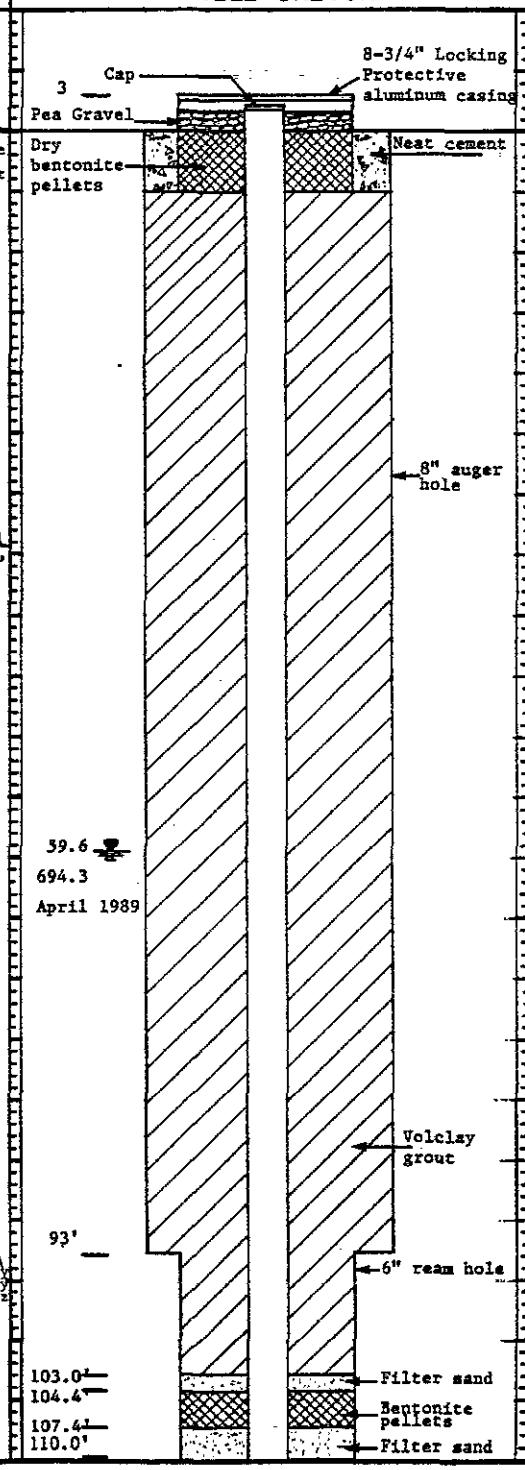
JOB NO. 883-6158 PROJECT WMI/RIFS/MODERN WELL NO. MU319R SHEET 1 OF 2
GA INSP. AMT DRILLING METHOD NQ Wireline Core/Water Rotary (6") GROUND ELEV. 753.88 WATER DEPTH 59.6'
WEATHER Sunny DRILLING COMPANY Hydro Group COLLAR ELEV. 756.91 DATE/TIME 3/1/89
TEMP. 60° DRILL RIG GUS Pech DRILLER Jesse Arnett STARTED 1/30/89 (TIME / DATE) COMPLETED 2/1/89 (TIME / DATE)
LOCATION/COORDINATES N228132.02 E2325421.33

MATERIALS INVENTORY

WELL CASING 2" in. dia. 143.0' l.f. WELL SCREEN 2" in. dia. 10.0 l.f. BENTONITE SEAL Piezometer Research & Devl.: Bentonite Pellets
CASING TYPE PVC SCREEN TYPE Tri-Lock INSTALLATION METHOD Gravity
JOINT TYPE Tri-Lock Flush Threaded SLOT SIZE 10 FILTER PACK QTY 7.5 Bags #4/1 Bag #1
GROUT QUANTITY 52.4 cu. ft./15 Bags CENTRALIZERS Stainless Steel (2) FILTER PACK TYPE U.S. Silica 4-O-ROK/**
GROUT TYPE Volclay DRILLING MUD TYPE Water INSTALLATION METHOD Gravity
** U.S. Silica #1 Dry Penn Sand

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
GROUND SURFACE	
0.0	0.0-34.5 Soft to firm, loose to compact, orange brown SILTY CLAY (CL) with abundant White QUARTZ gravel
35	34.5-95.0 Compact to Dense, foliated, abundant white quartz, completely weathered, SILTY CLAY (CL) with PHYLLITE gravel
95	95.0-111.5 ft. Fresh strongly foliated and cleaved, locally layered with lenses of quartz-feldspathic lenses, dark grayish-green, very fine grained with 0.5 mm porphyroblasts of feldspar, locally with pyrite grains, CHLORITIC PHYLLITE.

WELL SKETCH



INSTALLATION NOTES

$V_1 = \pi[(0.5)^2 - (0.166)^2] \times 40 \text{ ft.} / 4$

$V_1 = 6.98 \text{ ft}^3$ Coarse Sand

$V_2 = \pi[(0.5)^2 - (0.166)^2] \times 2 \text{ ft.} / 4$

$V_2 = .349 \text{ ft}^3$ Fine Sand

$V_3 = \pi[(0.5)^2 - (0.166)^2] \times 3 \text{ ft.} / 4$

$V_3 = .5235 \text{ ft}^3$ Bentonite Pellets

$V_4 = \pi[(0.5)^2 - (0.166)^2] \times 10 \text{ ft.} / 4$

$V_4 = 1.74 \text{ ft}^3 = 13.06$ gal. Grout (Volclay)

$V_5 = \pi[(.833)^2 - (0.166)^2)] \times 86.5 / 4$

$V_5 = 45.3 \text{ ft}^3 = 353.2$ gal. Grout (Volclay)

1.74 + 45.3 = 47.04 cu. ft. Est.
actually used 52.4 cu. ft.

WELL DEVELOPMENT NOTES

The well was developped for 4 hours using bottled nitrogen and boiling method.

Golder Associates

AR303383

MONITORING WELL INSTALLATION LOG

JOB NO. 883-6158 PROJECT WMI/RIFS/MODERN WELL NO. MU319R SHEET 2 OF 2

QA INSP. AMT DRILLING METHOD NQ Wireline Core/Water Rotary (6") GROUND ELEV. 753.88 WATER DEPTH 59.6'

WEATHER Sunny DRILLING COMPANY Hydro Group COLLAR ELEV. 756.91 DATE/TIME 3/1/89

TEMP 60° DRILL RIG GUS Pech DRILLER Jesse Arnett STARTED 1/30/89 (TIME / DATE) COMPLETED 2/1 (TIME / DA

LOCATION/COORDINATES N228132.02 E2325421.33

MATERIALS INVENTORY

WELL CASING 2 in. dia. 143.0 ft WELL SCREEN 2 in. dia. 10.0 ft BENTONITE SEAL Piezometer Research & Devl.: Bentonite Pellets

CASING TYPE PVC SCREEN TYPE Tri-Lock INSTALLATION METHOD Gravity

JOINT TYPE Tri-Lock Flush Threaded SLOT SIZE 10 FILTER PACK QTY. 7.5 Bags #4/1 Bag #1

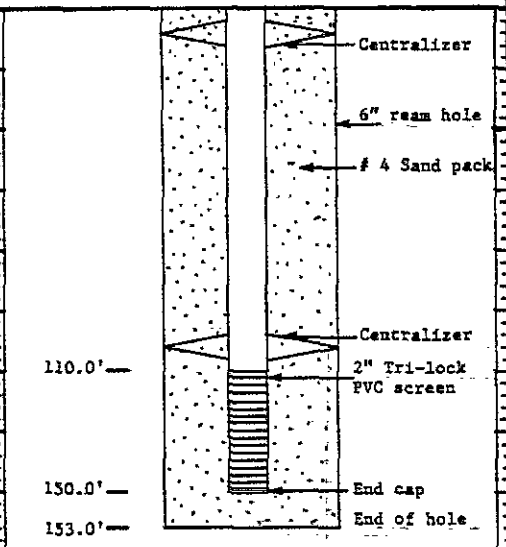
GROUT QUANTITY 52.4 cu. ft./15 Bags CENTRALIZERS Stainless Steel (2) FILTER PACK TYPE U.S. Silica 4-O-ROK/**

GROUT TYPE Volclay DRILLING MUD TYPE Water INSTALLATION METHOD Gravity

** U.S. Silica #1 Dry Penn Sand

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
110	111.3 to 113.5 ft. Fresh, layered, foliated porphyroblastic, phyllitic carbonate META SANDSTONE.
115	
120	113.5-153.0 ft. Fresh, strongly foliated and cleaved locally layered with lenses, of quartz feldspathic lenses dark grayish-green, very fine grain with 0.5 mm porphyroblasts of feldspar, locally with pyrite grains, CHLORITIC PHYLLITE.
125	
130	
135	
140	
145	
150	
155	

WELL SKETCH



INSTALLATION NOTES

WELL DEVELOPMENT NOTES

Golder Associates

AR303384

TEMPORARY PIEZOMETER INSTALLATION LOG

JOB NO. 883-6158 PROJECT WMI/RIFS/MODERN WELL NO. 306R SHEET 1 OF 2
GA INSP. SHM DRILLING METHOD NQ Wireline/6" rotary (Both w/potable water) GROUND ELEV. 510.79 WATER DEPTH D=10.06; S=10.40
WEATHER Cloudy DRILLING COMPANY Hydro Group COLLAR ELEV. 512.27 DATE/TIME April 1989
TEMP. 40°F DRILL RIG Acker Soil Sentry DRILLER F. Cornell STARTED ____ TIME / DATE COMPLETED ____ TIME / DATE
LOCATION/COORDINATES N230967.14 E2323330.66

MATERIALS INVENTORY

WELL CASING	0.5 in. dia. ____ l.f.	WELL SCREEN	0.5 in. dia. 2 X 10 l.f.	BENTONITE SEAL	3/8" pellets
CASING TYPE	PVC Sch 40	SCREEN TYPE	0.01" PVC Sch 40	INSTALLATION METHOD	Gravity
JOINT TYPE	Flush thread	SLOT SIZE	0.2"	FILTER PACK QTY.	6 / 2
GROUT QUANTITY	4 bags	CENTRALIZERS	2	FILTER PACK TYPE	40 rock / #1 US Silica
GROUT TYPE	Volclay	DRILLING MUD TYPE	Water	INSTALLATION METHOD	Gravity

ELEV./DEPTH	SOIL/ROCK DESCRIPTION	WELL SKETCH	INSTALLATION NOTES
	Angled boring 60° N330° Depth measured along the drilling rods. GROUND SURFACE	3 / 2.5 — 6" steel casing with locking lid	
0.0	0.0-28.0 ft. Compact, orange to brown, SANDY SILT, gravel. (SM)		
5.0			
10		10.06 / 502.26 ▼ ▼	
		10.40 / 501.96	
15		6' rotary hole	
20			
22 / 23		Fine sand	
25		Bentonite pellets	
26 / 27		Fine sand	
30	28.0-98.8 ft. Completely weathered, foliated, cleaved, locally banded, brown, medium grained, biotitic, CALCITE CEMENTED (META) SANDSTONE.	Coarse sand	
35			
37			
40			
45			
47 / 48		End cap; Fine sand	
50		Bentonite pellets	
51.5 / 52.5		Fine sand	
55			WELL DEVELOPMENT NOTES
60		Volclay	
65			
70			
75			
80			
85			
90			
94 / 95		Fine sand	
95		Bentonite pellets	
98.8 / 99		Fine sand; Centralizer	
100	98.8-158.8 ft. Fresh to slightly weathered, massive to weakly foliated, locally cut by small-scale faults, cleaved, light gray, M. grained, BIOTITIC, CALCITE CEMENTED (META) SANDSTONE.	NQ corehole	
105			
110			

Golder Associates

AR303385

TEMPORARY PIEZOMETER INSTALLATION LOG

JOB NO. 881-6158 PROJECT WMI/RIFS/MODERN WELL NO. 306R SHEET 2 OF 2

GA INSP. SBM DRILLING METHOD NQ Wireline/6" rotary (Both with potable water) GROUND ELEV. 510.79 WATER DEPTH S=10.40; D=10.06

WEATHER Cloudy DRILLING COMPANY Hydro Group COLLAR ELEV. 512.27 DATE/TIME April 1989

TEMP 40°F DRILL RIG Acker Soil Sentry DRILLER F. Cornell STARTED ____ (TIME / DATE) COMPLETED ____ (TIME / DATE)

LOCATION/COORDINATES

MATERIALS INVENTORY

WELL CASING 0.5 in. dia. ____ Lf	WELL SCREEN 0.5 in. dia. 2 X 10 Lf	BENTONITE SEAL 3/8" pellets
CASING TYPE PVC Sch 40	SCREEN TYPE 0.01" PVC Sch 40	INSTALLATION METHOD Gravity
JOINT TYPE Flush thread	SLOT SIZE 0.2"	FILTER PACK QTY. 6 / 2
GROUT QUANTITY 4 bags	CENTRALIZERS 2	FILTER PACK TYPE #40 rock / #1
GROUT TYPE Volclay	DRILLING MUD TYPE Water	INSTALLATION METHOD Gravity

ELEV./DEPTH	SOIL/ROCK DESCRIPTION	WELL SKETCH	INSTALLATION NOTES
110	98.8-158.8 ft. Fresh to slightly weathered, massive to weakly foliated locally cut by small-scale faults, cleaved, light gray, medium grained, BIOTITIC, CALCITE CEMENTED (META) SANDSTONE.	NQ corehole; Coarse sand; Centralizer (148); End cap / End of hole (158)	
115			
120			
125			
130			
135			
140			
145			
150			
155			
160			

WELL DEVELOPMENT NOTES

Golder Associates

AR303386

TEMPORARY PIEZOMETER INSTALLATION LOG

JOB NO. 883-6158 PROJECT WMI/RIFS/MODERN WELL NO. 307 SHEET 1 OF 2

GA INSP. SBM DRILLING METHOD NO Wireline GROUND ELEV. 506.89 WATER DEPTH 7.5' BGS

WEATHER Windy, Overcast DRILLING COMPANY Hydro Group COLLAR ELEV. 508.21 DATE/TIME April 1989

TEMP. 45° F DRILL RIG Acker Soil Sentry DRILLER F. Cornell STARTED 2:00 / 2/22/89 (TIME / DATE) COMPLETED 8:00am 2/24/89 (TIME / DATE)

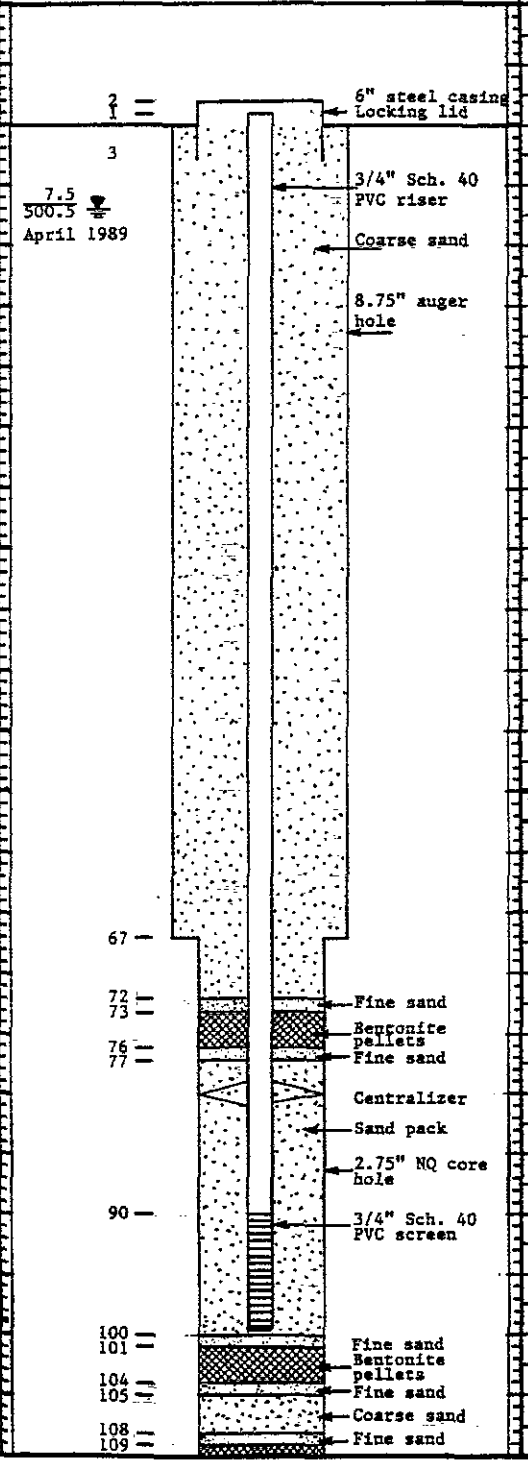
LOCATION/COORDINATES N231045.13 E2323267.06

MATERIALS INVENTORY

WELL CASING	0.5 in. dia. 101 l.f.	WELL SCREEN	0.5 in. dia. 10 l.f.	BENTONITE SEAL	1 bucket
CASING TYPE	PVC	SCREEN TYPE	0.01" PVC Sch. 40	INSTALLATION METHOD	Gravity
JOINT TYPE	Flush thread	SLOT SIZE	0.2"	FILTER PACK QTY	16 bags #4/2 bags #1
GROUT QUANTITY	-	CENTRALIZERS	One	FILTER PACK TYPE	40 Sand/#1 Sand
GROUT TYPE	None	DRILLING MUD TYPE	Water	INSTALLATION METHOD	Gravity

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
	Angled boring 60° N330°
	GROUND SURFACE
0.0	0.0-2.0 ft. Soft, loose, trace organics, brown, CLAYEY SILT. (CL)
5	2.0-67.0 ft. Loose to compact, brown to purplish brown, CLAYEY SILT SAPROLITE. (CL)
10	
15	
20	
25	
30	
35	
40	
45	
50	
55	
60	
65	
70	67.0-71.0 ft. Dense, brown to gray brown, completely weathered, DOLOMITIC MARBLE.
75	71.0-99.0 ft. Slightly weathered to fresh, massive, closely cleaved to locally brecciated, some quartz veining, white to gray brown, DOLOMITIC MARBLE.
80	
85	
90	99.0-103.3 ft. Moderately weathered, brecciated, CALCITE BRECCIA.
95	Void 101.0-102.8 ft.
100	103.3-107.8 ft. Slightly weathered, medium grained, MICACEOUS SANDSTONE.
105	107.8-110.0 ft. Slightly weathered, medium grained, BRECCIATED CHLORITIC SANDSTONE.
110	

WELL SKETCH



INSTALLATION NOTES

16 bags of 40 sand
2 bags of fine sand
1 bucket of bentonite

WELL DEVELOPMENT NOTES

Golder Associates

AR303387

TEMPORARY PIEZOMETER INSTALLATION LOG

JOB NO. 883-6158 PROJECT WMI/RIFS/MODERN WELL NO 307 SHEET 2 OF 2

GA MSP SHM DRILLING METHOD NQ Wireline GROUND ELEV. 506.89 WATER DEPTH 7.5' BGS

WEATHER Windy, Overcast DRILLING COMPANY Hydro Group COLLAR ELEV. 508.21 DATE/TIME April 1989

TEMP 45°F DRILL RIG Acker Soil Sentry DRILLER F. Cornell STARTED 2:00 / 2/22/89 COMPLETED 8:00am 2/24
TIME / DATE TIME / DA

LOCATION/COORDINATES N231045.13 E2323267.06

MATERIALS INVENTORY

WELL CASING	0.5 in. dia. 101 l.f.	WELL SCREEN	0.5 in. dia. 10 l.f.	BENTONITE SEAL	1 bucket
CASING TYPE	PVC	SCREEN TYPE	0.01" PVC Sch. 40	INSTALLATION METHOD	Gravity
JOINT TYPE	Flush thread	SLOT SIZE	0.2"	FILTER PACK QTY.	16 bags #4 / 2 bags #1
GROUT QUANTITY	-	CENTRALIZERS	One	FILTER PACK TYPE	40 Sand / #1 sand
GROUT TYPE	None	DRILLING MUD TYPE	Water	INSTALLATION METHOD	Gravity

ELEV./DEPTH	SOIL/ROCK DESCRIPTION	WELL SKETCH	INSTALLATION NOTES
110	110.0-131.0 ft. Slightly weathered, banded, weakly foliated, locally brecciated, bluish gray, medium grained, DOLOMITIC MICACEOUS SANDSTONE.	112 — Bentonite pellets 113 — Fine sand Caved rock Borehole caved to 113.0 ft. 131 — End of hole	
115			
120			
125			
130			
135			

WELL DEVELOPMENT NOTES

Golder Associates

AR303388

TEMPORARY PIEZOMETER INSTALLATION LOG

JOB NO. 883-6158 PROJECT WMI/RIFS/MODERN WELL NO. 311 SHEET 1 OF 2

GA INSP. SHM DRILLING METHOD Wireline Core GROUND ELEV. 532.06 WATER DEPTH S=13.14; D=13.88

WEATHER Clr., Windy DRILLING COMPANY Hydro Group COLLAR ELEV. 533.02 DATE/TIME 3/7/89; 7:00

TEMP. 10°F DRILL RIG Acker DRILLER F. Cornell STARTED 2:00 TIME / 2/7/89 DATE COMPLETED 9:00 TIME / 2/9/89 DATE

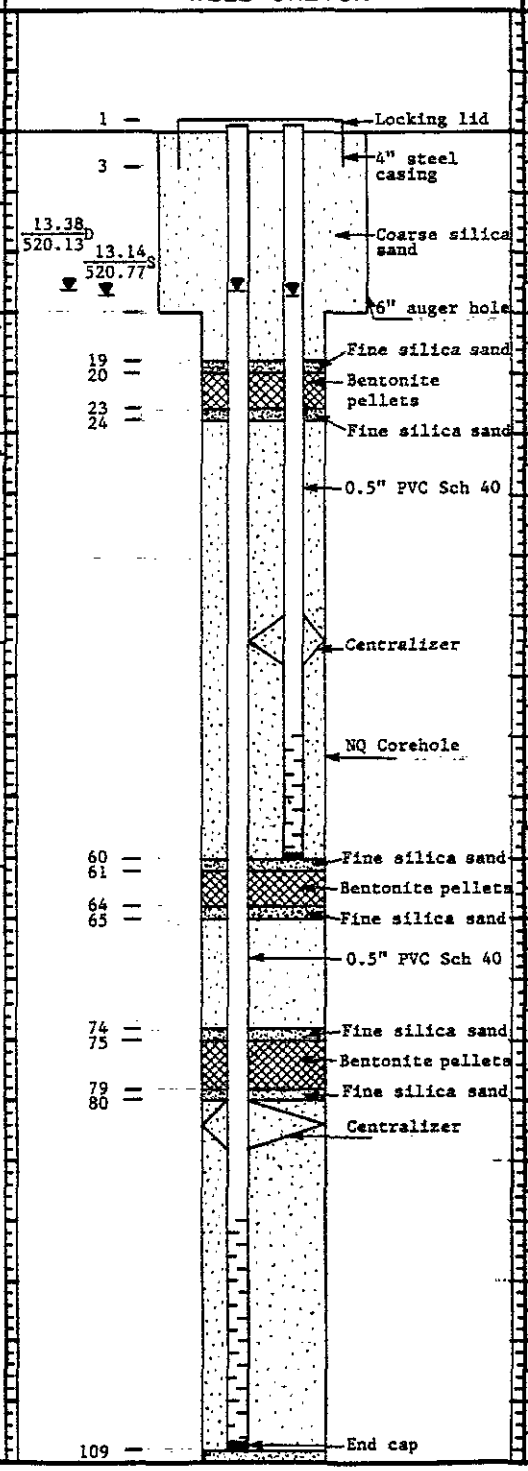
LOCATION/COORDINATES N232082.13 E2325771.30

MATERIALS INVENTORY

WELL CASING	Steel	in. dia. 4"	l.f.	BENTONITE SEAL	3/8" Pellets
CASING TYPE	PVC 1/2 fn.	WELL SCREEN	1/2" in. dia. D20/S10 l.f.	INSTALLATION METHOD	Gravity
JOINT TYPE	Flush thread	SCREEN TYPE	Hacksaw	FILTER PACK QTY.	6 bags/1 bag
GROUT QUANTITY	N/A	SLOT SIZE	--	FILTER PACK TYPE	#4-0-ROK/#1 Fine Sand
GROUT TYPE	N/A	CENTRALIZERS	2	INSTALLATION METHOD	Gravity
		DRILLING MUD TYPE	Water		

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
	Angled boring 60° N330° Depth measured along the drilling rods.
	GROUND SURFACE
0.0	0.0-1.8 ft. Soft, brown soil
5	1.8-6.0 ft. SILTY CLAY
10	6.0-15.0 ft. Completely weathered SLATE.
15	15.0-22.0 ft. BLOCK SLATE.
20	
25	22.0-25.0 ft. SLATY DOLOSTONE.
	25.0-26.3 ft. Black SLATE.
30	26.3-35.3 ft. SLATY DOLOSTONE.
35	35.3-42.3 ft. MARBLEIZED DOLOSTONE.
40	
45	42.3-60.5 ft. PHYLLITIC DOLOSTONE.
50	
55	
60	60.5-134.8 ft. NODULAR DOLOSTONE with MARBLEIZED DOLOSTONE zone.
65	
70	
75	
80	
85	
90	
95	
100	
105	
110	

WELL SKETCH



INSTALLATION NOTES

WELL DEVELOPMENT NOTES

Golder Associates

AR303389

TEMPORARY PIEZOMETER INSTALLATION LOG

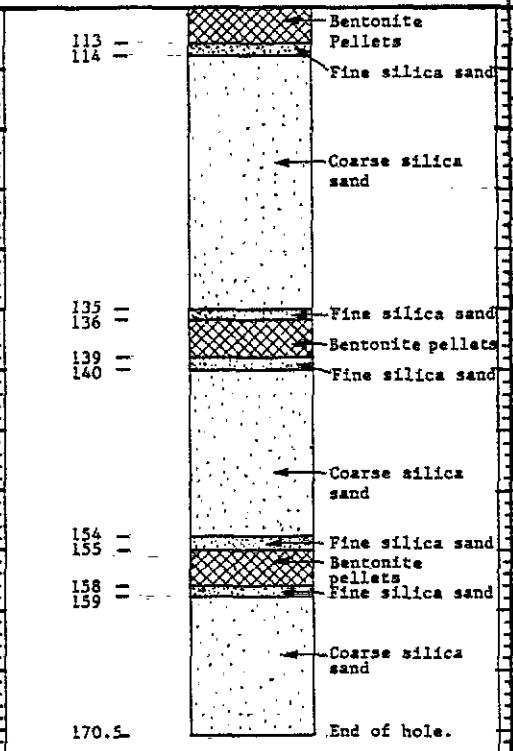
JOB NO. 883-6158 PROJECT YMI/RIFS/MODERN WELL NO. 311 SHEET 2 OF 2
S=13.14;
EA INSP. SHM DRILLING METHOD Wireline Core GROUND ELEV. 532.01 WATER DEPTH D=13.88
WEATHER Clr., Windy DRILLING COMPANY Hydro Group COLLAR ELEV. 533.02 DATE/TIME 3/7/89; 7:00
TEMP. 10°F DRILL RIG Acker DRILLER F. Cornell STARTED 2:00 / 2/7/89 (TIME / DATE) COMPLETED 9:00 / 2/9/89 (TIME / DATE)
LOCATION/COORDINATES N232082.13 E2325771.30

MATERIALS INVENTORY

WELL CASING	Steel	in. dia. 6"	lf	BENTONITE SEAL	3/8" Pellets
CASING TYPE	PVC 1/2 in	WELL SCREEN	1/2" in. dia. D20/S10 lf	INSTALLATION METHOD	Gravity
JOINT TYPE	Flush thread	SCREEN TYPE	Hacksaw	FILTER PACK QTY	6 bags/1 bag
GROUT QUANTITY	N/A	SLOT SIZE	—	FILTER PACK TYPE	#4-O-ROK/#1 Fine sand
GROUT TYPE	N/A	CENTRALIZERS	2	INSTALLATION METHOD	Gravity
		DRILLING MUD TYPE	Water		

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
110	60.5-134.8 ft. NODULAR DOLOSTONE with MARBLEIZED DOLOSTONE zone.
115	
120	
125	
130	
135	134.8-145.8 ft. PHYLLITIC DOLOSTONE.
140	
145	
150	145.8-152.3 ft. MARBLEIZED DOLOSTONE.
155	152.3-170.5 ft. Chloritic dolomitic cemented META SILTSTONE.
160	
165	
170	
175	
180	

WELL SKETCH



INSTALLATION NOTES

WELL DEVELOPMENT NOTES

Golder Associates

AR303390

TEMPORARY PIEZOMETER INSTALLATION LOG

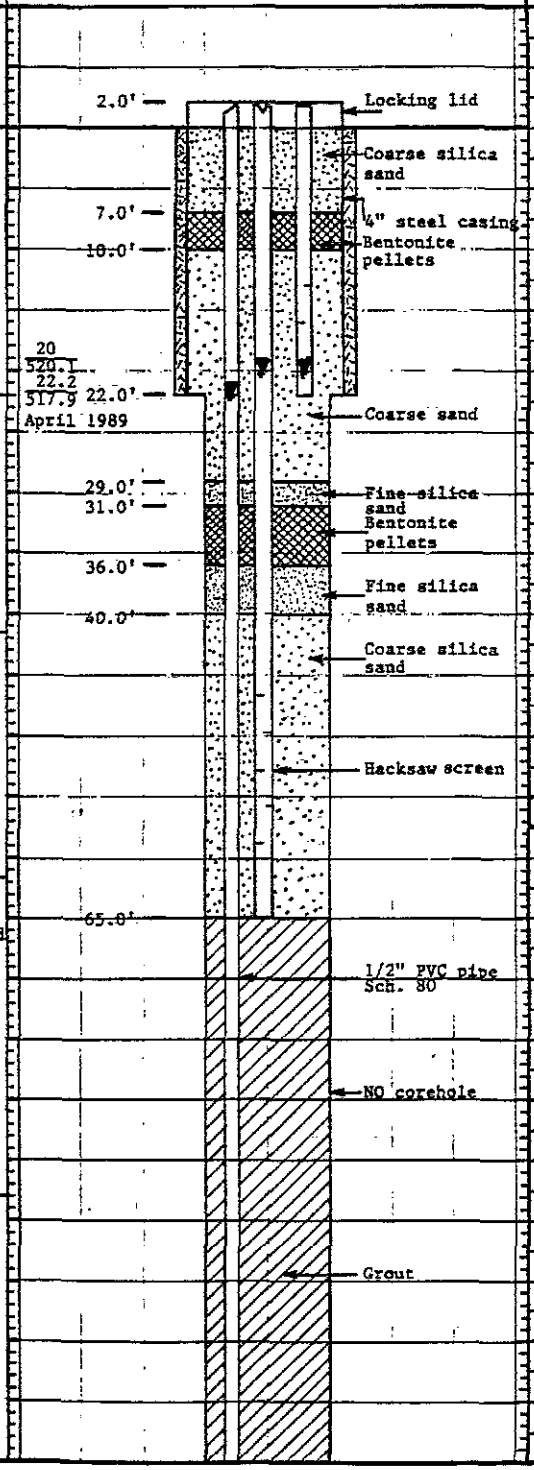
JOB NO. 883-6158 PROJECT WMI/RIFS/MODERN WELL NO. 312 SHEET 1 OF 3
S.I = 20
GA INSP. FG DRILLING METHOD NQ Corehole GROUND ELEV. 538.16 WATER DEPTH D = 22.2
WEATHER Sunny DRILLING COMPANY Hydro Group COLLAR ELEV. 540.00 DATE/TIME April 1989
TEMP. 50°F DRILL RIG Soil Sentry DRILLER F. Cornell STARTED 7:00 / 1/24/89 (TIME / DATE) COMPLETED / (TIME / DATE)

MATERIALS INVENTORY

WELL CASING 0.5 in. dia. 347 l.f. WELL SCREEN 1/2 in. dia. D20'/I20'/S10' l.f. BENTONITE SEAL 3/8" pellets
CASING TYPE PVC SCREEN TYPE Hacksaw INSTALLATION METHOD Gravity
JOINT TYPE Couples SLOT SIZE - FILTER PACK QTY. 4 bags / 1 bag
GROUT QUANTITY 45 gallons CENTRALIZERS 2 FILTER PACK TYPE 40 rock /#1 fine sand
GROUT TYPE 1 bag type I cement, 6 gallons water, and 2 lbs. bentonite powder DRILLING MUD TYPE Water INSTALLATION METHOD Gravity

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
	Angled boring 60° N330. Depth measured along the drilling rods.
	GROUND SURFACE
0.0	0.0-2.0 ft. Soft, loose, trace organics, SILT (soil)
5	
	2.0-22.0 ft. Compact to dense, mottled, conglomerate pieces of dolostone in orange brown SILTY CLAY. (ML)
10	
15	
20	
	22.0-41.5 ft. Slightly weathered, foliated, locally cleaved, banded with lenses of Dolomite and Phyllite, locally nodular, light gray, fine grained, DOLOMITIC PHYLLITE.
25	
30	
35	
40	
	41.5-61.5 ft. Fresh, closely cleaved, Healed with quartz or calcite) weakly foliated, locally layered, light gray, fine grained, PHYLLITE DOLOSTONE.
45	
50	
55	
60	
	61.5-88.0 ft. Fresh to slightly weathered (along joints), strongly foliated and cleaved, locally jointed, light gray to dark gray with bands of white quartz and calcite.
65	
70	
75	
80	
85	
	88.0-110.0 ft. Fresh, alternating nodular to foliated to massive to locally brecciated MARBLEIZED DOLOSTONE (healed with calcite).
90	
95	
100	
105	
110	

WELL SKETCH



INSTALLATION NOTES

1/25/89 The deep piezometer was installed and the section between 200 ft. and 65 ft. was grouted via tremie pipe using 6 bags of Type I cement.

1/26/89 The corehole was flushed with water to remove the traces of grout and bentonite pellets.

The shallow piezometer was installed as a stand pipe.

WELL DEVELOPMENT NOTES

Golder Associates

AR303391

TEMPORARY PIEZOMETER INSTALLATION LOG

JOB NO. 883-6158 PROJECT WMI/RIFS/MODERN WELL NO. 312 SHEET 2 OF 3

GA INSP. PG DRILLING METHOD NQ Corehole GROUND ELEV. 538.16 WATER DEPTH S.I=20; D=22.2

WEATHER Sunny DRILLING COMPANY Hydro Group COLLAR ELEV. 540.00 DATE/TIME April 1989

TEMP. 50°F DRILL RIG Soil Sentry DRILLER F. Cornell STARTED 7:00 (TIME) / 1/24/89 (DATE) COMPLETED ____ (TIME / DATE)

MATERIALS INVENTORY

WELL CASING 0.5 in. dia. 347 Lf. WELL SCREEN 1/2 in. dia. D20'/I20'/S10' Lf. BENTONITE SEAL 3/8" pellets

CASING TYPE PVC SCREEN TYPE Hacksaw INSTALLATION METHOD Gravity

JOINT TYPE Couples SLOT SIZE - FILTER PACK QTY. 4 bags / 1 bag

GROUT QUANTITY 45 gallons CENTRALIZERS 2 FILTER PACK TYPE 40 rock / #1 Fine sand

GROUT TYPE 1 bag type I cement, 6 gallons water, and 2 lbs. bentonite powder DRILLING MUD TYPE Water INSTALLATION METHOD Gravity

ELEV./DEPTH	SOIL/ROCK DESCRIPTION	WELL SKETCH	INSTALLATION NOTES
110	110.0-170.0 ft. Fresh, locally cut by abundant calcite filled gash fractures, foliated and cleaved, locally nodular, light to dark gray PHYLLITIC DOLOSTONE.	NQ corehole; Grout	
170	170.0-195.0 ft. Fresh, massive to weakly foliated and cleaved, locally banded with biotite rich zones, some calcite filled gash fractures, pyritic, light gray, MARBLEIZED SANDY DOLOSTONE. (Possible recrystallized fault zone)		WELL DEVELOPMENT NOTES
195	195.0-220.0 ft. Fresh, massive, marbleized to weakly banded with small elliptical pods of pyrite grains, locally fracture healed by calcite, some weak cleavage DOLOSTONE.	200.0' — Fine silica sand; 201.0' — Bentonite pellets; 205.0' — Fine silica sand; 209.0' — Centralizer; Coarse sand	
220	220.0-240.0 ft. Fresh, massive to weakly banded, locally fracture cleavage, light gray to brownish gray, locally silicified, very fine sulfides mixed with calcite gives banded texture, DOLOSTONE.		
230			

Golder Associates

AR303392

TEMPORARY PIEZOMETER INSTALLATION LOG

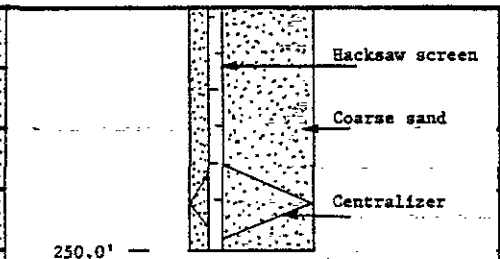
JOB NO. 883-6158 PROJECT WMI/RIFS/MODERN WELL NO. 312 SHEET 3 OF 3
SA INSP. FG DRILLING METHOD NQ Corehole GROUND ELEV. 538.16 WATER DEPTH S=1-20; D=22.2
WEATHER Sunny DRILLING COMPANY Hydro Group COLLAR ELEV. 540.00 DATE/TIME April 1989
TEMP. 50°F DRILL RIG Soil Sentry DRILLER F. Cornell STARTED 7:00 (TIME) / 1/24/89 (DATE) COMPLETED (TIME / DATE)
LOCATION/COORDINATES

MATERIALS INVENTORY

WELL CASING 0.5 in. dia. 347 l.f. WELL SCREEN 1/2 in. dia. D 20'/I20'/ S10' l.f. BENTONITE SEAL 3/8" pellets
CASING TYPE PVC SCREEN TYPE Hacksaw INSTALLATION METHOD Gravity
JOINT TYPE Couples SLOT SIZE - FILTER PACK QTY. 4 bags / 1 bag
GROUT QUANTITY 45 gallons CENTRALIZERS 2 FILTER PACK TYPE 40 rock / #1 fine sand
GROUT TYPE 1 bag type I cement, 6 gallons water, and 2 lbs. bentonite powder DRILLING MUD TYPE Water INSTALLATION METHOD Gravity

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
230	220.0-240.0 ft. Fresh, massive to weakly banded, locally fracture cleavage light gray to brownish gray, locally silicified, very fine sulfides mixed with calcite, DOLOSTONE.
235	
240	240.0-250.0 ft. Fresh, myriad of healed fracture cleavage, locally brecciates weakly foliated, light gray with dark greenish gray partings, silification, DOLOSTONE.
245	
250	

WELL SKETCH



INSTALLATION NOTES

WELL DEVELOPMENT NOTES

TEMPORARY PIEZOMETER INSTALLATION LOG

JOB NO. 883-6158 PROJECT WMI/RIFS/MODERN WELL NO. 316 SHEET 1 OF 2

GA INSP. SBM DRILLING METHOD NQ Wireline GROUND ELEV. 580.11 WATER DEPTH S=22.8; D=22.95

WEATHER Overcast DRILLING COMPANY Hydro Group COLLAR ELEV. 582.55 DATE/TIME April 1989

TEMP. 60° DRILL RIG Acker DRILLER T. Santelli STARTED ____ (TIME / DATE) COMPLETED ____ (TIME / DATE)

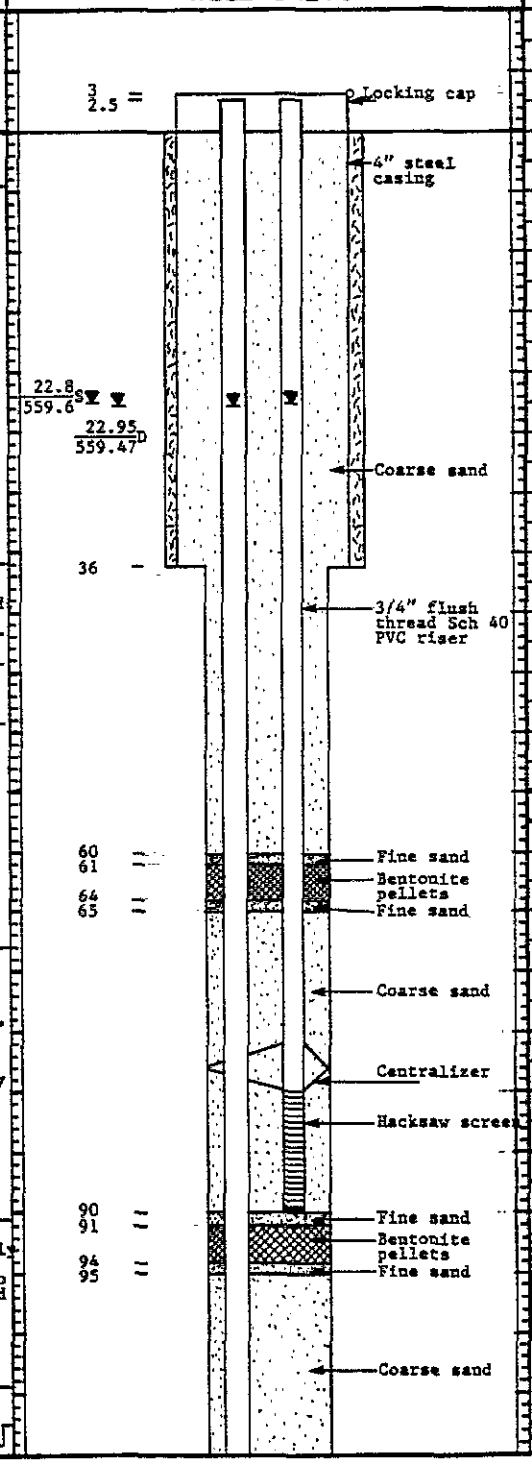
LOCATION/COORDINATES N230565.73 E2326087.79

MATERIALS INVENTORY

WELL CASING	0.5 in. dia. 229.0 ft	WELL SCREEN	0.5 in. dia. 10S/10D ft	BENTONITE SEAL	Pellets
CASING TYPE	PVC	SCREEN TYPE	0.5 in. spaced slots	INSTALLATION METHOD	Gravity
JOINT TYPE	Flush thread	SLOT SIZE	0.1 in.	FILTER PACK QTY	2
GROUT QUANTITY	None	CENTRALIZERS	2 on each piezometer	FILTER PACK TYPE	10/20
GROUT TYPE	N/A	DRILLING MUD TYPE	Water	INSTALLATION METHOD	Gravity

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
	Angled boring 60° N330° Depth measured along drilling rods.
	GROUND SURFACE
0.0	0.0–4.5 ft. Soft, loose, trace organics, SILTY CLAY. (CL)
5	
	4.5–36.0 ft. Compact to dense, foliated, orange brown, SILTY CLAY with PHYLLITE GRAVEL.
10	
15	
20	
25	
30	
35	
	36.0–68.0 ft. Moderately to slightly weathered, banded, strongly foliated locally folded by two generations (first generation isoclinal axial planes parallel to foliation, second small kink folds perpendicular to foliation) jointed with some quartz/calcite veinlets, light green, fine to medium grained, CHLORITIC PHYLLITE.
40	
45	
50	
55	
60	
65	
	68.0–90.5 ft. Slightly weathered to fresh, banded, some isoclinal folds, strongly foliated, joints with some moderately weathered rock voids after calcite) adjacent to joints, locally cleaved. Banded light green to white, fine grained, calcite banded, CHLORITIC PHYLLITE.
70	
75	
80	
85	
90	
	90.5–104.5 ft. Fresh, strongly foliated, locally banded with calcite and quartz lenses parallel to foliation, locally kinked folded perpendicular to foliation plane, dark green to light green, fine grained, chloritic, sericitic PHYLLITE.
95	
100	
105	
	104.5–107.5 ft. Fresh, calcitic, chloritic, sericitic PHYLLITE.
110	

WELL SKETCH



INSTALLATION NOTES

WELL DEVELOPMENT NOTES

Golder Associates

AR303394

TEMPORARY PIEZOMETER INSTALLATION LOG

JOB NO. 883-6158 PROJECT WMI/RIFS/MODERN WELL NO. 316 SHEET 2 OF 2

GA INSP. SHM DRILLING METHOD NQ Wireline GROUND ELEV. 580.11 WATER DEPTH S=22.8; D=22.95

WEATHER Overcast DRILLING COMPANY Hydro Group COLLAR ELEV. 582.55 DATE/TIME April 1989

TEMP. 60° DRILL RIG Acker DRILLER T. Santelli STARTED ____ TIME / DATE COMPLETED ____ TIME / DATE

LOCATION/COORDINATES N230565.73 E2326087.79

MATERIALS INVENTORY

WELL CASING 0.5 in. dia. 229.0 ft WELL SCREEN 0.5 in. dia. 10S/10D ft BENTONITE SEAL Pellets

CASING TYPE PVC SCREEN TYPE 0.5 in. spaced slots INSTALLATION METHOD Gravity

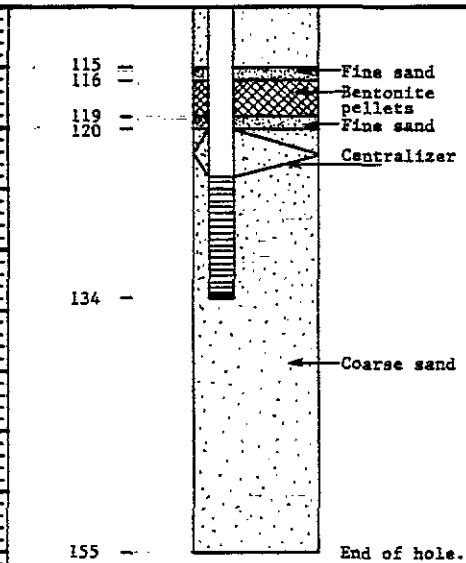
JOINT TYPE Flush thread SLOT SIZE 0.1 in. FILTER PACK QTY 2

GROUT QUANTITY None CENTRALIZERS 2 on each piezometer FILTER PACK TYPE 10/20

GROUT TYPE N/A DRILLING MUD TYPE Water INSTALLATION METHOD Gravity

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
110	107.5-111.5 ft. White quartz vein.
115	111.5-113.4 ft. Chloritic PHYLLITE.
120	113.4-155.5 ft. Fresh, strongly foliated, banded, locally isoclinely folded, minor quartz veins, dark green, medium grained, CHLORITIC PHYLLITE.
125	
130	
135	
140	
145	
150	
155	
160	

WELL SKETCH



INSTALLATION NOTES

WELL DEVELOPMENT NOTES

Golder Associates

AR303395

TEMPORARY PIEZOMETER INSTALLATION LOG

JOB NO. 883-6158 PROJECT GMI/RIFS/MODERN WELL NO. 318 SHEET 1 OF 2
S=21.7;
GA REP. SHM/ALC DRILLING METHOD HSA 6 1/4" ID, NQ Core GROUND ELEV. 639.68 WATER DEPTH D=25.2
WEATHER Overcast DRILLING COMPANY Hydro Group COLLAR ELEV. 641.54 DATE/TIME April 1989
TEMP. 60°F DRILL RIG Brat 22R DRILLER Jeff Sheatz STARTED 0700 / 3/27/89 COMPLETED TIME / DATE
LOCATION/COORDINATES N229278.23 E2325761.37

MATERIALS INVENTORY

WELL CASING 0.5 in. dia. 195.5 ft. WELL SCREEN 0.5 in. dia. S10/D10 ft. BENTONITE SEAL 3/8" pellets
CASING TYPE Timco Mfg., Inc. SCREEN TYPE Timco Mfg., Inc. INSTALLATION METHOD Gravity
JOINT TYPE Flush threaded SLOT SIZE 0.01" FILTER PACK QTY. 150 lbs., 125 lbs.
GROUT QUANTITY N/A CENTRALIZERS N/A FILTER PACK TYPE #4 sand/#1 sand
GROUT TYPE N/A DRILLING MUD TYPE Water INSTALLATION METHOD Gravity

ELEV./DEPTH	SOIL/ROCK DESCRIPTION	WELL SKETCH	INSTALLATION NOTES
	Angled boring 60° N330 Depth measured along drilling rods. GROUND SURFACE	3/2 = Protective casing with locking cap	
0.0	0.0-4.0 ft. Soft, loose, trace organics, SILTY CLAY. (soil) (ML)		
5			
10	4.0-49.0 ft. Compact to dense, foliated, orange brown, completely weathered PHYLLITE.		
15			
20		21.72 / 619.82	8" auger hole
25		25.23 / 616.31	Coarse sand
30			
35			
40			
45		45.5'	Bentonite pellets
50	49.0-69.2 ft. Slightly to moderately weathered, strongly foliated, locally banded, greenish-gray, f grained, PHYLLITE. Water bearing zone with FeO staining along foliation and joint surfaces.	48.4' / 49.0' / 49.4'	Fine sand
55		51.5'	Coarse sand
60		61.5'	WELL DEVELOPMENT NOTES
65		62.9' / 63.4'	Fine sand / Bentonite pellets
70	69.2-133.2 ft. Fresh, strongly foliated, locally banded, greenish-gray, f grained, PHYLLITE with calcite and quartz veins. No evidence of water bearing zones.	68.0' / 69.4'	Fine sand
75			
80			NQ core hole
85			
90			Coarse sand
95			
100		98.3' / 100.0'	Fine sand / Pellet seal
105		105.0'	Fine sand
110		108.0'	Coarse sand

Golder Associates

AR303396

TEMPORARY PIEZOMETER INSTALLATION LOG

JOB NO. 883-6158 PROJECT WMI/RIFS/MODERN WELL NO. 318 SHEET 2 OF 2

SA INSP. SHM/ALC DRILLING METHOD HSA 6 1/4" ID, NQ Core GROUND ELEV. 639.68 WATER DEPTH S=21.7; D=25.2

WEATHER Overcast DRILLING COMPANY Hydro Group COLLAR ELEV. 641.54 DATE/TIME April 1989

TEMP. 60°F DRILL RIG Brat 22R DRILLER Jeff Sheatz STARTED 0700 (TIME) / 3/27/89 (DATE) COMPLETED (TIME) / (DATE)

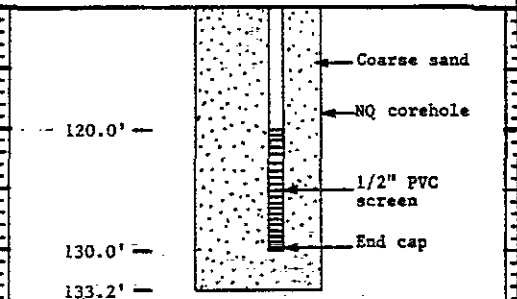
LOCATION/COORDINATES N229278.23 E2325761.37

MATERIALS INVENTORY

WELL CASING	0.5 in. dia. 195.5 l.f.	WELL SCREEN	0.5 in. dia. S10/D10 l.f.	BENTONITE SEAL	3/8" pellets
CASING TYPE	Timco Mfg., Inc.	SCREEN TYPE	Timco Mfg., Inc.	INSTALLATION METHOD	Gravity
JOINT TYPE	Flush threaded	SLOT SIZE	0.01"	FILTER PACK QTY.	150 lbs., 125 lbs.
GROUT QUANTITY	N/A	CENTRALIZERS	N/A	FILTER PACK TYPE	#4 sand /#1 sand
GROUT TYPE	N/A	DRILLING MUD TYPE	Water	INSTALLATION METHOD	Gravity

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
110	69.2-133.2 ft. Fresh, strongly foliated, locally banded, greenish-gray, fine grained, PHYLLITE with calcite and quartz veins. No evidence of water bearing zones.
115	
120	
125	
130	
135	

WELL SKETCH



INSTALLATION NOTES

WELL DEVELOPMENT NOTES

Golder Associates

AR303397

Well No. MU-401

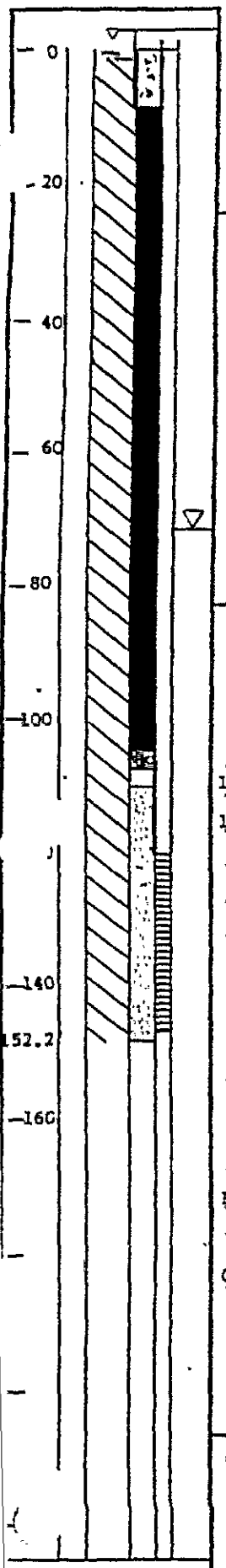
Boring No. X-Ref: DW-5

MONITOR WELL CONSTRUCTION SUMMARY

Survey Coords: N228114.26 E2324888.97

Elevation Ground Level 732.33

Top of Casing 733.59



Drilling Summary:

Total Depth 152.2'
Borehole Diameter 10" to 40' ; 6" to 152.2'
Casing Stick-up Height: PVC ~ 12"; Al-1.26'
Driller Myers Brothers Drilling Contractors, Inc. Salunga, Pennsylvania
Rig T4W-900
Bit(s) 10" Hammer Bit; 6" Hammer Bit
Drilling Fluid Potable Water
Protective Casing 4" Diameter Aluminum

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling				
10" hole	8/9/88	1005	8/9/88	1023
6" hole	8/9/88	1105	8/9/88	1215
Geophys.Logging:				
Casing:				
6" casing	8/9/88	1023	8/9/86	1105
4" Al. casing	10/31/88	1050	10/31/88	1230
Filter Placement:				
Cementing:				
Development: by Rig	8/9/88	1215	8/9/88	215

Well Design & Specifications

Basis: Geologic Log X Geophysical Log ___
Casing String (s): C = Casing S = Screen.

Depth		String(s)	Elevation	
150.0'	120.0'	Screen (S1)	582.33	612.33
120.0'	+1'	Casing (C1)	612.33	733.33
6.5'	+1.26	Casing (C2)	725.83	733.59

Casing: C1 2" PVC Sch. 40 F.J. (U.O.P. Johnson): 120.0' - +3.0'
C2 4" Aluminum Casing: -6.5' - +3.5'
Screen: S1 2" PVC, 0.020" Slot; U.O.P. Johnson: 150.0' - 120.0'
S2

Filter Pack: Morie Grade 1: 152.2' - 109.6'
Filter Sand: 109.6' - 107.6'
Grout Seal: 104.0' - 6.5'
Cement: 6.5' - 0.0'
Bentonite Seal: Pellets: 107.6' - 104.0'
Centering Disks: 148.0'; 125.0'

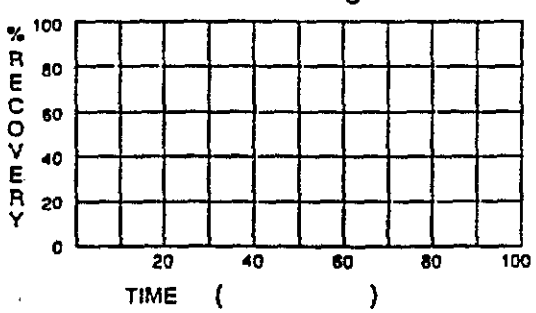
Well Development:

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (C)

Recovery Data:

Q= S_o=



Comments:

Elevation of top of PVC is approximate.
Soft Zones: None Detected
Water-bearing zones - none - 8/9/88 - dry hole; monitoring well construction put on hold; construction completed 10/6/88

SITE NAME Modern Landfill - Southwest Expansion
LOCATION R. D. #9, York, Pennsylvania
WO# 1402
SUPERVISED BY E. Allan Timmins
R. E. Wright Associates, Inc.
DATE 8/9/88

AR303398

88099-7-2 Well No. MU-402

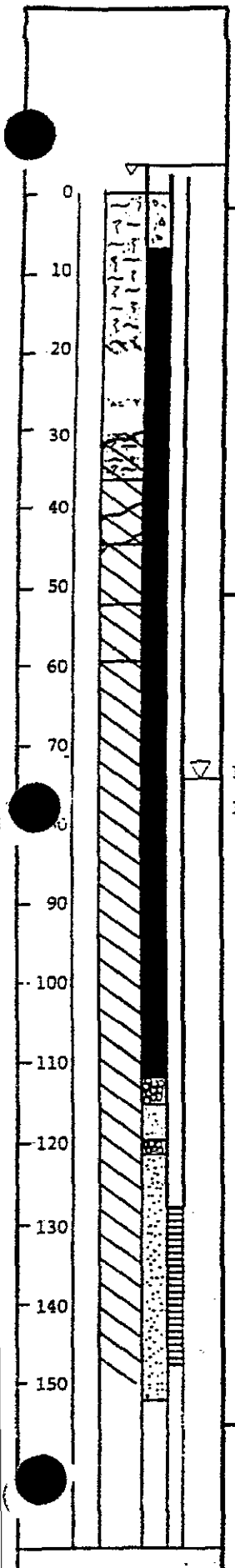
Boring No. X-Ref: DW-6

MONITOR WELL CONSTRUCTION SUMMARY

Survey Coords: N 222711.45
E 2324330.56

Elevation Ground Level 747.97

Top of Casing 751.5



Drilling Summary:

Total Depth 152.4'
Borehole Diameter 10' to 39'; 6' to 152.4
Casing Stick-up Height: PVC-2.96'; Al-3.53'
Driller Myers Brothers Drilling Contractors, Inc. Salunga, Pennsylvania
Rig D4W-900- Ingersol Rand
Bit(s) 10" Hammer bit; 6" Hammer bit
Drilling Fluid Potable Water
Protective Casing 4" Diameter Aluminum

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling				
10" hole	8-2-88	840	8-2-88	900
6" hole	8-2-88	920	8-2-88	1004
Geophys. Logging:				
Casing: steel				
6" casing	8-2-88	920	8-2-88	935
Filter Placement:	8-2-88	1107	8-2-88	1317
Cementing:	8-2-88	1317	8-2-88	1030
Development: by Rig	8-2-88	1004	8-2-88	1035

Well Design & Specifications

Basis: Geologic Log X Geophysical Log ____
Casing String (s): C = Casing S = Screen.

Depth	String(s)	Elevation
148.4' - 128.4'	Screen (S1)	599.57' 619.57'
128.4' - +3.96'	Casing (C1)	619.57' 750.83'
6.5' - +3.53'	Casing (C2)	741.47' 751.50'

Casing: C1 2" PVC Sch. 40 F.J. (U.O.P. Johnson): solid -128.4 to +3.0'
C2 4" Aluminum Casing: -6.5' to +3.5'
Screen: S1 2" PVC, 0.020" Slot; U.O.P. Johnson: 148.4' to 128.4
S2

Filter Pack: Morie Grade 1: 152.4 to 121.0'
Filter Sand: 120.6' to 115.8'
Grout Seal: 112.0 to 7.2'
Cement Seal: 7.2' to 0.0'
Bentonite Seal: Pellets 121.0' to 120.0'
115.8' to 112.0'
Centering Disks: 148.4' 135.7'

Well Development:

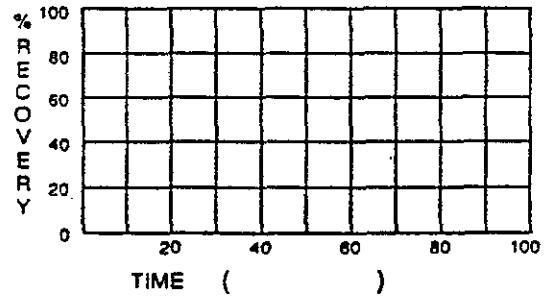
T-1440 SWL 71.08'. Water started very dirty, lot of grey sand, and some moray sand. Started to clear after 2 or 3 minutes. Surged and purged 50 minutes until clear.

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (C)
1530	7.77	236	10.2
1540	7.80	232	10.2
1550	7.92	234	10.2

Recovery Data:

Q= S_o=



Comments: 5 minutes after shutdown WL 109.21'
Casing - Rover 4" aluminum locking cap with ± 21 master lock
WBZ at 59 - 66' (~12 gpm); 133' (8-10 gpm).

SITE NAME Modern Landfill - Southwest Expansion
LOCATION R. D. #9, York, Pennsylvania
WC 01402
SUPERVISED BY R. E. Wright Associates, Inc. E. Allan Timmins
DATE 8-2-88

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

Modern Landfill
Southwest Expansion
R. D. #9
York, Pennsylvania

DRILLING METHOD: Split sppon to refusal; NX casing installed, NX core to proposed depth

SAMPLING METHOD: Split spoon sampling to rock; NX core to total depth

BORING NO. MU-402/DW-6

SHEET 1 OF 6

DRILLING: START 6-23 TIME 800; FINISH 7-14 TIME 1000

WATER LEVEL	16.3'	10.6'	39.75'	51.35'
TIME	1600	750	800	828
DATE	7-7	7-8	7-11	7-12
CASING DEPTH	30	30	30	30

DATUM ELEVATION

DRILL RIG Auger/Core Skid Rig

ANGLE Vertical BEARING --

SAMPLE HAMMER TORQUE 30/140 FT -LBS

SURFACE CONDITIONS

DRILLING CONTR F. T. Kitlinski Associates, Inc. Harrisburg, Pennsylvania

LOGGED BY R. E. Wright Associates, Inc.

DATE 8/20/88 CHK'D BY EAT

RL 2237

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: ROD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM/SEC.
0	1		S-1			Strong brown clayey fine Sandy Silt clay, dry, very friable.								
	2		S-1A	1.4										
1	3	1	S-1B	2.0										
	4													
2	5		S-2											
	7		S-2A	1.7		Yellow-red Clayey Silt clay, slightly moist and plastic.								
3	12	2	S-2B	2.0										
			S-2C											
4	12													
	8		S-3	1.2		Yellow-red micaceous Clayey Silt CL, very friable, moist.								
	11		S-3A	2.0										
5	19	3	S-3B			Red Clayey Silt CL, strong, firm somewhat plastic, somewhat moist.								
	18													
6	24		S-4	1.2		Light red-brown Saprolite ML/SM Loamy Silty Sand.								
	20		S-4A											
7	11	4	S-4B	2.0		Yellowish-brown Silty Sand SM, dry, loose, quartz chips.								
	31													
8	49		S-5	1.4		Yellowish-red to red Clayey Silty CL, somewhat moist, friable, somewhat plastic.								
	34													
9	35	5	S-5A	2.0		Grayish-brown and red Silty Sand SM, loose, dry Saprolite.								
	37		S-5B											
10	19		S-6	0.9		As above, more Silt fissile Saprolite structure.								
	20		S-6A			Yellow and lavender brown Silty and Clayey sand.								
11	100	6		2.0		MH very micaceous saprolite.								
12						Red and purplish-red Clayey and Fine Sandy Silt, somewhat moist and plastic. MnOx stains								
13						No sample.								
14						Moderate reddish-brown and purplish red micaceous Saprolite, Clayey Silt. MnOx staining.								
15		7	S-7											

NX to 9.5'

AR303400

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

.odern Landfill
Southwest Expansion
R. D. #9
York, Pennsylvania

DRILLING METHOD:

SAMPLING METHOD:

BORING NO. MU-402/DW-6

SHEET 2 OF 6

DRILLING START / FINISH

WATER LEVEL	49.5'	49.3'	51.25'		
TIME	1703	1245	740		
DATE	7-12	7-13	7-15		
CASING DEPTH	30'	30'	30'		

TIME / DATE (START) | TIME / DATE (FINISH)

DATUM ELEVATION

DRILL RIG

ANGLE BEARING

SAMPLE HAMMER TORQUE FT.-LBS

SURFACE CONDITIONS

DRILLING CONTR F. T. Kitlinski Associates, Inc. Harrisburg, Pennsylvania

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
15	10					As above, more competent, some moisture, fissile saprolite structure.								
	16	7	7A											
16	4													
	7	8	8			Red-brown Clayey Silt, very moist. Grayish-brown also, saprolitic material - Extremely weathered.								
	11		8A											
17	25													
	8	9	9											
	16		9A			Moderate red-brown to strong brown Clayey Silt moist but not as much as above, form with trace purple saprolite.								
18	24													
	21		10											
	42	10												
19	50		10A			As above, more coarse particles and more red-brown Saprolite, dry and loose.								
20						Red-brown Saprolite (fine sand silt/mixed) with moderate strong brown Clayey Silt, coarse grains of quartz (coarse sand sz.).								
21						No sample 20-25'.								
22														
23														
24														
25	16		11A			Red-brown - yellow-brown Clayey Silty Saprolite. Dry, crumbling (loose) fissile structure.								
	38	11												
26	50					Red-brown Silty Sand with quartz and micaceous particles, moist.								
27						No sample 25-30'.								
28														
29														
30														

LOGGED BY R. E. Wright Associates, Inc.

DATE 8-2-88 CHK'D BY E. Allan Timmins

RL 02237

Printed on recycled paper

AR303401

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

Modern Landfill
Southwest Expansion
R. D. #9
York, Pennsylvania

DRILLING METHOD:

SAMPLING METHOD:

BORING NO. MW-402/DW-6

SHEET 3 OF 6

DRILLING START / FINISH

WATER LEVEL					TIME	TIME
TIME						
DATE					DATE	DATE
CASING DEPTH						

DATUM ELEVATION

DRILL RIG

SURFACE CONDITIONS

ANGLE BEARING

SAMPLE HAMMER TORQUE FT.-LBS

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
30						Highly weathered grayish olive green to grayish-green Phyllite MxOx staining, chloritic micaceous. Also trace quantities of soft saprolite at 30.5' Phyllite weathered to limonite-disseminated.		Very blocky, foliation planes (↑ 75° to 80°). Micaceous along foliation.						
31				4.6										
32				6.5										
33	36.5'					Dark grey-green to dusky green Phyllite. Considerably more competent than above, grading into more of a phyllite - Sandstone by 44.5', but foliation still evident.		Foliating ↑ 80° quartz veins (very thin) common and parallel to foliation. Also micaceous along foliation.						
34				7.9	7.3									
35				8.0	8.0									
36														
37	45'					Bluish-greenish-gray Micaceous Phyllite, more silty seams, Fe_2O_3 coatings on foliation planes.		Foliation micaceous quartz vein at 47'. Broken soft at 45'.						
38				3.0	1.0									
39				8.0	8.0									
40														
41	52.5'					As above, vuggy due to weathered out limonite.		Extensive vertical folding - wavy at 52.5-52.8'. Quartz stronger at 58.3' shows 2" vertical muscovite crosscut.						
42				7.9										
43				8.0		59.3-60.5' Weathered Phyllite, very soft.								
44														
45	59.3'													
	60.5'													

DRILLING CONTR F. T. Kitlinski Associates, Inc.

Harrisburg, Pennsylvania

LOGGED BY R. E. Wright Associates, Inc.

DATE 8-2-88 CHK'D BY E. Allan Timmins

RL 02237

Printed on recycled paper

AR303402

ROCK BOREHOLE LOG

SITE NAME AND LOCATION: dern Landfill, Southwest Expansion, R. D. #9, York, Pennsylvania

DRILLING METHOD:

SAMPLING METHOD:

BORING NO. MU-402/DW-6

SHEET 4 OF 6

DRILLING: START TIME / FINISH TIME

WATER LEVEL					
TIME					
DATE					
CASING DEPTH					

DATUM ELEVATION

DRILL RIG

ANGLE BEARING

SAMPLE HAMMER TORQUE FT.-LBS

SURFACE CONDITIONS

DRILLING CONTR F. T. Kitlinski Associates, Inc. Harrisburg, Pennsylvania

LOGGED BY R. E. Wright Associates, Inc.

DATE 8-2-88 CHK'D BY E. Allan Timmins

RI 2237

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
45						Very Weathered phyllitic Material, olive brown to blue-green gray, silty. Micaceous phyllite, quartz veins very vuggy to porous.		Weathered rock Poorly recovered						
46														
47				3.2	0.0	Predominantly only quartz-rich material recovered. FeO, and MnO staining throughout.								
48				8.0	8.0									
49														
50						Bluish-greenish gray Micaceous Phyllite, silty at 70', grades to more micaceous, very micaceous at 69.5'.		Quartz stringers throughout parallel foliation.						
51								Soft zone 77'-78', more chloritic.						
52				8.0	7.1			Weathered fracture (joints) at 71.2, 73.8, 77.0 ∢ Cl = 60°, ∢ foliation = 75° - 80°						
53				8.0	8.0									
54								Kinkbands, vertical folds axis present. Chloritic material. very soft and ductile.						
55														
56														
57				3.3	2.4	Green Chlorite Phyllite								
58				9.1	9.1	Common lenses of feldspar elongated to foliation (∢ 70°); core broken.								
59														
60														

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

odern Landfill
Southwest Expansion
R. D. #9
York, Pennsylvania

DRILLING METHOD:

SAMPLING METHOD:

BORING NO. MU-402/DW-6

SHEET 5 OF 6

					DRILLING START	DRILLING FINISH
WATER LEVEL	50 ABGS	49.55 BGS			TIME	TIME
TIME	1703	832			800	1000
DATE	7-12	7-13			DATE	DATE
CASING DEPTH					7-7	7-14

DATUM ELEVATION

DRILL RIG

SURFACE CONDITIONS

ANGLE BEARING

SAMPLE HAMMER TORQUE FT.-LBS

DRILLING CONTR F. T. Kitlinski Associates, Inc. Harrisburg, Pennsylvania

RL 02237

LOGGED BY R. E. Wright Associates, Inc.

DATE 8-2-88 CHK'D BY E. Allan Timmins

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
60														
61				8.2	8.2	As above, more competent, very chloritic, feldspar + quartz zone + some $CaCO_3$ lenses throughout		Lenses have elongated axis parallel to foliation weathered joint ∢ 15° at 88.6 and 88.9' Foliation ∢ 75 - 80°						
62				9.9	9.9									
63						Biotite zone with no recovery to 88.6		$CaCO_3$ lenses reaching weathered fractures 92.6 ∢ 40° (open), 93.3 ∢ 65°						
64						Bluish green chloritic phyllite, with feldspar + quartz stringer + lenses (3-5mm) elongated along foliation-distributed randomly		Weathered, soft joints at 98.5', 98.7', 99.1', 99.5' all ∢ 60°						
65				8.7	8.7									
66				9.0	9.0			101.4', 103.1', 104.5', 105.3', 105.5', 106.5' weathered joint at 104.1 (smooth fresh) ∢ 60°						
67						97' to 106': uniform lithology								
68														
69						Limited recovery 108.5 to 115 evidence of washout large 1/2" quartz veins present		Signs of movement and rehealing						
70				3.0	4.0			107.3' ∢ 60° joint (weathered and soft)						
71				9.0	9.0	Bluish gray - bluish green chloritic phyllite, 3/4" pyrite cyrstals some replaced with quartz + feld spar		108.5' weathered joint						
72														
73														
74				7.2	7.2	As above, very ductile 119.4 - lithology interface marked by $CaCO_3$		∢ foliation 75°-80° kinkband with vertical fold axis common spun core at 115' and 117.6' Weathered open joint at 116.8 ∢ 60°						
75				8.0	8.0									

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

Modern Landfill
Southwest Expansion
R. D. #9
York, Pennsylvania

DRILLING METHOD:

SAMPLING METHOD:

BORING NO. MU-402/DW-6

SHEET 6 OF 6

					DRILLING START	DRILLING FINISH
WATER LEVEL	51.25	T.O.C.	(Approx. 4")	A.G.S	TIME	TIME
TIME	740					
DATE	7-15				DATE	DATE
CASING DEPTH					7-7	7-14

DATUM ELEVATION

DRILL RIG

SURFACE CONDITIONS

ANGLE BEARING

SAMPLE HAMMER TORQUE FT.-LBS

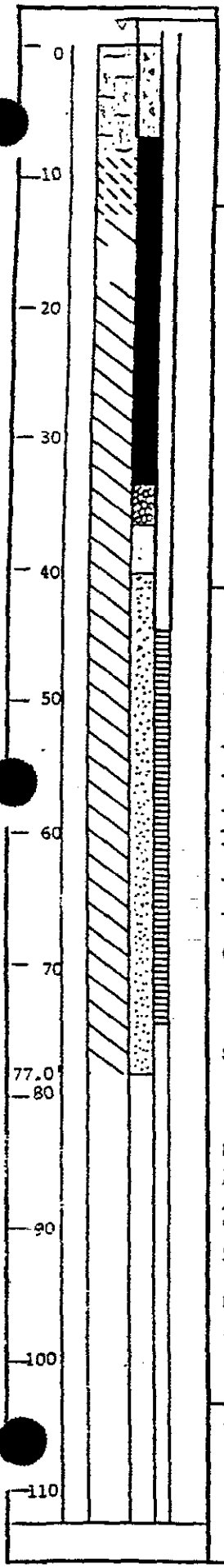
DEPTH IN FEET (ELEVATION)	BLOWS/6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: ROD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM/SEC.
75														
76						See above								
77						Bluish green to greenish gray chloritic phyllite soft ductile, more quartz ($CaCO_3$ inclusion) veins		126.4 mechanical break ∢ foliation 65° 126.9 mechanical break more vertical						
78				6.6	6.3									
79				8.0	8.0			Spun core, soft zone 128 to 129.3 - limited recovery. Possible soft zone below quartz rich large veins (1/2 -1" wide) zone. 129.5 - 129.8 Quartz 130.3 - 130.7 and $CaCO_3$ veins ∢ 60°						
80						124.1 - $CaCO_3$ quartz vein very irregular pattern lithologic interface? Weathered joint at 126								
81														
82				5.2	5	As above, very micaceous - fissile, breaks easily along foliation planes. Foliation ∢ 80°; more competent from 131.2-139 core contains quartz veins of irregular pattern								
83				8.0	5.0 8.0			Common pyrite crystals disseminated						
84														
85														
86				7.9	6.7	As above, very competent, quartz (with $CaCO_3$) veins nearly vertical at 144								
87				8.0	8.0									
88						Softer zone at 145.1 large broken fragments along foliation planes		Foliation ∢ 65 - 70' Fracture (slightly weathered) ∢ 60° at 142.7						
89				1.0	1.0	More dusky green phyllite (lithologic boundary) competent with quartz vein at 147.2		Somewhat fissile along foliation planes somewhat micaceous						
90				3.0	3.0									

DRILLING CONTR F. T. Kitlinski Associates, Inc. Harrisburg, Pennsylvania

LOGGED BY R. E. Wright Associates, Inc. 8-2-88 CHK'D BY E. Allan Timmins

RL 0037

AR303405



Well No. MD-403

Boring No. X-Ref: SW-7

MONITOR WELL CONSTRUCTION SUMMARY

Survey Coords: Not Available Elevation Ground Level ~ 671

Top of Casing Not Available

SITE NAME Modern Landfill - Southwest Expansion

Drilling Summary:

Total Depth 77.0'
Borehole Diameter 10" to 19'; 6" 19'-77'
Casing Stick-up Height: PVC = 36"; AL = 42"
Driller Myers Brothers Drilling Contractors, Inc. Salunga, Pennsylvania
Rig T4W-900 Ingersoll Rand
Bit(s) 6" Hammer Bit; 10" Hammer bit
Drilling Fluid Potable Water
Protective Casing 4" Diameter Aluminum

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling				
10" hole	9/23/88	0940	9/28/88	1000
6" hole	9/28/88	1010	9/28/88	1100
Geophys.Logging:				
Casing:				
6" casing	9/28/88	1105	9/28/88	1115
4" Aluminum	10/6/88		10/6/88	
Filter Placement:	10/5/88	1400	10/5/88	1430
Cementing:				
Development: by Rig	9/28/88	1100	9/28/88	1130

Well Design & Specifications

Basis: Geologic Log X Geophysical Log ___
Casing String (s): C = Casing S = Screen.

Depth	String(s)	Elevation
75.0' - 45.0'	Screen (S1)	___ - ___
45.0' - +3.0'	Casing (C1)	___ - ___
-6.5' - +3.5'	Casing (C2)	___ - ___
___ - ___	___	___ - ___
___ - ___	___	___ - ___

Casing: C1 2" PVC Sch. 40 F.J. (U.O.P. Johnson): 45.0' - +3.0'
C2 4" Aluminum Casing: -6.5' - +3.5'
Screen: S1 2" PVC, 0.020" Slot; U.O.P. Johnson: 75.0' - 45.0'
S2
Filter Pack: Morie Grade 1: 77' - 40'
Filter Sand: 40.0' - 37.0'
Grout Seal: 34.0' - 6.5'
Cement: 6.5' - 0'
Bentonite Seal: Pellets - 37.0' - 34.0'
Centering Disks: 74.0', 43.0'

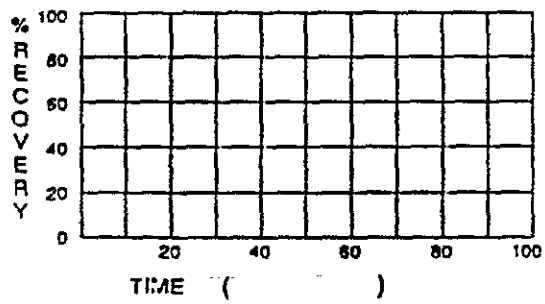
Well Development:

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (C)

Recovery Data:

Q= S_D=



Comments: Survey data not available at time of log preparation.

SUPERVISED BY R. E. Wright Associates, Inc.

DATE 9/28/88

FIELD LOG – SOIL BOREHOLE

SITE NAME AND LOCATION

Modern Landfill
Southwest Expansion
R. D. #9
York, Pennsylvania

DRILLING METHOD: 2" Split spoon to refusal; NX casing to refusal; NX core to total depth

SAMPLING METHOD: 2" Split spoon; NX core to proposed depth

BORING NO. MD-403/SW-7

SHEET 1 OF 5

					DRILLING START	DRILLING FINISH
WATER LEVEL	Dry	Dry			TIME	TIME
TIME	1600	830			1236	
DATE	9/13	9/14			DATE	DATE
CASING DEPTH	12'	12'			9/13/88	

DATUM ELEVATION

DRILL RIG #103 Skid Rig

SURFACE CONDITIONS Tilled field - replanted with corn - edge of access roads.

ANGLE Vertical BEARING --

SAMPLE HAMMER TORQUE 30"/140 lbs. FT.-LBS

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN ON SAMPLER (RECOVERY)	SOIL GRAPH	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	DEPTH IN FEET FROM	DEPTH IN FEET TO	DESCRIPTION OF OPERATION AND REMARKS
0	9 13		ML Fine Sandy Silt: 7.5YR 6/6, red-yellow to 2.5YR 4/6, red, friable, dry, some weathered phyllitic fragments, more clay @ 1.5' (ML).	2" Split Spoon	NX Casing				
2	12 15		ML						
	13 14		CL Silty Clay: 5YR 5/8, dry, competent, friable, some h. weathered quartz fragments, gravel size, fragments also ol. grn., phyllite, weathered (ML-CL).						2.2' ML-CL interface.
4	20 20		CL Silty Clay: As above, more rock fragments, grades to yellow-red (5YR 5/8), dry, friable (ML-CL).						
	5 20		CL						
6	25 31		CL						5.5' more rock fragments, saprolitic.
	24 36		CL Silty Clay: As above, 1" rock seam @ 7.1', 5YR 5/8, yellow-red to 2.5YR 4/8, red, phyllite with 1"-3" clay seams, more competent below 7.4'. Saprolite: FeO_2 stnd., limonite X-tals weathered out (ML-CL).						
	48 62		CL						
8	21 34		CL As above: rock sm. @ 9.0', weathered rock below 9.0', dry, bl. grn. mica. phyllite with red-yellow silty clay seams (ML-CL).						
	58 60		CL						TOWR - weathered with clay seams.
10	21 38		As above: Mgne. competent (ML-CL), weathered rock @ 11.3', bl. grn to ol. gray, micaceous phyllite, mod. weathered, very foliated.						
	58 100								TOCR - 11.3'.
12	12		Phyllite: Dark grn. gr. 5YR 4/1 silty, ⊀ fol. = 80°, mod. wthrd. along foliation planes, FeO_2 coatings, soft spots along joints and fractures, some fol. planes coated with or. br. silty clay.	NX Core	Open Hole				Split-spoon refusal @ 12' - Set NX casing to 10', stop 9-13-1600, 9-14-88 - NX casing - 12', start coring @ 8:58 a.m. @ 12', lost water at 13', vuggy quartz vein @ 12.3-12.6', ⊀ = 25° - discordant.
14									
15									15.2-15.4 qtz. vns. ⊀ = hor.

DRILLING CONTR Kitlinski Associates, Inc. Harrisburg, Pennsylvania

LOGGED BY R. E. Wright Associates, Inc. - E. Allan Timmins

DATE 9-13-88 CHK'D BY E. A. Timmins

FS 011606

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

Modern Landfill
Southwest Expansion
R. D. #9
York, Pennsylvania

DRILLING METHOD: 2" Split spoon to refusal; NX casing to refusal; NX core to total depth

SAMPLING METHOD: 2" Split spoon; NX core to proposed depth

BORING NO. MD-493/SW-7

SHEET 2 OF 5

					DRILLING START	DRILLING FINISH
WATER LEVEL	Dry	Dry			TIME	TIME
TIME	1600	830			1236	
DATE	9/13	9/14			DATE	DATE
CASING DEPTH	12'	12'			9/13/88	

DATUM ELEVATION

DRILL RIG #103 Skid Rig - S.S. Drive Casing Core

ANGLE Vertical BEARING --

SAMPLE HAMMER TORQUE 30"/140 lbs. FT.-LBS

SURFACE CONDITIONS Tilled field - replanted with corn - edge of access roads.

DRILLING CONTR. Kitlinski Associates, Inc.

Harrisburg, Pennsylvania

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT / CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
15						Moist, micaceous, graphitic texture.	NO RETURN	15.4' to 19' - limited to no recovery.	NX CORE / OPEN HOLE				
16				3.7	0.7			Fracture @ 12.5' ∠ = 25					
		1		7.0	7.0			14.4' ∠ = hor.					
18								15.2' ∠ = hor.					
19	9.35 / 10.15					Phyllite: As above, silty, some mica., Mn coatings on quartz and fracture surfaces, ∠ fol. = 70°, bl. gr. silty slightly mica. FeO_2 coatings along foliation planes, fractures @ 21.9, 22.0, 24, 25.7.		Fracture - MnO ctgs. 20.0 20.2					
20													
22								21.5 - fr. Mn/FeO_2 ctgs.					
		2		5.8	2.3	∠ Fol. = 70°, weathered with FeO_2.							
				8.0	8.0								
24								Poor recovery.					
26													
27	11.15 / 12.15					Phyllite: bl.-gr., silty, micaceous, very poor recovery material displays extensive weathering and alteration.		Weathered out area. 27.5 Extensive FeO_2 ctgs.					
28													
30													

LOGGED BY R. E. Wright Associates, Inc. - E. Allan Timmins

DATE 9/13/88 CHK'D BY

RL 02238

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AR303408

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

Modern Landfill
Southwest Expansion
R. D. #9
York, Pennsylvania

DRILLING METHOD: 2" Split spoon to refusal; NX casing to refusal: NX core to total depth

SAMPLING METHOD: -

BORING NO. MD-403/SW-7

SHEET 3 OF 5

					DRILLING START	DRILLING FINISH
WATER LEVEL	Dry	Dry			TIME 1236	TIME
TIME	1600	830				
DATE	9/13	9/13			DATE 9/13/88	DATE
CASING DEPTH	12'	12'				

DATUM ELEVATION

DRILL RIG #103 Skid Rig

SURFACE CONDITIONS Tilled field - replanted with corn - edge of access roads.

ANGLE Vertical BEARING --

SAMPLE HAMMER TORQUE 30"/140 lbs. FT.-LBS

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: ROD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
30						Fragments coated with FeO_2 and MnO ctgs. and or. br. silty clay, material displays very vuggy wthrd. out qtz. veins, more micaceous, appears to contain numerous clay seams, interbedded with highly wthrd. rock.								
32		3	--	1.5	1.0									
				8.0	8.0			∢ Foliation - 70°						
34								Poor recovery.						
35	1320													
	1410					Phyllite: Dark gray to bl. gr. silty, micaceous, more competent.		Quartz stringer / ∢ Foliation = 65°						
36								Fracture, open ∢ = 65°						
								Very competent rocks solid core.						
38		4		4.3	3.7	Small $CaCO_3$ inclusions disseminated quartz and $CaCO_3$ inclusions parallel to foliation through solid core from 36 to 38.7'.								
				8.0	8.0			38.7'- Broken up, soft.						
40								Poor recovery.						
42														
	1450													
	1510					Phyllite: Dark gray to bl. gr. silty, micaceous, quartz, feldspar and some $CaCO_3$.								
44		5												
45														

LOGGED BY R. E. Wright Associates, Inc. - E. Allan Timmins

DATE 9/13/88 CHK'D BY

DRILLING CONTR. Kitlinsky Associates, Inc. Harrisburg, Pennsylvania

RL 02238

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

Modern Landfill
Southwest Expansion
R. D. #9
York, Pennsylvania

DRILLING METHOD: 2" Split spoon to refusal; NX casing to refusal; NX core to total depth

SAMPLING METHOD: 2" Split spoon; NX core to proposed depth

BORING NO. MD-403/SW-7

SHEET 4 OF 5

WATER LEVEL	Dry	Dry	34.45	
TIME	1600	830	1626	
DATE	9/13	9/14	9-14	
CASING DEPTH	12'	12'	12'	

DRILLING START: TIME 1236, DATE 9/13/88
DRILLING FINISH: TIME —, DATE —

DATUM ELEVATION

DRILL RIG #103 Skid Rig

SURFACE CONDITIONS

ANGLE Vertical BEARING --

SAMPLE HAMMER TORQUE 30"/140 lbs. FT.-LBS

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
45														
46	-	5	-	3.2 / 5.0	2.7 / 5.0	Inclusions throughout parallel to foliation ∢ = 70°, trace FeO_2 and MnO coatings.								
48	1545 / 732	9-14-88						9-14-88 1626 SWL - 34.45'; TD = 48' SWL - dry hole: 7:30 am 9/15/88.						
50						Phyllite: M. gr. to bl. gr. silty, not very micaceous		Fr. (Foliation), Hor. Fr. = 27° Foliation = 70°	2" Split Spoon	NX Casing				
52	-	6	-	5.0 / 8.0	3.5 / 8.0	Orange, silty coating (FeO_2) on fracture contacts.		Recovery						
54						Quartz inclusions.								
56	815 / 8:50					Phyllite: Same as above		Foliation 75°						
58	-	7	-	3.0 / 8.0	2.8 / 8.0				NX Core	Open Hole				
60								Poor core recovery						

DRILLING CONTR Kitlinski Associates, Inc. Harrisburg, Pennsylvania

RL 02238

LOGGED BY R. E. Wright Associates, Inc. - E. Allan Timmins/Heidi A. Brown

DATE 9-13-88 CHK'D BY —

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

Modern Landfill
Southwest Expansion
R. D. #9
York, Pennsylvania

DRILLING METHOD: 2" Split spoon to refusal; NX casing to refusal; NX core to total depth

SAMPLING METHOD: 2" Split spoon; NX core to proposed depth

BORING NO: MD-403/SW-7

SHEET: 5 OF 5

					DRILLING START	DRILLING FINISH
WATER LEVEL	Dry	Dry	34.45	Dry	TIME	TIME
TIME	1600	830	16.26	7:32	1236	
DATE	9/13	9/14	9-14	9-15	DATE	DATE
CASING DEPTH	12'	12'			9/13/88	

DATUM ELEVATION

DRILL RIG #103 Skid Rig

SURFACE CONDITIONS -

ANGLE Vertical BEARING --

SAMPLE HAMMER TORQUE 30"/140 lbs. FT.-LBS

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: ROD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
60														
62	-	7	-	3.0 8.0	2.0 8.0	Phyllite: As above with quartz inclusions								
64						Phyllite: As above.								
66														
68	-	8	-	4.5 8.0	3.9 8.0			Foliation 75°.						
70														
72	-	9	-	3.2 3.2	2.7 3.2	Phyllite: As above.		Foliation 75°.						
74														
75.2								Total Depth - 75.2'						

2" Split Spoon
NX Casing
NX Core
Open Hole

DRILLING CONTR Kitlinski Associates, Inc.

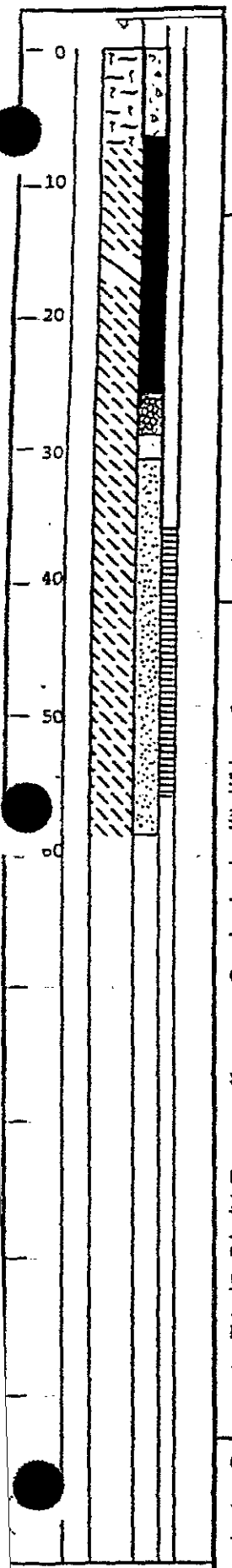
Harrisburg, Pennsylvania

RL 08238

LOGGED BY R. E. Wright Associates, Inc. - Heidi A. Brown

DATE 9/13/88 CHK'D BY

AR303411



Well No. MD-404

Boring No. X-Ref: SW-8

MONITOR WELL CONSTRUCTION SUMMARY

Survey Coords: Not available

Elevation Ground Level ~592

Top of Casing Not available

Drilling Summary:

Total Depth 59.0'
Borehole Diameter 10" 0'-59.0'
Casing Stick-up Height: PVC = 36"; AL = 42"
Driller Myers Brothers Drilling
Contractors, Inc.
Salunga, Pennsylvania
Rig T4W-900 Ingersoll Rand
Bit(s) 10" Hammer Bit

Drilling Fluid Potable Water

Protective Casing 4" Diameter Aluminum

Well Design & Specifications

Basis: Geologic Log X Geophysical Log ____
Casing String (s): C = Casing S = Screen.

Depth	String(s)	Elevation
57.0' - 37.0'	Screen (S1)	____ - ____
37.0' - +3.0'	Casing (C1)	____ - ____
6.5' - +3.5'	Casing (C2)	____ - ____
____ - ____	____	____ - ____
____ - ____	____	____ - ____

Casing: C1 2" PVC Sch. 40 F.J. (U.O.P. Johnson): 37.0' - +3.0'
C2 4" Aluminum Casing: -6.5' - +3.5'

Screen: S1 2" PVC, 0.020" Slot; U.O.P. Johnson: 57.0' - 37.0'
S2 ____

Filter Pack: Morie Grade 1: 59.0' - 31.0'
Filter Sand: 31.0' - 29.0'

Grout Seal: 26.0' - 6.5'
Cement: 6.5' - 0.0'

Bentonite Seal: Pellets: 29.0' - 26.0'

Centering Disks: 56.0'; 33.0'

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling 10" hole	9/28/88	1440	9/28/88	1510
Geophys.Logging:				
Casing:				
No casing				
4" Alum. Casing	9/30/88		9/30/88	
Filter Placement:	9/29/88	1035	9/29/88	
Cementing:				
Development: by Rig	9/29/88	1000	9/29/88	1030

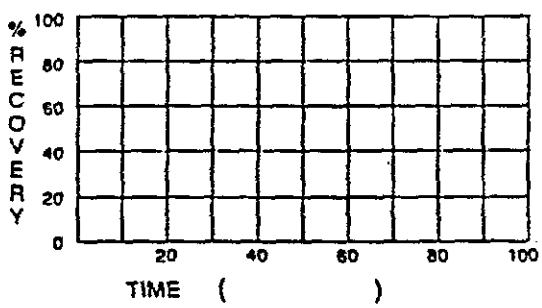
Well Development:

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (C)

Recovery Data:

Q= S_o=



Comments: Hit bedrock at 57.0'; drilled 10' hole to 59.0'.
Survey data not available at time of log preparation.

SITE NAME Modern Landfill - Southwest Expansion

LOCATION R. D. #9, York, Pennsylvania

WC 01402

SUPERVISED BY R. E. Wright Associates, Inc.
E. A. Timmins

DATE 9/29/88

AR303412

FIELD LOG – SOIL BOREHOLE

SITE NAME AND LOCATION

Modern Landfill
Southwest Expansion
R. D. #9
York, Pennsylvania

DRILLING METHOD: 2" Split spoon to refusal; NX casing to refusal; NX core to total depth

SAMPLING METHOD:

BORING NO. MD-404/SW-8

SHEET 1 OF 4

					DRILLING START	DRILLING FINISH
WATER LEVEL	Dry				TIME	TIME
TIME					8:45	
DATE					DATE	DATE
CASING DEPTH					9/16/88	

DATUM ELEVATION

DRILL RIG #103 Skid Rig

ANGLE Vertical BEARING --

SAMPLE HAMMER TORQUE 30"/140 lbs. FT.-LBS

SURFACE CONDITIONS Small wooded field behind Kessler's house.

DRILLING CONTR Kitlinski Associates, Inc. Harrisburg, Pennsylvania

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN. ON SAMPLER (RECOVERY)	SOIL GRAPH	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	DEPTH IN FEET FROM	DEPTH IN FEET TO	DESCRIPTION OF OPERATION AND REMARKS
9/16/88 - 8:45									
0	2		CL FINE SILTY CLAY: 7.5YR 3/4 Dark brown with phyllite chips, grades to slightly more red hue, dry, friable.	2" Split Spoon	NX Casing				
	2								
	3								
	2								
2	2		CL SILTY CLAY: 7.5YR 5/8 Strong brown, gravel-sized siltstone fragments (red-brown), dry, friable, quartz fragments.						Rock fragments begin.
	3								
	2								
	3								
4	4		CL SILTY CLAY: 7.5YR 5/8 Strong brown, quartz fragments, phyllite fragments, dry, friable.						
	4								
	7								
	11								
6	4		CL SILT CLAY: 7.5YR 5/6 Strong brown, BIG quartz fragments and several small ones, dry, friable, some red streaks, grading to saprolite.						Larger quartz fragments begin.
	17								
	23								
	50								
8	4		CL SAPROLITE: 7.5YR 5/6 Strong brown, quartz fragments, limonitic, quartz fragments sm and less of them, dry.						Saprolite.
	5								
	12								
	26								
10	17		CL SAPROLITE: 7.5YR 5/6 Strong brown, very friable, grading into sl. less friable, limonitic, few to no quartz fragments, dry.						
	38								
	62								
	100								
12			CL SAPROLITE: 2.5YR 3/6 Dark red (12' - 20' cored at 20', back to split spoon), very micaceous, friable, incr. quartz, only 2.5' (of 8.0') of recoverable material	Cored					
14									
15									

LOGGED BY R. E. Wright Associates, Inc. - Heidi A. Brown DATE 9/16/88 CHK'D BY

FS 0[illegible]06

AR303413

FIELD LOG – SOIL BOREHOLE

SITE NAME AND LOCATION

Modern Landfill
Southwest Expansion
R. D. #9
York, Pennsylvania

DRILLING METHOD: 2" Split spoon to refusal; NX casing to refusal; NX core to total depth

SAMPLING METHOD:

BORING NO: MD-404/SW-8

SHEET: 2 OF 4

					DRILLING START	DRILLING FINISH
WATER LEVEL	Dry				TIME 8:45	TIME 9:50
TIME						
DATE					DATE 9/16/88	DATE 9/19/88
CASING DEPTH						

DATUM ELEVATION

DRILL RIG #103 Skid Rig

SURFACE CONDITIONS: Small wooded field behind Kessler's house.

ANGLE Vertical BEARING --

SAMPLE HAMMER TORQUE 30"/140 lbs. FT.-LBS

DRILLING CONTR Kitlinski Associates, Inc. Harrisburg, Pennsylvania

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN ON SAMPLER (RECOVERY)	SOIL GRAPH	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	DEPTH IN FEET FROM	DEPTH IN FEET TO	DESCRIPTION OF OPERATION AND REMARKS
15			CL Same.						
16			PHYLLITE: Very micaceous with quartz veins, large quartz fragments, silty clay coatings, (2.5YR 3/6) dark red.						Large quartz fragments.
18			CL SAPROLITE: 2.5YR 3/6, dark red, micaceous, friable, phyllite fragments, quartz fragments, grading to smaller, dry, possible water-bearing zone.		NX Casing				
20	7 15 25		CL SAPROLITE: 2.5YR 3/6, dark red, separated from reddish-yellow saprolite by micaceous vein, both saps. are micaceous, no evidence of fragments, dry.	Split Spoon					
/16 22 /19	20 12:35 8:30		Not sampled (as specified, sample every 5').						
24									
26	7 15 25 61		CL SAPROLITE: 2.5YR 4/8 (red), grades from no apparent quartz to numerous quartz fragments, rng. from large to small, friable, interbedded yellow clay seams.						
28			Not sampled.	Split Spoon					
30									

LOGGED BY R. E. Wright Associates, Inc. - Heidi A. Brown

DATE 9/16/88 CHK'D BY

FS 01606

FIELD LOG – SOIL BOREHOLE

SITE NAME AND LOCATION

Modern Landfill
Southwest Expansion
R. D. #9
York, Pennsylvania

DRILLING METHOD: 2" Split spoon to refusal; NX casing to refusal; NX core to total depth

SAMPLING METHOD:

BORING NO. MD-404/SW-8

SHEET 3 OF 4

					DRILLING START	DRILLING FINISH
WATER LEVEL	15.4'				TIME 10:30	TIME
TIME	8:28				DATE 9/19/88	DATE
DATE	9/19					
CASING DEPTH	22'					

DATUM ELEVATION

DRILL RIG #103 Skid Rig

ANGLE Vertical BEARING --

SAMPLE HAMMER TORQUE 30"/140 lbs. FT.-LBS

SURFACE CONDITIONS Small wooded field behind Kessler's house.

DRILLING CONTR Kitlinski Associates, Inc. Harrisburg, Pennsylvania

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN. ON SAMPLER (RECOVERY)	SOIL GRAPH	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	DEPTH IN FEET FROM	DEPTH IN FEET TO	DESCRIPTION OF OPERATION AND REMARKS
30	13 35 42 76		CL SAPROLITE: 2.5YR 3/6, dark red, large quartz fragments, grading to no apparent quartz, kink folds, friable, MnO areas around quartz fragments.						
32			Not sampled.						
34									
36	7 15 15 15		CL SAPROLITE: 2.5YR 4/8 (red), large quartz fragments throughout, MnO infilling among quartz fragments, MnO areas around quartz fragments.	Split Spoon					
38			Not sampled.						
40	4 7 15 15		CL SAPROLITE: 5YR 5/6 (yellowish-red), large quartz fragments, grading out, MnO infilling among quartz fragments, very mottled appearance with quartz, MnO areas among quartz fragment and saprolite itself, quartz inter-bedding, increase of MnO (not just coating).						
42									
44			Not sampled.						
45									

LOGGED BY R. E. Wright Associates, Inc. - Heidi A. Brown

DATE 9/19/88 CHK'D BY

FS 1606

FIELD LOG – SOIL BOREHOLE

SITE NAME AND LOCATION

Modern Landfill
Southwest Expansion
R. D. #9
York, Pennsylvania

DRILLING METHOD: 2" Split spoon to refusal; NX casing to refusal; NX core to total depth

SAMPLING METHOD:

BORING NO. MD-404/SW-8

SHEET 4 OF 4

					DRILLING START	DRILLING FINISH
WATER LEVEL	15.4'				TIME	TIME
TIME	8:28					
DATE	9/19				DATE	DATE
CASING DEPTH	22'				9/19	

DATUM ELEVATION

DRILL RIG #103 Skid Rig

SURFACE CONDITIONS Small wooded field behind Kessler's house.

ANGLE Vertical BEARING --

SAMPLE HAMMER TORQUE 30"/140 lbs. FT.-LBS

DRILLING CONTR Kitlinski Associates, Inc. Harrisburg, Pennsylvania

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN ON SAMPLER (RECOVERY)	SOIL GRAPH	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	DEPTH IN FEET FROM	DEPTH IN FEET TO	DESCRIPTION OF OPERATION AND REMARKS
45	7	CL	SAPROLITE: 7.5YR 5/8 (strong brown), phyllite fragments, some quartz veining (≈ 2' of recovery).	Split Spoon					Drillers though that competent rock here, cored 3', not C.R., only big quartz fragments, back to split spooning.
	41								
46	68								
	100								
48			Quartz fragment (nothing else).						
50	4		SAPROLITE: 7.5YR 4/6 (strong brown), quartz fragments with MnO coatings, friable.						
	7								
	53								The past 2' sample shows much quartz fragments, all uniform in size and have been attributing it to wash out.
52	28		Not sampled.						
54									
	7								
	22		Washed out.						
56	68								
	100								Came back Tuesday to find wash out up to 53', called off further coring.
	9/20		Tried to clean out and split spoon but were at 53' and no go due to ≈7' of wash out.						
58									
60									

LOGGED BY R. E. Wright Associates, Inc. - Heidi A. Brown

DATE 9/19/88 CHK'D BY

FS 01606

Well No. MD-405

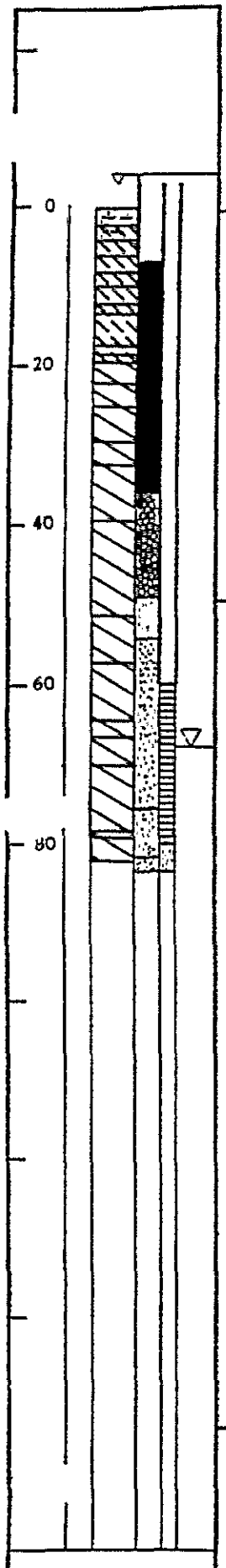
Boring No. X-Ref: SW-9

MONITOR WELL CONSTRUCTION SUMMARY

Survey Coords: N 229355.29
E2322638.36

Elevation Ground Level 609.07

Top of Casing 612.71



Drilling Summary:

Total Depth 83.0' (Caved to 81.6')
Borehole Diameter 10" to 40.5; 6" to 83'
Casing Stick-up Height: PVC 3.64'; AL - 3.64'
Driller Myers Brothers Drilling
Contractors, Inc.
Salunga, Pennsylvania
Rig T4W-900 Ingersoll Rand
Bit(s) 10" Hammer Bit; 6" Hammer Bit

Drilling Fluid Potable Water

Protective Casing 4" Aluminum Casing

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling				
10" hole	8/10/88	10:15	8/10/88	10:39
6" hole	8/10/88	10:58	8/10/88	12:35
Geophys. Logging:				
Casing:				
6" casing	8/10/88	10:34	8/10/88	10:58
4" casing	8/11/88	9:15	8/11/88	9:20
Filter Placement:	8/10/88	2:15	8/10/88	3:05
Cementing:	8/10/88	3:05	8/11/88	10:35
Development: by Rig	8/10/88	1:00	8/10/88	1:35

Well Design & Specifications

Basis: Geologic Log X Geophysical Log ___
Casing String (s): C = Casing S = Screen.

Depth	String(s)	Elevation
80 - 60	Screen (S1)	529.07' - 549.07'
60 - +3.64	Casing (C1)	549.07' - 612.71'
6.5 - +3.64	Casing (C2)	602.57' - 612.71'
40.5 - 1.0	Casing (3)	568.57' - 608.07'
___ - ___	___	___ - ___

6" casing (steel)
Casing: C1 2" PVC Sch. 40 Solid
60 to + 3.0'
C2 4" Aluminum Casing: 6.5 to 3.5

Screen: S1 2" PVC, Schedule 40 020 slotted
- 80' to -60'
C3 6" Steel casing (-1.0 to 40.5')

Filter Pack: Grade 1 81.5' to 54.4'
Filter Packs: 54.4 to 49.0'

Grout Seal: Slurry 6" casing - 36.2 to -7'
6"-10" Annulus-slurry- -36 to -7
Cuttings - 38 to 36
Bentonite Seal: Pellet 49' to 36.2'

Centering Disks: 75.2', 46.1, 36.2'

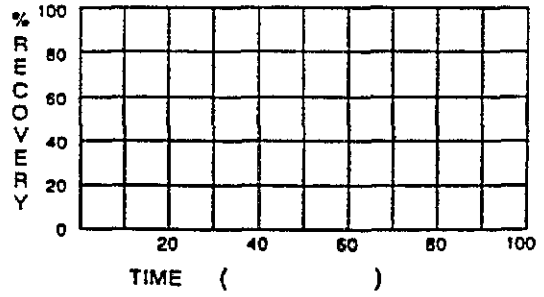
Well Development:

Stabilization Test Data:

Time	p H	Spec. Cond.	Temp (C)

Recovery Data:

Q= S_o=



Comments:

Caved formation 83 to 81.5;
Water-bearing zone: 73-74, (2 gpm); weathered zone at 40.1-40.5, (dry); 41.5'-43' (dry);
47.3-49.1 (dry); 60.8-6.2 (wet) (SWL); 73-74 (2 gpm)

SITE NAME Modern Landfill - Southwest Expansion

LOCATION R. D. #9, York, Pennsylvania

WC 02402

SUPERVISED BY R. E. Wright Associates, Inc.

DATE ___

AR303417

Printed on recycled paper

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

Modern Landfill
Southwest Expansion
R. D. #9
York, Pennsylvania

DRILLING METHOD: Split-spoon to rock refusal; install NX casing; NX core to depth

SAMPLING METHOD: Split-spoon to refusal; NX Core to proposed depth

BORING NO. MD405/SW-9

SHEET 1 OF 6

					DRILLING START	DRILLING FINISH
WATER LEVEL	Day	50.8	50.83	58.95	TIME	TIME
TIME	PM	20.00	7.59	16.35	14:00	11:00
DATE	7/22	7/25	7/26	7/26	DATE	DATE
CASING DEPTH	6'	18.0'	18'	18'	7/22/88	7/28/88

DATUM ELEVATION

DRILL RIG Truck Mounted Auger/Core

SURFACE CONDITIONS Corn field with 6'-8' high corn stocks

ANGLE Vertical BEARING --

SAMPLE HAMMER TORQUE 30/140 FT.-LBS

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
0														
1	2 2 3 4	1 1A 1B 1C				Dark yellow fine sandy silt, moist, firm (10yr,3/6) at 8" to strong brown (7.5yr 5-8) clayey silt, moist firm			2" Split-spoon	NX casing to 18.0'	Not available			
2														
3	4 3 7 7	2 2A 2B				As above, grading to saprolite at 2.3', at 2.3 to reddish-brown (5yr,5/4) dry, loose, very micaceous								
4														
5	6 8 7 9	3 3A 3B				As above saprolite very micaceous dry to moist, loose at 4.3' more quartz rich (weathered quartz), more sandy								
6														
7	8 11 9 8	4 4A 4B				As above								
8														
9	8 6 8 10	5 5A 5B 5C				Grades at 8' to reddish yellow (5yr 6/6) very micaceous silty saprolite-rock structure present. Surface creep noted more reddish color (10yr 7/8								
10														
11	16 12 12 14	6 6A 6B 6C				yellow, moist, rock strongly present As above								
12														
13	22 37 46	7 7A 7B 7C				As above, very soft, foliation \$85' fine sandy zones common More competent, breaks along foliation.								
14	23 24 30	8 8A 8B				As above grades to reddish-yellow, moist, very soft foliation \$80° weathering along planes								
15														

DRILLING CONTR F. T. Kitlinski Associates, Inc. Harrisburg, Pennsylvania

LOGGED BY R. E. Wright Associates, Inc. Allan Timmins/Stephen J. Mitchell

DATE 7/28/88 CHK'D BY EAT

RL 02237

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

odern Landfill
Southwest Expansion
R. D. #9
York, Pennsylvania

DRILLING METHOD: Split-spoon to refusal; NX casing installed, NX core to total depth

SAMPLING METHOD: Split-spoon to refusal; NX core to proposed depth

BORING NO. MD405/SW-9

SHEET 2 OF 6

					DRILLING START	DRILLING FINISH
WATER LEVEL	NA	59.1			TIME	TIME
TIME	AM	11.15			14:00	11:00
DATE	7/27	7/28			DATE	DATE
CASING DEPTH	18.0	18.0			7/22/88	7/28/88

DATUM ELEVATION

DRILL RIG Truck Mounted Auger/Core

SURFACE CONDITIONS Corn field with 6'-8' high corn stocks.

ANGLE Vertical BEARING --

SAMPLE HAMMER TORQUE 30/140 FT.-LBS

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: ROD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
15														
16														
17			Refusal			at 17.3'								
18						18.3' No recovery.								
19	19.4'													
20				1.4	0	Extremely weathered phyllite (reddish-brown, olive green, yellowish-orange, moderate brown) Fragments		Foliation ⊀85° also quartz granules (slightly rounded)	NX Core	Open Rock Hole	Not Applicable			
21				2.6	2.6									
22	22'													
23				2.5	1.5	Phyllite, red & moderate brown, some of others above also. Variegated Competent micaceous and very fissile.		Fragmental at base of section. Difficult to place due to incomplete recovery						
24				3.0	3.0									
25						Phyllite as above becoming pale reddish-brown at 25.7'. Very pale green yellow to gray olive variegated with above at 27.1, pale olive green at 92.2		Weathered zone at approximately 25' to 25.7'. Followed by multiple horizontal fractures at 26'. Soft zone 26.5 to 27.1						
26														
27				4.2	0.3									
28				4.2	4.2									
29														
30														

DRILLING CONTR F. T. Kitlinski Associates, Inc. Harrisburg, Pennsylvania

LOGGED BY R. E. Wright Associates, Inc. Stephen J. Mitchell

DATE 7-28-88 CHK'D BY E. Allan Timmins

RL 0237

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

Modern Landfill
Southwest Expansion
R. D. #9
York, Pennsylvania

DRILLING METHOD: Split-spoon to rock refusal, install NX casing; NX core to depth

SAMPLING METHOD: Split-spoon to refusal; NX core to proposed depth

BORING NO. MD405/SW-9

SHEET 3 OF 6

					DRILLING START	DRILLING FINISH
WATER LEVEL					TIME	TIME
TIME					14:00	11:00
DATE					DATE	DATE
CASING DEPTH					7/22/88	7/28/88

DATUM ELEVATION

DRILL RIG Truck Mounted Auger/Core

SURFACE CONDITIONS Corn field with 6'-8' high corn stocks.

ANGLE Vertical BEARING --

SAMPLE HAMMER TORQUE 30/140 FT.-LBS

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
30	29.2													
31				3.1	1.9	Phyllite, pale olive-green with some pale red to yellowish gray green at 30.8'. Competent and solid to 30.6 fragmental to 30.8' then solid to 32.3'.		Black layer on fracture planes-residual? Grimmy and oily. Foliation ⊀75o-80o						
32				3.1	3.1									
33						Phyllite-light olive- to grayish-olive. Gradational to 35.3' then grayish-green. Variegated with dusky-green at 36.8' to 37.2'.		Foliation ⊀75o-80o Weathered horizontal fracture (⊀5-10o) at 36.7. Unweathered horizontal fractures at 35.7 and 36.3'.						
34														
35														
36						Quartz veins at 37.5' and 38.5' irregularly following foliation trend. Very vuggy due to weathered out limonite.								
37														
38														
39														
40						Gradational change to grayish-green, quartz abundant phyllite fragments from 39.7 to 41.5' Quartz very vuggy. Phyllite is micaceous Quartz vein ⊀80o at 43.5'		Horizontal fractures have irregular angular surfaces common at 41.5 to 43'. Foliation ⊀80o unweathered horizontal fractures at 41.5 unweathered horizontal fractures commonly intersected by ⊀80o fractures paralleling foliation						
41														
42														
43														
44														
45														

DRILLING CONTR F. T. Kitlinski Associates, Inc. Harrisburg, Pennsylvania

LOGGED BY R. E. Wright Associates, Inc. Stephen J. Mitchell DATE 7-28-88 CHK'D BY E. Allan Timmins

RL 02237

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

odern Landfill
Southwest Expansion
R. D. #9
York, Pennsylvania

DRILLING METHOD: Split-spoon to rock refusal, install NX casing; NX core to depth

SAMPLING METHOD: Split-spoon to refusal; NX core to proposed depth

BORING NO. MD405/SW-9

SHEET 4 OF 6

					DRILLING START	DRILLING FINISH
WATER LEVEL					TIME	TIME
TIME					14:00	11:00
DATE					DATE	DATE
CASING DEPTH					7/22/88	7/29/88

DATUM ELEVATION

DRILL RIG Truck Mounted Auger/Core

SURFACE CONDITIONS Corn field with6'-8' high corn stocks.

ANGLE Vertical BEARING --

SAMPLE HAMMER TORQUE 30/140 FT.-LBS

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
44.9														
45						Phyllite same as above; also fragments grayish-green variegated with grayish-olive--quartz rich (vuggy)		Quartz vein along horizontal fracture (⊀100) at 45.6'. Also horizontal fractures at 46.9 and 47.4						
46														
47														
48														
49				6.1 6.3	4.4 6.3									
50														
51	51.4													
52						Same as above. Very competent to 53.7 then fragmental to 56.2'. Solid and more quartz rich after 56.2'.		Horizontal fractures at 53.7 and 56.2.						
53														
54					3.3 5.8									
55				5.8 5.8										
56														
57														
58				2.8 2.8	2.0 2.8	As above, with some dusky green also (variegated) quartz veins and lens parallel foliation generally		FeO_2 staining is evident. Phyllite is chloritic. Quartz is very vuggy.						
59														
60														

DRILLING CONTR F. T. Kitlinski Associates, Inc. Harrisburg, Pennsylvania

LOGGED BY R. E. Wright Associates, Inc. Stephen J. Mitchell

DATE 7-28-88 CHK'D BY E. Allan Timmins

RI 2237

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

odern Landfill
Southwest Expansion
R. D. #9
York, Pennsylvania

DRILLING METHOD: Split-spoon to rock refusal, install NX casing, NX core to depth

SAMPLING METHOD: Split-spoon to refusal; NX core to proposed depth

BORING NO. MD405/SW-9

SHEET 5 OF 6

	DRILLING START	DRILLING FINISH
WATER LEVEL		
TIME	14:00	11:00
DATE	7/22/88	7/28/88

DATUM ELEVATION

CASING DEPTH

DRILL RIG: Truck Mounted Auger/Core

SURFACE CONDITIONS: Corn field with 6'-8' high corn stocks.

ANGLE: Vertical BEARING: --

SAMPLE HAMMER TORQUE: 30/140 FT.-LBS

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
60						Same as above. Quartz veins at 64.25' + 62.5' and in fragments at 64.8'. Trace $CaCO_3$ in quartz. Disseminated limonite and staining through entire section 60'-64.8'.		Fracture at 60.2' Fracture ∢ 40 at 60.5' Horizontal fracture at 63.7						
61														
62				4.8	4.4									
				4.8	4.8									
63														
64														
	64.8'													
65				1.3	1.0	Phyllite, as above with vertical quartz vein to 66.9'. Quartz at 64.8 to 65' with abundant $CaCO_3$		Yellow tint on quartz at 69.8-69.9', possible sulfur trace?						
66				2.1	2.1									
	66.9'													
67						Vuggy Quartz with trace phyllite $CaCO_3$ common with quartz as above. Vugs are larger than anywhere above 67.7 to 69.3 is phyllite as above. Large fragments to 70'.		Phyllite is somewhat ductily bent along foliation. Chloritic quartz at 66.9 to 67.7' is in 4-2" sections split by horizontal fractures.						
68				3.1	1.2									
				3.1	3.1									
69														
70						Light olive with light gray green phyllite. Very micaceous soft.		Soft zone 70-75' Fracture ∢25-30° noted in 2 lg fragments. Water-bearing zone?						
71														
72				1.75	0									
				5.0	5.0									
73														
74														
75	75'													

DRILLING CONTR F. T. Kitlinski Associates, Inc. Harrisburg, Pennsylvania

LOGGED BY R. E. Wright Associates, Inc. Stephen J. Mitchell

DATE 7-28-88 CHK'D BY E. Allan Timmins

RL 02237

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

Modern Landfill
Southwest Expansion
R. D. #9
York, Pennsylvania

DRILLING METHOD: Split-spoon to rock refusal, install NX casing; NX core to depth

SAMPLING METHOD: Split-spoon to refusal; NX core to proposed depth

BORING NO. MD405/SW-9

SHEET 6 OF 6

					DRILLING START	DRILLING FINISH
WATER LEVEL	59.1	58.95			TIME	TIME
TIME	11:15	16:35			14:00	11:00
DATE	7/28/88	7/26/88			DATE	DATE
CASING DEPTH					7/22/88	7/28/88

DATUM ELEVATION

DRILL RIG Truck Mounted Auger/Core

ANGLE Vertical BEARING --

SAMPLE HAMMER TORQUE 30/140 FT.-LBS

SURFACE CONDITIONS Corn field with 6'-8' high corn stocks.

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: ROD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
75						Continuation of soft weathered zone Quartz cobbles to 75.8' with phyllite fragments. Then brown phyllite to 76.1'. Then gray-green Phyllite as above.		Quartz cobbles somewhat rounded. Chloritic; fragmental at approximately 78' Foliation ≈ 70-75°				Start	7/28	
76				3.1 3.3	1.9 3.3									
77														
78														
				0	0	No recovery, quartz from soft zone above caving in								
79						Gray Green phyllite as above to 82'. Total depth competent but highly mechanically fractured.		Highly mechanical fractured parallel (along) foliation planes, but relatively competent.						
80														
81				1.3 3.0	1.5 3.0									
82						Total Depth = 82'		Note: Rig did not operate 7/27.						

DRILLING CONTR F. T. Kitlinski Associates, Inc. Harrisburg, Pennsylvania

RL 2237

LOGGED BY R. E. Wright Associates, Inc. Stephen J. Mitchell

DATE 7-28-88 CHK'D BY E. Allan Timmins

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AR303423

Well No. MD-406s

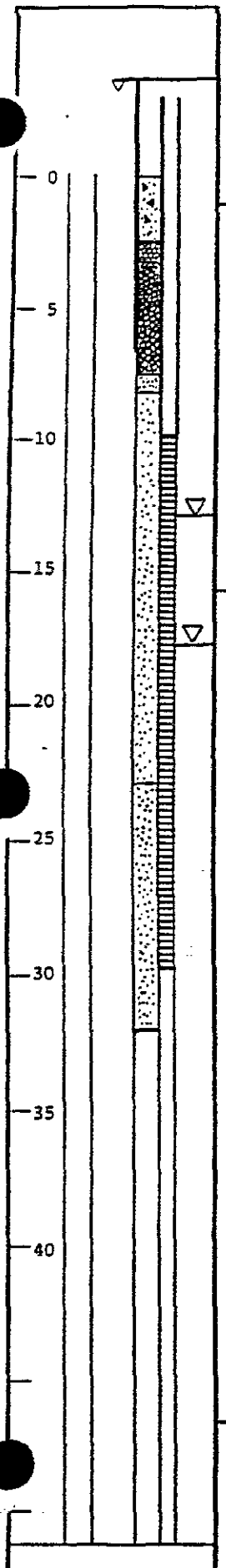
Boring No. X-Ref: SW-13

MONITOR WELL CONSTRUCTION SUMMARY

Survey Coords: N229837.36 E2322155.87

Elevation Ground Level 527.74

Top of Casing 531.20



Drilling Summary:

Total Depth 32.5'
Borehole Diameter 10" to 9.5'; 6' to 32'
Casing Stick-up Height: PVC 3.46'; Al 3.46'
Driller Myers Brothers Drilling Contractors, Inc. Salunga, Pennsylvania
Rig T4N-900
Bit(s) 10" Hammer bit; 6" hammer bit
Drilling Fluid Potable Water
Protective Casing 4" Diameter Aluminum

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling				
10" hole	8-15	844	8-15	849
6" hole	8-15	857	8-15	909
Geophys. Logging:				
Casing:				
6" casing	8-15	849	8-15	857
4" casing	8-15	215	8-15	315
Filter Placement:	8-15	1010	8-15	1103
Cementing:	8-15	1258	8-15	116
Development: by Rig	8-15	909	8-15	940

Well Design & Specifications

Basis: Geologic Log X Geophysical Log ____
Casing String (s): C = Casing S = Screen.

Depth	String(s)	Elevation
29.9 - 9.9	Screen (S1)	497.8 - 517.8
9.9 - +3.46	Casing (C1)	517.8 - 531.2
6.5 - +3.46	Casing (C2)	521.2 - 531.2
____ - ____	____	____ - ____
____ - ____	____	____ - ____

Casing: C1 2" PVC Sch. 40 F.J. (U.O.P. Johnson):
C2 4" Aluminum Casing:
Screen: S1 2" PVC, 0.020" Slot; U.O.P. Johnson:
S2
Filter Pack: Morie Grade 1: 32.5' to 8.2'
Filter 8.2' to 7.5'
Grout Seal: No slurry seal
Cement seal 5.0 to 0'
Bentonite Seal: Pellets 2.5 to 5.0'
Centering Disks: 32.5', 23.1'

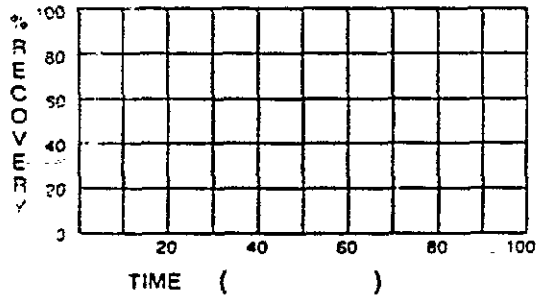
Well Development:

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (C)
1245	6.22	270	10.7
1250	6.06	268	10.65
1255	6.03	270	10.65

Recovery Data:

Q= S_o=



Comments: Water-bearing zone: 13' to 18' (10 gpm); This well is drilled 25' offset from MD-407i: See log for MD-407i for lithology.

SITE NAME Modern Landfill - Southwest Expansion

LOCATION P.O. York, Pennsylvania

WIC 011402

R. E. Wright Associates, Inc.

SUPERVISED BY Allan Timmins

DATE 8/15/88

AR303424

Well No. MD-407i

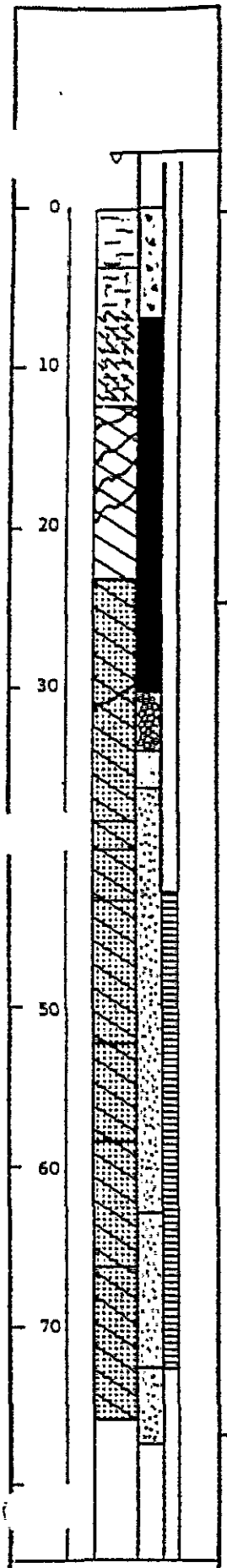
Boring No. X-Ref: SW-10

MONITOR WELL CONSTRUCTION SUMMARY

Survey Coords: N229817.51
E2322146.61

Elevation Ground Level 527.92

Top of Casing 531.53



Drilling Summary:

Total Depth 77.5'
Borehole Diameter 10"-0' to 19';6" to 79.5
Casing Stick-up Height: PVC 3.48'; Al 3.61'
Driller Myers Brothers Drilling Contractors, Inc. Salunga, Pennsylvania
Rig T4W-900 Ingersoll Rand
Bit(s) 10" hammer bit 1, 6" hammer bit

Drilling Fluid Potable Water

Protective Casing 4" Diameter Aluminum

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling 10' hole	8/12	1243	8/12	1259
6' hole	8/12	106pm	8/12	133pm
Geophys.Logging:				
Casing: 6' casing	8/12	1259	8/12	104pm
4' casing	8/15	215pm	815	320pm
Filter Placement:	8/15	1116	8/15	1235
Cementing:	8/15	1258	8/15	225pm
Development: by Rig	8/12	133pm	8/12	215pm

Well Design & Specifications

Basis: Geologic Log X Geophysical Log ___
Casing String (s): C = Casing S = Screen.

Depth	String(s)	Elevation
72.8' – 42.8'	Screen (S1)	455.12' – 485.12
42.8' – +3.48'	Casing (C1)	485.12' – 531.22
6.5' – +3.61'	Casing (C2)	521.42' – 531.53
___ – ___		___ – ___
___ – ___		___ – ___

Casing: C1 2" PVC Sch. 40 F.J. (U.O.P. Johnson):
C2 4" Aluminum Casing:

Screen: S1 2" PVC, 0.020" Slot; U.O.P. Johnson:
S2

Filter Pack: Morie Grade 1: 77.5' to 36.4'
Filter Sand 36.4 to 34

Grout Seal: Slunig - 30.3 to 7'

Bentonite Seal: Pellets: 34 to 30.3
Cement Seal 7' to 0'
Discs C72.8', 63.1'

Centering Disks:

Well Development:

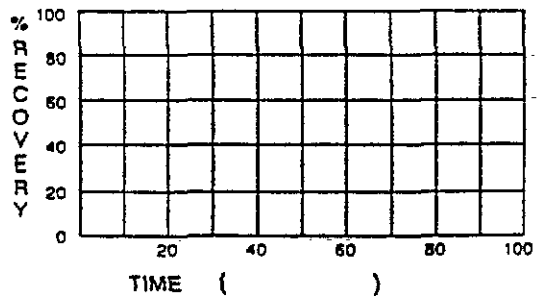
9/2 T-1042 SWL 6.95'. Purged and surged for 45 minutes water always seemed to clear fairly quick. Some grey fine sand and some moray sand.

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (C)
1200	8.10	409	10.6
1210	8.02	418	10.7
1220	8.00	420	10.7

Recovery Data:

Q= S_o=



Comments: No detectable water bearing zones below 9' after temporary 6" casing installed; dig hole during rig development; SWL recovery to 7' bgs on 8/13/88 at 8:00 a.m.

SITE NAME Modern Landfill - Southwest Expansion LOCATION R. D. #9, York, Pennsylvania

WC 1402

SUPERVISED BY R. E. Wright Associates, Inc. E. Allan Timmins/Steve J. Mitchell DATE 8/3/88

AR303425

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

modern Landfill
Southwest Expansion
R. D. #9
York, Pennsylvania

DRILLING METHOD: Split spoon to refusal; NX casing installed; NX core to depth

SAMPLING METHOD: 2" split spoon to refusal; NX core to proposed depth

BORING NO. MD-407i/SW-10

SHEET 1 OF 6

					DRILLING START	DRILLING FINISH
WATER LEVEL	Dry	4.45'	4.0'		TIME 815	TIME 1630
TIME	--	800	1540		DATE 7/29/88	DATE 8/2/88
DATE	7/29	8/1	8/2			
CASING DEPTH	10'	10'	10'			

DATUM ELEVATION

DRILL RIG Truck mounted auger/core rig

ANGLE Vertical BEARING

SAMPLE HAMMER TORQUE 30/140 FT.-LBS

SURFACE CONDITIONS Open nonvegetated cow feed pen

DRILLING CONTR F. T. Kitlinski Associates, Inc. Harrisburg, Pennsylvania

LOGGED BY R. E. Wright Associates, Inc. E. Allan Timmins/Steve J. Mitchell

DATE 8/3/88 CHK'D BY E. A. Timmins

RL 02237

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
0	6	1			-	10 YR 3/3 Dark brown sandy silt, firm			2" split spoon	NX casing to 10'	Not applicable			
	5	1A			-	As Ab, Qtz cobble with trace of greenish saprolite								
1	5	1B			-	At approximately 12" to 10 YR y/y dark yellow brown less sandy silt with traces of saprolite - firm								
	4	1C			-	Suddenly to brownish yellow 10 YR 6/6 firm, some quartz cobbled saprolite.								
2	5	2			-	10 YR 5/6 yellow brown Clayey Silt, very firm, more saprolite								
	5	2A			-	As Ab, more Gr s7 (small) fragments of phyllite, firm								
3	8	2B			-	As above -, more sandy								
	9	2C												
4	8	3			-	More saprolite very micaceous as above								
	9													
5	14	3A			-	Clayey silt as above, firm with light reddish brown, many rock fragments toward bottom inclued (saprolite begins)								
	7													
6	8	4			-	Dusky green to green gray very micaceous saprolite, FeO_2 staining - weathered limonite sandy silt								
	9													
7	11	4A												
	22				-	Pale greenish gray, as Ab								
8	37	5			-	As Ab, Saprolite - slightly more sandy more competent in spots, loose otherwise								
	67													
9	70	5A												
	100/4													
10				2.0	0.9	Pale grayish olive to grayish green very weathered phyllite; vuggy due to weathered limonite		Foliation ∢ 70° two fractures ∠35' at approximately 10.5 to 11'	NX Core	Open Rock Hole	Not applicable			
				2.4	2.4									
11														
12	12.4'													
				2.6	1.3	Bluish gray to dusky bluish gray phyllite		Weathered fracture ∢10° at 12.6 followed by highly fractured zone to 15' following ∢ 70° lost drill fluid at 13.2'						
13				2.6	2.6	more competent, less weathered around 13' tends to olive green until 15' Quartz vein 14.6' discordant with foliation (∢ 80°)								
14														
15														

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

Modern Landfill
Southwest Expansion
R. D. #9
York, Pennsylvania

DRILLING METHOD: Split spoon to refusal; NX casing installed; NX core to depth

SAMPLING METHOD: 2" split spoon to refusal; NX core to proposed depth

BORING NO. MD-407i/SW-10

SHEET 2 OF 6

					DRILLING START	DRILLING FINISH
WATER LEVEL	Dry	4.45'	4.0'		TIME	TIME
TIME	--	800	1540		815	1630
DATE	7/29	8/1	8/2		DATE	DATE
CASING DEPTH	10'	10'	10'		7/29/88	8/2/88

DATUM ELEVATION

DRILL RIG Truck mounted auger/core rig

ANGLE Vertical BEARING

SAMPLE HAMMER TORQUE 30/140 FT.-LBS

SURFACE CONDITIONS Open nonvegetated cow feed pen

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY C.M./SEC.
15														
16						Phyllite, even more competent, less weathered, rarely vuggy very competent at 17.5 with appearance of more quartz chloritic somewhat		Foliation ∠ 75° Fracture at 16.6' discordant with fol (35' to 40') along 1/8" thick quartz vein Foliation not very distinct						
17				R.C 7.7										
18				S.C 3.0				Fracture at 21.7' ∠ 30° (very rough break)						
19														
20						Still phyllite, but grading slowly to more of a phyllitic siltstone with increase in quartz fine sand grains		Healed fractures at 22.3' + 22.7' (∠65°)						
21														
22														
23	23.0					As Ab - dusky grayish blue - phyllite - siltstone very competent, very hard		Foliation ∠75 - 80° Fracture at 27.3' ∠80° smooth						
24						Chloritic somewhat								
25				7.7 7.7										
26				7.7 7.7		Rock is quartz rich though disseminated, no large veins - thin wispy banding of quartz (no $CaCO_3$ noted reaching in HCl)		Fracture at 27.3' ∠ 80°, 90° rotation to orientation of foliation.						
27														
28								Numerous mechanical fresh fractures paralleling foliation.						
29														
30														

NX Core | Open Rock Hole | Not applicable

DRILLING CONTR F. T. Kitlinski Associates, Inc. Harrisburg, Pennsylvania

LOGGED BY E. Allan Timmins/Steve J. Mitchell R. E. Wright Associates, Inc.

DATE 8/3/88 CHK'D BY E. A. Timmins

RL 02237

Printed on recycled paper

AR303427

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

odern Landfill
outhwest Expansion
R. D. #9
York, Pennsylvania

DRILLING METHOD: Split spoon to refusal; NX casing installed; NX core to depth

SAMPLING METHOD: 2" split spoon to refusal; NX core to proposed depth

BORING NO. MD-407i/SW-10

SHEET 3 OF 6

					DRILLING START TIME	DRILLING FINISH TIME
WATER LEVEL	Dry	4.45'	4.0'			
TIME	--	800	1540		815	1630
DATE	7/29	8/1	8/2		DATE	DATE
CASING DEPTH	10'	10'	10'		7/29/88	8/2/88

DATUM ELEVATION

DRILL RIG Truck mounted auger/core rig

SURFACE CONDITIONS Open nonvegetated cow feed pen

ANGLE Vertical BEARING

SAMPLE HAMMER TORQUE 30/140 FT.-LBS

DRILLING CONTR F. T. Kitlinski Associates, Inc. Harrisburg, Pennsylvania

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: ROD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
30						Phyllite - siltstone		Foliation ∢ 80°						
31						Small spots (x/s) weathered phyllite								
						limonite		Fractures at 31.2'+ 31.7' weathered ∢ 10°						
32														
33								Horizontal fractures at 32.6' above rough 10° fractures						
				7.3	6.7									
34				7.3	7.3			Traces of healed discordant fracture from 33' to 34' (∢ 80°)						
						Solid from 33.7' to 38' with few random mechanical fractures paralleling foliation		Also a near vertical fracture offside of core 33' to 74', intersects foliation						
35														
36														
37														
	38'					Foliation kink band foliation		Kink band - 37.8' to 38.5' (1/8") 80 w.r.t. core ∢ 35° w.r.t. foliation at 38.6' discordant to foliation - fracture ∢ 55°						
38														
39						Phyllite-siltstone								
				2.6	2.6									
				2.6	2.6									
40								Joint ∢ 10° at 39'						
	40.6'													
						As Ab, more common occurrence of disseminated pyrite x/s (still slight amount) Becoming slightly more sandy		Foliation barely apparent in spots, evident most where most micaceous Horizontal fracture at 43'						
41				2.6	2.6									
				2.6	2.6									
42														
43														
	43.2'													
44						See Below								
45														

LOGGED BY E. Allan Timmins/Steve J. Mitchell R. E. Wright Associates, Inc.

DATE 8/3/88 CHK'D BY E. A. Timmins

RL 02237

Printed on recycled paper

AR303428

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

odern Landfill
Southwest Expansion
R. D. #9
York, Pennsylvania

DRILLING METHOD: Split spoon to refusal; NX casing installed; NX core to depth

SAMPLING METHOD: 2" split spoon to refusal; NX core to proposed length

BORING NO. MD-407i/SW-10

SHEET 4 OF 6

					DRILLING START	DRILLING FINISH
WATER LEVEL	Dry	4.45'	4.0'		TIME 815	TIME 1630
TIME	--	800	1540		DATE 7/29/88	DATE 8/2/88
DATE	7/29	8/1	8/2			
CASING DEPTH	10'	10'	10'			

DATUM ELEVATION

DRILL RIG Truck mounted auger/core rig

SURFACE CONDITIONS Open nonvegetated cow feed pen

ANGLE Vertical BEARING

SAMPLE HAMMER TORQUE 30/140 FT.-LBS

DEPTH IN FEET (ELEVATION)	BLOWS/ 1 FT ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM/SEC.
45														
46						Phyllite - siltstone; Quartz lenses and veins		Fracture discordant with foliation; almost at intersection fracture ∡20° for 1" then parallels foliation.							
47						small amount of $CaCO_3$ detected with HCl (10 percent)								
48				6.1	5.1									
				6.1	5.1			Typical mechanical fractures parallel foliation at ∡70 - 75° randomly.						
49														
50														
51														
52	52.5							End of run: Rough, jagged break (fracture) at 52.5' approximately 10° trend						
53						Phyllitic siltstone; As above, chloritic		Partially weathered open fracture at 55.4' ∡15 - 20° (Almost to foliation) sign of slight spun core						
54														
55				7.0	7.0									
				7.0	7.0									
56														
57								Irregular jagged break at 58.7' end of run						
58	58.7													
59														
60														

LOGGED BY E. Allan Timmins/Steve J. Mitchell
R. E. Wright Associates, Inc.

DRILLING CONTR F. T. Kitlinski Associates, Inc.
Harrisburg, Pennsylvania

DATE 8/3/88 CHK'D BY E. A. Timmins

RL 02237

AR303429

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

odern Landfill
Southwest Expansion
R. D. #9
York, Pennsylvania

DRILLING METHOD: Split spoon to refusal; NX casing installed; NX core to depth

SAMPLING METHOD: 2" split spoon to refusal; NX core to proposed length

BORING NO. MD-407i/SW-10

SHEET 5 OF 6

DRILLING

					START	FINISH
WATER LEVEL	Dry	4.45'	4.0'		TIME 815	TIME 1630
TIME	--	800	1540		DATE 7/29/88	DATE 8/2/88
DATE	7/29	8/1	8/2			
CASING DEPTH	10'	10'	10'			

DATUM ELEVATION

DRILL RIG Truck mounted auger/core rig

SURFACE CONDITIONS Open nonvegetated cow feed pen

ANGLE Vertical BEARING

SAMPLE HAMMER TORQUE 30/140 FT.-LBS

DEPTH IN FEET (ELEVATION)	BLOWS/ 4 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
60					8.1	Phyllitic siltstone;								
61				8.1	8.1	As above; practically all quartz after 65.7 to 66.7', with fracture at 66.2' (10), 62.4' to 63' healed fracture (75 - 80') discordant with floiation								
62														
63														
64						Disseminated pyrite noted								
65														
66														
67	66.7					As above though more silty less micaceous, chloritic		Fracture ∡ 10 - 15° at 69' numerous tightly packed thin quartz veins parallel to foliation (68.4' to 69.2)						
68														
69						Disseminated (trace amount) of biotite noted especially at 71.7', parallel to foliation		At 70', horizontal to ∡5° Fracture with slight core spin						
70														
71														
72						Abundance of quartz 74.1' to 74.5'								
73						Large quartz vien from 73.7' t 74.6'								
74														
75	74.8													

DRILLING CONTR F. T. Kitlinski Associates, Inc. Harrisburg, Pennsylvania

LOGGED BY E. Allan Timmins/Steve J. Mitchell R. E. Wright Associates, Inc.

DATE 8/3/88 CHK'D BY E. A. Timmins

RL 02237

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

dern Landfill
Southwest Expansion
R. D. #9
York, Pennsylvania

DRILLING METHOD: Split spoon to refusal; NX casing installed; NX core to depth

SAMPLING METHOD: 2" split spoon to refusal; NX core to proposed length

BORING NO. MD-407i/SW-10

SHEET 6 OF 6

DRILLING

WATER LEVEL	Dry	4.45'	4.0'	
TIME	--	800	1540	
DATE	7/29	8/1	8/2	
CASING DEPTH	10'	10'	10'	

START: TIME 815, DATE 7/29/88
FINISH: TIME 1630, DATE 8/2/88

DATUM ELEVATION

DRILL RIG Truck mounted auger/core rig

SURFACE CONDITIONS Open nonvegetated cow feed pen

ANGLE Vertical BEARING 30/I40

SAMPLE HAMMER TORQUE FT.-LBS

DEPTH IN FEET (ELEVATION)	BLOWS/ 1 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: ROD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
74.8														
75				1.2	1.2	As Ab, disseminated flakes of brotite and pyrite more common by 76'		Pyrite sheets along mechanical fracture at 75.4 fracture at 75.1 (±10) and 76' also						
76				1.2	1.2									
77						Total depth = 76.0'								
78														
79														
80														
81														
82														
83														
84														
85														
86														
87														
88														
89														
90														

DRILLING CONTR F. T. Kitlinski Associates, Inc. Harrisburg, Pennsylvania

LOGGED BY E. Allan Timmins/Steve J. Mitchell R. E. Wright Associates, Inc.

DATE 8/3/88 CHK'D BY E. A. Timmins

202237

Printed on recycled paper

AR303431

Well No. MD-408 s

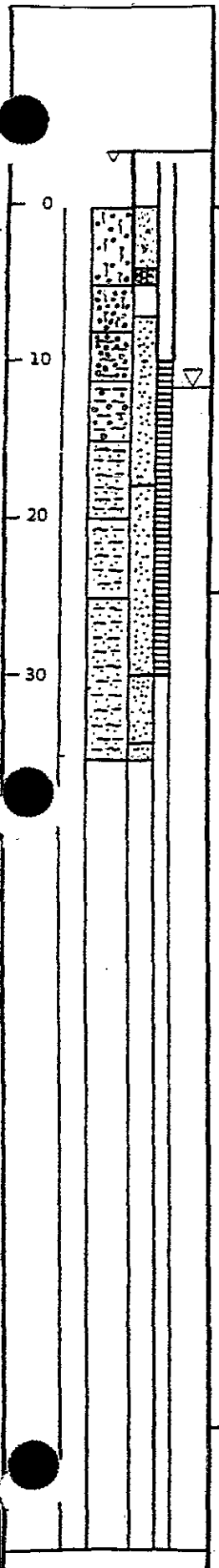
Boring No. X-Ref: SW-11

MONITOR WELL CONSTRUCTION SUMMARY

Survey Coords: N230821.48 E2322668.55

Elevation Ground Level 507.91

Top of Casing 511.63



Drilling Summary:

Total Depth 34'
Borehole Diameter 10" to 15'; 6" to 34'
Casing Stick-up Height: PVC - 2.92'; Al - 3.72'
Driller Myers Brothers Drilling Contractors, Inc. Salunga, Pennsylvania
Rig T4W - 900 - Ingersoll Rand
Bit(s) 10" Hammer Bit; 6" Hammer Bit
Drilling Fluid Potable Water
Protective Casing 4" Diameter Aluminum

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling				
10" hole	6-22	1300	6-22	1310
6" hole	6-22	1330	6-22	1400
Geophys Logging				
Casing				
6" Casing	6-22	1500	6-22	1510
4" Casing				
Filter Placement:	6-24	0800	6-24	1300
Cementing:				
Development: by Rig	6-22	1400	6-22	1430

Well Design & Specifications

Basis: Geologic Log X Geophysical Log ___
Casing String (s): C = Casing S = Screen.

Depth		String(s)	Elevation	
30	- 10	Screen (S1)	477.91'	- 497.91'
10	- +2.92'	Casing (C1)	497.91'	- 510.83'
5.5	- +3.72'	Casing (C2)	502.41'	- 511.63'
	-			-
	-			-

Casing: C1 2" PVC Sch. 40 F.J. (U.O.P. Johnson):
C2 4" Aluminum Casing:
Screen: S1 2" PVC, 0.020" Slot; U.O.P. Johnson:
S2
Filter Pack: Morie Grade 1: 34" to 7.0'
Filter Seal; 7.0 to 5.0'
Grout Seal: None
Cement Collar: 4' to 0'
Bentonite Seal: Pellets: 5.0 to 4.0'
Centering Disks: 30' 18'

Well Development:

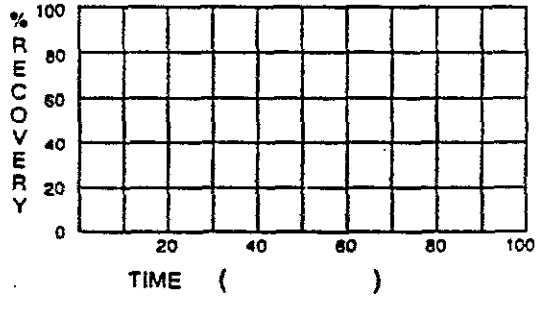
8-88 Purged well with centrifugal pump - 800 to 500 pm - continuous

Stabilization Test Data:

Time	p H	Spec. Cond.	Temp (C)

Recovery Data:

Q= S_o=



Comments:

Total measured depth = total drilled depth = 34.0 4" aluminum casing with Rover 4" locking cap using #21 Master lock

SITE NAME Modern Landfill - Southwest Expansion

LOCATION R. D. #9, York, Pennsylvania

WC 01402

SUPERVISED BY R. E. Wright Associates, Inc.

DATE

AR303432

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

dern Landfill
uthwest Expansion
R. D. #9
York, Pennsylvania

DRILLING METHOD: Air rotary percussion drilling

SAMPLING METHOD: Grab samples every 5'

BORING NO. MD-408s/SW-11

SHEET 1 OF 1

WATER LEVEL	6'8"			
TIME	1500			
DATE	6-22			
CASING DEPTH	15			

DRILLING START TIME p.m. DATE 6-22 — FINISH TIME p.m. DATE 6-22

DATUM ELEVATION

DRILL RIG T4W - 900 - Ingersoll Rand

ANGLE Vertical BEARING --

SAMPLE HAMMER TORQUE -- FT.-LBS

SURFACE CONDITIONS Edge of fence in vegetated cow pasture

DRILLING CONTR Myers Brothers Drilling Salunga, PA

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: ROD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
0						Brown-tan Clay with abundant gravel.			10" Hammer Bit	Temp 6" Steel Casing				
5						5-8' Clay, as above, more gravel; 1/4 to 3/4" subrounded to angular.								
10						8-11' Silt with rounded gravel; yellow-brown (ML) grading to micaceous brown to sandy granular size Gravel.								
15						15' Siltstone, sandy granular size gravel, micaceous, soft, friable, moderate weathering; tan-brown.								
20						20', as above, more competent.								
25						25-35' - Sandy Micaceous Siltstone FeO_2 staining evident, moderately weathered, brown to tank-brown.								
30														
35						Total depth - 34'			6" Hammer Bit					

LOGGED BY R. E. Wright Associates, Inc. Thomas O. Marrs

DATE 6-22-88 CHK'D BY E. Allen Timmins

RE 2237

AR303433

Well No. MT-411s

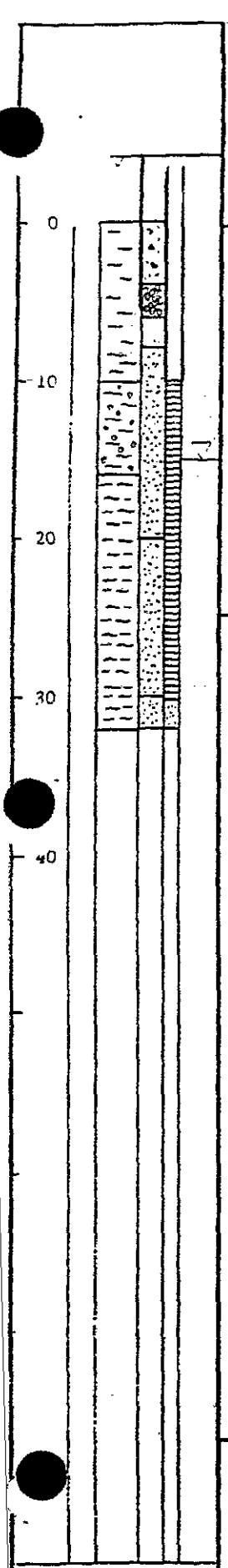
Boring No. X-Ref: SW-1

MONITOR WELL CONSTRUCTION SUMMARY

Survey Coords: N230810.74 E2323106.18

Elevation Ground Level 509.55

Top of Casing 513.17



Drilling Summary:

Total Depth 32.0'
Borehole Diameter 10" to 2s' 6" to 32'
Casing Stick-up Height: 2" PVC - 36"; AL-42'
Driller Myers Brothers Drilling Contractors, Inc. Salunga, Pennsylvania
Rig Ingersoll Rand T4W-900
Bit(s) 10" hammer bit; 6" hammer bit
Drilling Fluid Potable Water
Protective Casing 4" Diameter Aluminum

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling				
10" hole	6/21	1030	6/21	1055
6" hole	6/21	1200	6/21	1215
Geophys. Logging				
Casing:				
6" casing	6/21	1155	6/21	1200
Filter Placement:	6/21	1500	6/21	1630
Cementing:	7/29	1230	7/29	1315
Development: by Rig	6/21	1215	6/21	1300

Well Design & Specifications

Basis: Geologic Log X Geophysical Log ___
Casing String (s): C = Casing S = Screen.

Depth	String(s)	Elevation
30.0 - 10.0	Screen (S1)	479.55 - 499.55
10 - 3.0	Casing (C1)	499.55 - 512.71
5.5' - +3.5	Casing (C2)	504.05 - 513.17
-		-
-		-

Casing: C1 2" PVC Sch. 40 F.J. (U.O.P. Johnson): 10.0' to +3.0'
C2 4" Aluminum Casing: -5.5' to +3.5'
Screen: S1 2" PVC, 0.020" Slot; U.O.P. Johnson: -30.0' to -10.0'
S2
Filter Pack: Morie Grade 1: 32.0 to 8.0'
Filter Sand; 8.0 to 6.0'
Grout Seal: None
Cement seal: 4.0' to 0.0'
Bentonite Seal: 1/4" bentonite pellets - 4.0' to 6.0'
Centering Disks: 30.0; 20.0

Well Development:

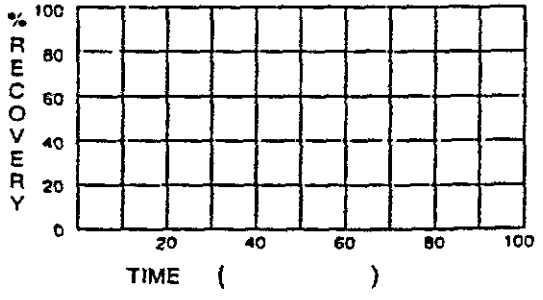
Centrifugal pump:
8/4/88 - pumped for 1 hour 40 minutes
8/5/88 - pumped for 9 hours

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (C)

Recovery Data:

Q= S_o=



Comments: 4" aluminum casing with Royer 4" locking cap using #21 master lock;
Total drilled depth = Total sounded depth = 32.0': WBZ at ~20.5' (> 20 gpm)

SITE NAME Modern Landfill - Southwest Expansion LOCATION R. D. 49, York, Pennsylvania

WC 01402

SUPERVISED BY R. E. Wright Associates, Inc. E. Allan Timmins

DATE 5-21-88

AR303434

ROCK BOREHOLE LOG

PROJECT NAME AND LOCATION

Modern Landfill
Southwest Expansion
R. D. #9
York, Pennsylvania

DRILLING METHOD: Air Rotary

SAMPLING METHOD: Grab samples from cuttings

BORING NO.: MD-41ls/SW-1

SHEET: 1 of 1

					DRILLING START	DRILLING FINISH
WATER LEVEL	7.2'					
TIME	1200				TIME 900	TIME 1200
DATE	6/21				DATE 6/21/88	DATE 6/21/88
CASING DEPTH	25'					

DATUM: ELEVATION:

DRILLING: Air rotary T4W-900 Ingersoll Rand

ANGLE: Vertical BEARING: --

SAMPLER HAMMER TORQUE: N/A FT.-LBS

SURFACE CONDITIONS: Vegetated pasture - open field adjacent stream and small pond (dry)

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY OR SEC.
5	N/A		N/A	N/A	N/A	Silt; (7.5 YR 5/8) orange brown, micaceous		None	Grab samples	Temporary 6" carbon steel casing	Not applicable			
10						Silt with abundant rock fragments weathered bedrock (10 YR 7/4)								
15														
20						At 16: Siltstone Bedrock gray brown; competent occasional fractures								
25														
30						Total depth 32'								
35														

LOGGED BY R. E. Wright Associates, Inc. DATE 6-21-88 CHK'D BY E. A. Timmins

DRILLING CONTR. P. F. Kilinski Associates, Inc. Harrisburg, Pennsylvania

RL 0237

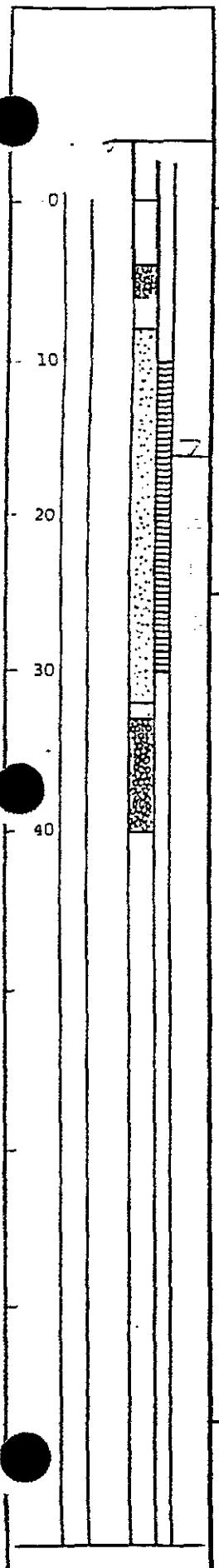
AR303435

88099-7-2 Well No. MD-413s

Boring No. X-Ref: SW-2

MONITOR WELL CONSTRUCTION SUMMARY

Survey Coords: N230308.42 E2323352.54 Elevation Ground Level 531.63 Top of Casing 534.50



Drilling Summary:

Total Depth 40.0'
Borehole Diameter 10" to 15'; 6" to 40'
Casing Stick-up Height: PVC 2.98'; Al 2.87'
Driller Myers Brothers Drilling Contractors, Inc. Salunga, Pennsylvania
Rig Ingersoll Rand T4W
Bit(s) 10" hammer bit; 6" hammer bit
Drilling Fluid Potable Water
Protective Casing 4" Diameter Aluminum

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling				
10" hole	6/20	1000	6/20	1010
6" hole	6/20	1010	6/20	1020
Geophys. Logging				
Casing:				
6" casing	6/20	1010	6/20	1012
4" casing	6/20	1130	6/20	1315
Filter Placement:	6/20	1545	6/20	1630
Cementing				
Development by Rig	6/20	1020	6/20	1050

Well Design & Specifications

Basis: Geologic Log X Geophysical Log ___
Casing String (s): C = Casing S = Screen.

Depth	String(s)	Elevation
30 – 10	Screen (S1)	501.63 – 521.63
10 – +2.98	Casing (C1)	521.63 – 534.61
5.0 – +2.87	Casing (C2)	526.63 – 534.50

Casing: C1 2" PVC Sch. 40 F.J. (U.O.P. Johnson): -10 to +3.0'
C2 4" Aluminum Casing: -5.0" to 3.5'
Screen: S1 2" PVC, 0.020" Slot; U.O.P. Johnson: 30' to 10'
S2
Filter Pack: Morie Grade 1: 32' to 8'
Filter Sand 32-33; 8 to 6'
Grout Seal: None
Bentonite Seal: Pellets: 40 to 33; 6 to 4
Cement: 4'-0'
Centering Disks: 30'; 20'

Well Development:

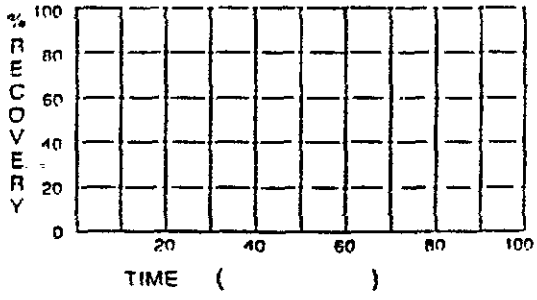
9/2
T0930 SWL 17.17'
Pumped for about 45 minutes. Water was a bit cloudy at start but cleared quickly.

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (C)
1005	5.80	479	10.5
1015	6.02	558	10.5
1025	6.13	560	10.5
1035	6.18	562	10.5

Recovery Data:

Q= S_o=



Comments: SWL 5 minute after shutdown 18.02'.
4" aluminum protector pipe with Royer lockable cap using #21 Master lock: Total sounded depth = drilled depth = 40 feet
WBZ at 25 - 30' (4-6 gpm).

SITE NAME Modern Landfill - Southwest Expansion
WC 01402
SUPERVISED BY R. E. Wright Associates, Inc. E. Allan Timmins
DATE 6-20-88

AR303436

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

Modern Landfill
Southwest Expansion
R. D. #9
York, Pennsylvania

DRILLING METHOD: Air Rotary

SAMPLING METHOD: Grab samples from cuttings

WATER LEVEL	10'			
TIME	1020			
DATE	6/20			
CASING DEPTH	15'			

BORING NO. MD-413s/SW-2

SHEET 1 OF 1

DRILLING

START	FINISH
TIME 1000	TIME 1630
DATE 6/20/88	DATE 6/20/88

DATUM ELEVATION

DRILLING CONTR F. T. Kitlinski Associates, Inc. Harrisburg, Pennsylvania

DRILL RIG: Air rotary - T4W-900 Ingersoll Rand

SURFACE CONDITIONS: Open cattle yard; no vegetation; adjacent woodpile

ANGLE vertical BEARING --

SAMPLE HAMMER TORQUE N/A FT-LBS

LOGGED BY R. E. Wright Associates, Inc.

DATE CHK'D BY

DEPTH IN FEET (ELEVATION)	BLOWS/6" ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND SIZ	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY OR SEC.
5	N/A		N/A			(7.5 YR Silt - orange brown 6/6)			10" H. B.	6" Steel CSG (Removed)	N/A			
10						At 6': (7.5 YR Silt sandy - brown 7/2) with phyllite rock fragments								
15						At 15': Gray phyllite medium to fine grain fractured 20' as above lighter gray to total depth								
20														
25														
30														
35									6" H. B.					
40						Total depth 40'								

RL 0237

AR303437

Printed on recycled paper

Well No. MD-415s

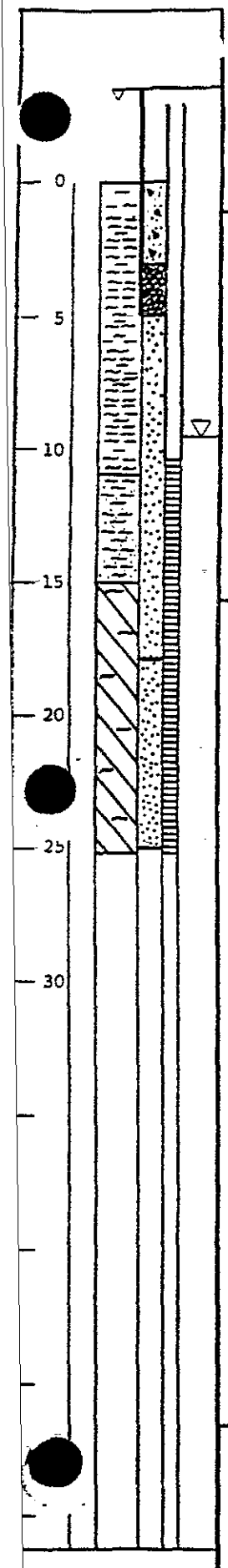
Boring No. X-Ref: SW-3

MONITOR WELL CONSTRUCTION SUMMARY

Survey Coords: N229574.00 E2323721.07

Elevation Ground Level 560.87

Top of Casing 564.27



Drilling Summary:

Total Depth 26'
Borehole Diameter 10" to 5'; 6" to 26'
Casing Stick-up Height: PVC 36"; Al 42'
Driller Myers Brothers Drilling Contractors, Inc. Salunga, Pennsylvania
Rig T4W - Ingersoll Rand
Bit(s) 10" Hammer Bit; 6" Hammer Bit
Drilling Fluid Potable Water
Protective Casing 4" Diameter Aluminum

Well Design & Specifications

Basis: Geologic Log X Geophysical Log ____
Casing String (s): C = Casing S = Screen.

Depth		String(s)	Elevation	
25.2	10.2	Screen (S1)	535.7	550.7
10	+2.8	Casing (C1)	550.7	563.7
5.0	+3.4	Casing (C2)	555.3	564.27

Casing: C1 2" PVC Sch. 40 F.J. (U.O.P. Johnson): -10 to +3.0'
C2 4" Aluminum Casing: -5.0 to +3.5'

Screen: S1 2" PVC, 0.020" Slot; U.O.P. Johnson: -25 to -10
S2

Filter Pack: Morie Grade 1: -25 to -5'

Grout Seal: None

Cement Seal: 0 to 3

Bentonite Seal: Pellets: 3 to 5'

Cement Seal: 0 to 3'

Centering Disks: 25'; 18'

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling				
10' hole	6-17-88	1015	6-19-88	1030
6' hole	6-17-88	1100	6-17-88	1130
Geophys. Logging				
Casing:				
6" casing	6-17-88	1030	6-17-88	1045
4" casing	7-20-88	1115	7-20-88	1158
Filter Placement:	6-17-88	1315	6-12-88	1530
Cementing:	7-20-88	125	7-20-88	130
Development: by Rig	6-17-88	1130	6-17-88	1200

Well Development:

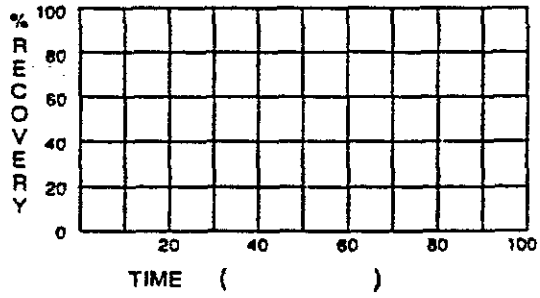
Centrifugal pump (8-8-88) ≥10-15 gpm

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (C)

Recovery Data:

Q= S_o=



Comments:

Total drilled depth = 26'; water zone at 18'.

SITE NAME Modern Landfill - Southwest Expansion

LOCATION R. D. #9, York, Pennsylvania

WC 01402

SUPERVISED BY R. E. Wright Associates, Inc. Thomas O. Marrs

DATE 6-17-88

AR303438

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

odern Landfill
outhwest Expansion
R. D. #9
York, Pennsylvania

DRILLING METHOD: Air rotary

SAMPLING METHOD: Grab samples from cuttings

BORING NO: MD-415s/SW-3

SHEET: 1 OF 1

					DRILLING START	DRILLING FINISH
WATER LEVEL	5.5'				TIME 1015	TIME 1200
TIME	1130				DATE 6-17-88	DATE 6-17-88
DATE	677					
CASING DEPTH	15					

DATUM ELEVATION

DRILL RIG: Air rotary - T4W - 900 Ingersoll Rand

SURFACE CONDITIONS: Vegetated area adjacent to stream

ANGLE: Vertical BEARING: --

SAMPLE HAMMER TORQUE: -- FT.-LBS

DEPTH IN FEET (ELEVATION)	BLOWS/ FT. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: ROD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
0						Silt orange to red-brown (7.5YR 6/6), Clayey.		10" air-rotary hammer bit drilling to 5'.	Grab Samples	Temporary 6" Steel Casing				
5						11' Sand and Silt orange-brown (7.5YR 7/10); phyllite rock fragments.		6" hammer bit drilling to total depth of 26'.						
10						15' Bedrock Siltstone Phyllite gray-brown (7.5YR 7/0) very fine-grained micaceous.								
15						Total depth - 26'								
20														
25														
30														

DRILLING CONTR F. T. Kitlinski Associates, Inc. Harrisburg, Pennsylvania

RL 237

LOGGED BY R. E. Wright Associates, Inc.

DATE 7-20-88 CHK'D BY Thomas O. Marrs

AR308439

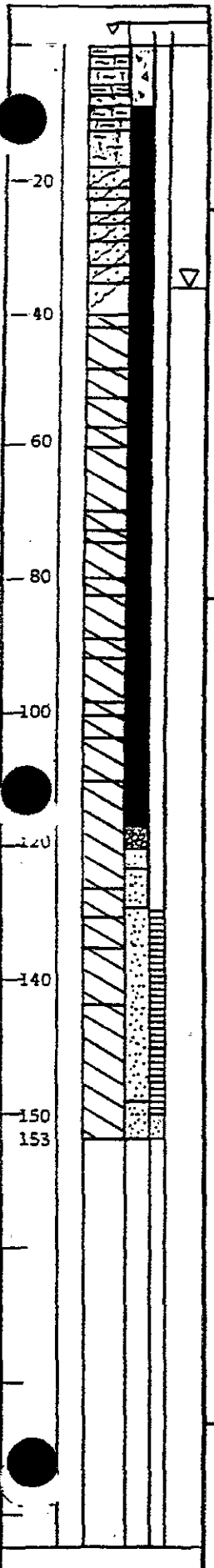
88099-7-2 Well No. MD-416d

Boring No. X-Ref: DW-3

MONITOR WELL CONSTRUCTION SUMMARY

Survey Coords: N 229595.97
E 2323718.04

Elevation Ground Level 559.33
Top of Casing 562.21



Drilling Summary:

Total Depth 153.0'
Borehole Diameter 10' to 30'; 6' to 153.'
Casing Stick-up Height: PVC - 2.38'; Al - 2.88'.
Driller Myers Brothers Drilling Contractors, Inc. Salunga, Pennsylvania
Rig T4W -
Bit(s) 10' Hammer bit; 6" Hammer
Drilling Fluid Potable Water
Protective Casing 4" Diameter Aluminum

Well Design & Specifications

Basis: Geologic Log X Geophysical Log ___
Casing String (s): C = Casing S = Screen.

Depth	String(s)	Elevation
150 - 130	Screen (S1)	408.7 - 428.71
130 - +2.38	Casing (C1)	428.71 - 561.71
6.5 - +2.88	Casing (C2)	552.21 - 562.21
-		-
-		-

Casing: C1 2" PVC Sch. 40 F.J. (U.O.P. Johnson):
C2 4" Aluminum Casing:

Screen: S1 2" PVC, 0.020" Slot; U.O.P. Johnson:
S2

Filter Pack: Morie Grade 1: 153 to 123.6'

Filter Pack 123.6 to 121.2
Grout Seal: slurry - 118.3 to 8'

Cement seal: 8' to 0'
Bentonite Seal: pellets: 121.2 to 118.3

Centering Disks: 148.7'; 129.3'

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling				
10" hole	8-5-88	1520	8-5-88	1540
6" hole	8-8-88	850	8-5-88	1005
Geophys. Logging				
Casing:				
6" casing	8-5-88	1540	8-5-88	1608
4" casing	8-9-88	2020	8-9-88	2120
Filter Placement:	8-8-88	1158	8-8-88	1320
Cementing:	8-8-88	1320	8-9-88	915
Development: by Rig	8-8-88	1000	8-8-88	1108

Well Development: 9/1/88

11:35 SWL 10.98'. Purged and surged for 5 minutes water became cloudy for a few minutes but cleared. Water level during purging 132.92'.

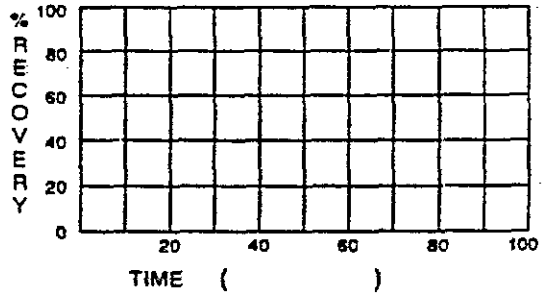
Stabilization Test Data:

9/2 0900 SWL 140.82'

Time	p H	Spec. Cond.	Temp (C)

Recovery Data:

Q= S_o=



Comments:

Total depth = 153.0';

Water bearing zones at: 36' approximately 1 gpm; 40-41 trace; 90' - 3 gpm;

AR303440

SITE NAME Modern Landfill - Southwest Expansion LOCATION R. D. #9, York, Pennsylvania

WC 01402

SUPERVISED BY R. E. Wright Associates, Inc. Allan Timmins

DATE 8-9-88

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

odern Landfill
Southwest Expansion
R. D. #9
York, Pennsylvania

DRILLING METHOD: Split spoon and installtion of NX casing; NX coring to 150.0'

SAMPLING METHOD: split spoon to refusal; NX core to well total depth

BORING NO: MD-416d DW-3

SHEET: 1 OF 10

					DRILLING START	DRILLING FINISH
WATER LEVEL	12.6'	6.3'	6.25'	3.3'	TIME	TIME
TIME	1040	1740	815	1730	920	1200
DATE	6-22	6-28	6-39	6-29	DATE	DATE
CASING DEPTH	18.3'	18.3'	18.3'	18.3'	6-21	7-6

DATUM ELEVATION

DRILL RIG: Truck mounted auger/core rig

ANGLE: vertical BEARING: --

SAMPLE HAMMER TORQUE: 140 FT.-LBS

SURFACE CONDITIONS: Pasture area - ~ 30' west of stream

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: ROD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
0														
1	6 5 6 8	1 1A 1B		1.4		Strong brown, Sandy Silt ML, dry, friable. As above, slightly more moist, more coarse fragments (10%).			2" Split Spoon	Temporary NX Casing				
2														
3	8 5 6 7	2 2A 2B 2C		1.8		Strong brown micaceous Clayey Silt, ML/MH yellow-red, very micaceous Clayey Silt, MH/CL. As above, somewhat moist and smooth. As above, MnOx stained.								
4														
5	4 4 5 5	3 3A 3B		1.2		strong brown to yellow-red, very micaceous Clayey Silt, MH/CL, smooth and very friable. Slightly sticky with pressure.								
6														
7	5 6 6 5	4 4A 4B		1.4		Moist yellow-red, very micaceous Clayey Silt MH/CL. Yellow-brown to olive-brown very micaceous Clayey Silt, moist, smooth, and very friable MH/CL.								
8														
9	4 5 8 7	5 5A		0.8		Strong brown and brown very micaceous Saprolite		Saprolite						
10						Clayey Silt MH/CL, very friable, smooth and sticky with pressure, moist.								
11	4 4 4 6	6 6A 6B		1.6		Very wet Clayey Silty, brown, clay. Brown to olive-brown, very moist Saprolite.								
12														
13	0 1 1 0	7 7A 7B 7C		2.2		Very micaceous Clayey Silt. MH/CL Brown and yellowish-brown very micaceous Clayey Silt, MH/CL, very moist, friable and somewhat plastic.								
14	0 7 1	8		0.9		Strong brown Clayey Silty, moist MH/CL friable, slightly plastic MnOx stains.								
15														

DRILLING CONTR F. T. Kitlinski Associates, Inc. Harrisburg, Pennsylvania

LOGGED BY R. E. Wright Associates, Inc. E. A. Timmins

DATE 8-9-88 CHK'D BY Allan Timmins

RL 0237

AR303441

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

odern Landfill
Southwest Expansion
R. D. #9
York, Pennsylvania

DRILLING METHOD: NX Coring to 150' (coring began 6/28)

SAMPLING METHOD:

BORING NO. MD-416d/DW-3

SHEET 2 OF 10

DRILLING START TIME / FINISH TIME

WATER LEVEL	3.75	3.5	3.85	4.1	
TIME	803	1730	805	1455	
DATE	6-30	6-30	7-1	7-1	
CASING DEPTH	18.3	18.3	18.3	18.3	

DRILLING START DATE 6-21-88 / FINISH DATE 7-7-88

DATUM ELEVATION

DRILL RIG

SURFACE CONDITIONS

ANGLE BEARING

SAMPLE HAMMER TORQUE FT.-LBS

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: ROD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM/SEC.
15	2					Clayey Silt, as above.								
	7	8A				Red-brown gravelly, very micaceous saprolite, Sandy and Clayey Silt,		Friable.						
16	14													
	10	9												
17	20			1.1										
	100	9A		2.0										
18						Gray black green (5B6 5/2) Micaceous Quartzite rich phyllite, weathered along foliation planes.		Rock well worked several folding events common quartz veins discordant and concordant.						
19				2.0	16"									
20		1		2.0	2.0									
	20.3'					As Above, Fol ∢ 85° quartz veins concordant with foliation.		Evidence of shearing and movement along foliation, reheated by vuggy quartz.						
21		2		1.7	0									
				1.7	1.7									
22	22.0					As Above; more quartz veins - vuggy - limonite weathered out. Very chloritic to micaceous.		21 - 27.4' chloritic very micaceous.						
23														
	23.9'	3		1.9	0									
24				1.9										
						As Above, chloritic.		Foliation ∢ 85° clay ∢ 10° at approximately 24.5 + 25', open, coatings and vuggy.						
25		4		2.1	1.5									
				2.1	2.1									
26	26'					As Above, chlorite to 27.4' grades to more micaceous material, very flaky, very soft, calcite lenses with quartz at 28.5' quartz - vuggy.		Highly fracture 26 - 27', 27 - 27.5' Broken zone some large pyrite xls.						
27		5		3.0	2.0									
				3.0	3.0									
28														
29	29'													
		6				See below.								
30														

NX Core to 150'

Open Rock Hole
Not Applicable

AR303742

DRILLING CONTR F. T. Kitlinski Associates, Inc.

Harrisburg, Pennsylvania

RL 02237

LOGGED BY E. A. Timmins
R. E. Wright Associates, Inc.

DATE 8-9-88 CHK'D BY E. A. Timmins

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

lodern Landfill
Jouthwest Expansion
R. D. #9
York, Pennsylvania

DRILLING METHOD: NX Coring to 150'

SAMPLING METHOD:

BORING NO: MD-416d/DW-3

SHEET: 3 OF 10

WATER LEVEL		6.85			
TIME		755			
DATE		7-7			
CASING DEPTH					

DRILLING START TIME / FINISH TIME

DATE 6-21-88 / DATE 7-7-88

DATUM ELEVATION

DRILL RIG

SURFACE CONDITIONS

ANGLE BEARING

SAMPLE HAMMER TORQUE FT.-LBS

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: ROD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
30														
31		6		4.1 4.1	3.2 4.1	Quartzite as above, more micaceous, (numerous) quartz veins with $CaCO_3$ inclusions - throughout Quartzite with micaceous lenses. Limonite xls. weathered out from quartz		Foliation ∢ 80° Mechanical fractures parallel to foliation common.	NX Core					
32														
33														
34	33.1'	7		2.1 2.2	0 2.2	As Above, more phyllite less quartz veins thicker 172° ∠ 37° quartz veins Rock more chloritic less micaceous.		Foliation ∢ 85° cleavage = foliation cremation folds common. Broken up zone 34.2 to 35.6'.						
35	35.3'													
36		8		2.0 2.0	1.1 2.0	As Above $CaCO_3$ with quartz - veins very vuggy.		Foliation ∢ 85° cleaveage = foliation.						
37	37.3'													
38		9		2.0 2.0	1.3 2.0	As Above pyrite/arseno-pyrite present with quartz veings, muscovite oriented parallel to foliated quartz seams.		Smokey quartz - 38.4' to 41' with some $CaCO_3$ inclusion quartz veins throughout.						
39	39.3'	10		.6 .6	0	Smokey quartz vein, vuggy, without limonite.								
40	39.9'													
41	41.6'	11		x 1.7	x 1.7	Quartz -as above to 41.3' Pyrite along muscovite seams 41.3-41.6'. Quartz and Micaceous Phyllite. Pyrite xls developed along foliation.								
42														
43		12		5.7 5.7	1.9 5.7	Light gray to light brown-gray very micaceous Phyllite, very soft - highly weathered quartz veins (w/$CaCO_3$) parallel to folaition.		Foliation ∢ 85-90° several 1/2 - 1" quartz veins reworked zone (approximately 45'-46')						
44														
45														

DRILLING CONTR F. T. Kitlinski Associates, Inc. Harrisburg, Pennsylvania

LOGGED BY E. A. Timmins
R. E. Wright Associates, Inc.

DATE 8-9-88 CHK'D BY E. A. Timmins

RL 2237

AR303443

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

odern Landfill
outhwest Expansion
R. D. #9
York, Pennsylvania

DRILLING METHOD: Coring (NX-4") to 150'

SAMPLING METHOD:

BORING NO. MD-416d/DW-3

SHEET 4 of 10

					DRILLING START	DRILLING FINISH
WATER LEVEL					TIME	TIME
TIME					920	1200
DATE					DATE	DATE
CASING DEPTH					6-21-88	7-6-88

DATUM ELEVATION

DRILL RIG Truck mounted auger/core rig

ANGLE vertical BEARING --

SAMPLE HAMMER TORQUE 140 FT.-LBS

SURFACE CONDITIONS

Coring began 6/28

DEPTH IN FEET (ELEVATION)	BLOWS/ 4 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
45														
46		12				See above.		Very Porous rock, very Soft $CaCO_3$ inclusions in quartz veins only.						
47	47.3													
48		13				Phyllite, As Above, very micaceous above/below quartz veins (3-4" zones each side). Other areas less micaceous more silty.								
49				3.5 5.0	2.0 5.8									
50														
51														
52														
53	53.1													
54						As Above, very micaceous zone large amount of core. Quartz vein at approximately 53.'									
55				2.4 5.2	0									
56		14												
57														
58	58.3													
59		15												
60														

NX Core
Open Rock Hole
Not Applicable

DRILLING CONTR F. T. Kitlinski Associates, Inc.

Harrisburg, Pennsylvania

LOGGED BY E. A. Timmins
R. E. Wright Associates, Inc.

DATE 8-9-88 CHK'D BY E. A. Timmins

RL 02237

Printed on recycled paper

AR303444

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

odern Landfill
Southwest Expansion
R. D. #9
York, Pennsylvania

DRILLING METHOD: Coring (NX - 4") to 150' (6-28)

SAMPLING METHOD:

BORING NO: MD-416d/DW-3

SHEET: 5 of 10

					DRILLING START	DRILLING FINISH
WATER LEVEL					TIME	TIME
TIME					920	1200
DATE					DATE	DATE
CASING DEPTH					6-21-88	7-6-88

DATUM ELEVATION

DRILL RIG: Truck mounted auger/core rig

ANGLE: vertical BEARING: --

SAMPLE HAMMER TORQUE: 140 FT.-LBS

SURFACE CONDITIONS: Pasture area - ~ 30' west of stream

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: ROD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
60														
60.2				1.3	1.3	As above, grayish-blue green micaceous Phyllite. Quartz veins concordant with foliation.		Foliations ∢ 85-90' weathered joint at 60.5' ∢ 15' open.	NX Core	Open Rock Hole Not Applicable				
61		16		1.3	1.3									
61.5														
62														
63						As above, rock reworked metamorphosed Phyllite increased fissility. Quartz veins (boudin. texture) pyrite infillings with quartz veins - disseminated. $CaCO_3$ inclusions with quartz rock, more competent.		∢ Foliation = ∢ cleavage. Foliation ∡ 80°.						
64								Weathered joint at 66' ∢ 10'. No coatings. Smooth and open.						
65		17		6.8	6.8									
66				6.8	6.8			Isoclinal fold at 66.5' axis 75° plunge.						
67														
68														
69														
69.3														
70						As Above, quartz veins lenses throughout, very micaceous at contacts between quartz veins and host rock $CaCO_3$ lenses/stringers common throughout.		Foliation ∢= cleavage ∢ = 80°. 1/2" quartz vein at 70.5'.						
71				4.0	3.9									
72		18		4.9	4.0									
73						Phyllite, As above, more micaceous - more fissile, more competent and heated below quartz vein at 75.3' Disseminated pyrite throughout.		Vein at 75.3'. Disseminated pyrite throughout.						
73.3														
74				3.4	3.4									
75		19		3.4	3.4									

DRILLING CONTR F. T. Kitlinski Associates, Inc. Harrisburg, Pennsylvania

RL 237

LOGGED BY E. A. Timmins
R. E. Wright Associates, Inc.

E 8-9-88 CHK'D BY E. A. Timmins

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

odern Landfill
Southwest Expansion
R. D. #9
York, Pennsylvania

DRILLING METHOD: NX coring to 150' (6/28 to 7/7)

SAMPLING METHOD

BORING NO. MD-416d/DW-3

SHEET 6 OF 10

					DRILLING START	DRILLING FINISH
WATER LEVEL					TIME	TIME
TIME					920	1200
DATE					DATE	DATE
CASING DEPTH					6/21/88	7/6/88

DATUM ELEVATION

DRILL RIG Truck mounted auger/core rig

ANGLE vertical BEARING --

SAMPLE HAMMER TORQUE 140 FT.-LBS

SURFACE CONDITIONS

Pasture area -- 30' west of stream

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: ROD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
75														
76		19				See above.								
76.7						Phyllite, as above.		Quartz vein at 78.6'.						
77														
78														
79		20		x 4.0	x 4.0									
80														
80.7														
81						As above, foliation ∢ 80° 82-82.5' shows isoclinal folding. Quartz veins are dominant, concordant to folation.		Fold axis horizontal limbs dip at 65'.	NX Core	Open Rock Hole Not Applicable				
82		21												
83	83.0					As above, fol.∢ 80° 86 to 89.5 fol.∢ 85' quartz lens zone, competent and healed; with limonite crystals.		Heated shear zone 85-86; broken up, very micaceous, 89.5-92.7' - Soft zone, very fissil and soft.						
84														
85														
86		22		6.7 6.7	3.0 6.7	Quartz veins display boudigne texture.		Potential water-bearing zone at 83.5 - 84.5,						
87														
88														
89														
90	89.7	23												

DRILLING CONTR F. T. Kitlinski Associates, Inc. Harrisburg, Pennsylvania

LOGGED BY E. A. Timmins R. E. Wright Associates, Inc.

DATE 8-9-88 CHK'D BY E. A. Timmins

RL 02237

AR303446

ROCK BOREHOLE LOG

SITE NAME AND LOCATION: Modern Landfill, Southwest Expansion, R. D. #9, York, Pennsylvania	DRILLING METHOD: NX coring to 150' (6/28 to 7/7)	BORING NO. MD-416d/DW-3
	SAMPLING METHOD:	SHEET 7 OF 10
		DRILLING START / FINISH
	WATER LEVEL	TIME 920 / TIME 1200
	TIME	
	DATE	DATE 6-21-88 / DATE 7-6-88
DATUM ELEVATION	CASING DEPTH	
DRILL RIG: Truck mounted auger/core rig	SURFACE CONDITIONS: Pasture area ~ 30' west of stream	
ANGLE: vertical BEARING: --		
SAMPLE HAMMER TORQUE: 140 FT.-LBS		

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: ROD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
90														
91		23		3.0 3.0	3.0 3.0	As above, potential extensive shear zone.		Rock has been extensively squeezed, broken up.						
92	92.7'													
93		24				92.7-93.5'(10") very broken up, rounded fragments of shiny, gray, soft phyllite with folded bands of quartz;traces of calcite with quartz. Also disseminated pyrite.		Calcite, also disseminated pyrite.	NX Core Open Rock Hole Not Applicable					
94														
95				4.0 5.4	1.0 5.4			Some mechanical breakage in center section of core.						
96						93.5-98.1' Phyllite as above, thick quartz bands with associated white encrusting.								
97														
98	98.1'					98.1' to 100.6'; intact section - gray phyllite with tightly folded quartz bands (smokey gray).		Harder than above, no obvious calcite quartz banding typially 1/16 - 1/4" thick.						
99				2.5 2.5	2.5 2.5									
100														
101	100.6	25				101.35-102.6' Moderately hard, Gray Phyllite, folded white to smokey gray quartz banding. Minor amount of calcite		Natural fracture at 101.6' and 102.6' (weathered). Mechanical break at 102'. Fractures at 104.85' and 105.65'.						
102														
103		26		5.6 5.6	5.6 5.6	102.6-104.8' As above, intact, folded quartz en echelon.								
104														
105														

DRILLING CONTR F. T. Kitlinski Associates, Inc. Harrisburg, Pennsylvania

RL 2237

LOGGED BY E. A. Timmins DATE 8-9-88 CHK'D BY E. A. Timmins

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

odern Landfill
outhwest Expansion
R. D. #9
York, Pennsylvania

DRILLING METHOD: NX (4') coring to 150' (began 6-28)

SAMPLING METHOD:

BORING NO. MD-416d/DW-3

SHEET 8 OF 10

					DRILLING START	DRILLING FINISH
WATER LEVEL					TIME	TIME
TIME					920	1200
DATE					DATE	DATE
CASING DEPTH					6-21-88	7-6-88

DATUM ELEVATION

DRILL RIG Truck mounted auger/core rig

ANGLE vertical BEARING --

SAMPLE HAMMER TORQUE 140 FT.-LBS

SURFACE CONDITIONS: Pasture area - ~ 30' west of stream

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
105		26				See above.			NX Core	Open Rock Hole	Not Applicable			
106	106.2					106.2-108' Moderately hard Phyllite as above, with less quartz banding, trace $CaCO_3$.		Mechanical fractures along cleavage = folaition. Few minor tight folds obvious in quartz. Break at 108'. Fracture at 109.9'.						
107		27												
108														
109				6.3	6.3	108-112.5' As above, but softer with disseminated pyrite traces of calcite, highly mechanically fractured.								
110				6.3	6.3									
111														
112	112.5													
113						112.5-113.5' Quartz vein heated, with inclusions of host rock.		Foliation ∮ = 80°.						
114		28												
115						$CaCO_3$ stringers with quartz at 117', ∮ 15° 1/2" - 3/4" spacing. Abrupt change at 119'. No quartz veins, rock alters to homogeneous bluish-gry to green. Silty micaceous phyllite. No $CaCO_3$ reactions.		$CaCO_3$ stringers in quartz vein at 117' ∮ 45°. Soft zone at bottom end of section.						
116				6.9	6.5									
117				7.7	7.7									
118														
119	118.9													
120		29												

DRILLING CONTR F. T. Kitlinski Associates, Inc. Harrisburg, Pennsylvania

LOGGED BY E. A. Timmins R. E. Wright Associates, Inc.

DATE 8-9-88 CHK'D BY E. A. Timmins

RL 02237

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

Modern Landfill
Southwest Expansion
R. D. #9
York, Pennsylvania

DRILLING METHOD: NX(4") coring to 150'

SAMPLING METHOD:

WATER LEVEL					
TIME					
DATE					
CASING DEPTH					

DATUM ELEVATION

BORING NO: MD-416d/DW-3

SHEET: 9 OF 10

DRILLING START	DRILLING FINISH
TIME: 920	TIME: 1200
DATE: 6-21-88	DATE: 7-6-88

DRILL RIG: Truck mounted auger/core rig

ANGLE: vertical BEARING: —

SAMPLE HAMMER TORQUE FT.-LBS

SURFACE CONDITIONS: Pasture area - ~ 30' west of stream

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
120						As above, very competent, mechanical breaks along foliation ∢ along foliation ∢ 80°. More silty, foliation contains micaceous material; no HCL reactive $CaCO_3$; randomly dispersed pyrite crystals (1/4" - 1/8") throughout.		124-124.5' Broken zone. Small quartz vein, soft at 125'. Soft zone with spun core at 126'. Quartz lens at 126.8' horizontal (discordant) to foliation.	NX Core	Open Rock Hole Not Applicable				
121														
122		29		7.9 7.9	7.3 7.9									
123														
124														
125														
126														
127	126.8					Dusky blue-green to greenish-black micaceous quartzite Phyllite. Foliation ∢ 60°. Cleavage to 80°.		Foliation ∢ 80° at 129.5' at soft zone (3'). Also soft zone at 131.2-132' - Broken up.						
128														
129		30		5.3 5.4										
130					3.75 5.4	Disseminated pyrite along quartz veins and soft zones, quartz has $CaCO_3$ inclusions (to folation). Almost vertical at 129'.								
131														
132	132.3					Dusky blue-green to		Fracture ∢ 10° at 132.9' quartz vein ∢ 75° at 134' small soft zone at 135.9'. Foliation ∢ 70-75°. Crenulation folding; quartz vein at 136.9 with $CaCO_3$ inclusions.						
133		31				Micaceous phyllite as above. $CaCO_3$ inclusions with quartz (parallel to foliation). Disseminated pyrite.								
134				5.4 5.4	4.9 5.4									
135														

DRILLING CONTR: F. T. Kitlinski Associates — Harrisburg, Pennsylvania

LOGGED BY: E. A. Timmins / R. E. Wright Associates, Inc.

DATE: 8-9-88 CHK'D BY: E.A. Timmins

RL 02237

Printed on recycled paper

AR303449

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

Modern Landfill
Southwest Expansion
R. D. #9
York, Pennsylvania

DRILLING METHOD: NX (4") coring to 150'

SAMPLING METHOD:

BORING NO: MD-416d/DW-3

SHEET: 10 OF 10

DRILLING: START 920 6-21-88; FINISH 1200 7-6-88

WATER LEVEL					
TIME					
DATE					
CASING DEPTH					

DATUM ELEVATION

DRILL RIG: Truck mounted auger/core

ANGLE: vertical BEARING: --

SAMPLE HAMMER TORQUE: 140 FT.-LBS

SURFACE CONDITIONS: Pasture area - ~ 30' west of stream

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: ROD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM/SEC.
135						See above.		Foliation ∢ 75-80° with evident crenulation folds. Softer zone 137.5, 137.6' (1"). Quartz vein parallel to foliation at 138.7'. Also at 139.9 ∢ 80°.	NX Core	Open Rock Hole	Not Applicable			
136		31												
137	137.6													
138						Phyllite, as above, slightly more greenish quartz veins less frequent. Rock is micaceous with biotite (disseminated) occurring along folaition planes $CaCO_3$ inclusions in quartz veins (parallel to folation). Disseminated pyrite.								
139														
140		32												
141														
142														
143														
144	144'					As above.		Foliation ∢ 70-80° 6" soft zone 143.7' to 144.4'; also at 145.1'. Quartz vein parallel to foliation ∢ 80° at 145.3'. $CaCO_3$ inclusions Softer zone at 146.2'						
145														
146		33												
147														
148														
149														
150	150'					Total depth = 150.0'								

DRILLING CONTR F. T. Kitlinski Associates, Inc. Harrisburg, Pennsylvania

LOGGED BY R. E. Wright Associates, Inc. E. A. Timmins

DATE 8-9-88 CHK'D BY E. A. Timmins

RL 02237

Well No. MD-417s

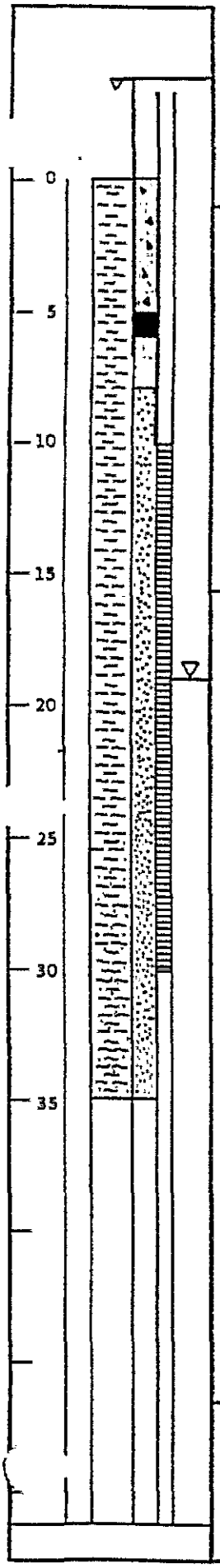
Boring No. X-Ref: SW-4

MONITOR WELL CONSTRUCTION SUMMARY

Survey Coords: N228963.05 E2324208.00

Elevation Ground Level 601.05

Top of Casing 604.79



Drilling Summary:

Total Depth 35.0'
Borehole Diameter 10" to 35'
Casing Stick-up Height: PVC 3.06'; Al - 3.74'
Driller Myers Brothers Drilling Contractors, Inc. Salunga, Pennsylvania
Rig T4W - Ingersoll Rand
Bit(s) 10" Hammer Bit
Drilling Fluid Potable Water
Protective Casing 4" Diameter Aluminum

Well Design & Specifications

Basis: Geologic Log X Geophysical Log ___
Casing String (s): C = Casing S = Screen.

Depth	String(s)	Elevation
30.1 - 10.1	Screen (S1)	570.9 - 590.9
-10.1 - +3.06	Casing (C1)	590.9 - 604.1
6.8 - +3.74	Casing (C2)	594.2 - 604.8
___ - ___		___ - ___
___ - ___		___ - ___

Casing: C1 2" PVC Sch. 40 F.J. (U.O.P. Johnson):
C2 4" Aluminum Casing:
Screen: S1 2" PVC, 0.020" Slot; U.O.P. Johnson:
S2
Filter Pack: Morie Grade 1: 35' to 8'
Filter Seal: 8' to 6'
Grout Seal: None
Cement Seal: 5 to 0'
Bentonite Seal: Pellets; 6' to 5'
Centering Disks: 30'; 20'

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling				
10" hole	6-22	1000	6-22	1015
Geophys.Logging:				
Casing:				
4" Al. Casing	8-17	950	8-17	1040
Filter Placement:	6-22	1115	6-22	1235
Cementing:	8-17	950	8-17	1040
Development: by Rig	6-22	1015	6-22	1045

Well Development:

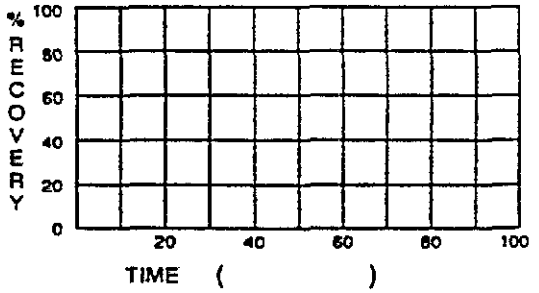
8-30-88; SWL 19.25' TOC.
Pumped at 25 gpm for 60 minutes.
Water cleared in first 30 minutes.
Drawdown: SWL at 1 minute = 20.16'
SWL at 5 minutes=19.98'; SWL at 10 minutes = 19.83'

Stabilization Test Data:

Time	p H	Spec. Cond.	Temp (C)
1405	4.97	127	
1410	5.06	119	
1415	5.12	125	
1420	5.14	121	

Recovery Data:

Q= S_o=



Comments: Total drilled depth = 35'; no competent bedrock encountered.

SITE NAME Modern Landfill - Southwest Expansion

LOCATION R. D. #9, York, Pennsylvania

WO# 1402

SUPERVISED BY R. E. Wright Associates, Inc. Thomas O. Marrs

DATE 6/22/88

Printed on recycled paper

AR303451

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

Modern Landfill
Southwest Expansion
R. D. #9
York, Pennsylvania

DRILLING METHOD: Air rotary

SAMPLING METHOD: Grab sample from cuttings

BORING NO. MD-417s/SW-4

SHEET 1 OF 1

					DRILLING START	DRILLING FINISH
WATER LEVEL	14.1'				TIME 1000	TIME 1235
TIME	1238				DATE 6-22	DATE 6-22
DATE	6-22					
CASING DEPTH	35'					

DATUM ELEVATION

DRILL RIG T4W - 900 - Ingersoll Rand

ANGLE Vertical BEARING --

SAMPLE HAMMER TORQUE -- FT.-LBS

SURFACE CONDITIONS Regraded area within forested area

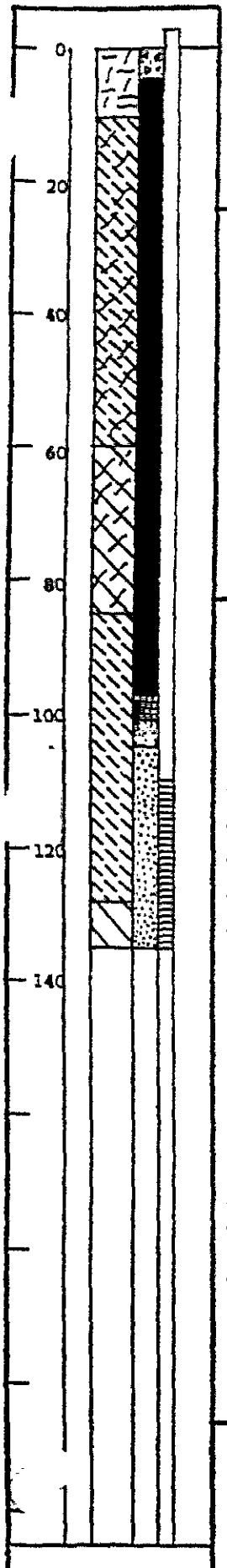
DRILLING CONTR Myers Brothers Drilling Salunga, PA

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
0						Silt red-brown (7.5 YR 6/6) sandy with rounded gravel. MN		No competent bedrock encountered.	10" H.B. Air-rotary	N.A.				
5														
10														
15						Silt (7.5 YR 6/6) as above, more gravel.								
20														
25						Silt and Sand with abundant siltstone gravel quartz and calciate fragments.								
30														
35						Total Depth - 35'								

LOGGED BY R. E. Wright Associates, Inc. Thomas O. Marrs

DATE 6/22/88 CHK'D BY Allan Timmins

RL 02237



Well No. MU-419

Boring No. X-Ref:

MONITOR WELL CONSTRUCTION SUMMARY

Survey Coords. N227454.71 E2324408.19

Elevation Ground Level 760.0

Top of Casing 763.07

Drilling Summary:

Total Depth 135'
Borehole Diameter 10"-0 to 89'/6"-89 to 135'
Casing Stick-up Height: 3'
Driller Myers Brothers
Salunga, PA

Rig Ingersoll Rand T-4
Bit(s) 10" to 89'
6" from 89' to 135'
Drilling Fluid Water

Protective Casing 4" Dia. Aluminum Casing

Well Design & Specifications

Basis: Geologic Log X Geophysical Log ___
Casing String (s): C = Casing S = Screen.

Depth	String(s)	Elevation
+2.5' - 109'	C1	767.5 - 651
109' - 135'	S1	651 - 625
+3.0' - 7.0'	Protector	763 - 753
___ - ___		___ - ___
___ - ___		___ - ___

Casing C1 111.5' Sch. 40, 2" PVC
C2

Screen: S1 25' Sch. 40, .020 slot, 2" PVC Screen
S2

Filter Pack: 104' to 135' of Grade 1 Morie Sand
101.5' to 104' Grade 00 Sand
Grout Seal: Portland cement from 0' to 4.0'

Bentonite Seal: Bentonite Pellets from 97.5' to 101.5'
Bentonite Slurry ~4.0' to 97.5'

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling	2/13/89	1200	2/13/89	1515
Geophys.Logging:				
Casing:				
6" casing	2/13/89	1400	2/13/89	1430
Filter Placement:	2/14/89	0930	2/14/89	1230
Cementing:	2/23/89	0830	2/24/89	1500
Development:				

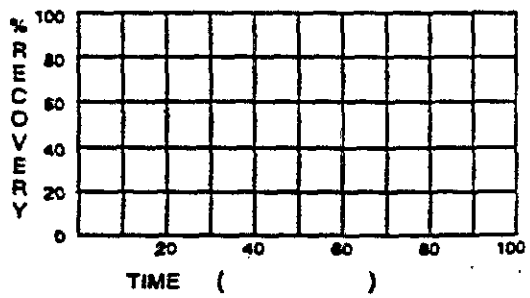
Well Development:

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (C)

Recovery Data:

Q= S_o=



Comments:

Centralizers placed at 135', 117.5', and 104'.
5 - 100 lb. bags of Grade 1 Morie Sand.
114' - 2" PVC, Schedule 40 riser pipe.
25'- 2" PVC, Schedule 40, .020 slot screen.
90' - 8" steel casing (removed).

SITE NAME Modern Landfill/York
LOCATION SW Expansion - GW Divide
WC 130
SUPERVISED BY Steve Rowley 2/10/89

AR303453

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

Modern Landfill
Southwest Expansion
Phase 13
RD #9
York, Pennsylvania

DRILLING METHOD: Air Rotary

SAMPLING METHOD: Grab

BORING NO. MU-419

SHEET 1 OF 5

					DRILLING START	DRILLING FINISH
WATER LEVEL	96'				TIME 1200	TIME 1515
TIME	0945				DATE 2/13/89	DATE 2/13/89
DATE	2/14/89					
CASING DEPTH	89'					

DATUM ELEVATION

DRILL RIG Ingersol Rand T-4900

SURFACE CONDITIONS

ANGLE Vertical BEARING 0

SAMPLE HAMMER TORQUE FT.-LBS

DRILLING CONTR. Myers Brothers Sulunja, PA

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
0						Dark yellowish brown micaceous Silty Clay, moist. CL. Slightly plastic.								
10						Light brown to dark yellowish-orange micaceous, silty, some clay, highly weathered phyllite, dry Saprolite Phyllite fragments are highly weathered, subround, and soft.							
14	NA													
30														

LOGGED BY Steve Rowley

DATE 2/10/89 CHK'D BY

RL 6103

AR303454

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

Modern Landfill
Southwest Expansion
Phase 13
RD #9
York, Pennsylvania

DRILLING METHOD: Air Rotary

SAMPLING METHOD: Grab

BORING NO: MU-419

SHEET: 2 OF 5

					DRILLING START	DRILLING FINISH
WATER LEVEL	96'				TIME	TIME
TIME	0945				1200	1515
DATE	2/14/89				DATE	DATE
CASING DEPTH	89'				2/13/89	2/13/89

DATUM ELEVATION

DRILL RIG: Ingersol Rand T-4900

ANGLE: Vertical BEARING

SAMPLE HAMMER TORQUE FT.-LBS

SURFACE CONDITIONS

DRILLING CONTR: Myers Brothers Sulunga, PA

LOGGED BY: Steve Rowley

CHK'D BY:

DATE: 2/10/89

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
30						Moderate reddish-brown highly weathered phyllite, silty, some clay, dry phyllitic Saprolite.								
32														
34														
36						Light brown to dark yellowish-orange, highly weathered, phyllite, micaceous, little clay, dry Saprolite.								
38														
40														
42	NA													
44						Grayish-orange to dark yellowish-orange, same as above. Light brown to dark yellowish-orange. Highly weathered phyllitic Saprolite.								
46														
48														
50						Grayish-orange to dark yellowish-orange. Many weathered phyllite fragments. Clayey. Saprolite.								
52														
54														
56														
58														
60														

RL 6003

AR303455

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

Modern Landfill
Southwest Expansion
Phase 13
RD #9
York, Pennsylvania

DRILLING METHOD: Air Rotary

SAMPLING METHOD: Grab

BORING NO: MU-419

SHEET: 3 OF 5

					DRILLING START	DRILLING FINISH
WATER LEVEL	96'				TIME 1200	TIME 1515
TIME	0945					
DATE	2/14/89				DATE 2/13/89	DATE 2/13/89
CASING DEPTH	89'					

DATUM ELEVATION

DRILL RIG: Ingersol Rand T-4900

SURFACE CONDITIONS

ANGLE: Vertical BEARING

SAMPLE HAMMER TORQUE FT.-LBS

DRILLING CONTR: Myers Brothers Salunga, PA

LOGGED BY: Steve Rowley

DATE: 2/10/89 CHK'D BY

RL 6103

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
60						Light brown to dark yellowish-orange, highly weathered Phyllite, highly micaceous, little clay and silt- saprolite.		Possibly highly weathered phyllite bedrock.						
62														
64						Grayish-orange to dark yellowish-orange, micaceous, little silt, trace clay, less weathered saprolite, pale olive Phyllite.		Weathered phyllite bedrock or harder lens in saprolite.						
66														
68						Moderate reddish brown micaceous, silty, little clay, dry, Saprolite.								
69														
70						Grayish-orange to dark yellowish-orange micaceous, silty dry Saprolite, or pale olive Phyllite.								
72														
74														
75						Moderate yellowish-brown, micaceous, silty, little clay, small pale olive phyllite fragments. Saprolite or highly weathered Phyllite.								
76														
78														
80														
82														
84						Dusky-yellow to light olive-brown, micaceous, silty, little to trace clay, phyllite frag- ments.		Possibly weathered phyllite bedrock.						
86						Pale olive to light olive-brown Saprolite, little silt, dry.								
88						Dusky yellow to light olive-gray, same as above.								
90														

AR303456

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

Modern Landfill
Southwest Expansion
Phase 13
RD #9
York, Pennsylvania

DRILLING METHOD: Air Rotary

SAMPLING METHOD: Grab

BORING NO: MU-419

SHEET: 4 of 5

					DRILLING START TIME	DRILLING FINISH TIME
WATER LEVEL	96'				1200	1515
TIME	0945					
DATE	2/14/89				DRILLING START DATE	DRILLING FINISH DATE
CASING DEPTH	89'				2/13/89	2/13/89

DATUM ELEVATION

DRILL RIG: Ingersol Rand T-4900

SURFACE CONDITIONS

ANGLE: Vertical BEARING

SAMPLE HAMMER TORQUE FT.-LBS

DRILLING CONTR: Myers Brothers Salunga, PA

LOGGED BY: Steve Rowley DATE: 2/10/89 CHK'D BY:

RL 6003

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: ROD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM/SEC.
90														
92														
94														
96						Pale olive to light-olive-brown micaceous, little silt, dry Saprolite, not coarse.									
98						Dusky yellow to grayish-yellow very fine. Saprolite.									
100														
102														
104	NA													
106						Moderate reddish-brown, micaceous, silty, dry. Saprolite.									
108														
110														
112														
114						Moderate yellowish-brown, micaceous, silty, clay Saprolite moist.									
16														
118														
120														

AR303457

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

Modern Landfill
Southwest Expansion
Phase 13
RD #9
York, Pennsylvania

DRILLING METHOD: Air Rotary

SAMPLING METHOD: Grab

BORING NO: MU-419

SHEET: 5 OF 5

DRILLING: START TIME / FINISH TIME

WATER LEVEL	95.5'				
TIME	0945				
DATE	2/14/89				
CASING DEPTH	89'				

DATUM ELEVATION

DRILL RIG: Ingersol Rand T-4900

ANGLE: Vertical BEARING

SAMPLE HAMMER TORQUE FT.-LBS

SURFACE CONDITIONS

DRILLING CONTR: Myers Brothers Salunga, PA

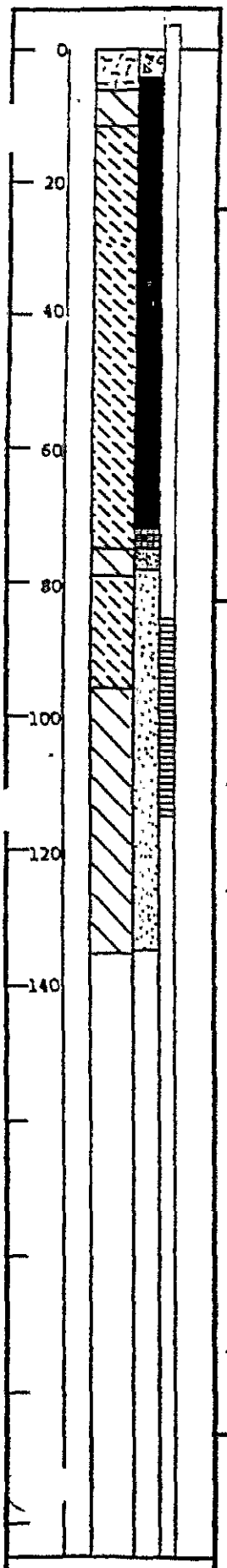
DEPTH IN FEET (ELEVATION)	BLOWS/6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
120														
122						Same as above.								
124														
126						Grayish-blue green phyllite/quartz, little pyrite. Seems much more competent. Quartz veins.								
128	NA													
130														
132														
134														
136														

LOGGED BY Steve Rowley

DATE 2/10/89 CHK'D BY

RL 6103

AR303458



Well No. MU-420

Boring No. X-Ref:

MONITOR WELL CONSTRUCTION SUMMARY

Survey Coords: N227314.76
E2323949.46

Elevation Ground Level 724.6

Top of Casing 727.74

Drilling Summary:

Total Depth 135'
Borehole Diameter 10"-0 to 19'/6"-19 to 135'
Casing Stick-up Height: 3'
Driller Myers Brothers
Salunga, PA
Rig Ingersol Rand T-4900
Bit(s)
Drilling Fluid Water
Protective Casing 4" Dia. Aluminum Casing

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling	2/17/89	1000	2/17/89	1300
Geophys.Logging:				
Casing: 6" Casing	2/17/89	1030	2/17/89	1100
Filter Placement:	2/17/89	1400	2/17/89	1600
Cementing:	2/24/89	1100	2/24/89	1500
Development:				

Well Design & Specifications

Basis: Geologic Log X Geophysical Log ___
Casing String (s): C = Casing S = Screen.

Depth	String(s)	Elevation
+2.5' - 85'	C1	727.1 - 639.6
85' - 115'	S1	639.6 - 609.6
___ - ___		___ - ___
+3.0' - 7.0'	Protector	727.6 - 717.6
___ - ___		___ - ___

Casing: C1 87.5' Schedule 40, 2" PVC
C2
Screen: S1 30' Schedule 40, .020 slot, 2" PVC Screen
S2
Filter Pack: 78' to 135' Grade 1 Morie Sand
76' to 78' Grade 00 Morie Sand
Grout Seal: Portland cement from 0' to 4.0'
Bentonite Seal: Bentonite pellets from 72' to 76'/Bentonite slurry ~4' to 72'.

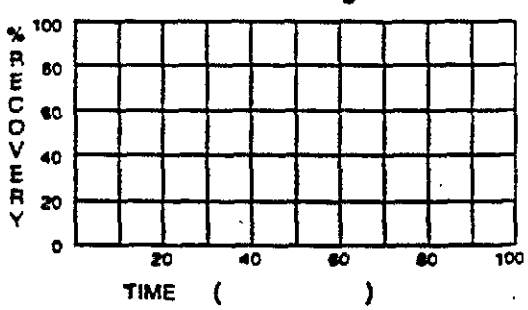
Well Development:

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (C)

Recovery Data:

Q= S_o=



Comments:

Centralizers at 115', 100', and 85'.

SITE NAME Modern Landfill/York
LOCATION SW Expansion - GW Divide
WC 30
SUPERVISED BY Steve Rowley
DATE 2/17/89

AR303459

ROCK BOREHOLE LOG

SITE NAME AND LOCATION
[redacted]odern Landfill
Southwest Expansion
Phase 13
RD #9
York, Pennsylvania

DRILLING METHOD: Air Rotary

SAMPLING METHOD: Every 5' or lithology change

BORING NO.: MU -420

SHEET: 1 OF 5

DRILLING: START TIME 0900 DATE 2/17/89; FINISH TIME 1300 DATE 2/17/89

DRILLING CONTR: Myers Brothers Salunga, PA

WATER LEVEL	128'	101'	76'	
TIME	1400	1430	1715	
DATE	2/20/89	2/20/89	2/20/89	
CASING DEPTH	19'	19'	19'	

DATUM ELEVATION

DRILL RIG: Ingersol Rand T-4900

SURFACE CONDITIONS:

ANGLE: Vertical BEARING: 0

SAMPLE HAMMER TORQUE FT.-LBS

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
0						Dark yellow-brown, Silty Clay, micaceous saprolite fragments. ML or CL.								
2														
4														
6						Light brown to dark yellowish-orange Phyllite Saprolite, dry.								
8														
10						Pale yellowish-brown, Saprolite, micaceous, little silt, dry.								
12	NA													
14														
16						Grayish-orange Saprolite, coarse fragments micaceous, silty, dry. Some highly weathered phyllite and quartz.								
18														
20						Pale olive Saprolite, micaceous, silty, dry.								
22														
24														
26						Light brown Saprolite, some clay, silty, micaceous little moisture. Phyllitic.								
28						Moderate reddish-brown. Clayey silt Saprolite, moist.								
30														

LOGGED BY Steve Rowley

DATE 2/17/89 CHK'D BY

RL 6103

AR303460

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

Modern Landfill
Southwest Expansion
Phase 13
RD #9
York, Pennsylvania

DRILLING METHOD: Air Rotary

SAMPLING METHOD: Every 5', Lithology change

BORING NO.: MW-420

SHEET: 2 OF 5

WATER LEVEL	128'	101'	76'	
TIME	1400	1430	1715	
DATE	2/20/89	2/20/89	2/20/89	
CASING DEPTH	19'	19'	19'	

DRILLING: START TIME 0900 DATE 2/17/89; FINISH TIME 1300 DATE 2/17/89

DATUM ELEVATION

DRILL RIG: Ingersol Rand T-4900

ANGLE: Vertical BEARING: 0

SAMPLE HAMMER TORQUE FT.-LBS

SURFACE CONDITIONS

DRILLING CONTR: Myers Brothers Saluuga, PA

LOGGED BY: Steve Rowley

DATE: 2/17/89 CHK'D BY:

RL 103

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: ROD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
30						Moderate olive-brown Saprolite, silty, micaceous, dry to moist.								
32														
34						Light brown Saprolite, silty, micaceous, dry to moist.								
36														
38														
40						Light brown Saprolite, silty, micaceous, FeO_2 Dry to moist.								
42	NA													
44														
46														
48						Light brown to dark yellowish-orange Saprolite, very silty, micaceous, little clay, dry to moist.								
50														
52														
54						Light brown Saprolite, some clay, micaceous, dry to moist. Weathered quartz and phyllite.								
56														
58														
60														

AR303461

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

Modern Landfill
Southwest Expansion
Phase 13
RD #9
York, Pennsylvania

DRILLING METHOD: Air Rotary

SAMPLING METHOD: Every 5' or lithology

BORING NO: MU-420

SHEET: 3 OF 5

WATER LEVEL	128'	101'	76'	
TIME	1400	1430	1715	
DATE	2/20/89	2/20/89	2/20/89	
CASING DEPTH	19'	19'	19'	

DRILLING START: TIME 0900, DATE 2/17/89
DRILLING FINISH: TIME 1300, DATE 2/17/89

DATUM ELEVATION

DRILL RIG: Ingersol Rand T-4900

ANGLE: Vertical BEARING

SAMPLE HAMMER TORQUE FT.-LBS

SURFACE CONDITIONS

DRILLING CONTR: Myers Brothers Salunga, PA

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: ROD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
60						Moderate reddish-brown Saprolite, micaceous, silty, moist.								
62														
64						Moderate reddish-brown to pale reddish-brown, micaceous, silty Saprolite, dry to moist								
66														
68														
70						Dark yellowish-brown Saprolite, coarse, micaceous, moist, sandier.								
72														
74														
76						Dusky yellowish-green Phyllite, micaceous. Harder than, above. Possibly weathered bedrock.								
78														
80						Moderate yellowish-brown Saprolite. Soft. Very little coarse.								
82						Dusky yellowish-green, quartz, little silt. Saprolite.								
84						Dark brown Saprolite, some clay, silty large rounded fragment, moist								
86														
88						Moderate yellowish-brown Saprolite, micaceous, silty.								
90														

LOGGED BY Steve Rowley

DATE 2/17/89 CHK'D BY

RL 6103

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

Modern Landfill
Southwest Expansion
Phase 13
RD #9
York, Pennsylvania

DRILLING METHOD: Air Rotary

SAMPLING METHOD: Every 5' or lithology change.

BORING NO.: MU-420

SHEET: 4 OF 5

DRILLING: START TIME 0900 DATE 2/17/89; FINISH TIME 1300 DATE 2/17/89

WATER LEVEL	128'	101'	76'	
TIME	1400	1430	1715	
DATE	2/20/89	2/20/89	2/20/89	
CASING DEPTH	19'	19'	19'	

DATUM ELEVATION

DRILL RIG: Ingersol Rand T-4900

ANGLE: Vertical BEARING

SAMPLE HAMMER TORQUE FT.-LBS

SURFACE CONDITIONS

DRILLING CONTR: Myers Brothers Salunga, PA

LOGGED BY: Steve Rowley

CHK'D BY:

DATE: 2/17/89

RL 103

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: ROD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
90						Same as above.								
92														
94														
96						Grayish-green Phyllite quartz, dry. Much harder. Quartz occurs in veins. Micaceous.								
98														
100														
102														
104														
106														
108														
110														
112														
114														
116														
118														
120														

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

Modern Landfill
Southwest Expansion
Phase 13
RD #9
York, Pennsylvania

DRILLING METHOD: Air Rotary

SAMPLING METHOD: Every 5' or lithology change

BORING NO. MU-420

SHEET 5 OF 5

					DRILLING START	DRILLING FINISH
WATER LEVEL	128'	101'	76'		TIME	TIME
TIME	1400	1430	1715		0900	1300
DATE	2/20/89	2/20/89	2/20/89		DATE	DATE
CASING DEPTH	19'	19'	19'		2/17/89	2/17/89

DATUM ELEVATION

DRILL RIG Ingersol Rand T-4900

ANGLE Vertical BEARING

SAMPLE HAMMER TORQUE FT.-LBS

SURFACE CONDITIONS

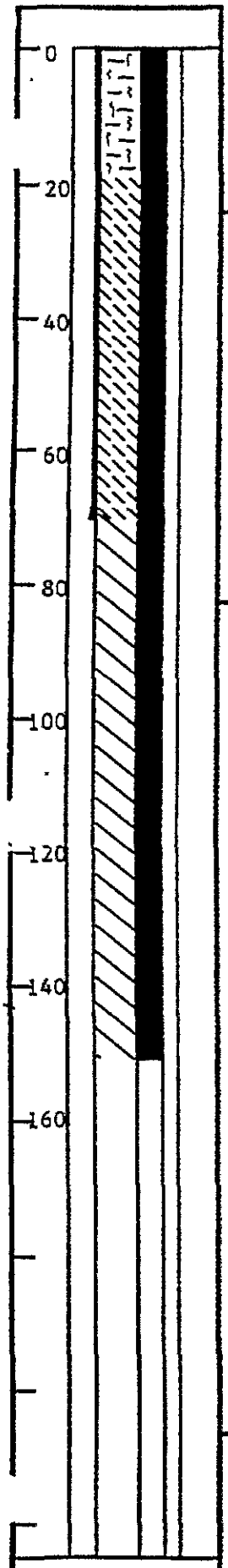
DRILLING CONTR. Myers Brothers Salunga, PA

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
120						Same as above.								
122														
124														
126														
128														
130														
132														
134														
136														

LOGGED BY Steve Rowley

DATE 2/17/89 CHK'D BY

RL 6103



Well No. MP-1

Boring No. X-Ref: DP-8

MONITOR WELL CONSTRUCTION SUMMARY

Survey Coords: N228544.1072 E2324178.2758

Elevation Ground Level 656.2

Top of Casing 657.08

Drilling Summary:

Total Depth 150'
Borehole Diameter 10" to 71', 6" to 150'
Casing Stick-up Height: St = 1.0
Driller Myers Brothers Drilling, Salunga, PA
Rig T4W - 900 Ingersoll Rand
Bit(s) 10" Hammer Bit, 6" Hammer Bit
Drilling Fluid Potable Water
Protective Casing 6" Carbon Steel

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling				
10" hole	6-7	1315	6-7	1335
6" hole	6-7	1400	6-7	1430
Geophys.Logging:				
Casing:				
6" casing	6-7	1335	6-7	1400
Filter Placement:				
Cementing:				
Development: by Rig	6-7	1430	6-7	1530

Well Design & Specifications

Basis: Geologic Log X Geophysical Log ___
Casing String (s): C = Casing S = Screen.

Depth	String(s)	Elevation
71 - +1	Casing (1)	586.08 - 658.08

Casing: C1 6" carbon steel casing
C2
Screen: S1
S2
Filter Pack:
Grout Seal:
Bentonite Seal:
Centering Disks:

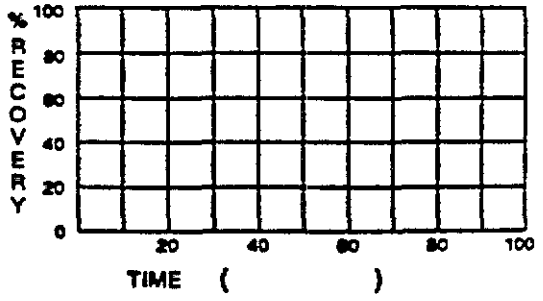
Well Development:

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (C)

Recovery Data:

Q= S_o=



Comments: Open rock hole from 71' to 150'; cased with 6" carbon steel casing from +1,0 to 71'; dry hole.
WELL DECOMMISSIONED 10-3-88
Casing removed - Boring Sealed With Bentonite Grout

SITE NAME Modern Landfill - Southwest Exp
LOCATION R D #9, York, Pennsylvania
WC 01402
R. E. Wright Associates, Inc.
SUPERVISED BY E. A. Timmins
DATE 6-7-88

Printed on recycled paper

AR303465

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

Modern Landfill
Southwest Expansion
R. D. #9
York, Pennsylvania

DRILLING METHOD: 8" air rotary percussion drilling to 71' into competent rock; set 6" casing; drill 6" hole to

SAMPLING METHOD: Grab samples every 2 to 5'

BORING NO. MP-1/DP-8

SHEET 1 OF 2

DRILLING: START / FINISH

WATER LEVEL	Dry hole		116.7	100.28	
TIME	1550		-	-	1315 / 1530
DATE	6-7-88		7-13-88	8-5-88	DATE / DATE
CASING DEPTH	71'		71'	71'	6-7-88 / 6-7-88

DATUM ELEVATION

DRILL RIG T4W - 900 - Ingersoll Rand

ANGLE Vertical BEARING --

SAMPLE HAMMER TORQUE FT.-LBS

SURFACE CONDITIONS Upper ease of site drainage swale which cross-cuts cornfield

DRILLING CONTR Myers Brothers Drilling Saluuga, PA

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
0						5YR 4/6 yellowish-red Clayey silt, moist, soft (MH-CL) some angular gravel frags. Saprolite at 1.5' Brown to (10YR 5/8) yellowish-brown micaceous clay Silt, spongy texture, moist, loose (MH), some rounded gravel fragments. Various color hues from brown to yellow-red (5YR4/6) yellowish-red showing various degrees of weathering.		Saprolite at 1.5'						
5														
10														
15														
20						At 20' Saprolite more micaceous, dry, loose graphitic texture.								
25						Saprolite continues; soft zone 30-31' - No water evident. Color changes to dark red to red (2.5YR4/6-3/6) powdery, moist, silt-clay texture at 34' - Change to brownish-yellow (10YR6/6) brown-yellow more competent, more micaceous fragments, fine gravel to coarse sandy texture.								
30														
35														
40														
45														
50						At 50' Soarolite, more sandy (SM).								
55						At 54' rock structure evident, micaceous with some chlorite.								
60						At 60' trace to some quartz limonite material, fine sandy size chlorite more abundant 54 (6/3), pale blue). Competent Rock at 61'.		Top of competent phyllite bedrock at 61'.						
65														
70						Phyllite, more micaceous and silty.								
75									8-inch carbon steel hammer bit to 71'	6-inch carbon steel casing set at 71'				

LOGGED BY R. E. Wright Associates, Inc. E. A. Timmins and Tom O. Marrs

DATE 6-7-88 CHK'D BY E. A. Timmins

RL 02238

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

Modern Landfill
Southwest Expansion
R. D. #9
York, Pennsylvania

DRILLING METHOD: 8" air rotary percussion drilling 10' into competent rock; set 6" casing; drill 6" hole to TD

SAMPLING METHOD: Grab samples every 2 to 5'

BORING NO. MP-1/DP-8

SHEET 2 OF 2

					DRILLING START	DRILLING FINISH
WATER LEVEL	Dry hole				TIME	TIME
TIME	7550				1315	1530
DATE	6-7-88				DATE	DATE
CASING DEPTH	71'				6-7-88	6-7-88

DATUM ELEVATION

DRILL RIG T4W - 900 - Ingersoll Rand

ANGLE Vertical BEARING --

SAMPLE HAMMER TORQUE FT.-LBS

SURFACE CONDITIONS Upper edge of site drainage swale which cross-cuts cornfield

DRILLING CONTR Myers Brothers Drilli Salunga, PA

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: ROD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
75						Phyllite, as above; more calcite present.			6-inch air rotary drilling	open rock hole				
80														
85														
90						Phyllite, as above, no calcite present, some chlorite.									
95						At 95' as above; 5% quartz ~15% calcite more competent, less micaceous/chloritic materials.									
100														
105						At 105' very dark gray (2.5YR (3/1)) Phyllite, 10-15% calcite, some chlorite.									
110														
115						At 115' Phyllite as above; color change to very dark gray 5Y (31)									
120						At 120' black 5Y-2.5/2); texture as above.									
125														
130						At 135' Phyllite, 40% calcite, less micaceous									
135														
140														
145						At 145' Phyllite, as above, less calciute, more micaceous.									
150								Total depth = 150'						

LOGGED BY R. E. Wright Associates, Inc. E. A. Timmins and Tom O. Marrs

DATE 6-7-88 CHK'D BY E. A. Timmins

RL-02238

Well No. MP-2s

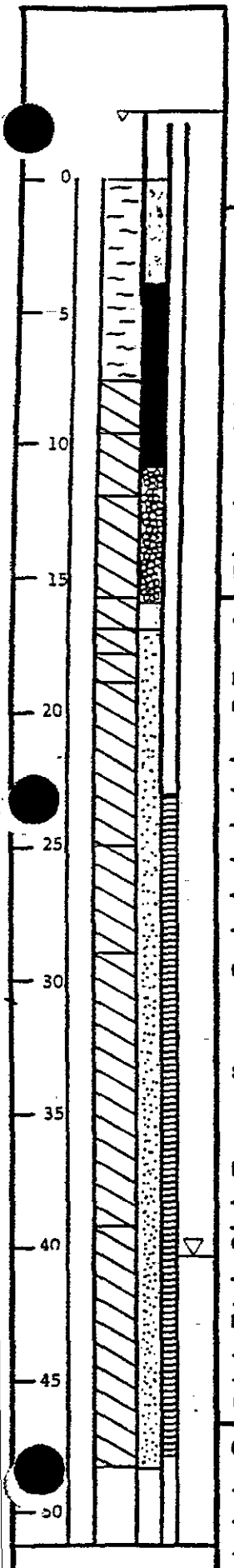
Boring No. X-Ref: SP-7

MONITOR WELL CONSTRUCTION SUMMARY

Survey Coords: N 228111.7208
E2323887.7304

Elevation Ground Level 693.2

Top of Casing 695.57



Drilling Summary:

Total Depth 50.0
Borehole Diameter 8" to 7.5'; 3.5" to 50'
Casing Stick-up Height: Al-2.37' PVC - 2.5'
Driller F.T. Kitlinsky Associates
Harrisburg, Pennsylvania
Rig Truck mounted auger/core rig
Bit(s) 4" ID hollow stem
NX Core bit
Drilling Fluid Potable water
Protective Casing 4" Alumin casing

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling S.S, coring	6-8	1015	6-10	1430
Geophys.Logging:				
Casing:	6-13	AM	6-13	PM
Filter Placement:	6-13	AM	6-13	AM
Cementing:	6-13	PM	6-13	PM
Development: by Rig				

Well Design & Specifications

Basis: Geologic Log X Geophysical Log ___
Casing String (s): C = Casing S = Screen.

Depth	String(s)	Elevation
48 - 23	screen (S1)	645.2 - 670.2
23 - +2.2	casing (C1)	670.2 - 695.44
4.6 - +2.37	casing (C2)	688.6 - 695.57
___ - ___		___ - ___
___ - ___		___ - ___

Casing: C1 2" Schedule 40 PVC - solid
C2 4" aluminum -
Screen: S1 2" scheudle 40 .020 slotted
S2
Filter Pack: Grade 1 Morie (48.8 to 17')
Filter sand: - 16' to 17'
Grout Seal: SLurry - 11' to 4'
Bentonite Seal: Pellets - 11 to 16'
Cement Seal 0 to 4'
Centering Disks:

Well Development:

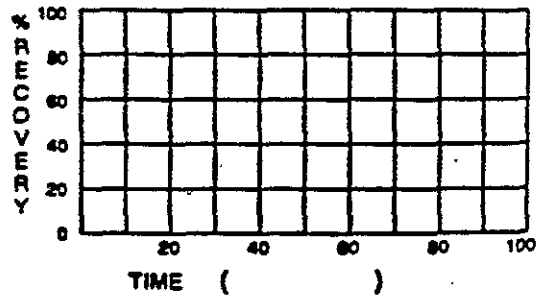
Not developed

Stabilization Test Data:

Time	p H	Spec. Cond.	Temp (C)

Recovery Data:

Q= S_o=



Comments: Formation collapse 48.8 to 50.

SITE NAME Modern Landfill - Southwest Expansion
LOCATION R. D. #9, York, Pennsylvania
WC 01402
SUPERVISED BY R. E. Wright Associates, Inc. (Luke Smeltz)
DATE 6-8 to 6-13-88

AR303468

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

Modern Landfill
Southwest Expansion
RD #9
York, Pennsylvania

DRILLING METHOD: 2" split spoon to refusal; 4" ID auger to refusal; NX core to total depth.

SAMPLING METHOD: 2" split spoon to refusal; NX core to proposed depth.

BORING NO. MP-2s/SP-7

SHEET 1 OF 4

					DRILLING START	DRILLING FINISH
WATER LEVEL	38.8'				TIME	TIME
TIME	--				1015	1430
DATE	7/22/88				DATE	DATE
CASING DEPTH	7.5'				6-8-88	6-10-88

DATUM ELEVATION

DRILL RIG Truck mounted auger/core rig

SURFACE CONDITIONS Filled field; replanted with corn.

ANGLE vertical BEARING --

SAMPLE HAMMER TORQUE 30"/140 lbs FT.-LBS

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
0	4 5 3 4					Silt Loam 10YR 5/4 to 7.5 R 5/6 yellowish-brown Friable, dry to slightly moist, ML		B horizon	2" split spoon	4" ID auger				
2	5 9 10 9					Silt, 5YR 5/6 to 5/8, yellow red silt, friable; slightly moist ML		2-3.5' Shelby tube sample						
4	8 9 8 5					Silt; 2.5YR 5/8 red very micaceous silt, plastic friable, moist, MH at 5', 7.5YR 5/6 strong brown		Saprolite						
6	6 13 15 100					As above; Saprolite								
7.5						Blue green phyllite; soft, very micaceous; (7.3'-7.5')		Split spoon refusal at 7.5' weathered rock						
8				16" 2.5	0 2.5	Blue green, gray green moderate to very weathered fine sandy micaceous phyllite; MnO staining, Pyrite and limonite X-tals present								
10	9.6	1		2.9 2.4	1.2 2.4	Phyllite; blue green to green, slightly weathered micaceous 2-1/4 to 1/2" quartz veins Joints at 2" btoc)=80° spacing > 1/8" 13" btoc)=20° spacing > 14"		Very broken up		Open core hole				
12	12	2		2.0 2.0	1.0 2.0	10.9 to 12.2' 1/4" quartz vein Phyllite, many quartz veins with pyrite mineralization along foliation planes		Quartz Vein 9.6'-10' ∢=80° 1/2" thick Clay seam at 10.5' ∢=80° parallel to foliation foliation ∢=80-83° 19' orange brown 14.5' silty clay some fragments Joints ∢=10-25° filled						
14	14	3		1.8 3.5	0.0 3.5	Phyllite, as above very weathered, many soft zones								

DRILLING CONTR Kitlinski Associates Harrisburg, PA

LOGGED BY R. E. Wright Associates, Inc. (Luke Smeltz/E. A. Timmins)

DATE 6-8-88 CHK'D BY Paul E. Nachlas

RL 2238

Printed on recycled paper

AR303469

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

Modern Landfill
Southwest Expansion
RD #9
York, Pennsylvania

DRILLING METHOD: 2" split spoon to refusal; 4" ID auger to refusal NX core to proposed depth.

SAMPLING METHOD: 2" split spoon to refusal; NX core to proposed depth.

BORING NO. MP-2s/SP-7

SHEET 2 OF 4

					DRILLING START	DRILLING FINISH
WATER LEVEL	2.8'				TIME	TIME
TIME	1305				1015	1430
DATE	6-8				DATE	DATE
CASING DEPTH	7.5'				6-8-88	6-10-88

DATUM ELEVATION

DRILL RIG Truck mounted auger/core rig

SURFACE CONDITIONS Filled field; replanted with corn.

ANGLE vertical BEARING --

SAMPLE HAMMER TORQUE 30"/140lbs FT.-LBS

DRILLING CONTR Kitlinski Associates Harrisburg, PA

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: ROD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
15						Weathered, very micaceous, thin 1/4"-1/8" quartz veins		weathered rock quartz veins parallel to foliation ∢=80° very vuggy at 15'						
16	-	3	-	1.85 3.5	0.0 3.5	Phyllite, as above; MnO and FeO_2 coatings quite apparent.								
17.5								Joints - 4" spacing ∢=30-35° foliation ∢=70° weathered Very soft at 19.0'						
18		4	-	1.3 1.5	0 1.5									
19														
20		5	-	0.8 1.0	0 1.0	Phyllite; blue green weathered, FeO and MnO coatings		Fracture ∢=40° open, weathered at 20.2', 20.3', 21.2', 21.5', 22.1'						
22		6	-	2.7 5.0	0.0 5.0	Phyllite; blue green to green gray moderately weathered micaceous, small quartz veins along foliation 1/4-1/8" wide. Some FeO_2 coatings along foliation; Quartz veins - vuggy, limonite weathered out.		22.1' to 23.0' broken up 23' to 24' washed out 24.2' to 25.0' soft, broken	NX Core					
24								Fracture ∢ horizontal to 40° at 25.2', 25.5', 25.8', 26.1', 26.3', 26.9' 26.9' to 28.8' soft, broken					
25						Phyllite; blue green, very micaceous, fracture 25.2' to 26.9' open weathered, FeO_2 coatings very soft								
26		7	-	3.8 3.8	0.8 3.8			foliation ∢=75°						
28						Phyllite; blue green very micaceous		Quartz stringer at 28.8' to 30' fractured at 30', ∢=horizontal open weathered						
28.8				8.1 10.2	5.3 10.2									
30		8												

LOGGED BY R. E. Wright Associates, Inc. (Luke Smeltz/E. A. Timmins)

DATE 6-8-88 CHK'D BY

RL 02238

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

Modern Landfill
Southwest Expansion
RD #9
York, Pennsylvania

DRILLING METHOD: 2" split spoon to refusal; 4" ID auger to refusal NX core to proposed depth.

SAMPLING METHOD: 2" split spoon to refusal; NX core to proposed depth.

BORING NO. MF-2s/SP-7

SHEET 3 OF 4

					DRILLING START	DRILLING FINISH
WATER LEVEL	2.8'				TIME	TIME
TIME	1305				1015	1430
DATE	6-8				DATE	DATE
CASING DEPTH	7.5'				6-8-88	6-10-88

DATUM ELEVATION

DRILL RIG Truck mounted auger/core rig

SURFACE CONDITIONS Filled field; replanted with corn.

ANGLE vertical BEARING --

SAMPLE HAMMER TORQUE 30"/140lbs FT.-LBS

DRILLING CONTR. Kitlinski Associates Harrisburg, PA

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: ROD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
30						Phyllite continues		28.8' to 32.8' axis of fold outlined by quartz stringer ◁ foliation =70°	NX Core	None				
32														
34		8				Weathered - open ◁=40°		34.8' to 35.0' broken zone						
36				8.1 10.2	5.3 10.2			36.5' soft zone ◁ foliation = 80°						
38								38.3' open						
	39					as above; quartz and feldspar stringer ◁=75°		39.0' weather joint ◁= 15° open 39.3' healed fracture ◁ = 20°						
40						Phyllite; blue green micaceous, moderately weathered Some quartzite along foliations weathered along stringers from 39.6' - 41.6' Stringer ◁=45° X-cuts foliation ◁=70°								
42		9						Vertical movement 1/2" displayed by kink band Quartz stringer follows kink band.						
44														

LOGGED BY R. E. Wright Associates, Inc. (Luke Smeltz/E. A. Timmins)

DATE 6-8-88 CHK'D BY Paul E. Nachlas

R 2238

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

Modern Landfill
Southwest Expansion
RD #9
York, Pennsylvania

DRILLING METHOD: 2" split spoon to refusal; 4" ID auger to refusal NX core to proposed depth.

SAMPLING METHOD: 2" split spoon to refusal; NX core to proposed depth.

BORING NO. MP-2s/SP-7

SHEET 4 OF 4

					DRILLING START	DRILLING FINISH
WATER LEVEL	2.8'				TIME	TIME
TIME	1305				1015	1430
DATE	6-8				DATE	DATE
CASING DEPTH	7.5'				6-8-88	6-10-88

DATUM ELEVATION

DRILL RIG Truck mounted auger/core rig

SURFACE CONDITIONS Filled field; replanted with corn.

ANGLE vertical BEARING --

SAMPLE HAMMER TORQUE 30"/140lbs FT.-LBS

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: ROD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC
45														
46				8.5	5.8	Phyllite - as above								
				8.5	8.5									
9	47.5	9				Phyllite - as above								
8				1.7	0.7			49.5' broken up, weathered along top						
		10		2.5	2.5									
49								∢ foliation = 75°						
50								weathered joint closed ∢ = 20°						
								49.9' ∢=15°, open quartz lens						
								Total depth = 50'						

DRILLING CONTR Kitlinski Associates Harrisburg, PA

LOGGED BY R. E. Wright Associates, Inc. (Luke Smeltz/E. A. Timmins)

DATE 6-8-88 CHK'D BY Paul E. Nachlas

RL 02238

Printed on recycled paper

AR303472

Well No. MP-3s

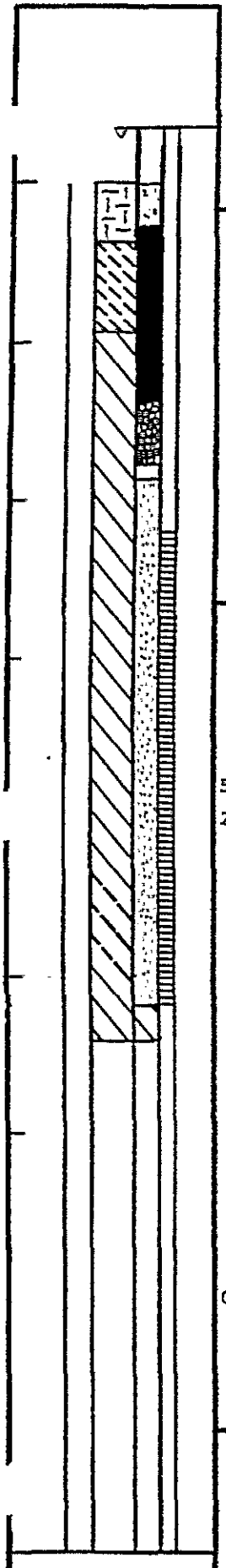
Boring No. X-Ref: SP-6

MONITOR WELL CONSTRUCTION SUMMARY

Survey Coords: N228595.8602 E2323800.0532

Elevation Ground Level 657.7

Top of Casing 660.36



Drilling Summary:

Total Depth 54.5'
Borehole Diameter 8" to 9.5'; 4" to 54.5'
Casing Stick-up Height: A1-2.46'; PVC 2.4'
Driller F.T. Kitlinski Associates
Harrisburg, PA
Rig Truck-mounted auger/core rig
Bit(s) Hollow-stem auger & NX core bit
Drilling Fluid Potable water
Protective Casing 4" aluminum casing

Well Design & Specifications

Basis: Geologic Log X Geophysical Log ___
Casing String (s): C = Casing S = Screen.

Depth		String(s)	Elevation	
52.0	- 22.0	Screen (S_1)	605.7	- 635.7
22.0	- +2.4	Casing (C_1)	635.7	- 660.21
4.4	- +2.66	Casing (C_2)	653.4	- 660.36
	-			-
	-			-

Casing: C1 3/4" solid PVC Sch 40
C2 4" Aluminum casing with locking top
Screen: S1 3/4" PVC Sch 40 Hacksaw slotted
S2
Filter Pack: 52.0' to 18.6'; grade 1 (Morie) Fine sand 18.6 to 17.8'
Grout Seal: Slurry: 13.8' to 3.0'
Cement Seal: 3.0 to 0.0
Bentonite Seal: Pellets: 17.8' to 13.8'
Centering Disks:

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling				
8" Hollow stem	6-8	a.m.	6-8	a.m.
NX Coring	6-8	a.m.	6-8	1130
Geophys.Logging:				
Casing:				
4" A1 casing	6-13	p.m.	6-13	p.m.
	6-13	a.m.	6-13	p.m.
Filter Placement:	6-13	p.m.	6-13	p.m.
Cementing:				
Development: by Rig				
Not applicable				

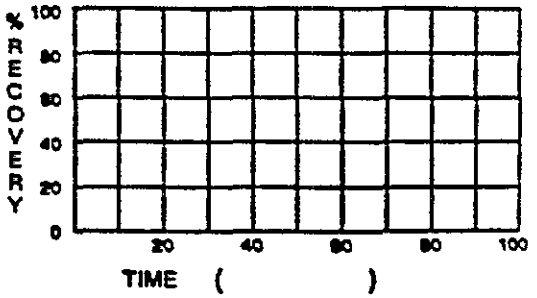
Well Development:

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (C)

Recovery Data:

Q= S_o=



Comments:

Dry hole, no measurable water level.

SITE NAME Modern Landfill - Southwest Exp
LOCATION R. D. #9, York, Pennsylvania
SUPERVISED BY R. E. Wright Associates, Inc., Luke E. Smeltz
DATE 6-8-88 to 6-13-88
WCM1402

AR303473

ROCK BOREHOLE LOG

SITE NAME AND LOCATION: Modern Landfill, Southwest Expansion, R. D. #9, Yorkanna, PA	DRILLING METHOD: Split-spoon followed by 8" hollow-stem auger to refusal: NX core to proposed depth				BORING NO. MP-3s/SP6
	SAMPLING METHOD: 2" split spoon; NX core through 8" O.D. hollow-stem auger				SHEET 1 OF 2
					DRILLING START / FINISH
	WATER LEVEL	6.2'	11.2'	14.7'	TIME a.m. / TIME p.m.
	TIME	1000	1245	p.m.	
	DATE	6-9	6-9	6-9	DATE 6-8-88 / DATE 6-13-88
DATUM ELEVATION	CASING DEPTH	9.5'	9.5'	9.5'	

DRILL RIG: Truck-mounted auger/core rig
ANGLE: Vertical BEARING: --
SAMPLE HAMMER TORQUE: 30/140 FT.-LBS
SURFACE CONDITIONS: tilled field reseeded with corn

DRILLING CONTR: Kitlinski Associates, Harrisburg, PA
LOGGED BY: R. E. Wright Associates (Luke Smeltz)
DATE: 6-13-88 CHK'D BY: E. A. Timmins

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
0	2 4 4 4		1	1.4		Dark yellow-brown (10 YR 4/4) Strong brown Silty Clay.		6/8/88 Start						
			1a	2.0										
			1b											
2	2 3 5 6		2	1.7		Strong brown to red clay Silt								
			2a	2.0										
			2b											
4	8 7 14 18		3			Red very Micaceous highly foliated Saprolite friable, dry, loose		Saprolite at 4'.	2" Split Spoon	8" Hollow Stem Auger	Not Applicable			
			3a	1.7										
			3b	2.0										
6	7 35 61 31		4			Brown to green gray micaceous very foliated phyllitic Saprolite, loose, dry,								
			4a	1.5										
			4b	2.0										
8	30 100/.2		5			No Sample								
	9.5	1		0.7	0	Olive green to brown Phyllite, MNO, FeO_2 coatings, foliated								
10	10.5			1.0	1.0									
				1.7	0.0									
12	12.5	2		2.0	2.0	Olive green Phyllite, foliated with quartz veins, some silty clay seams @11.8' to 12.5', FeO_2 & MNO Coatings								
	13.4	3		.7	0									
				.9	.9									
14						13.4-18.5':								
		4		3.0	0	Bluish green phyllite with quartz veins parallel to foliation, FeO_2, MNO and orange brown silty clay along foliation and fractures		◊Foliation=80°, micaceous along foliation planes; 13.4' to 14.5' FeO_2 stained area, very soft, saprolitic						
16				5.1	5.1									
18	18.5													
						18.5-22.3':		6/9/88 start - 18.5'						
20						Bluish green micaceous phyllite, fractured, some quartzite seams, silty clay along foliation FeO_2, MNO coatings		◊foliation = 75°, horizontal fracture @ 18.9', 19.3', 21.3' to 22.0', limited recovery quartz rich vuggy	NX Core	Open Rock Hole	Not Applicable			
		5		3.4	0									
22	22.3			3.8	3.8			◊Foliation=85° Numerous quartz stringers parallel to foliation, 1/2 to 1/4" thick.						
24														
						As above; more competent, less FeO_2, MNO coatings along foliation								
26		6		1.0	0									
				6.7	6.7									
28	29													
30														

RL 02238

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

Modern Landfill
Southwest Expansion
R. D. #9
Yorkanna, PA

DRILLING METHOD: Split-spoon followed by 8" hollow-stem auger to refusal: NX core to proposed depth

SAMPLING METHOD: 2" split spoon; NX core through 8" O.D. hollow-stem auger

BORING NO. MP-3s/SP-6

SHEET 2 OF 2

				DRILLING START / FINISH
WATER LEVEL	6.2'	11.2'	14.7'	
TIME	1000	1245	p.m.	TIME: a.m. / p.m.
DATE	6-9	6-9	6-9	DATE: 6-8-88 / 6-13-88
CASING DEPTH	9.5'	9.5'	9.5'	

DATUM ELEVATION

DRILL RIG Truck-mounted auger/core rig

SURFACE CONDITIONS tilled field reseeded with corn

ANGLE Vertical BEARING --

SAMPLE HAMMER TORQUE 30/140 FT.-LBS

DRILLING CONTR. Kitlinski Associates Harrisburg, PA

LOGGED BY R. E. Wright Associates, Inc. (Luke Smeltz) DATE 6-13-88 CHK'D BY E. A. Timmins

DEPTH IN FEET (ELEVATION)	BLOWS/6" & I.D. SAMPLER ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: ROD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
30														
32		7		4.1 / 4.7	0.6 / 4.7	Olive yellow silty micaceous phyllite; saprolitic texture; very fissile, very foliated		Saprolitic zone from 30.5' to 33.7'						
33.7														
34														
36		8		1.3 / 3.8	0.0 / 3.8	Olive brown micaceous phyllite, highly foliated, to 34.4' color hue @ 37.0' to orange red clayey silt highly weathered phyllite. Saprolitic seams.		∢foliation = 75° very quartz rich						
37.5														
38														
40		9		0.9 / 5.8	0 / 5.8									
42														
43.3														
44						Yellow brown micaceous saprolite Some quartzite fragments		6/10/88 start 0.5' recovery from 43.3' to 48.0' weathered joints @ 49.0' 48.5' ∢=5-15°						
46				1.7 / 5.9	0.7 / 5.9			∢ foliation = 75°						
48		10												
49.2								Weathered quartz @ 49.2 open, some FeO_2 coated 49.7 52.2 53.3 ∢=5-10° 53.9						
50						Brown to red brown phyllite grade to brownish green micaceous phyllite								
52		11		2.8 / 4.7	1.4 / 4.7			∢ foliation = 70° ∢ CL = 30°						
53.9														
54														
54.5	--			--	--	No sample.		Tri-cone R.B.	NX Core	Open Rock Hole	Not Applicable			
56														
58														
60														

AR303475

R 2238

Well No. MP-4s

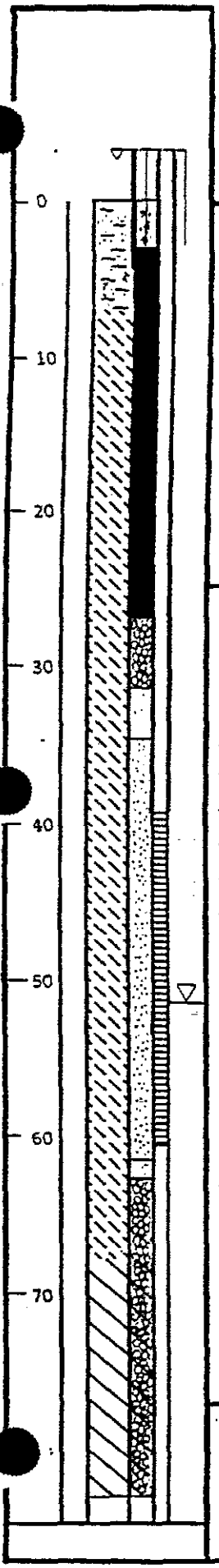
Boring No. X-Ref: SP-4

MONITOR WELL CONSTRUCTION SUMMARY

Survey Coords: N228964.5856 E23 23286.7254

Elevation Ground Level 617.7

Top of Casing 620.36



Drilling Summary:

Total Depth 83'
Borehole Diameter (0-55'8") (55-68;3") (68-83 2")
Casing Stick-up Height: A1 - 3'; PVC 2.5'
Driller Kitlinski Drilling Associates
Harrisburg, Pennsylvania
Rig Truck mounted auger/core rig
Bit(s) 2" split spoon; NX core
Drilling Fluid Potable water
Protective Casing 4" aluminum casing

Well Design & Specifications

Basis: Geologic Log X Geophysical Log ___
Casing String (s): C = Casing S = Screen.

Depth	String(s)	Elevation
60.1 - 39.1	S1	557.6 - 578.6
39.1 - +2.66	C1	578.6 - 620.36
4.0 - +3.0	C2	613.7 - 620.7
___ - ___		___ - ___
___ - ___		___ - ___

Casing: C1 3/4" PVC solid
C2 4" aluminum casing
Screen: S1 3/4" PVC with hacksaw slots
S2
Filter Pack: 62.7 - 61.5 filter sand
61.5 - 34.7 grade 1 Morie sand
34.7 - 31.3 filter sand
Grout Seal: 3.0 - 0.0 concrete
Bentonite Seal: 83 - 62.7 bentonite pellets
31.3 - 27.0 bentonite pellets
27.0 - 3.0 bentonite slurry
Centering Disks:

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling NX core	6-1-88	1435	6-17-88	1045
Geophys. Logging:				
Casing:				
S1 & C1	6-17-88	1100	6-17-88	1400
C2	6-20-88	1300	6-20-88	1600
Filter Placement:	6-17-88	1400	6-20-88	1300
Cementing:	6-20-88	1300	6-20-88	1600
Development: by Rig				
Not applicable				

Well Development:

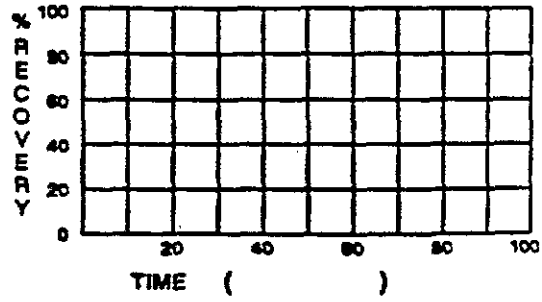
Not applicable

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (C)

Recovery Data:

Q= S_o=



Comments: Auger to 58' casing driven to 65.5' split spoon to 67.7'
tricone bit drilling to 67.9' cored from 67.9' to 83'
83' - 62.7' - bentonite pellet sealed

SITE NAME Modern Landfill - Southwest Expansion

LOCATION R. D. #9, York, Pennsylvania

WC 01402

SUPERVISED BY R. E. Wright Associates, Inc. (Luke Smeltz/Steve J. Mitchell)

DATE 6-20-88

AR303476

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

Modern Landfill
Southwest Expansion
RD #9
York, Pennsylvania

DRILLING METHOD: Split spoon sampling with augering to refusal followed by NX core.

SAMPLING METHOD: Split spoon, NX Core

BORING NO. MP-4s/SP-4

SHEET 1 OF 6

DRILLING

					START TIME	FINISH TIME
WATER LEVEL	50.2'	Dry	47.5	47.5		
TIME	PM	1100	800	1130	1435	1045
DATE	6-3	6-16	6-17	6-17	DATE 6-1	DATE 6-17
CASING DEPTH	53.0	66	66	66		

DATUM ELEVATION

DRILL RIG Truck monted auger/core

SURFACE CONDITIONS Tilled; reseeded with corn

ANGLE vertical BEARING --

SAMPLE HAMMER TORQUE 30/140 FT.-LBS

DRILLING CONTR Kitlinski Associates Harrisburg, PA

LOGGED BY R. E. Wright Associates, Inc. Luke Smeltz

DATE 6-1 to 6-17-88 CHK'D BY E. A. Timmins

RL 238

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: ROD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
	2	1				Brown to orange-brown Fine Sand and Silt,			2" split spoon	8" outside diameter hollow stem auger	Not applicable			
1	3	1A		L35		trace roots, dry, firm								
	4	1B		2.0		to moderatey firm.								
	6													
2	6	2				As above, occasional								
	6	2A		2.0		pebbles of quartz,								
3	8	2B		2.0		sandstone , phyllitic.								
	9	2C												
4	8	3		L35										
	15	3A		2.0		Orange-brown, SM,								
5	15	3B				fine Sandy Silty Clay,								
	15					iron staining, dry.								
6	16	4				ML								
	20	4A		1.1										
				2.0		Orange-brown, SM silty,								
7	20	4B				sandy, pebbly, Clay,								
	19					dry.								
8	18					Yellow-brown Saprolite,								
	15	5		1.6		fine bedding/foliation								
		5A		2.0		iron/manganese staining,								
9	14	5B				dry.								
	14					Brown Saprolite, non-								
		5C				foliated, fine to medium								
10	7					grained to foliated,								
	6	6		.8		moderately soft, gradually								
	8					becoming firmer with								
		6A		2.0		pebbles grading to								
11	10					reddish-brown.								
	12					Brown-yellow Saprolite,								
						soft, foliated, dry.								
12	9	7		1.2										
	8	7A		2.0		Reddish-yellow Saprolite								
13	18	7B				foliated, dry, some mica								
	19					with fine sand.								
14	17	8												
	18					Red, Saprlite, foliated								
15				.8		brittle fine Sand mica-								
				2.0		ceous, manganese staining.								

AR303477

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

Modern Landfill
Southwest Expansion
RD #9
York, Pennsylvania

DRILLING METHOD: Split spoon sampling with augering to refusal followed by NX core.

SAMPLING METHOD: Split spoon, NX Core

BORING NO. MP-4s/SP-4

SHEET 2 OF 6

					DRILLING START	DRILLING FINISH
WATER LEVEL	45.2				TIME 1435	TIME 1045
TIME	800				DATE 6-1	DATE 6-17
DATE	6-21-88					
CASING DEPTH	66					

DATUM ELEVATION

DRILL RIG Truck monted auger/core

SURFACE CONDITIONS Tilled; reseeded with corn.

ANGLE vertical BEARING --

SAMPLE HAMMER TORQUE 30/140 FT.-LBS

DRILLING CONTR Kitlinski Associates Harrisburg, PA

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: ROD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM/SEC.
						As above.			2" split spoon	8" outside diameter hollow stem auger	Not applicable			
16	19	8A												
	24	9		.9		Red, yellow-red Saprolite, thin foliation, dry to moist, soft manganese staining. Micaceous.								
	22			2.0										
17	21	9A												
	20													
8	21	10		1.5		Dark red Saprolite, micaceous, thin foliation.								
	26	10A		2.0										
19	30	10B												
	37					Yellow iron stains.								
	26					Augered from 20 to 23 feet, no samples.								
20														
21														
22														
23	10	11				Dark red Saprolite, ML-CL foliated, micaceous, yellowish-brown iron staining.								
	12													
	15	11A		1.35										
24	17			2.0										
25						Augered 25 to 28 feet, no samples.									
26														
27														
28	34	12		1.8		As above, saprolite.								
	40	12A		2.0										
29	49	12B				Weathering, jointing black manganese.								
	41	12C												
30														

LOGGED BY R. E. Wright Associates, Inc. Luke Smeltz

DATE 6-1 to 6-17-88 CHK'D BY E. A. Timmins

RL 02238

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

Modern Landfill
Southwest Expansion
RD #9
York, Pennsylvania

DRILLING METHOD: Split spoon sampling with augering to refusal followed by NX core.

SAMPLING METHOD: Split spoon, NX Core

BORING NO. MP-4s/SP-4

SHEET 3 OF 6

					DRILLING START	DRILLING FINISH
WATER LEVEL					TIME	TIME
TIME					1435	1045
DATE					DATE 6-1	DATE 6-17
CASING DEPTH						

DATUM ELEVATION

DRILL RIG Truck monted auger/core

SURFACE CONDITIONS Tilled; reseeded with corn.

ANGLE vertical BEARING --

SAMPLE HAMMER TORQUE 30/140 FT.-LBS

DRILLING CONTR Kiliinski Associates Harrisburg, PA

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: ROD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM/SEC.
31						Augered 31 to 33 feet.			2" split spoon	8" outside diameter hollow stem auger	Not applicable			
32														
3	10	13		1.9		Dark red Saprolite, foliated, stiff, brittle, micaceous thin yellow-brown iron stains.								
34	12	13A		2.0										
	14	13B												
	21	13C				Reddish-yellow Saprolite, ML-CL, mottled, moist, iron weathering.								
35														
36						Drilled 35 to 38 feet.								
37														
38	47	14				Dark red Saprolite, ML-SM, soft, micaceous, abundant quartz veins, foliated, with 2.5" quartz vein; weathered iron manganese staining, massive, abundant quartz veining.								
	60	14A		1.2										
39	96	14B		2.0										
	88													
40						Augered 40 to 41.5 feet.								
41						Saprolite, as above with 1/4" quartz veins.								
42	9	15		1.9										
	16	15A		2.0										
	19	15B												
43	25	15C												
						Augered 43.5 to 48 feet.								
44														
45														

LOGGED BY R. E. Wright Associates, Inc. Luke Smeltz

DATE 6-1 to 6-17-08 CHK'D BY E. A. Timmins

R 2238

Printed on recycled paper

AR303479

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

Modern Landfill
Southwest Expansion
RD #9
York, Pennsylvania

DRILLING METHOD: Split spoon sampling with augering to refusal followed by NX core.

SAMPLING METHOD: Split spoon, NX Core

BORING NO. MP-4s/SP-4

SHEET 4 OF 6

					DRILLING START	DRILLING FINISH
WATER LEVEL						
TIME					1435	1045
DATE					DATE 6-1	DATE 6-17
CASING DEPTH						

DATUM ELEVATION

DRILL RIG Truck monted auger/core

SURFACE CONDITIONS Tilled; reseeded with corn.

ANGLE vertical BEARING --

SAMPLE HAMMER TORQUE 30/140 FT.-LBS

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: ROD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM/SEC.
46						Augered to 48'								
47														
48	35	16		1.4		Dusky red to yellow-red Saprolite, moist, brittle micaceous thinly foliated abundant quartz grains.			2" split spoon	8" outside diameter hollow stem auger	Not applicable			
49	39	16A		2.0										
	33	16b												
	56					Interbedded dusky red & yellow red laminations .125" wide, saturation at 49.8'.								
50														
						Augered 50 to 53 feet.								
51														
52														
53						Dusky red with inter-banded yellow Saprolite moist, soft, brittle, thinly foliated, mottled, with fine dark brown sand.			NX Core	Open Core Hole				
	16	17		1.0										
54	27	17A		2.0										
	33	17B												
	46					Auger refusal at 54.2 feet.								
55														
						Cored 54.2 to 64 feet, no recovery.								
56														
57														
58														
59														
60														

DRILLING CONTR Kitlinski Associates Harrisburg, PA

LOGGED BY R. E. Wright Associates, Inc. Luke Smeltz

DATE 6-1 to 6-17-88 CHK'D BY E. A. Timmins

RL 02238

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

Modern Landfill
Southwest Expansion
RD #9
York, Pennsylvania

DRILLING METHOD: Split spoon sampling with augering to refusal followed by NX core.

SAMPLING METHOD: Split spoon, NX Core

BORING NO. MP-4s/SP-4

SHEET 5 OF 6

					DRILLING START	DRILLING FINISH
WATER LEVEL					TIME	TIME
TIME					1435	1045
DATE					DATE	DATE
CASING DEPTH					6-1	6-17

DATUM ELEVATION

DRILL RIG Truck monted auger/core

ANGLE vertical BEARING --

SAMPLE HAMMER TORQUE 30/140 FT.-LBS

SURFACE CONDITIONS Tilled; reseeded with corn.

DRILLING CONTR Kitlinski Associates Harrisburg, PA

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: ROD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
61						Cored - no recovery.								
62														
63														
64	16	18				Strong brown to reddish-yellow, Saprolite, ML, micaceous, friable, moist.			NX Core	Open Core Hole/NX Casing	Not Applicable			
	44													
65	66	18A												
	67	19												
66	66	19A				Red and yellow-red Saprolite, ML-CL, micaceous, fissle, manganese/iron/oxide coatings.								
	15	19B												
67	36													
67.9	100													
68						Red to yellow-red Phyllite, weathered,		Foliation 80-85° abundant mechanical fractures.	Tri-cored					
				3.1	0.6	fissle, manganese/iron								
69		1		4.3	4.3	oxide stains.								
70														
71														
72														
				3.4	0	Reddish-brown to olive-brown Phyllite, very weathered, broken manganese oxide on cleavage surfaces.		Parallel foliations at 80-85°. Abundant mechanical fractures.	NX Core.	Open Core Hole/NX Casing				
73		2		3.4	3.4									
74														
75														

LOGGED BY R. E. Wright Associates, Inc. Luke Smeltz

DATE 6-1 to 6-17-88 CHK'D BY E. A. Timmins

R[illegible]2238

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

Modern Landfill
Southwest Expansion
RD #9
York, Pennsylvania

DRILLING METHOD: Split spoon sampling with augering to refusal followed by NX core.

SAMPLING METHOD: Split spoon, NX Core

BORING NO. MP-4s/SP-4

SHEET 6 OF 6

					DRILLING START	DRILLING FINISH
WATER LEVEL						
TIME					1435	1045
DATE					6-1	6-17
CASING DEPTH						

DATUM ELEVATION

DRILL RIG Truck monted auger/core

ANGLE vertical BEARING --

SAMPLE HAMMER TORQUE 30/140 FT.-LBS

SURFACE CONDITIONS Tilled; reseeded with corn.

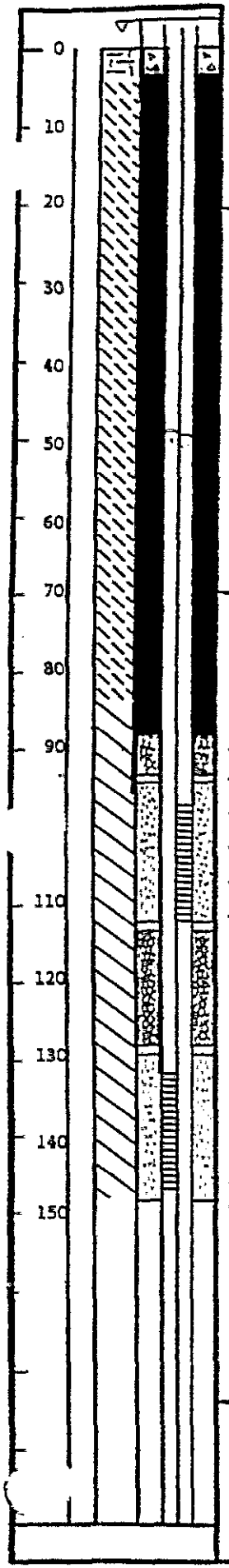
DEPTH IN FEET (ELEVATION)	BLOWS/6 IN ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: ROD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM/SEC.
75.4						As above, Phyllite, very weathered.		Foliations 65-75° abundant mechanical fractures.	NX Core	Open Core Hole	Not Applicable			
76														
77		3		3.9	0									
				4.6	4.6	More olive-brown to yellow Phyllite.		Foliations 75-80°.						
78														
79								Soft zone.						
80						Red, reddish-brown to yellowish-brown, Phyllite, fissile, weathered, broken, heavy manganese oxide on cleavage planes and foliations.		Fractures at 85' and 80'.						
81				2.8	0			Foliations 75' to 83', rock is fractured parallel to foliation						
82		4		3.0	3.0									
83	TOTAL DEPTH	83'												
84														
85														
86														
87														
88														
89														
90														

DRILLING CONTR Kitlinski Associates Harrisburg, PA

LOGGED BY R. E. Wright Associates, Inc. Luke Smeltz

DATE 6-1 to 6-17-88 CHK'D BY E. A. Timmins

RL 02238



Well No. MP-5d/MP-5i

Boring No. X-Ref: DP-4d/DP-4i

MONITOR WELL CONSTRUCTION SUMMARY

Survey Coords: N228938.0072
E2323295.0321

Elevation Ground Level 619.1

Top of Casing 622.0

Drilling Summary:

Total Depth 150'
Borehole Diameter 8" to 95'; 6" to 150'
Casing Stick-up Height: Al-3'; PVC 2.5'
Driller Myers Brothers Drilling
Salunga, PA

Rig T4W - 900 Ingersoll Rand
Bit(s) 8" Hammer Bit; 6" Hammer Bit

Drilling Fluid Potable water

Protective Casing 6" carbon steel casing

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling				
8" drilling	6-11	930	6-11	1630
6" drilling	6-13	845	6-13	930
Geophys.Logging:				
Casing:				
6" casing	6-11	1430	6-11	1630
Filter Placement:	6-13	1230	6-16	1200
Cementing:	8-17	920	8-17	950
Development: by Rig	6-13	930	6-13	1000

Well Design & Specifications

Basis: Geologic Log X Geophysical Log ___
Casing String (s): C = Casing S = Screen.

Depth		String(s)	Elevation	
147	132	Screen (S_1)	472.1	487.1
132	+2.5	Casing (C_1)	487.1	621.6
112	97	Screen (S_2)	507.1	522.1
97	+2.5	Casing (C_2)	522.1	621.6
95	+3	Casing (C_3)	524.1	622.1

Casing: C1 3/4" PVC Sch 40 solid - MP-5d
C2 3/4" PVC Sch 40 solid - MP-5i
C3 6" Carbon steel casing
Screen: S1 3/4" PVC Sch 40 Hacksaw slotted -MP-5d
S2 3/4" PVC Sch 40 Hacksaw slotted -MP-5i
Filter Pack: D = 148 to 129'; I = 112 to 94'
Finer Sand: D = 129-128'; I = 113-112; 94-93'
Grout Seal: Slurry - D & I = 88 to 3'

Cement Seal - 3' to 0'
Bentonite Seal: Pellets: D = 128 - 113'
I = 93 - 88'

Centering Disks:

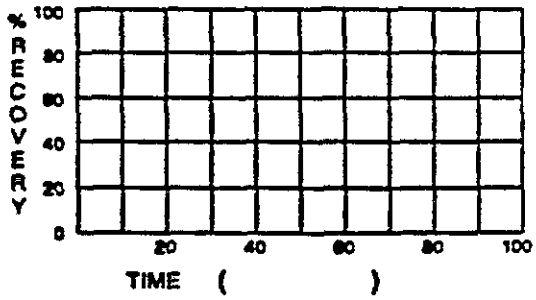
Well Development:

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (C)

Recovery Data:

Q= S_o=



Comments: No distinct water-bearing zones encounted below casing.

SITE NAME Modern Landfill - Southwest Expansion

LOCATION R. D. #9, York, Pennsylvania

WO 01402

SUPERVISED BY R. E. Wright Associates, Inc.
Tom O. Marrs and E. A. Timmins

DATE 6-11-88 to 6-16-88

Printed on recycled paper.

AR303483

ROCK BOREHOLE LOG

Piezometer MP-5I/MP-5D

SITE NAME AND LOCATION

Modern Landfill
Southwest Expansion
R. D. #9
Yorkanna, Pennsyvania

DRILLING METHOD: 8" drilling to 9.5' into competent rock; set 6" casing; drill 6" hole to proposed depth

SAMPLING METHOD: Grab samples every 2-5'

BORING NO. DP-4

SHEET 1 OF 2

DRILLING

	MP-5I	MP-5D	MP-5I	MP-5D	START	FINISH
WATER LEVEL	571.43	572.38	570.34	571.63	TIME 930	TIME 1030
TIME						
DATE	7-13-88	7-13-88	8-5-88	8-5-88	DATE 6-11	DATE 6-13
CASING DEPTH	95'	95'	95'	95'		

DATUM ELEVATION

DRILL RIG T4W - 900 - Ingersoll Rand

SURFACE CONDITIONS

ANGLE Vertical BEARING --

SAMPLE HAMMER TORQUE -- FT.-LBS

DRILLING CONTR Myers Brothers Drilling Salunga, PA

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: ROD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
0						Topsoil - Top 9"; dark brown organic fiberous, soft, dry orange-brown to red-brown Clayey Silt, soft, moist, some angular fragments grades to red-brown Saprolite, fragment % increase at 6'. Top of Saprolite at 6'		Top of saprolite						
5														
10														
15						Saprolite - Reddish-brown fine powdery, micaceous, soft, moist, some angular fragments, spongy texture, some graphitic particles. Various color hue changes due to variable weathering.								
20														
25														
30						36.5 to 39'; highly weathered zone, distionct color change.								
35						Saprolite continuing at 42-43.5'; highly weathered zone, distinct color change at 45', samples more micaceous, less weathered, grades to more graphitic texture.								
40														
45														
50														
55						61-63' Saprolite, more sandy - more competent		Water bearing zone (est. 1-1.5 gpm).						
60														
65						63-65' - Grades from sandy to fine micaceous material.								
70						65-75' - More micaceous silty texture. Sub-angular fragments, less competent.								
75														

LOGGED BY Tom O. Marrs and E. A. Timmins

DATE 6-11-88 CHK'D BY E. A. Timmins

RL 02238

Printed on recycled paper.

AR303484

ROCK BOREHOLE LOG Piezometers MP-5I/MP-5D

SITE NAME AND LOCATION

Modern Landfill
Southwest Expansion
R. D. #9
Yorkanna, Pennsylania

DRILLING METHOD: 8" drilling to 95' into competent rock; set 6" casing; drill 6" hole to proposed depth

SAMPLING METHOD:

BORING NO. DP-4

SHEET 2 OF 2

	MP-5I	MP-5D	MP-5I	MP-5D	DRILLING START	DRILLING FINISH
WATER LEVEL	571.43	572.38	570.34	571.63	TIME	TIME
TIME					930	1030
DATE	7-13-88	7-13-88	8-5-88	8-5-88	DATE	DATE
CASING DEPTH	95'	95'	95'	95'	6-11	6-13

DATUM ELEVATION

DRILL RIG T4W - 900 - Ingersoll Rand

ANGLE Vertical BEARING --

SAMPLE HAMMER TORQUE -- FT.-LBS

SURFACE CONDITIONS

DRILLING CONTR Myers Brothers Drilling Salunga, PA

LOGGED BY Tom O. Marrs and E. A. Timmins CHK'D BY E. A. Timmins

DATE 6-11-88

02238

DEPTH IN FEET (ELEVATION)	BLOWS/6" ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: ROD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
75						As above, more sandy, yellow-brown moist to wet, silty texture, soft.								
80						Top of rock at 83'.		Top of competent bedrock.						
85						Weathered Phyllite bluish-gray quartz fragments, soft, iron stained subangular fragments, break in hand.								
90						6" casing set at 95'.								
95						90-100' Weathered bluish gray Phyllite interbedded with quartz veins, some vuggy texture			Grab Samples 6" Hammer Bit	6" carbon steel to 95'				
100						Phyllite - 10-15% calcite and 5% quartz, hard, micaceous platy partings.				Open Rock Hole				
105						At 105' - some chlorite material, less micaceous 30% quartz, less calcite.								
110														
115														
120						At 125' - Phyllite as above, decrease in quartz to 5% calcite 20% No platy partings.								
125						At 130' - As above, quartz ~15% with occasional calcite.								
130						Phyllite - As above, 130-150' variable quartz content 10-25%, calcite content 5-15%.								
135						Some chloritic and micaceous partings.								
140						Total depth - 150'.								
+5														
150														

Well No. MP-6s

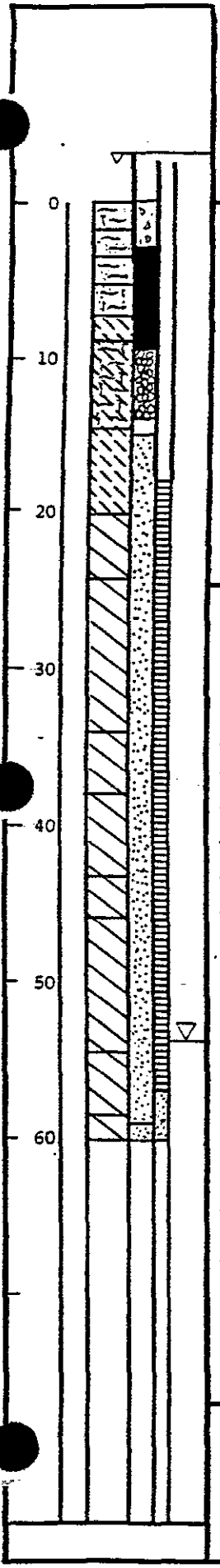
Boring No. X-Ref: SP-3

MONITOR WELL CONSTRUCTION SUMMARY

Survey Coords: N229346.7989
E2322998.7621

Elevation Ground Level 599.1

Top of Casing 602.62



Drilling Summary:

Total Depth 60'
Borehole Diameter 8" to 16.7' 2½" from 16.7 to 6.0
Casing Stick-up Height: Al-3.52; PVC 3.46
Driller Kitlinski Drilling Associates
Harrisburg, Pennsylvania
Rig Truck mounted auger/core rig
Bit(s) 2" Split spoon; NX core
Drilling Fluid Potable water
Protective Casing 4" aluminum with locking cap.

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling				
Split Spoon	6-13	AM	6-13	1630
NX core	6-14	AM	6-16	800
Geophys.Logging:				
Casing:				
4" aluminum	6-16	PM	6-16	PM
Filter Placement:	6-15	PM	6-16	PM
Cementing:	6-16	PM	6-16	PM
Development: by Rig				
Not Applicable				

Well Design & Specifications

Basis: Geologic Log X Geophysical Log ___
Casing String (s): C = Casing S = Screen.

Depth	String(s)	Elevation
57 - 18	S1	542.1 - 581.1
18 - +3.46	C1	581.1 - 602.56
4 - +3.52	C2	595.1 - 602.62
-		-
-		-

Casing: C1 3/4" PVC solid
C2 4" aluminum protector pipe
Screen: S1 3/4" PVC hand slotted
S2
Filter Pack: 59' to 15' grade 1 Morie sand
15' - 14' filter sand
Grout Seal: 3.0 - 0 concrete
Bentonite Seal: 14' - 9.5' bentonite pellets
9.5 - 3.0 bentonite slurry
Centering Disks:

Well Development:

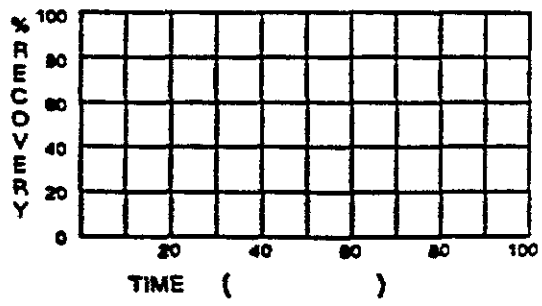
Not Applicable

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (C)

Recovery Data:

Q= S_o=



Comments:

Caved formation 60 to 59.2.

SITE NAME Modern Landfill - Southwest Expansion

LOCATION R. D. #9, York, Pennsylvania

WC 01102

SUPERVISED BY R. E. Wright Associates, Inc. (Luke E. Smeltz/Steve Mitchell)

DATE 6-16-88

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

Modern Landfill
Southwest Expansion

RD #9
York, Pennsylvania

DRILLING METHOD: Split spoon sampling with augering to refusal followed by NX core.

SAMPLING METHOD: Split spoon, NX Core

BORING NO. MP-6s/SP-3

SHEET 1 OF 4

					DRILLING START	DRILLING FINISH
WATER LEVEL	27.3	35.7	30.0	43.4'	TIME	TIME
TIME	1630	950	1345	800	AM	AM
DATE	6-14	6-15	6-15	6-16	DATE	DATE
CASING DEPTH	16	16	16	16	6-13	6-16

DATUM ELEVATION

DRILL RIG Truck mounted auger/core

SURFACE CONDITIONS Tilled field, seeded with corn.

ANGLE vertical BEARING --

SAMPLE HAMMER TORQUE 30/140 FT.-LBS

DRILLING CONTR. Kitlinski Associates Harrisburg, Pennsylvania

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: ROD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
0	4	1				Dark yellowish-brown to strong brown, ML/CL silt loam to silty clay loam, friable, silty moist, 0-5% coarse fragments.			2" split spoon	NX casing	Not available			
1	3	1A		1.5										
	3	1B		2.0										
2	2	1C												
	3	2				Strong brown to red, ML/MN, micaceous fine sandy silt very friable smooth, very plastic, common MnOx.								
	4	2A		1.6										
	4	2B		2.0										
	5	2C												
4	4	3				Strong brown light reddish-brown yellow red, MH, fine sandy micaceous silt, moist, very talcy feel, strong brown yellow-red, MH, clayey silt saprolite.								
	2	3A		1.6										
5	3	3B		2.0										
	4													
	4					Yellow-red, red, yellowish-brown, MH, micaceous saprolite very fissle. Strong brown, yellow-red clayey silt saprolite.								
6	5	4		1.7										
	6	4A		2.0										
7	7	4B												
	6					Yellow-red and red, MH very micaceous saprolite MnOx. Brown yellow and red, MH, highly weathered Phyliite very fissle.								
8	6	5		1.3										
	7	5A		2.0										
9	9	5B												
	4					Red saprolite, MH, very micaceous red clay silt, MH, micaceous, friable, very plastic.								
10	5	6												
		6A		1.6										
11	5	6B		2.0										
	5	6C		1.7										
12	4	7		2.0										
	7	7A				Red yellow-brown, MH, very micaceous silt, friable, moist MnOx coatings. Brown yellowish-brown, MH, micaceous saprolite, slightly moist.								
3	13	7B												
	21	7C												
14	30	8												
15	27	8A												

LOGGED BY R. E. Wright Associates, Inc. (Luke E. Smeltz/Steve Mitchell)

DATE 6-13 to 6-16 CHK'D BY E. A. Timmins

R 2238

Printed on recycled paper

AR303487

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

Modern Landfill
Southwest Expansion

RD #9
York, Pennsylvania

DRILLING METHOD: Split spoon sampling with augering to refusal followed by NX core.

SAMPLING METHOD: Split spoon, NX Core

BORING NO. MP-6s/SP-3

SHEET 2 OF 4

					DRILLING START	DRILLING FINISH
WATER LEVEL	27.3	35.7	30.0	43.4'	TIME	TIME
TIME	1630	950	1345	800	AM	AM
DATE	6-14	6-15	6-15	6-16	DATE	DATE
CASING DEPTH	16	16	16	16	6-13	6-16

DATUM ELEVATION

DRILL RIG Truck mounted auger/core

SURFACE CONDITIONS Tilled field, seeded with corn.

ANGLE vertical BEARING

SAMPLE HAMMER TORQUE 30/140 FT.-LBS

DRILLING CONTR Kiliinski Associates

Harrisburg, Pennsylvania

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM/SEC.
16	38	8B				Less weathered, very fissle saprolite. Yellow-brown, MH, iron stained phyllite spoon refusal at 16'. Tricone drilling 16.7' to 17.7'		Foliation >75-80°	2" split spoon	NX casing	Not available			
17	100	8C												
8														
19		1		2.1 2.8	0 2.8	Brown to olive-brown highly weathered phyllite Mn/Fe Ox abundant in fractures occasional red clayey silt coatings, very fissle material lost water at 19'.								
20														
20.5														
21						Gray and silt gray phyllite, highly to moderately weathered, many cleavage planes Fe/Mn Ox on cleavage faces some pyrite and ilmenite crystals, broken, fissle								
22		2		4.2 4.2	0 4.2									
23														
24														
24.7														
25						Gray to green-gray phyllite, broken, fissle, very micaceous Mn/Fe Ox stains cleavage and jointing.								
26		3		2.8 2.8	1.2 2.8									
27														
28						Phyllite, as above, some quartzite, foliations, abundant pyrite weathered to limonite very fissle.								
29		4		7.1 7.1	3.8 7.1									
30														

LOGGED BY R. E. Wright Associates, Inc. (Luke E. Smeltz/Steve Mitchell)

DATE 6-13 to 6-16 CHK'D BY E. A. Timmins

RL 02238

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

Modern Landfill
Southwest Expansion

RD #9
York, Pennsylvania

DRILLING METHOD: Split spoon sampling with augering to refusal followed by NX core.

SAMPLING METHOD: Split spoon, NX Core

BORING NO. MP-6s/SP-3

SHEET 3 OF 4

					DRILLING START	DRILLING FINISH
WATER LEVEL	27.3	35.7	30.0	43.4'	TIME	TIME
TIME	1630	950	1345	800	AM	AM
DATE	6-14	6-15	6-15	6-16	DATE	DATE
CASING DEPTH	16	16	16	16	6-13	6-16

DATUM ELEVATION

DRILL RIG Truck mounted auger/core

SURFACE CONDITIONS Tilled field, seeded with corn.

ANGLE vertical BEARING --

SAMPLE HAMMER TORQUE 30/140 FT.-LBS

DRILLING CONTR Kitlinski Associates Harrisburg, Pennsylvania

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: ROD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
31						(see previous page)								
32														
33														
34														
34.6						Phyllite, as above Blue-gray color at 38'.		Cleavage at 60° very fissle mechanical breaks 75-80°.						
35														
36		5		3.7	2.3				2" split spoon	NX casing	Not available			
37				3.8	3.8									
38														
38.4						Phyllite, as above Blue-gray, trace quartzite cleavage Mn/Fe Ox stains micaceous partings		Mechanical fractures at 70°.						
39														
40		6		5.1	3.9									
41				5.1	5.1									
42														
43														
43.5														
44														
45														

LOGGED BY R. E. Wright Associates, Inc. (Luke E. Smaltz/Steve Mitchell)

DATE 6-13 to 6-16 CHK'D BY E. A. Timmins

RL 238

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

Modern Landfill
Southwest Expansion

RD #9
York, Pennsylvania

DRILLING METHOD: Split spoon sampling with augering to refusal followed by NX core.

SAMPLING METHOD: Split spoon, NX Core

BORING NO. MP-6s/SP-3

SHEET 4 OF 4

DRILLING

					START	FINISH
WATER LEVEL	27.3	35.7	30.0	43.4'	TIME	TIME
TIME	1630	950	1345	800	AM	AM
DATE	6-14	6-15	6-15	6-16	DATE	DATE
CASING DEPTH	16	16	16	16	6-13	6-16

DATUM ELEVATION

DRILL RIG Truck mounted auger/core

SURFACE CONDITIONS Tilled field, seeded with corn.

ANGLE vertical BEARING --

SAMPLE HAMMER TORQUE 30/140 FT.-LBS

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
46		7		3.6	3.3	(see previous page)		Foliation at 70-75°.						
				3.6	3.6									
47	START	6-15												
47.1						Blue-gray Phyllite moderately abundant pyrite and limonite		Quartz veins - 1/4-inch thick on 1-inch spacing.						
48														
49		8		4.4	3.2									
				5.0	5.0									
50														
51														
52						Phyllite, as above, trace quartz veining limonite traces along		Foliation 70-75°.						
52.1														
				2.4	2.4	fractures								
53		9		2.4	2.4									
54														
54.5						Olive-gray Phyllite, as above		Quartz veining along foliations. Foliations 70-90°.						
55														
				4.2	2.7									
56		10		4.2	4.2									
57														
58														
58.7														
59		11		1.3	1.3	Phyllite as above								
				1.3	1.3									
60						Total Depth = 60 feet			2" split spoon	NX casing	Not available			

DRILLING CONTR Kitlinski Associates Harrisburg, Pennsylvania

LOGGED BY R. E. Wright Associates, Inc. (Luke E. Smeltz/Steve Mitchell)

DATE 6-13 to 6-16 CHK'D BY E. A. Timmins

RL 02238

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AR303490