

APPENDIX A

Monitoring Well Construction Logs



PROJECT Cedar Hills Ground Water Study Page 1 of 1

Location Northeast corner

Boring No. MW-29

Surface Elevation 532.9 ft.

Drilling Method Air Rotary

Total Depth 60 ft.

Drilled By Unitas/Johnson

Date Completed 6/23/83

Logged By C.E.Wells

WELL DETAILS	PENE-TRATION TIME/RATE	DEPTH (FEET)	SAMPLE		PERME-ABILITY TESTING	SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
			NO.	TYPE				
Screen- 0.010 in. slots Bentonite Seal Gravel Bentonite Backfill (dry) 3" dia. Sch. 80 PVC Riser			1	Bag			0.0'-8.0' <u>GRAVELLY SANDY SILT</u> - Brown, moist.	
		10	2	"	a		8.0'-17.0' <u>SILTY GRAVELLY SAND</u> - Tan to greyish tan, dry.	
				3	"			
		20	4	"			17.0'-40.0' <u>SILTY SANDY GRAVEL</u> - Grey, variable silt content, saturated at 20 and 35 ft., otherwise dry or moist.	
				5	"			
		30	6	"	b			
				7	"			
		40	8	"			40.0'-60.0' <u>GRAVELLY SAND and SANDY GRAVEL</u> - Grey with only minor silt, damp to wet.	
				9	"			
		50	10	"				
				11	"			
		60	12	"		c		
		70						

LOG OF EXPLORATORY BORING

PROJECT NAME King County Solid Waste Division
LOCATION Cedar Hills Regional Landfill
DRILLED BY Holt Drilling
DRILL METHOD Cable Tool
LOGGED BY M.D. Noll

BORING NO. MW-30A
PAGE 1 OF 2
REFERENCE ELEV. 567
TOTAL DEPTH 40
DATE COMPLETED 9/6/89

Sample Number	Sampling Method	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
			5				0 - 4 feet: SILTY SAND, medium brown, fine; trace fine gravel; moist, organic-rich. (FILL) (SM)
1	C						4 - 7 feet: SILT, dark grayish brown, non-plastic, abundant fine to coarse sand, some fine gravel; moist. (ML)
			10				7 - 14 feet: GRAVEL, olive gray; abundant silt and coarse sand; moist. (GP)
2	C						-- @ 10 - 11 feet: Olive gray silty sand lense. (SM)
			15				14 - 19.5 feet: SILT, olive gray, non-plastic to low plasticity; abundant fine to coarse sand and fine subrounded gravel, moist, some cobbles with oxidized surfaces. (TILL?) (ML)
3	C						
			20				19.5 - 21 feet: GRAVEL, olive brown, fine, subangular to subrounded, some fine to coarse sand, trace silt, moist. (GP)
4	C						
			25				21 - 26 feet: SILTY SAND, Olive gray to olive brown, fine to coarse, abundant fine subrounded gravel, some cobbles; moist to wet. (SM)
5	C						

REMARKS

1) Reference elevation is ground surface, based on topography. 2) C = sample of cuttings.



LOG OF EXPLORATORY BORING

PROJECT NAME King County Solid Waste Division
LOCATION Cedar Hills Regional Landfill
DRILLED BY Holt Drilling
DRILL METHOD Cable Tool
LOGGED BY M.D. Noll

BORING NO. MW-30A
PAGE 2 OF 2
REFERENCE ELEV. 567
TOTAL DEPTH 40
DATE COMPLETED 9/6/89

Sample Number	Sampling Method	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
6	C		30				26 - 31 feet: SAND, olive gray to gray brown, fine to coarse, abundant fine to coarse subangular to subrounded gravel, some cobbles, granitic boulder at 31 feet, wet. (SP)
7	C		35				31 - 38 feet: SILTY SAND, gray brown, fine becoming fine to coarse at 37 feet, some fine to coarse subrounded gravel, trace cobbles, moist. (SM)
8	C		40				38 - 40 feet: SILT, gray brown, non-plastic, abundant fine sand, trace gravel, moist. (ML)
9	C						Bottom of boring at 40 feet
10	C						NOTES: Monitoring well completion details: 25 - 35 feet, 2-inch diameter, Schedule 40 PVC screen with 0.010-inch slots; 0 - 25 feet, 2-inch, Schedule 40 PVC riser; 0 - +3 feet, 8-inch steel security casing. Backfill materials: 36.5 - 40 feet, native caved material; 35.5 - 36.5 feet, bentonite chips; 15 - 35.5 feet, Colorado Silica Sand; 1 - 15 feet, bentonite chip seal; 0 - 1 foot, concrete.

REMARKS

1) Reference elevation is ground surface, based on topography. 2) C = sample of cuttings.





BORING LOG

PROJECT CEDAR HILLS SITE DEVELOPMENT PLAN

Page 1 of 2

Location NE corner of Landfill Boundary

Boring No. MW-47

Surface Elevation 633.56

Drilling Method QDEX and Air Rotary

Total Depth 50.0 Feet

Drilled By Kring Drilling Co.

Date Completed 31 May 1985

Logged By D.E. Nadler

WELL DETAILS	PENETRATION TIME/RATE	DEPTH (FEET)	SAMPLE		PERMEABILITY TESTING	SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY	
			NO.	TYPE					
<p>Bentonite Slurry</p> <p>2" PVC Riser</p> <p>Bentonite Pellets</p> <p>2" PVC screen with 0.01" slots</p>		0					0-6.0' <u>SANDY SILT</u> and <u>GRAVELLY SANDY SILT</u> , mottled brown and gray, moist, loose. Gravel to 1.5" diameter rounded to subangular. (FILL AND DISTURBED TILL)		
		5	S1	SS					
		10	S2	SS				6.0-11.0' <u>SANDY SILT</u> and <u>GRAVELLY SANDY SILT</u> , variable ratios of silt, sand, and gravel, light brown, dry, very dense. Gravel to 1.5" diameter, rounded. Cobbles at 8-11'. (WEATHERED TILL)	
		15						11.0-13.0' <u>SILTY GRAVEL</u> , light brown, dry, very dense. (WEATHERED TILL)	
		20						13.0-23.0' <u>SILTY GRAVELLY SAND</u> and <u>SANDY GRAVEL</u> , gray to brown-gray below 19.5', dry, very dense. Gravel to 1.0" diameter rounded, cobbles encountered at 17.5-18' and 21-23'. (TILL)	
	25		S3	SS			23.0-29.5' <u>SILTY SAND</u> and <u>SANDY SILT</u> , gray, saturated, very dense. Trace gravel to 0.5" diameter, rounded at 23 to 23.3'		
	30		S4	SS			Sand primarily fine to medium. (TILL)		
		35					29.5-44.5' Description on following page		



Boring No. MW-47

WELL DETAILS	PENE-TRATION TIME/RATE	DEPTH (FEET)	SAMPLE		PERME-ABILITY TESTING	SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
			NO.	TYPE				
<p>Fine Gravel</p> <p>Bentonite Pellets</p> <p>2" PVC screen with 0.01" slots</p>		35					29.5-44.5' <u>CLAYEY SANDY SILT</u> to <u>CLAYEY SILT</u> and <u>SILTY SANDY CLAY</u> , gray, light brown below 42.5 saturated, very stiff. Trace fine gravel, rounded at 31-33' and 38-39.5' (TILL)	
			40	SS	SS			
		45					44.5-50.0' <u>SILTY SANDY GRAVEL</u> , brown, dry, very dense. Gravel 0.75-3" diameter, rounded; cobbles at 44.5-46'. (ADVANCE OUTWASH)	
		50						
		55					NOTES: 1. SS=Split Spoon Sample 2. Boring advanced by ODEX method to 43.0 ft. Air rotary with tricone bit used 43.0 to 50.0 ft.	



PROJECT CEDAR HILLS SITE DEVELOPMENT PLAN

Page 1 of 2

Location East side of landfill

Boring No. MW-50

Surface Elevation 637.3 feet a.s.l.

Drilling Method ODEX

Total Depth 39.5 feet

Drilled By Kring Drilling Co.

Date Completed 6/3/85

Logged By D.E. Nadler

WELL DETAILS	PENE-TRATION TIME/RATE	DEPTH (FEET)	SAMPLE		PERME-ABILITY TESTING	SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
			NO.	TYPE				
		0					0-7.0' <u>CLAYEY SANDY SILT</u> , light brown, moist, medium density. Cobble at 3'. (WEATHERED TILL)	
		5	S1	SS				
		10	S2	SS				
		15						
		20	S3	SS				
		25					7.0-20.0' <u>SANDY SILT</u> and <u>GRAVELLY SANDY SILT</u> , variable ratios of silt, sand, and gravel, gray, moist, very dense. Gravel chiefly to 0.5" diameter rounded, some to 0.75" diameter. Sand primarily fine. (TILL)	
		30	S4	SS			20.0-26.5' <u>SILTY SAND</u> to <u>SILTY GRAVELLY SAND</u> and <u>GRAVELLY SANDY SILT</u> , variable ratios of silt, sand, and gravel, gray, moist at 20-22', dry below 22', very dense. Gravel to 1.0" diameter, rounded. Gravel content increases at 25.5'. (TILL)	
		35					26.5-27.5' <u>SANDY CLAYEY SILT</u> , gray, saturated, very dense. (TILL)	
							27.5-38.5' Description on following page.	

LOG OF EXPLORATORY BORING Renumbered as MW-62 as of 8/91.

PROJECT NAME Cedar Hills Landfill
 LOCATION Adjacent to MW-30A
 DRILLED BY Holt Drilling, Inc.
 DRILL METHOD Cable Tool
 LOGGED BY Mike Noll

BORING NO. ~~MW-60~~
 PAGE 1 OF 4
 REFERENCE ELEV. 554.41' MSL
 TOTAL DEPTH 65.50'
 DATE COMPLETED 2/1/90

SAMPLING METHOD AND NUMBER	BLOW COUNTS	SPECIFIC CONDUCTANCE (umhos)	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
				0				0 - 4 feet: SANDY SILT with gravel, light olive brown, non-plastic, fine to coarse sand, trace fine to coarse subrounded gravel, trace cobbles (to 4-inches diameter), moist. (GLACIAL TILL) (ML)
G 1		*150		5	5			4 - 6.5 feet: SANDY GRAVEL, olive, fine to coarse, subangular to subrounded, fine to coarse sand, trace non-plastic fines, moist. Boulders at 4.5 to 5 feet. (GLACIAL TILL) (GP)
G 2		*145		10	10			6.5 - 19 feet: SANDY SILT with gravel, olive, non-plastic, fine to coarse sand, trace to some fine to coarse subrounded gravel, moist. (GLACIAL TILL) (ML)
G 3		*150		15	15			
G 4		*250		20	20			19 - 40 feet: See description on the following page.

REMARKS

1) Conductivity of water used during drilling = 165 to 185 umhos. 2) G = grab samples, collected over a 0.5 to 1 foot interval from bailed drill cuttings; SB = split barrel samples collected using a 2.5-inch O.D. Sprigs- Hendley core barrel driven using a 300-lb hammer. 3) * = Muddy water samples, diluted with drilling water. 4) Reference elevation = ground surface.



LOG OF EXPLORATORY BORING

Renumbered as MW-62
as of 8/91.

PROJECT NAME Cedar Hills Landfill
 LOCATION Adjacent to MW-30A
 DRILLED BY Holt Drilling, Inc.
 DRILL METHOD Cable Tool
 LOGGED BY Mike Noll

BORING NO. MW-62
 PAGE 2 OF 4
 REFERENCE ELEV. 554.41' MSL
 TOTAL DEPTH 65.50'
 DATE COMPLETED 2/1/90

SAMPLING METHOD AND NUMBER	BLOW COUNTS	SPECIFIC CONDUCTANCE (umhos)	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
G 5		*245		25				19 - 40 feet: SILTY SAND, olive gray, fine to coarse, non-plastic fines, trace fine to coarse subrounded gravel, moist. (GLACIAL TILL/STRATIFIED DRIFT) (SM)
G 6		*225						
G 7		*250		30				
G 8		*215						
G 9		*195		35				
G 9		*175						
G 10		490						
				40				



REMARKS

1) Conductivity of water used during drilling = 165 to 185 umhos. 2) G = grab samples, collected over a 0.5 to 1 foot interval from bailed drill cuttings; SB = split barrel samples collected using a 2.5-inch O.D. Sprigs- Hendley core barrel driven using a 300-lb hammer. 3) * = Muddy water samples, diluted with drilling water. 4) Reference elevation = ground surface.

LOG OF EXPLORATORY BORING

Renumbered as MW-62
as of 8/91.

PROJECT NAME Cedar Hills Landfill
 LOCATION Adjacent to MW-30A
 DRILLED BY Holt Drilling, Inc.
 DRILL METHOD Cable Tool
 LOGGED BY Mike Noll

BORING NO. ~~MW-60~~
 PAGE 3 OF 4
 REFERENCE ELEV. 554.41' MSL
 TOTAL DEPTH 65.50'
 DATE COMPLETED 2/1/90

SAMPLING METHOD AND NUMBER	BLOW COUNTS	SPECIFIC CONDUCTANCE (umhos)	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLING	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
SB 11	50/6"							40 - 42.5 feet: SILTY GRAVEL with sand, light olive brown, fine to coarse, subrounded, fine to coarse sand, non-plastic fines, moist. (STRATIFIED DRIFT) (GM)
G 12		525						42.5 - 50 feet: SILTY SAND with gravel, light olive brown, fine to coarse, fine to coarse subrounded gravel, low plasticity fines, moist. (DRIFT?) (SM)
G 13			▽	45				
G 14		310						50 - 51.5 feet: SILTY GRAVEL with sand, olive to yellowish brown, fine to coarse, subrounded, some oxidized gravel, some fine to coarse sand, low plasticity fines, moist to wet. (GM)
SB 15	75/12"							
G 16		245						51.5 - 56 feet: SILTY SAND with gravel, light olive brown, fine to coarse, some fine to coarse subrounded gravel, low plasticity fines, moist to wet. (SM)
G 17		480						
SB 18	50/6"							56 - 65.5 feet: SILTY GRAVEL with sand, olive to yellowish brown, some yellowish brown staining and blueish gray to olive mottling, fine to coarse, subrounded, fine to coarse sand, moist to wet. (GM)
G 18		510						--- Color change to light olive brown between 58 and 61 feet.
				60				

REMARKS

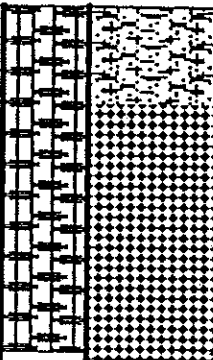
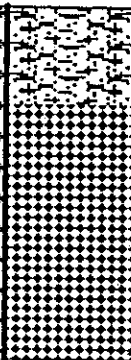
1) Conductivity of water used during drilling = 165 to 185 umhos. 2) G = grab samples, collected over a 0.5 to 1 foot interval from bailed drill cuttings; SB = split barrel samples collected using a 2.5-inch O.D. Sprigs- Hendley core barrel driven using a 300-lb hammer. 3) * = Muddy water samples, diluted with drilling water. 4) Reference elevation = ground surface.



LOG OF EXPLORATORY BORING Renumbered as mw-62 as of 8/91.

PROJECT NAME Cedar Hills Landfill
LOCATION Adjacent to MW-30A
DRILLED BY Holt Drilling, Inc.
DRILL METHOD Cable Tool
LOGGED BY Mike Noll

BORING NO. ~~MW-60~~
PAGE 4 OF 4
REFERENCE ELEV. 554.41' MSL
TOTAL DEPTH 65.50'
DATE COMPLETED 2/1/90

SAMPLING METHOD AND NUMBER	BLOW COUNTS	SPECIFIC CONDUCTANCE (umhos)	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
G 19 SB 20	50/12"	450		65				61 - 65.5 feet: See previous page for description. Bottom of boring at 65.5 feet. WELL CONSTRUCTION DETAILS: 0 - 44 feet: 2-inch schedule 40 PVC casing 44 - 54 feet: 2-inch schedule 40 PVC screen with 0.010-inch slots 0 - 2 feet: Concrete 2 - 41.5 feet: Bentonite chips 41.5 - 54.5 feet: Colorado silica sand (8x10) 54.5 - 56.5 feet: Bentonite chips 56.5 - 61.5 feet: Native caved material 61.5 - 65.5 feet: Bentonite chips
				75				
				80				

REMARKS

1) Conductivity of water used during drilling = 165 to 185 umhos. 2) G = grab samples, collected over a 0.5 to 1 foot interval from bailed drill cuttings; SB = split barrel samples collected using a 2.5-inch O.D. Sprigs- Hendley core barrel driven using a 300-lb hammer. 3) * = Muddy water samples, diluted with drilling water. 4) Reference elevation = ground surface.



LOG OF EXPLORATORY BORING Renumbered as mw-63 as of 8/91.

PROJECT NAME Cedar Hills Landfill
 LOCATION Adjacent to MW-30A
 DRILLED BY Holt Drilling, Inc.
 DRILL METHOD Cable Tool
 LOGGED BY Mike Noll

BORING NO. ~~MW-61~~
 PAGE 1 OF 2
 REFERENCE ELEV. 510.00' MSL
 TOTAL DEPTH 510.00'
 DATE COMPLETED 2/12/90

SAMPLING METHOD AND NUMBER	BLOW COUNTS	SPECIFIC CONDUCTANCE (umhos)	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
			▽	5				0 - 5 feet: GRAVELLY SAND, light olive brown, fine to coarse, fine to medium subrounded gravel, trace non-plastic fines, moist. Some graded bedding. (ALLUVIUM) (SP)
G 1		185		10				5 - 12 feet: SANDY GRAVEL, light olive brown, fine to coarse, subrounded, fine to coarse sand, trace low plasticity to non-plastic fines, moist to wet. (STRATIFIED DRIFT) (GP-GM) --- Color change and becoming denser at 9 feet.
G 2		340		15				12 - 17 feet: SILTY SAND with gravel, olive to olive brown, yellowish brown at 15 to 17 feet, fine to coarse, some fine to coarse subrounded gravel, little low plasticity fines, moist to wet. (SM)
G 3		360	▽	20				17 - 22 feet: SANDY GRAVEL, olive with some yellowish brown at 18 to 19 feet, fine to coarse, subrounded, fine to coarse sand, trace silt, wet. Silty sand beds to 1 foot thick. (GP-GM)

REMARKS

1) Conductivity of water used during drilling = 160 to 170 umhos. 2) G = grab samples, collected over a 0.5 to 1 foot interval from bailed drill cuttings. 3) Reference elevation = ground surface.



LOG OF EXPLORATORY BORING Renumbered as mw-63 as of 8/91.

PROJECT NAME Cedar Hills Landfill
 LOCATION Adjacent to MW-30A
 DRILLED BY Holt Drilling, Inc.
 DRILL METHOD Cable Tool
 LOGGED BY Mike Noll

BORING NO. MW-61
 PAGE 2 OF 2
 REFERENCE ELEV. 510.00' MSI
 TOTAL DEPTH 510.00'
 DATE COMPLETED 2/12/90

SAMPLING METHOD AND NUMBER	BLOW COUNTS	SPECIFIC CONDUCTANCE (umhos)	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
G 4		250		25	30	35		<p>17 - 22 feet: See description on previous page.</p> <hr/> <p>Bottom of boring at 22 feet.</p> <p>WELL CONSTRUCTION DETAILS 0 - 11.5 feet: 2-inch schedule 40 PVC casing 11.5 - 16.5 feet: 2-inch schedule 40 PVC screen with 0.010-inch slots 16.5 - 17 feet: 2-inch PVC end plug 0 - 2 feet: Concrete 2 - 10 feet: Bentonite chips 10 - 17 feet: Colorado silica sand (8x10) 17 - 22 feet: Native caved material</p>

REMARKS

1) Conductivity of water used during drilling = 160 to 170 umhos. 2) G = grab samples, collected over a 0.5 to 1 foot interval from bailed drill cuttings. 3) Reference elevation = ground surface.





Monitoring Well Construction Log

Project Number
040122

Well Number
MW-102

Sheet
1 of 2

Project Name: Groundwater Monitoring Well System Enhancement

Ground Surface Elev. 549.73

Location: 172313.75 N, 1701858.76 E / Cedar Hills Landfill, Maple Valley, Wa

Top of Casing Elev. 552.48

Driller/Method: Boart Longyear / Rotary Sonic

Depth to Water (ft BGS) 42.96 - 3/3/2009

Sampling Method: Continuous Core

Start/Finish Date 1/26/2009-1/27/2009

Depth / Elevation (feet)	Borehole Completion	Sample Type/D	Tests	PID (ppm)	Blows/ 5"	Material Type	Description	Depth (ft)
549	10" ID, steel monument						Very moist/wet, red-brown, silty GRAVEL (GM); fine to coarse gravel, subrounded; organics (roots); charred layer at 4.5 ft.	1
548	Concrete (0-2')							2
547	Bentonite chips (2-17.5')							3
546								4
545	2" ID, schedule 40 PVC casing (0-34.5')						Wet, red-brown, silty GRAVEL (GM); fine gravel to cobbles, subangular/rounded.	5
544								6
543							Moist, light gray w/ red-brown staining, slightly silty GRAVEL (GP-GM); predominantly coarse gravel.	7
542								8
541							18-inch boulders and powdered rock (8-9.5').	9
540	Centralizer (10')						Moist, yellow-brown/light gray w/ red-brown staining, slightly silty GRAVEL (GV-GM); fine to coarse gravel, subrounded.	10
539								11
538								12
537								13
536							More gray in color; some coarse sand (14-15').	14
535							Less sand (15-17').	15
534								16
533								17
532							Some yellow-red, clay (17-18').	18
531	Bentonite grout (17.5-19')						Red and purple clasts.	19
530	Bentonite chips (19-29')						Increase in yellow clay (20-22.5').	20
529								21
528								22
527							Less yellow clay (22.5-25.5').	23
526								24
525								

MONITORING WELL CEDAR HILLS PERCHING INVESTIGATION - REVISED DENSITY.GPJ April 13, 2010

Sampler Type:

- No Recovery
- Continuous Core

PID - Photoionization Detector (Headspace Measurement)

- Static Water Level
- Water Level (ATD)

Logged by: **SJR**

Approved by: **EWM**

Figure No. **A-2**



Monitoring Well Construction Log

Project Number
040122

Well Number
MW-102

Sheet
2 of 2

Project Name: Groundwater Monitoring Well System Enhancement

Ground Surface Elev. 549.73

Location: 172313.75 N, 1701858.76 E / Cedar Hills Landfill, Maple Valley, Wa

Top of Casing Elev. 552.48

Driller/Method: Boart Longyear / Rotary Sonic

Depth to Water (ft BGS) 42.96 - 3/3/2009

Sampling Method: Continuous Core

Start/Finish Date 1/26/2009-1/27/2009

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
26 524							All fine gravel (25.5-28').	26
27 523								27
28 522								28
29 521	Centralizer (29')							29
30 520							Moist, red-brown, slightly silty SAND (SP-SM); fine to medium sand.	30
31 519	Bentonite pellets (29-32')						Moist, light gray/red-brown, slightly silty GRAVEL (GW-GM); fine to coarse gravel, subrounded.	31
32 518								32
33 517	10-20 silica sand (32-50')							33
34 516								34
35 515	2" ID, schedule 40, PVC screen, 0.020" slot-size (34.5-49.5')						Increasing silt to sand ratio, (35-40').	35
36 514								36
37 513								37
38 512								38
39 511								39
40 510							Very moist, light gray/red-brown, silty, gravelly SAND (SM); predominantly fine to medium sand; coarse gravel, subrounded.	40
41 509								41
42 508	▽ 1/27/2009							42
43 507	▽ 3/3/2009						Moist, light gray/red-brown, slightly silty GRAVEL (GW-GM); fine to coarse gravel, subrounded.	43
44 506								44
45 505							Higher sand to silt ratio (44.5-48').	45
46 504								46
47 503								47
48 502							Dark gray, mostly silt matrix.	48
49 501								49
50 500	Centralizer (49.5') PVC end cap (49.5')						Bottom of boring (50')	50

MONITORING WELL CEDAR HILLS PERCHING INVESTIGATION - REVISED DENSITY G.P.J. April 13, 2010

- Sampler Type:
- No Recovery
 - Continuous Core

- PID - Photoionization Detector (Headspace Measurement)
- ▽ Static Water Level
 - ▽ Water Level (ATD)

Logged by: **SJR**
 Approved by: **EWM**
 Figure No. **A- 2**



Monitoring Well Construction Log

Project Number
040122

Well Number
MW-103

Sheet
1 of 2

Project Name: **Groundwater Monitoring Well System Enhancement**

Ground Surface Elev. **636.8**

Location: **170473.99 N, 1702210.55 E / Cedar Hills Landfill, Maple Valley, Wa**

Top of Casing Elev. **639.08**

Driller/Method: **Boart Longyear / Rotary Sonic**

Depth to Water (ft BGS) **8.76 - 3/3/2009**

Sampling Method: **Continuous Core**

Start/Finish Date **1/28/2009**

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
1 636	10" ID, Steel monument Concrete (0-2')						Wet, dark red-brown, SILT (ML); numerous organics (roots), decreasing organics to 2.5'.	1
2 635	Bentonite chips (2-14')							2
3 634							Change in color to yellow-red (2.5-3.5').	3
4 633							Very moist, yellow-red, slightly sandy, silty GRAVEL (GM); fine to medium sand; fine gravel to cobbles, rounded.	4
5 632	2" ID, schedule 40 PVC casing (0-25')						Hard, slightly moist, brown/light olive gray, slightly gravelly SILT (ML); trace fine sand.	5
6 631								6
7 630								7
8 629								8
9 628								9
10 627								10
11 626								11
12 625								12
13 624								13
14 623							Hard, slightly moist, olive gray/gray, SILT; trace fine gravel, rounded; trace fine sand.	14
15 622	Bentonite grout (14-16')							15
16 621								16
17 620								17
18 619	Bentonite chips (16-19.5')							18
19 618								19
20 617								20
21 616	Bentonite pellets (19.5-22.5')							21
22 615								22
23 614	10-20 silica sand (22.5-37')							23
24 613								24
612								

MONITORING WELL - CEDAR HILLS PERCHING INVESTIGATION - REVISED DENSITY.GPJ April 13, 2010

Sampler Type:
 No Recovery
 Continuous Core

PID - Photoionization Detector (Headspace Measurement)

Static Water Level
 Water Level (ATD)

Logged by: **SJR**

Approved by: **EWM**

Figure No. **A-3**



Monitoring Well Construction Log

Project Number
040122

Well Number
MW-103

Sheet
2 of 2

Project Name: Groundwater Monitoring Well System Enhancement

Ground Surface Elev. 636.8

Location: 170473.99 N, 1702210.55 E / Cedar Hills Landfill, Maple Valley, Wa

Top of Casing Elev. 639.08

Driller/Method: Boart Longyear / Rotary Sonic

Depth to Water (ft BGS) 8.76 - 3/3/2009

Sampling Method: Continuous Core

Start/Finish Date 1/28/2009

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
26 611	Centralizer (25')							26
27 610								27
28 609								28
29 608								29
30 607	2" ID, schedule 40, PVC screen, 0.020" slot-size (25-35')							30
31 606								31
32 605							Change in color to gray/brown (32-35').	32
33 604								33
34 603								34
35 602	Centralizer (35') PVC end cap (35')							35
36 601							Moist, brown/olive gray, silty GRAVEL (GM); fine to coarse gravel, rounded.	36
37 600								37
38 599								38
39 598	Bentonite chips (37-40')							39
40 597							Bottom of boring (40')	40
41 596								41
42 595								42
43 594								43
44 593								44
45 592								45
46 591								46
47 590								47
48 589								48
49 588								49
587								

MONITORING WELL - CEDAR HILLS PERCHING INVESTIGATION - REVISED DENSITY.GPJ April 13, 2010

Sampler Type:

- No Recovery
- Continuous Core

PID - Photoionization Detector (Headspace Measurement)

- Static Water Level
- Water Level (ATD)

Logged by: **SJR**

Approved by: **EWM**

Figure No. **A- 3**



Monitoring Well Construction Log

Project Number
040122

Well Number
MW-104

Sheet
1 of 2

Project Name: Groundwater Monitoring Well System Enhancement

Ground Surface Elev. 626.92

Location: 171153.34 N, 1702169.14 E / Cedar Hills Landfill, Maple Valley, Wa

Top of Casing Elev. 629.68

Driller/Method: Boart Longyear / Rotary Sonic

Depth to Water (ft BGS) 29.59 - 3/3/2009

Sampling Method: Continuous Core

Start/Finish Date 1/28/2009-1/29/2009

Depth / Elevation (feet)	Borehole Completion	Sample Type/#ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
1 - 626	10" ID, steel monument Concrete (0-2')						Medium stiff, very moist, yellow-red/red-brown, SILT (ML); trace fine sand; trace fine gravel; trace organics (roots).	1
2 - 625	Bentonite chips (2-10')						Very moist, yellow-red, silty GRAVEL (GM); trace fine to medium sand; trace organics (roots); fine gravel to cobbles (6-inch), rounded.	2
3 - 624								3
4 - 623								4
5 - 622	2" ID, schedule 40 PVC casing (0-22')						Slightly moist, yellow-red/light gray, silty GRAVEL (GM); trace fine sand; fine gravel to cobbles, rounded.	5
6 - 621								6
7 - 620								7
8 - 619								8
9 - 618								9
10 - 617								10
11 - 616								11
12 - 615	Bentonite grout (10-13')							12
13 - 614								13
14 - 613	Bentonite chips (13-16')							14
15 - 612							Hard, moist, yellow-red/light gray, silty GRAVEL (GM) and gravelly SILT (ML); trace fine sand; fine gravel to cobbles, rounded.	15
16 - 611								16
17 - 610								17
18 - 609	Bentonite pellets (16-19.5')							18
19 - 608								19
20 - 607	10-20 silica sand (19.5-35')							20
21 - 606							Hard, slightly moist/moist, gray, SILT (ML); trace fine to coarse gravel, rounded; trace fine sand.	21
22 - 605	Centralizer (22')							22
23 - 604	2" ID schedule 40, PVC screen, 0.020" slot-size (22-32')							23
24 - 603								24

MONITORING WELL - CEDAR HILLS PERCHING INVESTIGATION - REVISED DENSITY GPJ April 13, 2010

Sampler Type: No Recovery Static Water Level Logged by: **SJR**
 Continuous Core Water Level (ATD) Approved by: **EWM**
 Figure No. **A- 4**



Monitoring Well Construction Log

Project Number
040122

Well Number
MW-104

Sheet
2 of 2

Project Name: **Groundwater Monitoring Well System Enhancement**

Ground Surface Elev. **626.92**

Location: **171153.34 N.1702169.14 E / Cedar Hills Landfill, Maple Valley, Wa**

Top of Casing Elev. **629.68**

Driller/Method: **Boart Longyear / Rotary Sonic**

Depth to Water (ft BGS) **29.59 - 3/3/2009**

Sampling Method: **Continuous Core**

Start/Finish Date **1/28/2009-1/29/2009**

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)	
26 - 601	<p style="font-size: small;">3/3/2009</p> <p style="font-size: small;">Centralizer (32') PVC end cap (32')</p>							26	
27 - 600								27	
28 - 599								28	
29 - 598								29	
30 - 597								Occasional organics (wood?) (30-31')	30
31 - 596									31
32 - 595									32
33 - 594									33
34 - 593									34
35 - 592								Bottom of boring (35')	35
36 - 591								36	
37 - 590								37	
38 - 589								38	
39 - 588								39	
40 - 587								40	
41 - 586								41	
42 - 585								42	
43 - 584								43	
44 - 583								44	
45 - 582								45	
46 - 581								46	
47 - 580								47	
48 - 579								48	
49 - 578								49	

MONITORING WELL CEDAR HILLS PERCHING INVESTIGATION - REVISED DENSITY.GPJ April 13, 2010

Sampler Type:

- No Recovery
- Continuous Core

PID - Photoionization Detector (Headspace Measurement)

- Static Water Level
- Water Level (ATD)

Logged by: **SJR**

Approved by: **EWM**

Figure No. **A- 4**

LOG OF EXPLORATORY BORING

PROJECT NAME	Cedar Hills Landfill	BORING NO.	EB- 1
LOCATION	See below	PAGE	1 OF 2
DRILLED BY	Tacoma Pump & Drill	REFERENCE ELEV.	530.89' MSL
DRILL METHOD	Cable Tool	TOTAL DEPTH	30.00'
LOGGED BY	Mike Noll	DATE COMPLETED	6/26/90

SAMPLING METHOD AND NUMBER	SPECIFIC CONDUCTANCE (umhos)	BLOW COUNTS	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
				0				0 - 3.5 feet: SILTY GRAVEL (GM), dark brown, fine to coarse, subrounded, to 3 inches, fine to coarse sand, trace cobbles and boulders (subrounded, to 1-1/2 feet), loose to medium dense, dry to moist. (ALLUVIUM)
				5				3.5 - 6 feet: GRAVELLY SILT with sand (ML), olive, low plasticity, fine to coarse gravel (subrounded, to 2 inches), fine to coarse sand, firm, moist. (STRATIFIED DRIFT)
3 1	850		▽	10				6 - 13 feet: SILT with gravel (ML), olive to olive brown, low plasticity, fine to coarse gravel (subrounded, to 2-1/2 inches), few to some fine to coarse sand, firm to stiff, moist. (STRATIFIED DRIFT) -- increasing sand content at 10 feet
	83			15				13 - 15 feet: SILTY SAND with gravel (SM), grayish brown to olive, fine to coarse, low plasticity fines, fine to medium gravel (subangular to subrounded, to 1-1/4 inch), stiff, moist to wet. (STRATIFIED DRIFT)
G 2	347		▽	20				15 - 19 feet: SANDY SILT with gravel (ML), olive, low plasticity, fine to coarse sand, fine to medium gravel (subrounded, to 1 inch), stiff, moist to wet. (STRATIFIED DRIFT)
	155			20				19 - 20 feet: Description on following page.

REMARKS

1) G=grab sample, collected from bailed drill cuttings; SB=split barrel sample. 2) Conductance of drill rig water is 170 to 180 umhos/cm. 3) Elevation measurement point (T.O.C.)=532.39 feet. 4) REFERENCE ELEVATION represents ground surface. 5) LOCATION: North of MW-30A.



LOG OF EXPLORATORY BORING

PROJECT NAME Cedar Hills Landfill
LOCATION See below
DRILLED BY Tacoma Pump & Drill
DRILL METHOD Cable Tool
LOGGED BY Mike Noll

BORING NO. EB-1
PAGE 2 OF 2
REFERENCE ELEV. 530.89' MSL
TOTAL DEPTH 30.00'
DATE COMPLETED 6/26/90

SAMPLING METHOD AND NUMBER	SPECIFIC CONDUCTANCE (umhos)	BLOW COUNTS	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
G 3	317			25				19 - 22 feet: SAND and SILTY SAND with gravel (SP-SM), light olive gray, fine to coarse, low plasticity fines, fine to medium gravel (subrounded, to 1 inch), firm, wet. (STRATIFIED DRIFT)
G 4		100/3"		25				22 - 26 feet: GRAVELLY SILT with sand (ML), olive to pale olive, becoming light gray at 24 feet, low plasticity, fine to medium gravel (subrounded, to 1 inch), fine to coarse sand, stiff, moist. (STRATIFIED DRIFT)
SB 5		100/6"		25				26 - 27.5 feet: SILTY SAND (SM), grey to olive grey, fine to medium, trace fine to medium gravel, dense, moist. Sand becoming finer with depth. (ADVANCE OUTWASH)
SB 6	202	100/6"		30				27.5 - 30 feet: GRAVELLY SILT (ML), dark grey with grey silty sand beds, non-plastic, fine to coarse gravel, very stiff, dry to moist. Interbedded with silty sand. (ADVANCE OUTWASH)
Bottom of borehole at 30 feet. WELL COMPLETION DETAILS -- EB-1:								
0 - 17 feet: 2-inch-diameter schedule 40 PVC riser pipe; stick up 1.5 feet above ground surface								
17 - 22 feet: 2-inch-diameter schedule 40 PVC screen with 0.010-inch slots								
0 - 1.5 feet: concrete								
1.5 - 13 feet: bentonite chips								
13 - 23 feet: 10 x 20 Colorado silica sand								
23 - 30 feet: bentonite chips								
				35				
				40				

REMARKS

1) G=grab sample, collected from bailed drill cuttings; SB=split barrel sample. 2) Conductance of drill rig water is 170 to 180 umhos/cm. 3) Elevation measurement point (T.O.C.)=532.39 feet. 4) REFERENCE ELEVATION represents ground surface. 5) LOCATION: North of MW-30A.



LOG OF EXPLORATORY BORING

PROJECT NAME Cedar Hills Landfill
LOCATION See below
DRILLED BY Tacoma Pump & Drill
DRILL METHOD Cable Tool
LOGGED BY Mike Noll

BORING NO. EB-2
PAGE 1 OF 2
REFERENCE ELEV. 528.21' MSL
TOTAL DEPTH 33.00'
DATE COMPLETED 6/28/90

SAMPLING METHOD AND NUMBER	SPECIFIC CONDUCTANCE (umhos)	BLOW COUNTS	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
G 1	290			5				0 - 3 feet: GRAVELLY SILT (ML), dark yellowish brown, non-plastic, fine to coarse gravel (subrounded, to 3 inches), some fine to coarse sand, trace cobbles and boulders (to 10 inches), firm, dry to moist. (ALLUVIUM)
G 2	248			10				3 - 31 feet: GRAVELLY SILT with sand (ML), olive brown olive, non-plastic to low plasticity, fine to coarse gravel (subrounded, to 2-1/2 inches), fine to coarse sand, stiff, moist. (STRATIFIED DRIFT)
G 3	226		▽	15				-- color change to light grey to grey; gravel becoming coarse (to 3 inches)
G 4	243			20				

REMARKS

1) G= grab sample, collected from bailed drill cuttings. 2) Rig water conductivity=175 to 185 umhos/cm. 3) Elevation measurement point (T.O.C.)=530.32 feet (USC&GD). 4) REFERENCE ELEVATION represents ground surface elevation. 5) LOCATION: NW of MW-30A.



LOG OF EXPLORATORY BORING

PROJECT NAME Cedar Hills Landfill
LOCATION See below
DRILLED BY Tacoma Pump & Drill
DRILL METHOD Cable Tool
LOGGED BY Mike Noll

BORING NO. EB-2
PAGE 2 OF 2
REFERENCE ELEV. 528.21' MSL
TOTAL DEPTH 33.00'
DATE COMPLETED 6/28/90

SAMPLING METHOD AND NUMBER	SPECIFIC CONDUCTANCE (umhos)	BLOW COUNTS	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
G 5								See previous page for description. -- color change to olive brown, with dark yellowish brown oxidation
G 6	336			25				WELL COMPLETION DETAILS -- EB-2: 0 - 13.5 feet: 2-inch-diameter schedule 40 PVC riser pipe, stick up 2.0 feet above ground surface 13.5 - 23.5 feet: 2-inch-diameter schedule 40 PVC screen with 0.010-inch slots 0 - 1.5 feet: concrete 1.5 - 11 feet: bentonite chips 11 - 23.5 feet: 10 x 20 Colorado silica sand 23.5 - 29 feet: native caved material 29 - 31 feet: bentonite pellets 31 - 33 feet: native caved material.
G 7				30				31 - 33 feet: GRAVELLY SAND (SP), very dark gray with some grayish brown, fine to coarse, fine to medium gravel (subrounded, to 1-1/4 inch), trace non-plastic fines, loose to medium dense, moist. (ADVANCE OUTWASH)
				35				Bottom of borehole at 33 feet.
				40				

REMARKS

1) G = grab sample, collected from bailed drill cuttings. 2) Rig water conductivity = 175 to 185 umhos/cm. 3) Elevation measurement point (T.O.C.) = 530.32 feet (USC&GD). 4) REFERENCE ELEVATION represents ground surface elevation. 5) LOCATION: NW of MW-30A.



LOG OF EXPLORATORY BORING

PROJECT NAME Cedar Hills Landfill
LOCATION See below
DRILLED BY Tacoma Pump & Drill
DRILL METHOD Cable Tool
LOGGED BY Mike Noll

BORING NO. EB-3
PAGE 1 OF 4
REFERENCE ELEV. 607.37' MSL
TOTAL DEPTH 64.00'
DATE COMPLETED 6/23/90

SAMPLING METHOD AND NUMBER	SPECIFIC CONDUCTANCE (umhos)	BLOW COUNTS	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
G 1	255			5				0 - 4 feet: SILT with gravel (ML), moderate brown, non-plastic to low plasticity, some fine to coarse gravel (subrounded, to 1-3/4 inches), some to some fine to coarse sand, firm, moist, (ALLUVIUM).
G 2				10				4 - 18 feet: SILTY GRAVEL with sand (GM), olive to olive brown, fine to coarse (subangular to subrounded, to 2-1/2 inches), low plasticity fines, fine to coarse sand, few cobbles at 5 feet, medium dense to dense, moist. Some sandy lenses 1 to 3 inches thick. (GLACIAL TILL)
				15				-- @ 17 feet: abundant cobbles
				20				18 - 20 feet: SANDY GRAVEL with silt (GP), dark gray, fine to coarse (subrounded, to 1-3/4 inches), fine to coarse sand, low plasticity fines, dense, moist to wet.

REMARKS

1) G=grab sample, collected from bailed cuttings, SB=split barrel sample, collected with a 2-1/2-inch Dames and Moore core barrel and drive jars. 2) Conductivity of rig water = 180 to 185 umhos/cm. 3) Elevation measurement point (T.O.C.)=608.87 feet (USC&GD). 4) REFERENCE ELEVATION represents ground surface elevation. 5) LOCATION: SE of MW-30A.



LOG OF EXPLORATORY BORING

PROJECT NAME Cedar Hills Landfill
LOCATION See below
DRILLED BY Tacoma Pump & Drill
DRILL METHOD Cable Tool
LOGGED BY Mike Noll

BORING NO. EB-3
PAGE 2 OF 4
REFERENCE ELEV. 607.37' MSL
TOTAL DEPTH 64.00'
DATE COMPLETED 6/23/90

SAMPLING METHOD AND NUMBER	SPECIFIC CONDUCTANCE (umhos)	BLOW COUNTS	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
G 3								(STRATIFIED DRIFT)
SB 4	438	150/6"		25				20 - 23 feet: SILTY SAND with gravel (SM), olive to gray, fine to coarse, fine to medium gravel (subangular to subrounded), low plasticity fines, dense, moist. (STRATIFIED DRIFT)
G 5	480 705 460			30				23 - 28 feet: SILTY GRAVEL with sand (GM), light gray with some pale yellow, fine to medium, subangular to subrounded, fine to coarse sand, low plasticity fines, dense, moist to wet. (STRATIFIED DRIFT)
SB 6		100/3"						28 - 31.5 feet: SANDY GRAVEL and GRAVELLY SAND with silt (GP/SP), olive brown to dark gray, gravel is subangular to subrounded, to 2-3/4 inches, fine to coarse sand, few to some low plasticity fines, dense, moist to wet. (STRATIFIED DRIFT)
G 7	585							31.5 - 33 feet: SILTY GRAVEL with sand (GM), olive gray to olive brown, fine to medium (subrounded, to 1 inch), fine to coarse sand, low plasticity fines, dense, moist. (STRATIFIED DRIFT)
	390 328							33 - 36 feet: SILTY SAND with gravel (SM), medium to olive brown, fine to coarse, fine to coarse gravel (subrounded, to 2 inches), low plasticity fines, dense, moist to wet. (STRATIFIED DRIFT)
				40				36 - 37.5 feet: SANDY GRAVEL with silt (GP), gray to olive gray, fine to coarse (subangular to subrounded, to 2 inches), fine to coarse sand, low plasticity fines, dense, wet. (STRATIFIED DRIFT)

REMARKS

1) G=grab sample, collected from bailed cuttings, SB=split barrel sample, collected with a 2-1/2-inch Dames and Moore core barrel and drive jars. 2) Conductivity of rig water = 180 to 185 umhos/cm. 3) Elevation measurement point (T.O.C.)=608.87 feet (USC&GD). 4) REFERENCE ELEVATION represents ground surface elevation. 5) LOCATION: SE of MW-30A.



LOG OF EXPLORATORY BORING

PROJECT NAME Cedar Hills Landfill
LOCATION See below
DRILLED BY Tacoma Pump & Drill
DRILL METHOD Cable Tool
LOGGED BY Mike Noll

BORING NO. EB-3
PAGE 3 OF 4
REFERENCE ELEV. 607.37' MSL
TOTAL DEPTH 64.00'
DATE COMPLETED 6/23/90

SAMPLING METHOD AND NUMBER	SPECIFIC CONDUCTANCE (umhos)	BLOW COUNTS	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
SB 8	405	150/6"		45		XX		37.5 - 40.5 feet: GRAVELLY SILT with sand (ML), olive to olive gray, low plasticity, fine to coarse gravel (subangular to subrounded, to 2-1/2 inches), fine to coarse sand, stiff, dry to moist. (STRATIFIED DRIFT)
	410							40.5 - 48.5 feet: SILTY SAND with gravel (SM), brown to olive brown, fine to coarse, some gravel (subangular to subrounded, to 2 inches), low plasticity to non-plastic fines, dense, moist. Some sandy gravel beds. (STRATIFIED DRIFT ?)
SB 9	450	150/9"		50				48.5 - 51 feet: SANDY GRAVEL with silt (GP), gray to dark gray, subangular to subrounded, to 2 inches, fine to coarse sand, few non-plastic fines, dense to very dense, dry to moist. (ADVANCE OUTWASH)
	373			55				51 - 59 feet: GRAVELLY SAND (SM), light yellowish brown and some light olive gray, fine to medium, coarse sand, fine to medium gravel (subangular to subrounded, to 1-1/4 inches), few low plasticity fines, dense to very dense, dry to moist. Some silty gravel layers. (ADVANCE OUTWASH)
				60				

REMARKS

1) G=grab sample, collected from bailed cuttings, SB=split barrel sample, collected with a 2-1/2-inch Dames and Moore core barrel and drive jars. 2) Conductivity of rig water = 180 to 185 umhos/cm. 3) Elevation measurement point (T.O.C.)=608.87 feet (USC&GD). 4) REFERENCE ELEVATION represents ground surface elevation. 5) LOCATION: SE of MW-30A.



LOG OF EXPLORATORY BORING

PROJECT NAME Cedar Hills Landfill
LOCATION See below
DRILLED BY Tacoma Pump & Drill
DRILL METHOD Cable Tool
LOGGED BY Mike Noll

BORING NO. EB-3
PAGE 4 OF 4
REFERENCE ELEV. 607.37' MSL
TOTAL DEPTH 64.00'
DATE COMPLETED 6/23/90

SAMPLING METHOD AND NUMBER	SPECIFIC CONDUCTANCE (umhos)	BLOW COUNTS	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
SB 10	270 *	200/6"			X			59 - 64 feet: SILTY SAND with gravel (SM), light olive brown, mostly fine to medium sand, some coarse sand, gravel is subangular to subrounded, to 1-1/4 inches, low plasticity to non-plastic fines, dense, dry to moist. Silty gravel interbeds, distinct bedding; beds 2 to 6 inches thick, olive grey. (ADVANCE OUTWASH) Bottom of borehole at 64 feet. * Sample probably diluted with rig water. <u>WELL COMPLETION DETAILS -- EB-3:</u> 0 - 35 feet: 2-inch-diameter schedule 40 PVC riser pipe; stick up 1.5 feet above ground surface 35 - 40 feet: 2-inch-diameter schedule 40 PVC screen with 0.010-inch slots 0 - 1.5 feet: concrete 1.5 - 31.5 feet: bentonite chips 31.5 - 41 feet: 10 x 20 Colorado silica sand 41 - 64 feet: bentonite chips
SB 11		200/6"			X			
				65				
				70				
				75				
				80				

REMARKS

1) G=grab sample, collected from bailed cuttings, SB=split barrel sample, collected with a 2-1/2-inch Dames and Moore core barrel and drive jars. 2) Conductivity of rig water = 180 to 185 umhos/cm. 3) Elevation measurement point (T.O.C.)=608.87 feet (USC&GD). 4) REFERENCE ELEVATION represents ground surface elevation. 5) LOCATION: SE of MW-30A.



LOG OF EXPLORATORY BORING

PROJECT NAME Cedar Hills Landfill
LOCATION See below
DRILLED BY Tacoma Pump & Drill
DRILL METHOD Cable Tool
LOGGED BY Mike Noll

BORING NO. EB- 4
PAGE 1 OF 3
REFERENCE ELEV. 643.79' MSL
TOTAL DEPTH 60.00'
DATE COMPLETED 7/6/90

SAMPLING METHOD AND NUMBER	SPECIFIC CONDUCTANCE (umhos)	BLOW COUNTS	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
				5				0 - 6 feet: GRAVELLY SILT with sand (ML), olive to olive gray, non-plastic to low plasticity, fine to coarse gravel (subrounded, to 3-inch diameter), fine to coarse sand, soft to firm, dry to moist. (FILL)
				10				6 - 19.5 feet: GRAVELLY SILT (ML), olive to olive gray, some olive brown, low plasticity, fine to coarse gravel (subangular to subrounded, to 3-inch diameter), few to some fine to coarse sand, firm to stiff, moist. Cobble bed at 8 to 8.5 feet. (GLACIAL TILL)
G 1	240		▽					
	235							
G 2	280			15				
G 3	268							
G 4	277			20				19.5 - 24 feet: Description on following page.

REMARKS


- 1) G = grab sample, collected from bailed drill cuttings.
- 2) Specific conductance of drill rig water is 190 to 200 umhos.
- 3) Elevation measurement point (T.O.C.) = 645.79 feet (USC&GD).
- 4) REFERENCE ELEVATION represents ground surface elevation. LOCATION: approximately 400' S of MW-47.



LOG OF EXPLORATORY BORING

PROJECT NAME Cedar Hills Landfill
LOCATION See below
DRILLED BY Tacoma Pump & Drill
DRILL METHOD Cable Tool
LOGGED BY Mike Noll

BORING NO. EB- 4
PAGE 2 OF 3
REFERENCE ELEV. 643.79' MSL
TOTAL DEPTH 60.00'
DATE COMPLETED 7/6/90

SAMPLING METHOD AND NUMBER	SPECIFIC CONDUCTANCE (umhos)	BLOW COUNTS	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
	795							19.5 - 24 feet: SILTY GRAVEL (GM), olive to olive brown, fine to coarse (subrounded, to 3-inch diameter), low plasticity fines, few to some fine to coarse sand, dense, moist to wet. (GLACIAL TILL)
G 5	380			25				24 - 26 feet: GRAVELLY SILT (ML), dark gray, low plasticity, fine to coarse gravel (subangular to subrounded, to 2-1/4-inch diameter), few to some fine to coarse sand, trace cobbles at 24 feet, firm to stiff, moist. (GLACIAL TILL)
				30				26 - 32 feet: SILT with gravel (ML), dark gray, low plasticity, fine to medium gravel (subrounded, to 1-inch diameter), few to some fine to coarse sand, firm to stiff, moist. (GLACIAL TILL)
G 6	245			35				32 - 56 feet: SILT (ML), dark gray, low plasticity, few to some fine to medium gravel (subrounded, to 1-inch diameter), few fine to coarse sand, firm, moist. Some thin laminae (to 1 mm thick). (LACUSTRINE DEPOSITS).
G 7	217			40				

REMARKS

1) G = grab sample, collected from bailed drill cuttings. 2) Specific conductance of drill rig water is 190 to 200 umhos.
 3) Elevation measurement point (T.O.C.) = 645.79 feet (USC&GD). 4) REFERENCE ELEVATION represents ground surface elevation. LOCATION: approximately 400' S of MW-47.



LOG OF EXPLORATORY BORING

PROJECT NAME Cedar Hills Landfill
LOCATION See below
DRILLED BY Tacoma Pump & Drill
DRILL METHOD Cable Tool
LOGGED BY Mike Noll

BORING NO. EB- 4
PAGE 3 OF 3
REFERENCE ELEV. 643.79' MSL
TOTAL DEPTH 60.00'
DATE COMPLETED 7/6/90

SAMPLING METHOD AND NUMBER	SPECIFIC CONDUCTANCE (umhos)	BLOW COUNTS	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
G 8	292			45				See preceding page for description. <u>WELL COMPLETION DETAILS -- EB-4:</u> 0 - 30 feet: 2-inch schedule 40 PVC riser pipe, stick up 2 feet above ground surface 30 - 35 feet: 2-inch schedule 40 PVC screen with 0.010-inch slots 0 - 1.5 feet: concrete 1.5 - 20 feet: bentonite chips 20 - 36 feet: 10 x 20 Colorado silica sand 36 - 50 feet: bentonite chips 50 - 60 feet: native caved material
G 9	299			50				
G 10	266			55				
				60				56 - 60 feet: GRAVELLY SILT (ML), dark gray, low plasticity, fine to coarse gravel (subrounded, to 3-inch diameter), few to some fine to coarse sand, trace to few cobbles, stiff to very stiff, moist. Refusal at 60 feet. (STRATIFIED DRIFT) Bottom of boring at 60 feet.

REMARKS

1) G=grab sample, collected from bailed drill cuttings. 2) Specific conductance of drill rig water is 190 to 200 umhos.
 3) Elevation measurement point (T.O.C.)=645.79 feet (USC&GD). 4) REFERENCE ELEVATION represents ground surface elevation. LOCATION: approximately 400' S of MW-47.



LOG OF EXPLORATORY BORING

PROJECT NAME Cedar Hills Landfill
LOCATION See below
DRILLED BY Tacoma Pump & Drill
DRILL METHOD Cable Tool
LOGGED BY Mike Noll

BORING NO. EB- 5
PAGE 1 OF 4
REFERENCE ELEV. 644.03' MSL
TOTAL DEPTH 66.00'
DATE COMPLETED 6/5/90

SAMPLING METHOD AND NUMBER	SPECIFIC CONDUCTANCE (umhos)	BLOW COUNTS	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLING	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
			▽	5				0 - 6 feet: SILTY GRAVEL with sand (GM), olive brown, fine to coarse (subrounded, to 1-3/4 inches), fine to coarse sand, non-plastic fines, medium dense, moist. (FILL)
	260			10				6 - 17 feet: GRAVELLY SILT with sand (ML), olive to olive gray, non-plastic to low plasticity, fine to coarse subrounded gravel, fine to coarse sand, stiff to very stiff, dry to moist, becoming wet at 15 to 20 feet. (GLACIAL TILL)
	208			15				
				20				17 - 29.5 feet: SILT (ML), brown to olive brown, low plasticity, few fine sand, trace coarse sand and fine subrounded gravel, stiff, moist. (GLACIAL TILL)

REMARKS

1) G=grab sample, collected from bailed cuttings; SB=split barrel sample, collected using a 2-1/2-inch Dames and Moore sample barrel and drive jars. 2) Conductivity of the rig water=180 to 185 umhos/cm. 3) Elevation measurement point (T.O.C.)=645.53 feet (USC&GD). 4) REFERENCE ELEVATION represents ground surface elevation. 5) LOCATION: NE of MW-50.



LOG OF EXPLORATORY BORING

PROJECT NAME Cedar Hills Landfill
LOCATION See below
DRILLED BY Tacoma Pump & Drill
DRILL METHOD Cable Tool
LOGGED BY Mike Noll

BORING NO. EB- 5
PAGE 2 OF 4
REFERENCE ELEV. 644.03' MSL
TOTAL DEPTH 66.00'
DATE COMPLETED 6/5/90

SAMPLING METHOD AND NUMBER	SPECIFIC CONDUCTANCE (umhos)	BLOW COUNTS	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
G 1				25				Description on previous page. -- @ 26 feet: color change to grey ----- 29.5 - 40 feet: SILT (ML), gray to dark gray, non-plastic, few fine to medium sand, trace coarse sand and fine subrounded gravel, very stiff, moist. (GLACIAL TILL)
SB 2	280	18 40 50		30	XXXX			
				35				
				40				

REMARKS

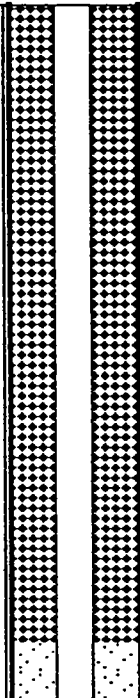
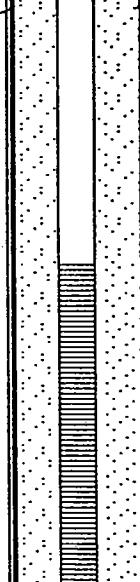

1) G=grab sample, collected from bailed cuttings; SB=split barrel sample, collected using a 2-1/2-inch Dames and Moore sample barrel and drive jars. 2) Conductivity of the rig water=180 to 185 umhos/cm. 3) Elevation measurement point (T.O.C.)=645.53 feet (USC&GD). 4) REFERENCE ELEVATION represents ground surface elevation. 5) LOCATION: NE of MW-50.



LOG OF EXPLORATORY BORING

PROJECT NAME Cedar Hills Landfill
LOCATION See below
DRILLED BY Tacoma Pump & Drill
DRILL METHOD Cable Tool
LOGGED BY Mike Noll

BORING NO. EB-5
PAGE 3 OF 4
REFERENCE ELEV. 644.03' MSL
TOTAL DEPTH 66.00'
DATE COMPLETED 6/5/90

SAMPLING METHOD AND NUMBER	SPECIFIC CONDUCTANCE (umhos)	BLOW COUNTS	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
SB 3		25 100/8"		40	XX			40 - 51 feet: GRAVELLY SILT (ML), dark gray to blueish gray, non-plastic, fine to medium gravel (subrounded, to 1 inch), trace fine to coarse sand, very stiff to hard, dry to moist. (GLACIAL TILL)
SB 4	206	35 100/7"		51	XX			51 - 60 feet: SILT (ML), gray to dark gray, low plasticity, few fine to medium sand, trace coarse sand and fine gravel (subrounded, to 3/4 inch), very stiff, moist to wet. Some thin laminae and sandy lenses. (LACUSTRINE DEPOSITS)
				60				

REMARKS

1) G=grab sample, collected from bailed cuttings; SB=split barrel sample, collected using a 2-1/2-inch Dames and Moore sample barrel and drive jars. 2) Conductivity of the rig water=180 to 185 umhos/cm. 3) Elevation measurement point (T.O.C.)=645.53 feet (USC&GD). 4) REFERENCE ELEVATION represents ground surface elevation. 5) LOCATION: NE of MW-50.



LOG OF EXPLORATORY BORING

PROJECT NAME Cedar Hills Landfill
 LOCATION See below
 DRILLED BY Tacoma Pump & Drill
 DRILL METHOD Cable Tool
 LOGGED BY Mike Noll

BORING NO. EB-5
 PAGE 4 OF 4
 REFERENCE ELEV. 644.03' MSL
 TOTAL DEPTH 66.00'
 DATE COMPLETED 6/5/90

SAMPLING METHOD AND NUMBER	SPECIFIC CONDUCTANCE (umhos)	BLOW COUNTS	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
SB 5		50/4"				X		60 - 64 feet: SILTY GRAVEL with sand (GM), olive brown with olive gray mottling, fine to coarse (subrounded, to 1-3/4 inch), fine to coarse sand, low plasticity fines, very dense, moist. (ADVANCE OUTWASH)
G 6	220 255 260			65				64 - 66 feet: SILTY GRAVEL with sand (GM), olive gray to light olive gray, fine to coarse (subrounded, to 1-3/4 inch), fine to coarse sand, low plasticity fines, dense, dry to moist. (ADVANCE OUTWASH)
				70				Bottom of borehole at 66 feet.
				75				WELL COMPLETION DETAILS -- EB-5: 0 - 55 feet: 2-inch diameter schedule 40 PVC riser pipe, stick up 1.5 feet above ground surface 55 - 60 feet: 2-inch diameter schedule 40 PVC screen with 0.010-inch slots 0 - 1.5 feet: concrete 1.5 - 50 feet: bentonite chips 50 - 61 feet: 10 x 20 Colorado silica sand 61 - 66 feet: bentonite chips
				80				

REMARKS

1) G=grab sample, collected from bailed cuttings; SB=split barrel sample, collected using a 2-1/2-inch Dames and Moore sample barrel and drive jars. 2) Conductivity of the rig water=180 to 185 umhos/cm. 3) Elevation measurement point (T.O.C.)=645.53 feet (USC&GD). 4) REFERENCE ELEVATION represents ground surface elevation. 5) LOCATION: NE of MW-50.



LOG OF EXPLORATORY BORING

PROJECT NAME Cedar Hills Landfill
LOCATION See below
DRILLED BY Tacoma Pump & Drill
DRILL METHOD Cable Tool
LOGGED BY Mike Noll

BORING NO. EB- 5S
PAGE 1 OF 1
REFERENCE ELEV. 644.41' MSL
TOTAL DEPTH 20.00'
DATE COMPLETED 6/6/90

SAMPLING METHOD AND NUMBER	SPECIFIC CONDUCTANCE (umhos)	BLOW COUNTS	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
			▽	5				0 - 6 feet: SILTY GRAVEL with sand (GM), olive brown, fine to coarse (subrounded, to 1-3/4 inches), fine to coarse sand, non-plastic fines, medium dense, moist. (FILL)
				10				6 - 17 feet: GRAVELLY SILT with SAND (ML), olive to olive gray, non-plastic to low plasticity, fine to coarse gravel (subrounded, to 1-3/4 inches), fine to coarse sand, very stiff, dry to moist, becoming wet at 15 to 20 feet. (GLACIAL TILL)
				15				WELL COMPLETION DETAILS -- EB-5S: 0 - 15 feet: 2-inch schedule 40 PVC riser pipe; stick up 1.5 feet above ground surface 15 - 20 feet: 2-inch schedule 40 PVC screen with 0.010-inch slots 0 - 1.5 feet: concrete 1.5 - 13 feet: bentonite chips 13 - 20 feet: 10 x 20 Colorado silica sand
				20				17 - 20 feet: SILT with sand (ML), brown to olive brown, low plasticity, few fine to medium sand, trace coarse sand and fine gravel (subrounded, to 1/2 inch), stiff, moist to wet. (GLACIAL TILL) Bottom of borehole at 20 feet.

REMARKS

1) No samples collected; see EB- 5. 2) No conductivity readings taken; see EB- 5. 3) Elevation measurement point (T.O.C.) = 645.91 feet (USC&GD). 4) REFERENCE ELEVATION represents ground surface elevation. 5) LOCATION: NE of MW-50.



LOG OF EXPLORATORY BORING

PROJECT NAME Harper Owes
LOCATION
DRILLED BY Tacoma Pump & Drill
DRILL METHOD Air Rotary
LOGGED BY Mike Noll

BORING NO. EB-6
PAGE 1 OF 3
REFERENCE ELEV. 587.41' MSL
TOTAL DEPTH 50.00'
DATE COMPLETED 11/28/90

Sampling Method and Number	BLOWS/6"	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
			5		5		0 - 6.0 feet: SILTY GRAVEL with sand (GM); olive brown, fine to coarse (subangular to subrounded), non-plastic fines, fine to coarse sand, dense, moist. Boulder at 5 feet. (WEATHERED GLACIAL TILL)
			10		10		6.0 - 9.0 feet: GRAVELLY SILT with sand (ML); olive to olive brown, non-plastic, fine to coarse gravel (subangular to subrounded), stiff, dry. (WEATHERED GLACIAL TILL)
			15		15		9.0 - 23.0 feet: SILTY GRAVEL with sand (GM); olive brown to olive gray, fine to coarse (subangular to subrounded), non-plastic fines, fine to coarse sand, dense, dry. Some cobbles and boulders at 16 feet and 23 feet. (GLACIAL TILL)
			20		20		

REMARKS

1) Elevation measurement point (T.O.C.) = 589.23 feet. 2) REFERENCE ELEVATION represents ground surface. 3) LOCATION: Northeast of MW-47.



LOG OF EXPLORATORY BORING

PROJECT NAME Harper Owes
LOCATION
DRILLED BY Tacoma Pump & Drill
DRILL METHOD Air Rotary
LOGGED BY Mike Noll

BORING NO. EB-6
PAGE 2 OF 3
REFERENCE ELEV. 587.41' MSL
TOTAL DEPTH 50.00'
DATE COMPLETED 11/28/90

Sampling Method and Number	BLOWS/6"	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
103		▽	25				23.0 - 26.0 feet: SILTY GRAVEL with sand (GM); olive to olive gray, fine to coarse (subangular to subrounded), low plasticity fines, fine to coarse sand, dense, moist. (STRATIFIED DRIFT)
			30				26.0 - 30.0 feet: SANDY GRAVEL (GP); olive to olive gray, fine to coarse (subangular to subrounded), fine to coarse sand, trace fines, some cobbles, dense, moist to wet. (STRATIFIED DRIFT)
			35				30.0 - 34.0 feet: SILTY GRAVEL with sand (GM); olive brown, fine to coarse (subangular to subrounded), low plasticity fines, fine to coarse sand, dense, wet. Some possible water production at 30 feet. (STRATIFIED DRIFT)
			40				34.0 - 36.0 feet: SILTY SAND with gravel (SM); olive, fine to coarse, low plasticity fines, fine to coarse gravel, dense, moist. (ADVANCE OUTWASH)
			40				36.0 - 50.0 feet: SANDY GRAVEL with silt (GP); olive, fine to coarse (subangular to subrounded), fine to coarse sand, low plasticity fines, medium dense, dry to moist. (ADVANCE OUTWASH)
115							

REMARKS

1) Elevation measurement point (T.O.C.) = 589.23 feet. 2) REFERENCE ELEVATION represents ground surface. 3) LOCATION: Northeast of MW-47.



LOG OF EXPLORATORY BORING

PROJECT NAME Harper Owes
LOCATION
DRILLED BY Tacoma Pump & Drill
DRILL METHOD Air Rotary
LOGGED BY Mike Noll

BORING NO. EB-6
PAGE 3 OF 3
REFERENCE ELEV. 587.41' MSL
TOTAL DEPTH 50.00'
DATE COMPLETED 11/28/90

Sampling Method and Number	BLOWS/6"	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
			45				
			50				Bottom of boring at 50.0 feet.
			55				<p><u>Well Completion Details - EB-6:</u></p> <p>0 - 20.0 feet: 2-inch diameter schedule 40 PVC riser pipe with 1.5 foot stick up.</p> <p>20.0 - 30.0 feet: 2-inch diameter schedule 40 PVC screen with 0.010-inch machined slots.</p> <p>30.0 - 30.5 feet: 2-inch diameter schedule 40 PVC end cap.</p> <p>0 - 2.0 feet: concrete.</p> <p>2.0 - 16.0 feet: bentonite chips.</p> <p>16.0 - 30.5 feet: 10 x 20 Colorado silica sand.</p> <p>30.5 - 46.0 feet: bentonite chips.</p> <p>46.0 - 50.0 feet: native caved materials.</p>
			60				

REMARKS

1) Elevation measurement point (T.O.C.) = 589.23 feet. 2) REFERENCE ELEVATION represents ground surface. 3) LOCATION: Northeast of MW-47.



LOG OF EXPLORATORY BORING

PROJECT NAME Harper Owes
LOCATION
DRILLED BY Tacoma Pump & Drill
DRILL METHOD Air Rotary
LOGGED BY Mike Noll

BORING NO. EB-7
PAGE 1 OF 4
REFERENCE ELEV. 609.10' MSL
TOTAL DEPTH 66.00'
DATE COMPLETED 11/21/90

Sampling Method and Number	BLOWS/6"	GROUND WATER LEVELS	DEPTH IN FT.	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
			5	0 - 6.5 feet: SILTY SAND with gravel (SM); olive brown, fine to coarse, non-plastic fines, fine to coarse gravel (subangular to subrounded), medium dense to dense, moist to dry. (FILL/WEATHERED GLACIAL TILL)		
			10	6.5 - 11.0 feet: SILTY GRAVEL with sand (GM); light olive brown, fine to coarse (subangular to subrounded), non-plastic fines, fine to coarse sand, some cobbles and boulders at 9 feet, dense to very dense, dry. (WEATHERED GLACIAL TILL)		
			15	11.0 - 15.0 feet: GRAVELLY SILT with sand (ML); olive gray, non-plastic, fine to coarse gravel (subangular to subrounded), fine to coarse sand, stiff to very stiff, dry. (GLACIAL TILL)		
			20	15.0 - 19.0 feet: SILTY GRAVEL with sand (GM); olive to olive gray, fine to coarse (subangular to subrounded), non-plastic fines, fine to coarse sand, dense to very dense, dry. Boulders at 15 and 16.5 feet. (GLACIAL TILL)		
				19.0 - 25.5 feet: GRAVELLY SILT with sand (ML); olive gray, non-plastic, fine to coarse		

REMARKS

1) Elevation measurement point (T.O.C.) = 611.01 feet. 2) REFERENCE ELEVATION represents ground surface. 3) LOCATION: Northeast of MW-47.



LOG OF EXPLORATORY BORING

PROJECT NAME Harper Owes

BORING NO. EB-7

LOCATION

PAGE 2 OF 4

DRILLED BY Tacoma Pump & Drill

REFERENCE ELEV. 609.10' MSL

DRILL METHOD Air Rotary

TOTAL DEPTH 66.00'

LOGGED BY Mike Noll

DATE COMPLETED 11/21/90

Sampling Method and Number	BLOWS/6"	GROUND WATER LEVELS	DEPTH IN FT.	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
			25	25.5 - 28.0 feet: SILTY SAND with gravel (SM); olive gray, fine to coarse, low plasticity fines, fine to coarse gravel, dense, dry to moist. (STRATIFIED DRIFT)		gravel, fine to coarse sand, stiff, moist. SILTY GRAVEL (GM) lense at 21.5 to 24 feet. (GLACIAL TILL)
			30	28.0 - 30.0 feet: GRAVELLY SAND (SP); olive, fine to coarse, fine to coarse gravel, dense, moist to wet. (STRATIFIED DRIFT)		
			35	30.0 - 41.0 feet: SILTY GRAVEL with sand (GM); olive gray to 31 feet, olive brown below 31 feet, fine to coarse (subangular to subrounded), low plasticity fines, fine to coarse sand, dense, moist to wet below 31 feet. Boulders at 34.5 feet, cobbles and boulders at 39 feet and 40 to 41 feet. (STRATIFIED DRIFT)		
			40			

REMARKS

1) Elevation measurement point (T.O.C.) = 611.01 feet. 2) REFERENCE ELEVATION represents ground surface. 3) LOCATION: Northeast of MW-47.



LOG OF EXPLORATORY BORING

PROJECT NAME Harper Owes
LOCATION
DRILLED BY Tacoma Pump & Drill
DRILL METHOD Air Rotary
LOGGED BY Mike Noll

BORING NO. EB-7
PAGE 3 OF 4
REFERENCE ELEV. 609.10' MSL
TOTAL DEPTH 66.00'
DATE COMPLETED 11/21/90

Sampling Method and Number	BLOWS/6"	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
			45				41.0 - 43.0 feet: SILTY SAND with gravel (SM); olive, fine to coarse, low plasticity fines, fine to coarse gravel, dense, wet. (STRATIFIED DRIFT)
			50				43.0 - 53.0 feet: SILTY GRAVEL with sand (GM); olive, fine to coarse (subangular to subrounded), non-plastic to low plasticity fines, fine to coarse sand, dense, moist. BOULDERS at 43.5 to 45 feet, 48 feet, and 51.5 feet. (STRATIFIED DRIFT)
		▽	55				53.0 - 59.0 feet: SILTY GRAVEL with sand (GM); olive brown, fine to coarse, (subangular to subrounded), low plasticity fines, fine to coarse sand, dense, moist to wet. (STRATIFIED DRIFT)
294			60				59.0 - 66.0 feet: GRAVELLY SAND (SP); olive to olive brown, fine to coarse, fine to coarse

REMARKS

1) Elevation measurement point (T.O.C.) = 611.01 feet. 2) REFERENCE ELEVATION represents ground surface. 3) LOCATION: Northeast of MW-47.



LOG OF EXPLORATORY BORING

PROJECT NAME Harper Owes
LOCATION
DRILLED BY Tacoma Pump & Drill
DRILL METHOD Air Rotary
LOGGED BY Mike Noll

BORING NO. EB-7
PAGE 4 OF 4
REFERENCE ELEV. 609.10' MSL
TOTAL DEPTH 66.00'
DATE COMPLETED 11/21/90

Sampling Method and Number	BLOWS/6"	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
			65				gravel (subangular to subrounded), trace fines, medium dense, dry to moist. (ADVANCE OUTWASH)
			70				Bottom of boring at 66.0 feet. <u>Well Completion Details - EB-7:</u> 0 - 31.0 feet: 2-inch diameter schedule 40 PVC riser pipe with 1.5-foot stick up. 31.0 - 56.0 feet: 2-inch diameter schedule 40 PVC screen with 0.010-inch machined slots. 56.0 - 56.5 feet: 2-inch diameter schedule 40 PVC end cap. 0 - 2.0 feet: concrete. 2.0 - 28.0 feet: bentonite chips. 28.0 - 57.0 feet: 10 x 20 Colorado silica sand. 57.0 - 66.0 feet: bentonite chips.
			75				
			80				

REMARKS

1) Elevation measurement point (T.O.C.) = 611.01 feet. 2) REFERENCE ELEVATION represents ground surface. 3)
 LOCATION: Northeast of MW-47.



LOG OF EXPLORATORY BORING

PROJECT NAME CHRL Expanded Aquifer Characterization
 LOCATION Cedar Hills Landfill
 DRILLED BY Ramlo Well Drilling
 DRILL METHOD Air Rotary
 LOGGED BY A. Udalay/P. Brooks

BORING NO. MW-67S
 PAGE 1 OF 12
 GROUND ELEV. 514.00'
 TOTAL DEPTH 210.00'
 DATE COMPLETED 04/06/93

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
G	1			5	■	○		0 to 2.5 feet: SILTY SAND (SM), reddish brown, fine to coarse, little fine to medium gravel, damp to moist, some roots. (TOPSOIL)
G	2			10	■	○		2.5 to 12.0 feet: SILTY GRAVEL (GM), yellow brown, fine to medium, subrounded, little to some sand, few to little fines, moist. (TILL/STRATIFIED DRIFT)
G	3			15	■	○		12.0 to 49.0 feet: SILTY GRAVEL (GP-GM), olive brown, fine to medium, subrounded, little to some sand, few fines, moist to wet. (STRATIFIED DRIFT) @ 15.0 feet: wet.
				20		○		

REMARKS

(1) See general remarks. (2) Blow counts do not represent SPT results. (3) Reference elevation = approximate ground surface. (4) Well decommissioned after installation (see page 12). (5) Water added during drilling below 15 feet.



LOG OF EXPLORATORY BORING

PROJECT NAME CHRL Expanded Aquifer Characterization
LOCATION Cedar Hills Landfill
DRILLED BY Ramlo Well Drilling
DRILL METHOD Air Rotary
LOGGED BY A. Udalay/P. Brooks

BORING NO. MW-67S
PAGE 2 OF 12
GROUND ELEV. 514.00'
TOTAL DEPTH 210.00'
DATE COMPLETED 04/06/93

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
G	4							12.0 to 49.0 feet: SILTY GRAVEL (GP-GM), olive brown, fine to medium, subrounded, little to some sand, few fines, moist to wet. (STRATIFIED DRIFT) @ 35.0 to 40.0 feet: little fines.
G	5			25				
G	6			30				
G	7			35				
				40				

REMARKS

(1) See general remarks. (2) Blow counts do not represent SPT results. (3) Reference elevation = approximate ground surface. (4) Well decommissioned after installation (see page 12). (5) Water added during drilling below 15 feet.



LOG OF EXPLORATORY BORING

PROJECT NAME CHRL Expanded Aquifer Characterization
LOCATION Cedar Hills Landfill
DRILLED BY Ramlo Well Drilling
DRILL METHOD Air Rotary
LOGGED BY A. Udaloy/P. Brooks

BORING NO. MW-67S
PAGE 3 OF 12
GROUND ELEV. 514.00
TOTAL DEPTH 210.00
DATE COMPLETED 04/06/93

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
G	8							12.0 to 49.0 feet: SILTY GRAVEL (GP-GM), olive brown, fine to medium, subrounded, little to some sand, few fines, moist to wet. (STRATIFIED DRIFT)
G	9			45				
G	10			50			49.0 to 52.0 feet: GRAVEL (GP), reddish brown, fine to medium, few sand, few coarse gravel, trace fines, trace cobbles. (ADVANCE OUTWASH)	
G	11			55			52.0 to 54.0 feet: SILTY GRAVEL (GM), yellow brown, well graded, few to little sand. (ADVANCE OUTWASH) 54.0 to 75.0 feet: SILTY GRAVEL (GM), yellow brown, well graded, some sand. (ADVANCE OUTWASH)	
				60				

REMARKS

(1) See general remarks. (2) Blow counts do not represent SPT results. (3) Reference elevation = approximate ground surface. (4) Well decommissioned after installation (see page 12). (5) Water added during drilling below 15 feet.



LOG OF EXPLORATORY BORING

PROJECT NAME CHRL Expanded Aquifer Characterization
LOCATION Cedar Hills Landfill
DRILLED BY Ramlo Well Drilling
DRILL METHOD Air Rotary
LOGGED BY A. Udalay/P. Brooks

BORING NO. MW-67S
PAGE 4 OF 12
GROUND ELEV. 514.00'
TOTAL DEPTH 210.00'
DATE COMPLETED 04/06/93

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
G	12							54.0 to 75.0 feet: SILTY GRAVEL (GM), yellow brown, well graded, some sand. (ADVANCE OUTWASH)
G	13			65				@ 69.0 feet: coarse gravel or cobbles.
G	14			70				
G	15			75				75.0 to 82.0 feet: SILTY GRAVEL (GW-GM), yellow brown, little to some fine to coarse sand, few fines. (ADVANCE OUTWASH)
				80				

REMARKS

(1) See general remarks. (2) Blow counts do not represent SPT results. (3) Reference elevation = approximate ground surface. (4) Well decommissioned after installation (see page 12). (5) Water added during drilling below 15 feet.



LOG OF EXPLORATORY BORING

PROJECT NAME CHRL Expanded Aquifer Characterization
LOCATION Cedar Hills Landfill
DRILLED BY Ramlo Well Drilling
DRILL METHOD Air Rotary
LOGGED BY A. Udaloy/P. Brooks

BORING NO. MW-67
PAGE 5 OF 12
GROUND ELEV. 514.00'
TOTAL DEPTH 210.00'
DATE COMPLETED 04/06/93

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
G	16					75.0		75.0 to 82.0 feet: SILTY GRAVEL (GW-GM), yellow brown, little to some fine to coarse sand, few fines. (ADVANCE OUTWASH)
				85		82.0		82.0 to 97.0 feet: SILTY GRAVEL (GW-GM), yellow brown, subrounded, little fine to coarse sand. (ADVANCE OUTWASH)
G	17					90		
G	18					95		
G	19					100		97.0 to 114.0 feet: GRAVEL (GW), yellow brown to gray brown, fine to coarse, subrounded, some fine to coarse sand, trace fines. (ADVANCE OUTWASH)

REMARKS

(1) See general remarks. (2) Blow counts do not represent SPT results. (3) Reference elevation = approximate ground surface. (4) Well decommissioned after installation (see page 12). (5) Water added during drilling below 15 feet.



LOG OF EXPLORATORY BORING

PROJECT NAME CHRL Expanded Aquifer Characterization
LOCATION Cedar Hills Landfill
DRILLED BY Ramlo Well Drilling
DRILL METHOD Air Rotary
LOGGED BY A. Udalay/P. Brooks

BORING NO. MW-67S
PAGE 6 OF 12
GROUND ELEV. 514.00'
TOTAL DEPTH 210.00'
DATE COMPLETED 04/06/93

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
G	20					97.0		97.0 to 114.0 feet: GRAVEL (GW), yellow brown to gray brown, fine to coarse, subrounded, some fine to coarse sand, trace fines. (ADVANCE OUTWASH)
G	21			105				
G	22			110				
G	23			115				
				120				114.0 to 131.0 feet: SILTY GRAVEL (GW-GM), yellow brown, subrounded, some fine to coarse sand, few to little fines. (ADVANCE OUTWASH)

REMARKS

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LOG OF EXPLORATORY BORING

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LOCATION Cedar Hills Landfill
DRILLED BY Ramlo Well Drilling
DRILL METHOD Air Rotary
LOGGED BY A. Udalay/P. Brooks

BORING NO. MW-67S
PAGE 7 OF 12
GROUND ELEV. 514.00'
TOTAL DEPTH 210.00'
DATE COMPLETED 04/06/93

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
G	24							<p>114.0 to 131.0 feet: SILTY GRAVEL (GW-GM), yellow brown, subrounded, some fine to coarse sand, few to little fines. (ADVANCE OUTWASH)</p> <hr/> <p>131.0 to 138.0 feet: SILTY SAND (SP-SM), light gray brown to yellow brown, fine, trace gravel. (ADVANCE OUTWASH)</p> <hr/> <p>138.0 to 146.5 feet: GRAVEL (GW), gray brown, subrounded, orange-brown stained surfaces, some fine to coarse sand. (ADVANCE OUTWASH)</p>
G	25			125				
G	26			130				
G	27			135				
				140				

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PROJECT NAME CHRL Expanded Aquifer Characterization
LOCATION Cedar Hills Landfill
DRILLED BY Ramlo Well Drilling
DRILL METHOD Air Rotary
LOGGED BY A. Udalay/P. Brooks

BORING NO. MW-67S
PAGE 8 OF 12
GROUND ELEV. 514.00'
TOTAL DEPTH 210.00'
DATE COMPLETED 04/06/93

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
G	28					138.0		138.0 to 146.5 feet: GRAVEL (GW), gray brown, subrounded, orange-brown stained surfaces, some fine to coarse sand. (ADVANCE OUTWASH) 146.5 to 147.0 feet: SILT (ML), gray brown. (ADVANCE OUTWASH) 147.0 to 160.5 feet: GRAVEL (GP), fine to medium, subrounded, orange-brown staining on surfaces, some fine sand. (ADVANCE OUTWASH)
G	29			145				
G SB	30 31	NR						
G	32			150				
G	33			155				
				160				

REMARKS

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LOCATION Cedar Hills Landfill
DRILLED BY Ramlo Well Drilling
DRILL METHOD Air Rotary
LOGGED BY A. Udalyo/P. Brooks

BORING NO. MW-67
PAGE 9 OF 11
GROUND ELEV. 514.00'
TOTAL DEPTH 210.00'
DATE COMPLETED 04/06/93

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
SB	34	45-50/3"		165	■	●		160.5 to 171.0 feet: SILTY SAND (SP-SM), gray brown, fine, few fine to medium gravel. (ADVANCE OUTWASH)
SB	35	50		170	■	●		171.0 to 171.5 feet: SILT (ML), light gray, finely laminated, low plasticity. (ADVANCE OUTWASH)
SB	36	50		175	■	●		171.5 to 184.0 feet: SILTY SAND (SP-SM), gray brown, fine, trace fine to medium gravel. (ADVANCE OUTWASH)
SB	37	NR			■	●		
SB	38	50		180	■	●		

REMARKS

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DRILLED BY Ramlo Well Drilling
DRILL METHOD Air Rotary
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BORING NO. MW-67S
PAGE 10 OF 12
GROUND ELEV. 514.00'
TOTAL DEPTH 210.00'
DATE COMPLETED 04/06/93

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
G	39							171.5 to 184.0 feet: SILTY SAND (SP-SM), gray brown, fine, trace fine to medium gravel. (ADVANCE OUTWASH)
G	40			185				184.0 to 190.0 feet: SAND (SW), gray brown, fine to coarse, trace fines, trace fine gravel. (ADVANCE OUTWASH)
SB	41	NR						
SB	42	42-50/3"		190				190.0 to 191.0 feet: SILT (ML), gray, stiff, moderate plasticity. (PRE-VASHON DEPOSITS)
SB	43	42-50/3"						191.0 to 210.0 feet: SAND (SP), gray brown, fine to medium, few subrounded fine gravel, trace fines. Orange-brown staining on some surfaces. (PRE-VASHON DEPOSITS)
				195				
				200				

REMARKS

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LOCATION Cedar Hills Landfill
DRILLED BY Ramlo Well Drilling
DRILL METHOD Air Rotary
LOGGED BY A. Udalay/P. Brooks

BORING NO. MW-67
PAGE 11 OF 1
GROUND ELEV. 514.00'
TOTAL DEPTH 210.00'
DATE COMPLETED 04/06/93

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
G	44			205				191.0 to 210.0 feet: SAND (SP), gray brown, fine to medium, few subrounded fine gravel, trace fines. Orange-brown staining on some surfaces. (PRE-VASHON DEPOSITS) @ 208.0 feet: gravel becomes fine to medium.
G	45			210				
				215				Total depth drilled = 210.0 feet. Total depth sampled = 210.0 feet.
				220				See Page 12 for Well Completion Details.

REMARKS

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BORING NO. MW-67S
PAGE 12 OF 12
GROUND ELEV. 514.00'
TOTAL DEPTH 210.00'
DATE COMPLETED 04/06/93

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
				225				<p>WELL COMPLETION DETAILS:</p> <p>+2.6 to 175.7 feet: Nominal 2.5-inch O.D., flush-threaded, schedule 80 PVC blank riser pipe.</p> <p>175.7 to 179.7 feet: Nominal 2.5-inch O.D., flush-threaded, schedule 80 PVC well screen with 0.020-inch machined slots.</p> <p>179.7 to 180.5 feet: Nominal 2.5-inch O.D., flush-threaded schedule 80 PVC blank riser pipe.</p> <p>180.5 to 189.5 feet: Nominal 2.5-inch O.D., flush-threaded, schedule 80 PVC well screen with 0.020-inch machined slots.</p> <p>189.5 to 190.4 feet: Nominal 2.5-inch O.D., flush-threaded, schedule 80 PVC end cap with stainless steel centralizer.</p> <p>0 to 3.0 feet: Concrete.</p> <p>3.0 to 172.5 feet: Pure Gold medium bentonite chips hydrated with potable water.</p> <p>172.5 to 190.4 feet: 20 - 40 Colorado Silica Sand.</p> <p>190.4 to 210.0 feet: Pure Gold medium bentonite chips.</p> <p>199.7 to 210.0 feet: Cut casing and drive shoe.</p> <p>WELL DECOMMISSIONING DETAILS:</p> <p>0 to 3.0 feet: Concrete.</p> <p>3.0 to 190.4 feet: Pure Gold bentonite grout.</p> <p>Note: Bentonite grout was installed using pressure-grouting methods. Blank riser from +2.6 to above 17.0 feet below grade was removed after pressure-grouting.</p>
				230				
				235				
				240				

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LOG OF EXPLORATORY BORING

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LOCATION Cedar Hills Landfill
DRILLED BY Ramlo Well Drilling
DRILL METHOD Air Rotary
LOGGED BY P. Brooks/S. Burkett

BORING NO. MW-67
PAGE 1 OF 14
GROUND ELEV. 514.10'
TOTAL DEPTH 245.00'
DATE COMPLETED 04/28/93

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
				<div style="display: flex; align-items: center;"> <div style="margin-right: 10px;">5</div> <div style="margin-right: 10px;">10</div> <div style="margin-right: 10px;">15</div> <div style="margin-right: 10px;">20</div> </div>				<p>0 to 160.0 feet: See lithologic description for Boring MW-67S.</p>

REMARKS

(1) See general remarks. (2) Blow counts do not represent SPT results. (3) Reference elevation = ground surface. (4) Top of casing elevation = 516.43 feet. (5) Static water level = 223.64 feet below top of casing at 12:35 on June 7, 1993. (6) Water added during drilling below 15 feet.



LOG OF EXPLORATORY BORING

PROJECT NAME CHRL Expanded Aquifer Characterization
LOCATION Cedar Hills Landfill
DRILLED BY Ramlo Well Drilling
DRILL METHOD Air Rotary
LOGGED BY P. Brooks/S. Burkett

BORING NO. MW-67
PAGE 2 OF 14
GROUND ELEV. 514.10'
TOTAL DEPTH 245.00'
DATE COMPLETED 04/28/93

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
				<div style="display: flex; flex-direction: column; align-items: center;"> <div style="margin-bottom: 10px;">25</div> <div style="margin-bottom: 10px;">30</div> <div style="margin-bottom: 10px;">35</div> <div style="margin-bottom: 10px;">40</div> </div>				0 to 160.0 feet: See lithologic description for Boring MW-67S.

REMARKS

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LOG OF EXPLORATORY BORING

PROJECT NAME CHRL Expanded Aquifer Characterization
LOCATION Cedar Hills Landfill
DRILLED BY Ramlo Well Drilling
DRILL METHOD Air Rotary
LOGGED BY P. Brooks/S. Burkett

BORING NO. MW-67
PAGE 3 OF 14
GROUND ELEV. 514.10'
TOTAL DEPTH 245.00'
DATE COMPLETED 04/28/93

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 8-INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
				<div style="display: flex; flex-direction: column; align-items: center;"> <div style="margin-bottom: 10px;">45</div> <div style="margin-bottom: 10px;">50</div> <div style="margin-bottom: 10px;">55</div> <div style="margin-bottom: 10px;">60</div> </div>				0 to 160.0 feet: See lithologic description for Boring MW-67S.

REMARKS

(1) See general remarks. (2) Blow counts do not represent SPT results. (3) Reference elevation = ground surface. (4) Top of casing elevation = 516.43 feet. (5) Static water level = 223.64 feet below top of casing at 12:35 on June 7, 1993. (6) Water added during drilling below 15 feet.



LOG OF EXPLORATORY BORING

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LOCATION Cedar Hills Landfill
DRILLED BY Ramlo Well Drilling
DRILL METHOD Air Rotary
LOGGED BY P. Brooks/S. Burkett

BORING NO. MW-67
PAGE 4 OF 14
GROUND ELEV. 514.10'
TOTAL DEPTH 245.00'
DATE COMPLETED 04/28/93

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
				65				0 to 160.0 feet: See lithologic description for Boring MW-67S.
				70				
				75				
				80				

REMARKS

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LOG OF EXPLORATORY BORING

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LOGGED BY P. Brooks/S. Burkett

BORING NO. MW-67
PAGE 5 OF 14
GROUND ELEV. 514.10'
TOTAL DEPTH 245.00'
DATE COMPLETED 04/28/93

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
				85				0 to 160.0 feet: See lithologic description for Boring MW-67S.
				90				
				95				
				100				

REMARKS

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LOG OF EXPLORATORY BORING

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DRILL METHOD Air Rotary
LOGGED BY P. Brooks/S. Burkett

BORING NO. MW-67
PAGE 6 OF 14
GROUND ELEV. 514.10'
TOTAL DEPTH 245.00'
DATE COMPLETED 04/28/93

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
				<div style="display: flex; flex-direction: column; align-items: center;"> <div style="margin-bottom: 10px;">105</div> <div style="margin-bottom: 10px;">110</div> <div style="margin-bottom: 10px;">115</div> <div style="margin-bottom: 10px;">120</div> </div>				0 to 160.0 feet: See lithologic description for Boring MW-67S.

REMARKS

(1) See general remarks. (2) Blow counts do not represent SPT results. (3) Reference elevation = ground surface. (4) Top of casing elevation = 516.43 feet. (5) Static water level = 223.64 feet below top of casing at 12:35 on June 7, 1993. (6) Water added during drilling below 15 feet.



LOG OF EXPLORATORY BORING

PROJECT NAME CHRL Expanded Aquifer Characterization
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LOGGED BY P. Brooks/S. Burkett

BORING NO. MW-67
PAGE 7 OF 14
GROUND ELEV. 514.10'
TOTAL DEPTH 245.00'
DATE COMPLETED 04/28/93

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
				<div style="display: flex; flex-direction: column; align-items: center;"> <div style="margin-bottom: 10px;">125</div> <div style="margin-bottom: 10px;">130</div> <div style="margin-bottom: 10px;">135</div> <div style="margin-bottom: 10px;">140</div> </div>				0 to 160.0 feet: See lithologic description for Boring MW-67S.

REMARKS

(1) See general remarks. (2) Blow counts do not represent SPT results. (3) Reference elevation = ground surface. (4) Top of casing elevation = 516.43 feet. (5) Static water level = 223.64 feet below top of casing at 12:35 on June 7, 1993. (6) Water added during drilling below 15 feet.



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LOGGED BY P. Brooks/S. Burkett

BORING NO. MW-67
PAGE 8 OF 14
GROUND ELEV. 514.10'
TOTAL DEPTH 245.00'
DATE COMPLETED 04/28/93

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
				145				0 to 160.0 feet: See lithologic description for Boring MW-67S.
				150				
				155				
				160				

REMARKS

(1) See general remarks. (2) Blow counts do not represent SPT results. (3) Reference elevation = ground surface. (4) Top of casing elevation = 516.43 feet. (5) Static water level = 223.64 feet below top of casing at 12:35 on June 7, 1993. (6) Water added during drilling below 15 feet.



LOG OF EXPLORATORY BORING

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BORING NO. MW-67
PAGE 9 OF 14
GROUND ELEV. 514.10'
TOTAL DEPTH 245.00'
DATE COMPLETED 04/28/93

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
SB	1	50						160.0 to 189.5 feet: SILTY SAND (SP-SM), yellow brown to gray brown, fine, few to some fine to medium subrounded gravel, few fines, damp. Orange brown coatings on sands to 166.0 feet. (ADVANCE OUTWASH)
SB	2	50		165				
SB	3	50		170				
SB	4	50		175				
				180				

REMARKS

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LOG OF EXPLORATORY BORING

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LOCATION Cedar Hills Landfill
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DRILL METHOD Air Rotary
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BORING NO. MW-67
PAGE 10 OF 14
GROUND ELEV. 514.10'
TOTAL DEPTH 245.00'
DATE COMPLETED 04/28/93

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
SB	5	50						160.0 to 189.5 feet: SILTY SAND (SP-SM), yellow brown to gray brown, fine, few to some fine to medium subrounded gravel, few fines, damp. Orange brown coatings on sands to 166.0 feet. (ADVANCE OUTWASH)
SB	6	100/8"		185				
SB	7	100/6.5"						
SB	8	100/6.5"						
SB	9	100/9"						
SB	10	100/9"						
SB	11	50		190				189.5 to 190.5 feet: SILT (ML), gray, stiff, moist, finely laminated. (PRE VASHON DEPOSITS)
SB	12	50						190.5 to 206.0 feet: SAND (SP), gray brown, fine, little to some fine to medium subrounded gravel, few fines, trace discrete gray silt interbeds. (PRE-VASHON DEPOSITS)
				195				
				200				

REMARKS

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LOG OF EXPLORATORY BORING

PROJECT NAME CHRL Expanded Aquifer Characterization
LOCATION Cedar Hills Landfill
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DRILL METHOD Air Rotary
LOGGED BY P. Brooks/S. Burkett

BORING NO. MW-67
PAGE 11 OF 1
GROUND ELEV. 514.10'
TOTAL DEPTH 245.00'
DATE COMPLETED 04/28/93

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
				205				190.5 to 206.0 feet: SAND (SP), gray brown, fine, little to some fine to medium subrounded gravel, few fines, trace discrete gray silt interbeds. (PRE-VASHON DEPOSITS)
				210				206.0 to 238.0 feet: GRAVEL (GP), yellow brown, fine to medium, some fine to medium sand, trace to few fines, trace coarse gravel/cobbles. (PRE-VASHON DEPOSITS)
				215				
				220				

REMARKS

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LOCATION Cedar Hills Landfill
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DRILL METHOD Air Rotary
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BORING NO. MW-67
PAGE 12 OF 14
GROUND ELEV. 514.10'
TOTAL DEPTH 245.00'
DATE COMPLETED 04/28/93

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
G	13							206.0 to 238.0 feet: GRAVEL (GP), yellow brown, fine to medium, some fine to medium sand, trace to few fines, trace coarse gravel/cobbles. (PRE-VASHON DEPOSITS)
G	14			225				@ 228.0 feet: cobble.
G	15			230				@ 230.0 to 234.0 feet: yellow gray.
G	16			235				@ 234.0 to 245.0 feet: gray.
				240				238.0 to 245.0 feet: GRAVEL (GP), gray, medium to coarse, trace cobbles. (PRE-VASHON DEPOSITS)

REMARKS

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LOCATION Cedar Hills Landfill
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DRILL METHOD Air Rotary
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BORING NO. MW-67
PAGE 13 OF
GROUND ELEV. 514.10'
TOTAL DEPTH 245.00'
DATE COMPLETED 04/28/93

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
				245	○			238.0 to 245.0 feet: GRAVEL (GP), gray, medium to coarse, trace cobbles. (PRE-VASHON DEPOSITS)
				250				Total depth drilled = 245.0 feet. Total depth sampled = 236.0 feet.
				255				
				260				
See Page 14 for Well Completion Details.								

REMARKS

(1) See general remarks. (2) Blow counts do not represent SPT results. (3) Reference elevation = ground surface. (4) Top of casing elevation = 516.43 feet. (5) Static water level = 223.64 feet below top of casing at 12:35 on June 7, 1993. (6) Water added during drilling below 15 feet.



LOG OF EXPLORATORY BORING

PROJECT NAME CHRL Expanded Aquifer Characterization
LOCATION Cedar Hills Landfill
DRILLED BY Ramlo Well Drilling
DRILL METHOD Air Rotary
LOGGED BY P. Brooks/S. Burkett

BORING NO. MW-67
PAGE 14 OF 14
GROUND ELEV. 514.10'
TOTAL DEPTH 245.00'
DATE COMPLETED 04/28/93

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
				265				<p>WELL COMPLETION DETAILS:</p> <p>+2.3 to 216.3 feet: Nominal 2.5-inch O.D., flush-threaded, schedule 80 PVC blank riser pipe.</p> <p>215.6 to 216.3 feet: Stainless steel centralizer.</p> <p>216.3 to 220.3 feet: Nominal 2.5-inch O.D., flush-threaded, schedule 80 PVC well screen with 0.020-inch machined slots.</p> <p>220.3 to 221.1 feet: Nominal 2.5-inch O.D., flush-threaded, schedule 80 PVC blank riser pipe.</p> <p>221.1 to 230.1 feet: Nominal 2.5-inch O.D., flush-threaded, schedule 80 PVC well screen with 0.020-inch machined slots.</p> <p>230.1 to 231.0 feet: Nominal 2.5-inch O.D., flush-threaded, schedule 80 PVC end cap with stainless steel centralizer.</p> <p>0 to 3.0 feet: Concrete.</p> <p>3.0 to 212.8 feet: Pure Gold medium bentonite chips hydrated with potable water.</p> <p>212.8 to 234.3 feet: 20 - 40 Colorado Silica Sand.</p> <p>234.3 to 238.3 feet: Pure Gold medium bentonite chips.</p> <p>238.3 to 245.0 feet: Cut casing, drive shoe, and slough.</p>
				270				
				275				
				280				

REMARKS

(1) See general remarks. (2) Blow counts do not represent SPT results. (3) Reference elevation = ground surface. (4) Top of casing elevation = 516.43 feet. (5) Static water level = 223.64 feet below top of casing at 12:35 on June 7, 1993. (6) Water added during drilling below 15 feet.



LOG OF EXPLORATORY BORING

PROJECT NAME CHRL Expanded Aquifer Characterization
LOCATION Cedar Hills Landfill
DRILLED BY Ramlo Well Drilling
DRILL METHOD Air Rotary
LOGGED BY P. Brooks/A. Udalay

BORING NO. MW-6
PAGE 1 OF 2
GROUND ELEV. 644.79'
TOTAL DEPTH 370.00'
DATE COMPLETED 04/15/93

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
				0				0 to 1.5 feet: ROCK AND CONCRETE, cobble size. (FILL)
				5				1.5 to 12.0 feet: SILT (ML), gray brown to brown, few fine to coarse sand, few fine to medium gravel, moist. (TILL)
G	1			5				@ 7.0 feet: boulder.
				10				@ 8.0 to 12.0 feet: some gravel.
G	2			10				
				15				12.0 to 23.5 feet: SILTY GRAVEL (GM), gray brown, well graded, some fines, moist. (TILL)
G	3			15				
				20				

REMARKS

(1) See general remarks. (2) Blow counts do not represent SPT results. (3) Reference elevation = ground surface. (4) Top of casing elevation = 647.07 feet. (5) Static water level = 335.32 feet below top of casing at 12:15 on June 7, 1993. (6) Water added during drilling below 37.5 feet.



LOG OF EXPLORATORY BORING

PROJECT NAME CHRL Expanded Aquifer Characterization
LOCATION Cedar Hills Landfill
DRILLED BY Ramlo Well Drilling
DRILL METHOD Air Rotary
LOGGED BY P. Brooks/A. Udalay

BORING NO. MW-68
PAGE 2 OF 20
GROUND ELEV. 644.79'
TOTAL DEPTH 370.00'
DATE COMPLETED 04/15/93

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
G	4							12.0 to 23.5 feet: SILTY GRAVEL (GM), gray brown, well graded, some fines, moist. (TILL)
G	5			25				23.5 to 27.5 feet: SILT (ML), gray, little to some fine to coarse sand, little to some gravel, moist. (TILL)
G	6			30				27.5 to 32.5 feet: SILTY SAND (SM), gray, fine, moist. (STRATIFIED DRIFT)
G	7			35				32.5 to 35.0 feet: SILT (ML), gray, some fine sand, firm, moist. (STRATIFIED DRIFT)
				40				35.0 to 46.5 feet: SILTY GRAVEL (GP-GM), gray, fine to medium, some fine to coarse sand, few fines, dry to moist. (STRATIFIED DRIFT)
								@ 37.0 to 38.0 feet: granitic boulder.

REMARKS

(1) See general remarks. (2) Blow counts do not represent SPT results. (3) Reference elevation = ground surface. (4) Top of casing elevation = 647.07 feet. (5) Static water level = 335.32 feet below top of casing at 12:15 on June 7, 1993. (8) Water added during drilling below 37.5 feet.



LOG OF EXPLORATORY BORING

PROJECT NAME CHRL Expanded Aquifer Characterization
LOCATION Cedar Hills Landfill
DRILLED BY Ramlo Well Drilling
DRILL METHOD Air Rotary
LOGGED BY P. Brooks/A. Udalay

BORING NO. MW-68
PAGE 3 OF 20
GROUND ELEV. 644.79'
TOTAL DEPTH 370.00'
DATE COMPLETED 04/15/93

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
G	8							35.0 to 46.5 feet: SILTY GRAVEL (GP-GM), gray, fine to medium, some fine to coarse sand, few fines, dry to moist. (STRATIFIED DRIFT)
G	9			45				46.5 to 56.5 feet: SILT (ML), gray, few fine to medium sand, few clay, soft, moist. (STRATIFIED DRIFT)
G	10			50				
G	11			55				56.5 to 75.5 feet: SILTY GRAVEL (GM), yellow brown, fine to medium, little fines, trace cobbles. (ADVANCE OUTWASH)
				60				

REMARKS

(1) See general remarks. (2) Blow counts do not represent SPT results. (3) Reference elevation = ground surface. (4) Top of casing elevation = 647.07 feet. (5) Static water level = 335.32 feet below top of casing at 12:15 on June 7, 1993. (6) Water added during drilling below 37.5 feet.



LOG OF EXPLORATORY BORING

PROJECT NAME CHRL Expanded Aquifer Characterization
LOCATION Cedar Hills Landfill
DRILLED BY Ramlo Well Drilling
DRILL METHOD Air Rotary
LOGGED BY P. Brooks/A. Udalay

BORING NO. MW-68
PAGE 4 OF 20
GROUND ELEV. 644.79'
TOTAL DEPTH 370.00'
DATE COMPLETED 04/15/93

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
G	12							56.5 to 75.5 feet: SILTY GRAVEL (GM), yellow brown, fine to medium, little fines, trace cobbles. (ADVANCE OUTWASH) @ 64.5 to 75.5 feet: trace to few cobbles or boulders.
G	13			65				
G	14			70				
G	15			75				
				80				75.5 to 97.0 feet: SILTY GRAVEL (GP-GM), olive brown to 79.0 feet, yellow brown below, fine to medium, some medium to coarse sand, few fine sand. (ADVANCE OUTWASH)

REMARKS

(1) See general remarks. (2) Blow counts do not represent SPT results. (3) Reference elevation = ground surface. (4) Top of casing elevation = 647.07 feet. (5) Static water level = 335.32 feet below top of casing at 12:15 on June 7, 1993. (6) Water added during drilling below 37.5 feet.



LOG OF EXPLORATORY BORING

PROJECT NAME CHRL Expanded Aquifer Characterization
LOCATION Cedar Hills Landfill
DRILLED BY Ramlo Well Drilling
DRILL METHOD Air Rotary
LOGGED BY P. Brooks/A. Udalay

BORING NO. MW-61
PAGE 5 OF 20
GROUND ELEV. 644.79'
TOTAL DEPTH 370.00'
DATE COMPLETED 04/15/93

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
G	16							75.5 to 97.0 feet: SILTY GRAVEL (GP-GM), olive brown to 79.0 feet, yellow brown below, fine to medium, some medium to coarse sand, few fine sand. (ADVANCE OUTWASH) @ 81.0 feet: cobble.
G	17			85				@ 86.0 to 86.5 feet: SILTY SAND (SM), fine to medium. @ 88.0 to 89.0 feet: SILTY SAND (SM), fine to medium.
G	18			90				
G	19			95				
				100				97.0 to 102.0 feet: SAND (SP), yellow brown to brown, medium to coarse, little to some fine to medium gravel, trace fines. (ADVANCE OUTWASH)

REMARKS

(1) See general remarks. (2) Blow counts do not represent SPT results. (3) Reference elevation = ground surface. (4) Top of casing elevation = 647.07 feet. (5) Static water level = 335.32 feet below top of casing at 12:15 on June 7, 1993. (6) Water added during drilling below 37.5 feet.



LOG OF EXPLORATORY BORING

PROJECT NAME CHRL Expanded Aquifer Characterization
LOCATION Cedar Hills Landfill
DRILLED BY Ramlo Well Drilling
DRILL METHOD Air Rotary
LOGGED BY P. Brooks/A. Udalay

BORING NO. MW-68
PAGE 6 OF 20
GROUND ELEV. 644.79'
TOTAL DEPTH 370.00'
DATE COMPLETED 04/15/93

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
G	20							97.0 to 102.0 feet: SAND (SP), yellow brown to brown, medium to coarse, little to some fine to medium gravel, trace fines. (ADVANCE OUTWASH)
G	21			105				102.0 to 111.0 feet: GRAVEL (GP), yellow brown, medium to coarse, few fine to coarse sand, trace fines. Uncertain basal contact. (ADVANCE OUTWASH)
								@ 107.0 to 111.5 feet: no sample recovery.
G	22			110				111.0 to 120.0 feet: SILTY GRAVEL (GP-GM), yellow brown, fine to medium, little coarse sand, few to little fines. (ADVANCE OUTWASH)
G	23			115				@ 116.0 to 116.5 feet: SILTY GRAVEL (GM), yellow brown, little to some fines, some sand.
				120				

REMARKS

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LOG OF EXPLORATORY BORING

PROJECT NAME CHRL Expanded Aquifer Characterization
LOCATION Cedar Hills Landfill
DRILLED BY Ramlo Well Drilling
DRILL METHOD Air Rotary
LOGGED BY P. Brooks/A. Udaly

BORING NO. MW-68
PAGE 7 OF 20
GROUND ELEV. 644.79'
TOTAL DEPTH 370.00'
DATE COMPLETED 04/15/93

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
G	24				120.0			<p>120.0 to 137.0 feet: SILTY GRAVEL (GP-GM), gray brown to yellow brown, fine to medium, little fine to coarse sand, little fines. (ADVANCE OUTWASH)</p>
G	25			125				
G	26			130				
G	27			135				
				140				
								<p>137.0 to 178.0 feet: SILTY GRAVEL (GM), yellow brown to gray brown, fine to medium, little fine to coarse sand, little fines. (ADVANCE OUTWASH)</p>

REMARKS

(1) See general remarks. (2) Blow counts do not represent SPT results. (3) Reference elevation = ground surface. (4) Top of casing elevation = 647.07 feet. (5) Static water level = 335.32 feet below top of casing at 12:15 on June 7, 1993. (6) Water added during drilling below 37.5 feet.



LOG OF EXPLORATORY BORING

PROJECT NAME CHRL Expanded Aquifer Characterization
LOCATION Cedar Hills Landfill
DRILLED BY Ramlo Well Drilling
DRILL METHOD Air Rotary
LOGGED BY P. Brooks/A. Udaly

BORING NO. MW-68
PAGE 8 OF 20
GROUND ELEV. 644.79'
TOTAL DEPTH 370.00'
DATE COMPLETED 04/15/93

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
G	28							<p>137.0 to 178.0 feet: SILTY GRAVEL (GM), yellow brown to gray brown, fine to medium, little fine to coarse sand, little fines. (ADVANCE OUTWASH)</p> <p>@ 151.0 feet: cobble or boulder.</p> <p>@ 158.0 feet: cobble or boulder.</p>
G	29			145				
G	30			150				
G	31			155				
				160				

REMARKS

(1) See general remarks. (2) Blow counts do not represent SPT results. (3) Reference elevation = ground surface. (4) Top of casing elevation = 647.07 feet. (5) Static water level = 335.32 feet below top of casing at 12:15 on June 7, 1993. (6) Water added during drilling below 37.5 feet.



LOG OF EXPLORATORY BORING

PROJECT NAME CHRL Expanded Aquifer Characterization
LOCATION Cedar Hills Landfill
DRILLED BY Ramlo Well Drilling
DRILL METHOD Air Rotary
LOGGED BY P. Brooks/A. Udalay

BORING NO. MW-68
PAGE 9 OF 20
GROUND ELEV. 644.79'
TOTAL DEPTH 370.00'
DATE COMPLETED 04/15/93

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
G	32							<p>137.0 to 178.0 feet: SILTY GRAVEL (GM), yellow brown to gray brown, fine to medium, little fine to coarse sand, little fines. (ADVANCE OUTWASH)</p> <p>178.0 to 191.0 feet: GRAVEL (GW), gray brown, subrounded, some fine to medium sand, few fines. (ADVANCE OUTWASH)</p>
G	33			165				
G	34			170				
G	35			175				
				180				

REMARKS

(1) See general remarks. (2) Blow counts do not represent SPT results. (3) Reference elevation = ground surface. (4) Top of casing elevation = 647.07 feet. (5) Static water level = 335.32 feet below top of casing at 12:15 on June 7, 1993. (6) Water added during drilling below 37.5 feet.



LOG OF EXPLORATORY BORING

PROJECT NAME CHRL Expanded Aquifer Characterization
LOCATION Cedar Hills Landfill
DRILLED BY Ramlo Well Drilling
DRILL METHOD Air Rotary
LOGGED BY P. Brooks/A. Udaly

BORING NO. MW-68
PAGE 10 OF 20
GROUND ELEV. 644.79'
TOTAL DEPTH 370.00'
DATE COMPLETED 04/15/93

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
G	36					178.0		178.0 to 191.0 feet: GRAVEL (GW), gray brown, subrounded, some fine to medium sand, few fines. (ADVANCE OUTWASH)
G	37					185		
G	38					190		191.0 to 196.0 feet: SILTY GRAVEL (GM), gray brown to yellow brown, fine to coarse, some fine to coarse sand, little fines. (ADVANCE OUTWASH)
G	39					195		196.0 to 205.0 feet: SILTY SAND (SM), gray brown to yellow brown, fine, little fines, little fine gravel. Uncertain basal contact. (ADVANCE OUTWASH)
						200		

REMARKS

(1) See general remarks. (2) Blow counts do not represent SPT results. (3) Reference elevation = ground surface. (4) Top of casing elevation = 647.07 feet. (5) Static water level = 335.32 feet below top of casing at 12:15 on June 7, 1993. (6) Water added during drilling below 37.5 feet.



LOG OF EXPLORATORY BORING

PROJECT NAME CHRL Expanded Aquifer Characterization
LOCATION Cedar Hills Landfill
DRILLED BY Ramlo Well Drilling
DRILL METHOD Air Rotary
LOGGED BY P. Brooks/A. Udalay

BORING NO. MW-68
PAGE 11 OF 20
GROUND ELEV. 644.79'
TOTAL DEPTH 370.00'
DATE COMPLETED 04/15/93

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
G	40			196.0	■			196.0 to 205.0 feet: SILTY SAND (SM), gray brown to yellow brown, fine, little fines, little fine gravel. Uncertain basal contact. (ADVANCE OUTWASH)
G	41			205.0	■			205.0 to 222.0 feet: SILTY SAND (SP-SM), gray brown, fine, little fine to medium gravel, few fines. (ADVANCE OUTWASH)
G	42			210.0	■			@ 210.0 feet: some gravel.
G	43			215.0	■			
				220.0				

REMARKS

(1) See general remarks. (2) Blow counts do not represent SPT results. (3) Reference elevation = ground surface. (4) Top of casing elevation = 647.07 feet. (5) Static water level = 335.32 feet below top of casing at 12:15 on June 7, 1993. (6) Water added during drilling below 37.5 feet.



LOG OF EXPLORATORY BORING

PROJECT NAME CHRL Expanded Aquifer Characterization
LOCATION Cedar Hills Landfill
DRILLED BY Ramlo Well Drilling
DRILL METHOD Air Rotary
LOGGED BY P. Brooks/A. Udaloy

BORING NO. MW-68
PAGE 12 OF 20
GROUND ELEV. 644.79'
TOTAL DEPTH 370.00'
DATE COMPLETED 04/15/93

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
G	44							205.0 to 222.0 feet: SILTY SAND (SP-SM), gray brown, fine, little fine to medium gravel, few fines. (ADVANCE OUTWASH)
G	45			225				222.0 to 235.0 feet: GRAVEL (GP), gray brown, fine to medium, little fine to coarse sand. (ADVANCE OUTWASH)
G	46			230				
G	47			235				235.0 to 239.0 feet: SILTY GRAVEL (GP-GM), gray brown, fine to medium, some fine to coarse sand, few fines, trace gravel, has iron oxide staining. (ADVANCE OUTWASH)
				240				239.0 to 249.0 feet: See description on Page 13.

REMARKS

(1) See general remarks. (2) Blow counts do not represent SPT results. (3) Reference elevation = ground surface. (4) Top of casing elevation = 647.07 feet. (5) Static water level = 335.32 feet below top of casing at 12:15 on June 7, 1993. (6) Water added during drilling below 37.5 feet.



LOG OF EXPLORATORY BORING

PROJECT NAME CHRL Expanded Aquifer Characterization
LOCATION Cedar Hills Landfill
DRILLED BY Ramlo Well Drilling
DRILL METHOD Air Rotary
LOGGED BY P. Brooks/A. Udalay

BORING NO. MW-68
PAGE 13 OF 2
GROUND ELEV. 644.79'
TOTAL DEPTH 370.00'
DATE COMPLETED 04/15/93

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
SB	48	18-36-45						239.0 to 249.0 feet: SAND (SP), gray brown, fine, trace to little fine to medium subrounded gravel, trace fines. Trace spherical voids to 1/8-inch diameter. (ADVANCE OUTWASH/PRE-VASHON DEPOSITS)
SB	49	50/5"		245				
SB	50	37-39-48						
G SB	51 52	50		250				249.0 to 252.0 feet: SILT (ML), brown and gray, finely laminated, trace fine gravel. Basal contact uncertain. (PRE-VASHON DEPOSITS) @ 250.0 to 270.0 feet: no drilling water added. @ 250.0 to 255.0 feet: no sample recovery.
SB	53	50		255				252.0 to 264.0 feet: SAND (SP), gray, fine to medium, trace fines, trace medium gravel, trace wood fragments, moist. (PRE-VASHON DEPOSITS)
				260				

REMARKS

(1) See general remarks. (2) Blow counts do not represent SPT results. (3) Reference elevation = ground surface. (4) Top of casing elevation = 647.07 feet. (5) Static water level = 335.32 feet below top of casing at 12:15 on June 7, 1993. (6) Water added during drilling below 37.5 feet.



LOG OF EXPLORATORY BORING

PROJECT NAME CHRL Expanded Aquifer Characterization
LOCATION Cedar Hills Landfill
DRILLED BY Ramlo Well Drilling
DRILL METHOD Air Rotary
LOGGED BY P. Brooks/A. Udalay

BORING NO. MW-68
PAGE 14 OF 20
GROUND ELEV. 644.79'
TOTAL DEPTH 370.00'
DATE COMPLETED 04/15/93

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
SB	54	34-50/4"						252.0 to 264.0 feet: SAND (SP), gray, fine to medium, trace fines, trace medium gravel, trace wood fragments, moist. (PRE-VASHON DEPOSITS)
SB	55	33-43-50		265				264.0 to 266.5 feet: SAND (SP), gray, fine to medium, little to some fine to medium gravel, trace fines, damp. (PRE-VASHON DEPOSITS)
SB	56	50		270				266.5 to 273.5 feet: SAND (SP), gray, fine to medium, little fine to medium subrounded to subangular gravel, trace to few fines. (PRE-VASHON DEPOSITS)
SB	57	45-50/3"		275				273.5 to 280.0 feet: SILTY GRAVEL (GP-GM), gray, fine to medium, subrounded to subangular, some fine to coarse sand, few fines. (PRE-VASHON DEPOSITS)
				280				

REMARKS

(1) See general remarks. (2) Blow counts do not represent SPT results. (3) Reference elevation = ground surface. (4) Top of casing elevation = 647.07 feet. (5) Static water level = 335.32 feet below top of casing at 12:15 on June 7, 1993. (6) Water added during drilling below 37.5 feet.



LOG OF EXPLORATORY BORING

PROJECT NAME CHRL Expanded Aquifer Characterization
LOCATION Cedar Hills Landfill
DRILLED BY Ramlo Well Drilling
DRILL METHOD Air Rotary
LOGGED BY P. Brooks/A. Udalay

BORING NO. MW-68
PAGE 15 OF 2
GROUND ELEV. 644.79'
TOTAL DEPTH 370.00'
DATE COMPLETED 04/15/93

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
SB	58	50						280.0 to 301.9 feet: SAND (SP), gray, fine to medium, trace fines, trace medium gravel, dry to damp. (PRE-VASHON DEPOSITS)
SB	59	50		285				
SB	60	50		290				@ 290.0 feet: spherical voids to 1/4-inch diameter. @ 290.0 feet to 305.0 feet: no drilling water added.
SB	61	50		295				
SB	62	50						@ 298.0 feet: trace wood fragments.
				300				

REMARKS

(1) See general remarks. (2) Blow counts do not represent SPT results. (3) Reference elevation = ground surface. (4) T.C. of casing elevation = 647.07 feet. (5) Static water level = 335.32 feet below top of casing at 12:15 on June 7, 1993. (6) Water added during drilling below 37.5 feet.



LOG OF EXPLORATORY BORING

PROJECT NAME CHRL Expanded Aquifer Characterization
LOCATION Cedar Hills Landfill
DRILLED BY Ramlo Well Drilling
DRILL METHOD Air Rotary
LOGGED BY P. Brooks/A. Udaly

BORING NO. MW-68
PAGE 16 OF 20
GROUND ELEV. 644.79'
TOTAL DEPTH 370.00'
DATE COMPLETED 04/15/93

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
SB	63	NR						280.0 to 301.9 feet: SAND (SP), gray, fine to medium, trace fines, trace medium gravel, dry to damp. (PRE-VASHON DEPOSITS)
SB	64	38-50						301.9 to 304.0 feet: SILT (ML), gray, thinly laminated, few clay, very stiff, damp. Abrupt upper contact. (PRE-VASHON DEPOSITS)
SB	65	50		305				304.0 to 306.0 feet: SAND (SP), gray, fine to medium, trace fine gravel, trace fines, damp. (PRE-VASHON DEPOSITS)
SB	66	50						306.0 to 337.0 feet: SILTY SAND (SP-SM), gray, fine to medium, some fine to medium subrounded to subangular gravel. (PRE-VASHON DEPOSITS)
SB	67	50		310				
SB	68	NR		315				
SB	69	50						
				320				

REMARKS

(1) See general remarks. (2) Blow counts do not represent SPT results. (3) Reference elevation = ground surface. (4) Top of casing elevation = 647.07 feet. (5) Static water level = 335.32 feet below top of casing at 12:15 on June 7, 1993. (6) Water added during drilling below 37.5 feet.



LOG OF EXPLORATORY BORING

PROJECT NAME CHRL Expanded Aquifer Characterization
LOCATION Cedar Hills Landfill
DRILLED BY Ramlo Well Drilling
DRILL METHOD Air Rotary
LOGGED BY P. Brooks/A. Udalay

BORING NO. MW-68
PAGE 18 OF 20
GROUND ELEV. 644.79'
TOTAL DEPTH 370.00'
DATE COMPLETED 04/15/93

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
G	74			345	●	●		337.0 to 370.0 feet: GRAVEL (GP), gray brown, fine to medium, some fine to coarse sand, trace fines. (PRE-VASHON DEPOSITS)
G	75			350	●	●		
G	76			355	●	●		
G	77			360	●	●		

REMARKS

(1) See general remarks. (2) Blow counts do not represent SPT results. (3) Reference elevation = ground surface. (4) Top of casing elevation = 647.07 feet. (5) Static water level = 335.32 feet below top of casing at 12:15 on June 7, 1993. (6) Water added during drilling below 37.5 feet.



LOG OF EXPLORATORY BORING

PROJECT NAME CHRL Expanded Aquifer Characterization
LOCATION Cedar Hills Landfill
DRILLED BY Ramlo Well Drilling
DRILL METHOD Air Rotary
LOGGED BY P. Brooks/A. Udaloy

BORING NO. MW-68
PAGE 19 OF 20
GROUND ELEV. 644.79'
TOTAL DEPTH 370.00'
DATE COMPLETED 04/15/93

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
G	78							337.0 to 370.0 feet: GRAVEL (GP), gray brown, fine to medium, some fine to coarse sand, trace fines. (PRE-VASHON DEPOSITS)
G	79			365				@ 368.0 to 370.0 feet: few fines.
G	80			370				Total depth drilled = 370.0 feet. Total depth sampled = 370.0 feet.
				375				
				380				See Page 20 for Well Completion Details.

REMARKS

(1) See general remarks. (2) Blow counts do not represent SPT results. (3) Reference elevation = ground surface. (4) Top of casing elevation = 647.07 feet. (5) Static water level = 335.32 feet below top of casing at 12:15 on June 7, 1993. (6) Water added during drilling below 37.5 feet.



LOG OF EXPLORATORY BORING

PROJECT NAME CHRL Expanded Aquifer Characterization
LOCATION Cedar Hills Landfill
DRILLED BY Ramlo Well Drilling
DRILL METHOD Air Rotary
LOGGED BY P. Brooks/A. Udalay

BORING NO. MW-68
PAGE 20 OF 20
GROUND ELEV. 644.79'
TOTAL DEPTH 370.00'
DATE COMPLETED 04/15/93

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
				385				<p>WELL COMPLETION DETAILS:</p> <p>+2.3 to 333.5 feet: Nominal 2.5-inch O.D., flush-threaded, schedule 80 PVC blank riser pipe.</p> <p>332.7 to 333.5 feet: Stainless steel centralizer.</p> <p>333.5 to 342.5 feet: Nominal 2.5-inch O.D., flush-threaded, schedule 80 PVC well screen with 0.020-inch machined slots.</p> <p>342.5 to 343.3 feet: Nominal 2.5-inch O.D., flush-threaded, schedule 80 PVC blank riser pipe.</p> <p>343.3 to 352.5 feet: Nominal 2.5-inch O.D., flush-threaded, schedule 80 PVC well screen with 0.020-inch machined slots.</p> <p>352.3 to 353.1 feet: Nominal 2.5-inch O.D., flush-threaded, schedule 80 PVC end cap with stainless steel centralizer.</p> <p>0 to 3.0 feet: Concrete.</p> <p>3.0 to 330.5 feet: Pure Gold medium bentonite chips hydrated with potable water.</p> <p>330.5 to 356.0 feet: 20 - 40 Colorado Silica Sand.</p> <p>356.0 to 370.0 feet: Pure Gold medium bentonite chips.</p> <p>358.5 to 370.0 feet: Cut casing and drive shoe.</p>
				390				
				395				
				400				

REMARKS

(1) See general remarks. (2) Blow counts do not represent SPT results. (3) Reference elevation = ground surface. (4) Top of casing elevation = 647.07 feet. (5) Static water level = 335.32 feet below top of casing at 12:15 on June 7, 1993. (6) Water added during drilling below 37.5 feet.



LOG OF EXPLORATORY BORING

PROJECT NAME **CHRLF Monitoring Well Improvements**
 DRILLED BY **Hokkaido**
 DRILL METHOD **Air Rotary/Cable Tool**
 LOGGED BY **Pyle/Udaloy**
 DATE COMPLETED **9/24/99**

BORING NO. **MW-75**
 PAGE **1 OF 15**
 GROUND ELEV. **529.80'**
 DATUM **NGVD 29**
 TOTAL DEPTH **287.00'**

SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER 6 INCHES (RECOVERY)	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
5	G			5				<p>0 to 4.5 feet: SILTY SAND (SM), reddish brown to brown, fine, little silt, trace medium to coarse sand, trace fine gravel, abundant organics (roots), medium dense, dry. (LOESS) @ approximately 6-inches bgs, dug large cobble out by hand.</p>
				5				<p>4.5 to 7.0 feet: SILTY SAND (SM), brown, fine, little silt, few fine to coarse gravel, trace medium to coarse sand, dense, dry. (ADVANCE OUTWASH) @ 7.0 feet: cobbles, chattery drilling.</p>
				10				<p>7.0 to 17.5 feet: SILTY SAND (SM), brown, fine, few fine to coarse gravels, little silt, trace medium to coarse sand, dry to slightly moist. (ADVANCE OUTWASH) @ 9.0 feet: cobbles. @ 11.5 feet: grinding on a cobble. @ 12.0 feet: silt coating on gravel. @ 13.0 feet: driving very fast, 1 blow = 2 feet.</p>
15	G			15				<p>@ 17.0 feet: color change to brown-gray.</p>
				20				<p>17.5 to 40.0 feet: SILTY SAND (SM), gray to gray brown, fine, subrounded, some light gray fines, little medium to coarse sand, little fine subrounded gravel, wet at 19.0 feet, slightly moist to dry below 19.0 feet. (ADVANCE OUTWASH)</p>

REMARKS

(1) See general remarks. (2) Water added during drilling below 39 feet. (3) Nominal 8-inch diameter boring. (4) Drilled using air rotary to 156 feet, cable tool below 156 feet. (5) Water elevation for perched groundwater encountered during drilling = 380.2 feet (149.7 feet depth) with the borehole at 156 feet on September 7, 1999. (6) Static regional aquifer elevation = 286.88 feet on December 6, 1999. (7) Top of steel casing elevation = 532.71 feet, top of PVC cap = 532.40 feet. (8) Borehole ID = MW-D.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME CHRLF Monitoring Well Improvements
DRILLED BY Hokkaido
DRILL METHOD Air Rotary/Cable Tool
LOGGED BY Pyle/Udaloy
DATE COMPLETED 9/24/99

BORING NO. MW-75
PAGE 2 OF 15
GROUND ELEV. 529.80'
DATUM NGVD 29
TOTAL DEPTH 287.00'

SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER 6 INCHES (RECOVERY)	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
20	G				19.0			@ 19.0 feet: wet cuttings blowing up sides of casing, not out discharge tubing, no water added.
25	G			25	25			@ 28.0 feet: cobbly.
30	G			30	30			@ 34.0 feet: driller notes finer, siltier.
35	G			35	35			@ 38.0 feet: drilling easier. @ 39.0 feet: cuttings not coming up, adding water.
				40				

REMARKS

(1) See general remarks. (2) Water added during drilling below 39 feet. (3) Nominal 8-inch diameter boring. (4) Drilled using air rotary to 156 feet, cable tool below 156 feet. (5) Water elevation for perched groundwater encountered during drilling = 380.2 feet (149.7 feet depth) with the borehole at 156 feet on September 7, 1999. (6) Static regional aquifer elevation = 286.88 feet on December 6, 1999. (7) Top of steel casing elevation = 532.71 feet, top of PVC cap = 532.40 feet. (8) Borehole ID = MW-D.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME CHRLF Monitoring Well Improvements
DRILLED BY Hokkaido
DRILL METHOD Air Rotary/Cable Tool
LOGGED BY Pyle/Udaloy
DATE COMPLETED 9/24/99

BORING NO. MW-75
PAGE 3 OF 15
GROUND ELEV. 529.80'
DATUM NGVD 29
TOTAL DEPTH 287.00'

SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER 6 INCHES (RECOVERY)	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
40	G				40.0		40.0 to 87.0 feet: SILTY GRAVEL (GM), brown gray, fine subrounded gravel, some brown silt, little fine to coarse subrounded gravel. (ADVANCE OUTWASH)	
					43.0			@ 43.0 feet: slow, chattery drilling.
45	G				45.0			
					46.0			@ 46.0 feet: very slow drilling.
50	G				50.0			
55	G				55.0			
					58.0			@ 58.0 feet: drilling somewhat easier.
					60.0			

REMARKS

(1) See general remarks. (2) Water added during drilling below 39 feet. (3) Nominal 8-inch diameter boring. (4) Drilled using air rotary to 156 feet, cable tool below 156 feet. (5) Water elevation for perched groundwater encountered during drilling = 380.2 feet (149.7 feet depth) with the borehole at 156 feet on September 7, 1999. (6) Static regional aquifer elevation = 286.88 feet on December 6, 1999. (7) Top of steel casing elevation = 532.71 feet, top of PVC cap = 532.40 feet. (8) Borehole ID = MW-D.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME CHRLF Monitoring Well Improvements
DRILLED BY Hokkaido
DRILL METHOD Air Rotary/Cable Tool
LOGGED BY Pyle/Udaloy
DATE COMPLETED 9/24/99

BORING NO. MW-75
PAGE 4 OF 15
GROUND ELEV. 529.80'
DATUM NGVD 29
TOTAL DEPTH 287.00'

SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER 6 INCHES (RECOVERY)	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
60	G				60		60	40.0 to 87.0 feet: SILTY GRAVEL (GM) , continued.
65	G				65		65	
70	G				70		70	
75	G				75		75	
					80		80	

REMARKS

(1) See general remarks. (2) Water added during drilling below 39 feet. (3) Nominal 8-inch diameter boring. (4) Drilled using air rotary to 156 feet, cable tool below 156 feet. (5) Water elevation for perched groundwater encountered during drilling = 380.2 feet (149.7 feet depth) with the borehole at 156 feet on September 7, 1999. (6) Static regional aquifer elevation = 286.88 feet on December 6, 1999. (7) Top of steel casing elevation = 532.71 feet, top of PVC cap = 532.40 feet. (8) Borehole ID = MW-D.

LOG OF EXPLORATORY BORING

PROJECT NAME
 DRILLED BY
 DRILL METHOD
 LOGGED BY
 DATE COMPLETED

CHRLF Monitoring Well Improvements
 Hokkaido
 Air Rotary/Cable Tool
 Pyle/Udaloy
 9/24/99

BORING NO.
 PAGE
 GROUND ELEV.
 DATUM
 TOTAL DEPTH

MW-75
 5 OF 15
 529.80'
 NGVD 29
 287.00'

SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER 6 INCHES (RECOVERY)	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
80	G							<p>40.0 to 87.0 feet: SILTY GRAVEL (GM), continued.</p> <p>@ 87.0 feet: drilling, driving faster.</p> <p>87.0 to 128.0 feet: SILTY SAND (SM), brown, coarse, subrounded, some brown silt, little fine to coarse gravel, little fine to medium sand. (ADVANCE OUTWASH)</p> <p>@ 99.0 feet: drilling a little harder, larger gravels.</p>
85	G			85				
90	G			90				
95	G			95				
				100				

REMARKS

(1) See general remarks. (2) Water added during drilling below 39 feet. (3) Nominal 8-inch diameter boring. (4) Drilled using air rotary to 156 feet, cable tool below 156 feet. (5) Water elevation for perched groundwater encountered during drilling = 380.2 feet (149.7 feet depth) with the borehole at 156 feet on September 7, 1999. (6) Static regional aquifer elevation = 286.88 feet on December 6, 1999. (7) Top of steel casing elevation = 532.71 feet, top of PVC cap = 532.40 feet. (8) Borehole ID = MW-D.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME CHRLF Monitoring Well Improvements
DRILLED BY Hokkaido
DRILL METHOD Air Rotary/Cable Tool
LOGGED BY Pyle/Udaloy
DATE COMPLETED 9/24/99

BORING NO. MW-75
PAGE 6 OF 15
GROUND ELEV. 529.80'
DATUM NGVD 29
TOTAL DEPTH 287.00'

SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER 6 INCHES (RECOVERY)	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
100	G				█			<p>87.0 to 128.0 feet: SILTY SAND (SM), continued.</p> <p>@ 107.0 feet: drilling slower.</p> <p>@ 117.0 feet: metal chunk (peanut shell-sized) came up with cuttings (drill rod centralizer).</p> <p>@ 119.0 feet: driller notes easier, siltier drilling.</p>
105	G			105	█			
110	G			110	█			
115	G			115	█			
				120				

REMARKS

(1) See general remarks. (2) Water added during drilling below 39 feet. (3) Nominal 8-inch diameter boring. (4) Drilled using air rotary to 156 feet, cable tool below 156 feet. (5) Water elevation for perched groundwater encountered during drilling = 380.2 feet (149.7 feet depth) with the borehole at 156 feet on September 7, 1999. (6) Static regional aquifer elevation = 286.88 feet on December 6, 1999. (7) Top of steel casing elevation = 532.71 feet, top of PVC cap = 532.40 feet. (8) Borehole ID = MW-D.

LOG OF EXPLORATORY BORING

PROJECT NAME CHRLF Monitoring Well Improvements
DRILLED BY Hokkaido
DRILL METHOD Air Rotary/Cable Tool
LOGGED BY Pyle/Udaloy
DATE COMPLETED 9/24/99

BORING NO. MW-75
PAGE 7 OF 15
GROUND ELEV. 529.80'
DATUM NGVD 29
TOTAL DEPTH 287.00'

SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER 6 INCHES (RECOVERY)	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
120	G				■			<p>87.0 to 128.0 feet: SILTY SAND (SM), continued.</p> <p>@ 122.0 feet: metal flakes coming up in cuttings (drill rod centralizer).</p> <p>@ 126.0 feet: slow, fairly smooth drilling with zones of faster drilling.</p> <hr style="border-top: 1px dashed black;"/> <p>128.0 to 144.0 feet: SILTY GRAVEL (GM), brown, fine, subrounded, some brown silt, little medium to coarse gravel, little fine to coarse sand. (ADVANCE OUTWASH)</p>
125	G			125	■			
130	G			130	■			
135	G			135	■			
				140				

REMARKS

(1) See general remarks. (2) Water added during drilling below 39 feet. (3) Nominal 8-inch diameter boring. (4) Drilled using air rotary to 156 feet, cable tool below 156 feet. (5) Water elevation for perched groundwater encountered during drilling = 380.2 feet (149.7 feet depth) with the borehole at 156 feet on September 7, 1999. (6) Static regional aquifer elevation = 286.88 feet on December 6, 1999. (7) Top of steel casing elevation = 532.71 feet, top of PVC cap = 532.40 feet. (8) Borehole ID = MW-D.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME CHRLF Monitoring Well Improvements
DRILLED BY Hokkaido
DRILL METHOD Air Rotary/Cable Tool
LOGGED BY Pyle/Udaloy
DATE COMPLETED 9/24/99

BORING NO. MW-75
PAGE 8 OF 15
GROUND ELEV. 529.80'
DATUM NGVD 29
TOTAL DEPTH 287.00'

SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER 6 INCHES (RECOVERY)	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
140	G							128.0 to 144.0 feet: SILTY GRAVEL (GM) , continued.
								@ 144.0 feet: color change, easier drilling.
145	G			145				144.0 to 157.5 feet: SILTY SAND (SM) , brown-gray, fine to medium gray subrounded sand, some brown silt, trace coarse sand, trace fine to coarse rounded gravel. (ADVANCE OUTWASH)
			9/7/99					
150	G		▽	150				
155	G			155				@ 156.0 feet (casing depth): change to Speedstar 72 cable tool drilling rig (drilled out to 157.5 feet with air rotary).
156.5	SB	15-19-21 (6")						@ 157.0 feet: woody debris, drilling "tighter" through wood.
158	SB	11-18-23 (6")						@ 157.5 feet: color change to gray, drilling like silt.
				160				157.5 to 160.5 feet: SILTY SAND (SP-SM) , gray, fine, little fines, wet. Trace wood in bailed cuttings.

REMARKS

(1) See general remarks. (2) Water added during drilling below 39 feet. (3) Nominal 8-inch diameter boring. (4) Drilled using air rotary to 156 feet, cable tool below 156 feet. (5) Water elevation for perched groundwater encountered during drilling = 380.2 feet (149.7 feet depth) with the borehole at 156 feet on September 7, 1999. (6) Static regional aquifer elevation = 286.88 feet on December 6, 1999. (7) Top of steel casing elevation = 532.71 feet, top of PVC cap = 532.40 feet. (8) Borehole ID = MW-D.

LOG OF EXPLORATORY BORING

PROJECT NAME CHRLF Monitoring Well Improvements
DRILLED BY Hokkaido
DRILL METHOD Air Rotary/Cable Tool
LOGGED BY Pyle/Udaloy
DATE COMPLETED 9/24/99

BORING NO. MW-75
PAGE 9 OF 15
GROUND ELEV. 529.80'
DATUM NGVD 29
TOTAL DEPTH 287.00'

SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER 6 INCHES (RECOVERY)	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
160.5	SB	13-50 (12")						157.5 to 160.5 feet: SILTY SAND (SP-SM) , continued. @ 160.5 feet: brown silt clots in bailer, bails dry.
163	SB	50/5"						160.5 to 163.0 feet: SILTY SAND (SM) , dark brown with orange mottles, fine to coarse, subangular to angular, little fine to medium gravel, moist to wet. (ADVANCE OUTWASH)
167	SB	50/4"		165				163.0 to 168.5 feet: SILTY SAND (SP-SM) , brown with orange-red staining on sands and gravels, predominantly coarse, few fine to medium sand, few fine gravel, subrounded to subangular. (ADVANCE OUTWASH) @ 166.5 feet: casing drives slowly.
170	SB	34-50/1" (5")		170				168.5 to 172.5 feet: SILTY GRAVEL (GP-GM) , gray-brown fines, medium to coarse, some fine to coarse sand, few fines, clast-supported, gradational basal contact, moist. (ADVANCE OUTWASH)
177	SB	50 (5")		175				172.5 to 176.5 feet: GRAVEL (GP) , gray-brown fines, medium to coarse, some fine to coarse sand, trace fines, clasts include volcanic and metamorphic lithologies. (ADVANCE OUTWASH)
179.5	SB	50/4" (4")		180				176.5 to 178.5 feet: SILTY SAND (SP-SM) , yellow brown to gray, fine, few fines, dry. (ADVANCE OUTWASH) 178.5 to 193.5 feet: SILTY SAND (SM) , yellow brown, fine to coarse, some fine to medium subrounded gravel, some fines. (ADVANCE

REMARKS

(1) See general remarks. (2) Water added during drilling below 39 feet. (3) Nominal 8-inch diameter boring. (4) Drilled using air rotary to 156 feet, cable tool below 156 feet. (5) Water elevation for perched groundwater encountered during drilling = 380.2 feet (149.7 feet depth) with the borehole at 156 feet on September 7, 1999. (6) Static regional aquifer elevation = 286.88 feet on December 6, 1999. (7) Top of steel casing elevation = 532.71 feet, top of PVC cap = 532.40 feet. (8) Borehole ID = MW-D.

LOG OF EXPLORATORY BORING

PROJECT NAME DRILLED BY DRILL METHOD LOGGED BY DATE COMPLETED	CHRLF Monitoring Well Improvements Hokkaido Air Rotary/Cable Tool Pyle/Udaloy 9/24/99	BORING NO. PAGE GROUND ELEV. DATUM TOTAL DEPTH	MW-75 10 OF 15 529.80' NGVD 29 287.00'
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SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER 6 INCHES (RECOVERY)	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
180	G							OUTWASH)
185	SB	50/4"		185				
190	G			190				
193.5	SB	50/5"		195				193.5 to 195.5 feet: SILTY SAND (SM) , grayish brown, fine to very fine, damp to moist. (ADVANCE OUTWASH)
196.5	SB	50 (6")						195.5 to 198.0 feet: SILTY SAND (SM) , white and black, common orange staining, fine. (ADVANCE OUTWASH)
				200				198.0 to 204.0 feet: SILTY SAND (SM) , black, white, and tan with orange mottles and yellow brown fines, fine, rounded to subrounded, does not hold open when drilled. (ADVANCE

REMARKS

(1) See general remarks. (2) Water added during drilling below 39 feet. (3) Nominal 8-inch diameter boring. (4) Drilled using air rotary to 156 feet, cable tool below 156 feet. (5) Water elevation for perched groundwater encountered during drilling = 380.2 feet (149.7 feet depth) with the borehole at 156 feet on September 7, 1999. (6) Static regional aquifer elevation = 286.88 feet on December 6, 1999. (7) Top of steel casing elevation = 532.71 feet, top of PVC cap = 532.40 feet. (8) Borehole ID = MW-D.

LOG OF EXPLORATORY BORING

PROJECT NAME CHRLF Monitoring Well Improvements
DRILLED BY Hokkaido
DRILL METHOD Air Rotary/Cable Tool
LOGGED BY Pyle/Udaloy
DATE COMPLETED 9/24/99

BORING NO. MW-75
PAGE 11 OF 15
GROUND ELEV. 529.80'
DATUM NGVD 29
TOTAL DEPTH 287.00'

SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER 6 INCHES (RECOVERY)	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
200	G							OUTWASH)
201	SB	50/3" (3")						
204.5	G			205				@ 204.0 feet: harder drilling. 204.0 to 220.0 feet: SILTY GRAVEL (GM) , brown fines, fine, subrounded, some fine to coarse sand. (ADVANCE OUTWASH)
210	G			210				@ 210.0 feet: increasing sand content, transitional to SILTY SAND with some fine gravel.
215	G			215				
				220				

REMARKS

(1) See general remarks. (2) Water added during drilling below 39 feet. (3) Nominal 8-inch diameter boring. (4) Drilled using air rotary to 156 feet, cable tool below 156 feet. (5) Water elevation for perched groundwater encountered during drilling = 380.2 feet (149.7 feet depth) with the borehole at 156 feet on September 7, 1999. (6) Static regional aquifer elevation = 286.88 feet on December 6, 1999. (7) Top of steel casing elevation = 532.71 feet, top of PVC cap = 532.40 feet. (8) Borehole ID = MW-D.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME CHRLF Monitoring Well Improvements
DRILLED BY Hokkaido
DRILL METHOD Air Rotary/Cable Tool
LOGGED BY Pyle/Udaloy
DATE COMPLETED 9/24/99

BORING NO. MW-75
PAGE 12 OF 15
GROUND ELEV. 529.80'
DATUM NGVD 29
TOTAL DEPTH 287.00'

SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER 6 INCHES (RECOVERY)	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
220	SB	50 (6")						220.0 to 224.0 feet: SILTY SAND (SM) , yellow brown fines, fine to coarse, some fine to medium subrounded to subangular gravel, little fines, matrix supported. (ADVANCE OUTWASH) @ 224.0 feet: harder drilling.
225	SB	50/5" (5")		225				224.0 to 225.5 feet: SILTY GRAVEL (GP-GM) , yellow-brown fines, medium to coarse, subrounded, little fine sand, few fines, clast-supported. (ADVANCE OUTWASH)
226	G							225.5 to 227.5 feet: SILTY GRAVEL (GM) , gray fines, medium to coarse, some fine to coarse sand, some fines, very dense, very difficult drilling. (ADVANCE OUTWASH)
227.5	SB	50/3" (1")						227.5 to 230.0 feet: SILTY GRAVEL (GP-GM) , gray brown with orange mottles, medium to coarse, subrounded, some fine to medium sand, little fines. (ADVANCE OUTWASH)
228	G							@ 230.0 feet: possible minor sand bed.
230	G			230				230.0 to 233.5 feet: SILTY SAND (SM) , black with yellow-brown fines, fine to coarse, some fines, some fine to medium gravel, trace coarse gravel, gradational with overlying and underlying silty gravels. (ADVANCE OUTWASH)
231	G							
232.5	G							
234	G							
235	SB	50/5" (5")		235				233.5 to 236.0 feet: SILTY GRAVEL (GP-GM) , grayish brown with brown mottles, medium to coarse, some fine to coarse sand. (ADVANCE OUTWASH) @ 236.5 feet: cobble or boulder.
237.5	SB	50/3" (3")						236.5 to 243.0 feet: SILTY GRAVEL (GM) , brownish gray fines with brown mottles, fine to coarse, subrounded, some fine to coarse sand, some fines, matrix-supported, very dense, damp. Difficult drilling. (ADVANCE OUTWASH)
238.5	SB	50/5" (5")						@ 239.0 to 243.0 feet: somewhat sandier, gravels to 3-inch diameter.
				240				

REMARKS

(1) See general remarks. (2) Water added during drilling below 39 feet. (3) Nominal 8-inch diameter boring. (4) Drilled using air rotary to 156 feet, cable tool below 156 feet. (5) Water elevation for perched groundwater encountered during drilling = 380.2 feet (149.7 feet depth) with the borehole at 156 feet on September 7, 1999. (6) Static regional aquifer elevation = 286.88 feet on December 6, 1999. (7) Top of steel casing elevation = 532.71 feet, top of PVC cap = 532.40 feet. (8) Borehole ID = MW-D.

LOG OF EXPLORATORY BORING

PROJECT NAME CHRLF Monitoring Well Improvements
DRILLED BY Hokkaido
DRILL METHOD Air Rotary/Cable Tool
LOGGED BY Pyle/Udaloy
DATE COMPLETED 9/24/99

BORING NO. MW-75
PAGE 13 OF 15
GROUND ELEV. 529.80'
DATUM NGVD 29
TOTAL DEPTH 287.00'

SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER 6 INCHES (RECOVERY)	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
240.5	SB	50/2" (2")						236.5 to 243.0 feet: SILTY GRAVEL (GM) , continued.
241	G							
242	G		▼ 12/6/99					
244.5	SB	34-50/0" (6")		245				243.0 to 248.0 feet: SILTY SAND (SM) , mostly gray brown to dark brown fines with mottles of light gray and orange, medium to coarse, some fines, some fine to coarse gravel, damp to moist, matrix supported. (ADVANCE OUTWASH)
250.5	SB	90/10" (10")		250				248.0 to 251.5 feet: SILTY GRAVEL (GM) , gray fines, medium to coarse, little to some fine to medium sand, few to little fines, loose, wet, common wood debris. Mostly andesite clasts. (PRE-VASHON DEPOSITS)
251.5	SB	50/4" (4")						251.5 to 253.0 feet: GRAVEL (GP) , black and white, fine to medium some fine to medium sand, trace fines, wet. Mostly andesite clasts.
252	G							
253	SB	14-18-32 (18")						253.0 to 256.5 feet: SILTY SAND (SM) , with wood, black, fine, little to some fines, few fine to medium subrounded gravel, wet. (PRE-VASHON DEPOSITS) @ 254.0 to 256.5 feet: log.
254.5	SB	35-20-50/3" (15")		255				
256	SB	28-40/4"						
257	SB	50/4" (0")						256.5 to 264.0 feet: GRAVEL (GW) , black and white, fine to coarse, subrounded to rounded, some fine to coarse sand, loose, wet. (PRE-VASHON DEPOSITS)
258.5	SB	9-28-50/1"						
				260				

REMARKS



(1) See general remarks. (2) Water added during drilling below 39 feet. (3) Nominal 8-inch diameter boring. (4) Drilled using air rotary to 156 feet, cable tool below 156 feet. (5) Water elevation for perched groundwater encountered during drilling = 380.2 feet (149.7 feet depth) with the borehole at 156 feet on September 7, 1999. (6) Static regional aquifer elevation = 286.88 feet on December 6, 1999. (7) Top of steel casing elevation = 532.71 feet, top of PVC cap = 532.40 feet. (8) Borehole ID = MW-D.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME CHRLF Monitoring Well Improvements
DRILLED BY Hokkaido
DRILL METHOD Air Rotary/Cable Tool
LOGGED BY Pyle/Udaloy
DATE COMPLETED 9/24/99

BORING NO. MW-75
PAGE 14 OF 15
GROUND ELEV. 529.80'
DATUM NGVD 29
TOTAL DEPTH 287.00'

SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER 6 INCHES (RECOVERY)	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
260	SB	38-50/4" (0")						256.5 to 264.0 feet: GRAVEL (GW), continued. @ 261.0 feet and below: too coarse to drive samplers. @ 262.0 to 264.0 feet: common cobbles and boulders.
261	G							
262	G							
263	G							
264	G			265				264.0 to 267.0 feet: GRAVEL (GP), black and white, medium to coarse, some fine to coarse sand, subangular to subrounded, trace wood, wet. (PRE-VASHON DEPOSITS)
266	G							
267.5	SB	5-50/0" (0")						267.0 to 287.0 feet: GRAVEL (GW), black, white, and green, fine to coarse, subrounded, trace boulders, trace cobbles, trace wood. (PRE-VASHON DEPOSITS)
268.5	G							
270	G			270				
271	G							
272	G							
273.5	G							
275	G			275				
276	G							@ 276.5 feet: 2-inch-thick light gray silt (ML), laminated, trace subangular coarse sand, clayey.
				280				

REMARKS

(1) See general remarks. (2) Water added during drilling below 39 feet. (3) Nominal 8-inch diameter boring. (4) Drilled using air rotary to 156 feet, cable tool below 156 feet. (5) Water elevation for perched groundwater encountered during drilling = 380.2 feet (149.7 feet depth) with the borehole at 156 feet on September 7, 1999. (6) Static regional aquifer elevation = 286.88 feet on December 6, 1999. (7) Top of steel casing elevation = 532.71 feet, top of PVC cap = 532.40 feet. (8) Borehole ID = MW-D.

LOG OF EXPLORATORY BORING

PROJECT NAME CHRLF Monitoring Well Improvements
DRILLED BY Hokkaido
DRILL METHOD Air Rotary/Cable Tool
LOGGED BY Pyle/Udaloy
DATE COMPLETED 9/24/99

BORING NO. MW-75
PAGE 15 OF 15
GROUND ELEV. 529.80'
DATUM NGVD 29
TOTAL DEPTH 287.00'

SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER 6 INCHES (RECOVERY)	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
280	G							267.0 to 287.0 feet: GRAVEL (GW), continued.
281	G							
283	G							
285	G			285				
								@ 286.5 feet: no sample recovery.
287	SB	1-1-13 (0")						Total depth drilled = 287.0 feet. Total depth sampled = 288.5 feet. WELL COMPLETION DETAILS + 2.6 to 258.7 feet: nominal 4-inch O.D., flush-threaded, Schedule 40 PVC blank riser pipe. 258.7 to 268.4 feet: nominal 4-inch O.D., flush-threaded, Schedule 40 PVC well screen with 0.060-inch machined slots. 268.4 to 268.8 feet: nominal 4-inch O.D., flush-threaded, Schedule 40 PVC blank riser pipe and endcap. 258.0 feet: stainless steel centralizer. 268.5 feet: stainless steel centralizer. 0 to 2.0 feet: concrete. 2.0 to 10.0 feet: PureGold medium bentonite chips. 10.0 to 247.0 feet: PureGold bentonite grout. 247.0 to 252.9 feet: PureGold bentonite chips. 252.9 to 270.0 feet: 8-12 Colorado silica sand. 270.0 to 287.0 feet: slough and sand. 272.8 to 287.0 feet: nominal 8-inch diameter steel casing remnant with drive shoe.
				290				
				295				
				300				

REMARKS

(1) See general remarks. (2) Water added during drilling below 39 feet. (3) Nominal 8-inch diameter boring. (4) Drilled using air rotary to 156 feet, cable tool below 156 feet. (5) Water elevation for perched groundwater encountered during drilling = 380.2 feet (149.7 feet depth) with the borehole at 156 feet on September 7, 1999. (6) Static regional aquifer elevation = 286.88 feet on December 6, 1999. (7) Top of steel casing elevation = 532.71 feet, top of PVC cap = 532.40 feet. (8) Borehole ID = MW-D.

LOG OF EXPLORATORY BORING

PROJECT NAME Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY Hawkins

BORING NO. MW-80
PAGE 1 of 14
REFERENCE ELEV. 528.50
TOTAL DEPTH 270.0'
DATE COMPLETED 2/27/01

SAMPLE METHOD	SAMPLE NUMBER	PID (In ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	4			5	5		0 to 5.0 feet: GRAVELLY SANDY SILT (ML), dark brown, moist, some fine to medium sand, some fine to medium subround gravel, few organic debris, moist. (TOPSOIL-FILL)	
G	9			10	10		5.0 to 8.0 feet: SILTY SAND WITH GRAVEL (SM), light brown, fine to medium sand, trace coarse sand, some fines, few fine to medium subround gravel, moist. (FILL-REWORKED ADVANCE OUTWASH)	
G	13			15	15		8.0 to 19.0 feet: SANDY SILTY GRAVEL (GM), light brown fines, fine to medium, subround to subangular gravel, some fines, some fine to medium sand, moist. (ADVANCE OUTWASH)	
G	16			20	20		@ 16.0 feet: color change to gray. 19.0 to 23.0 feet: SILTY SANDY GRAVEL (GM), gray fines, fine to coarse, subrounded to subangular gravel,	

REMARKS

(1) See General Remarks. (2) Water added during drilling below 8 feet. (3) Drilled using nominal 12-inch casing and down-hole hammer to 112 feet, nominal 9 5/8-inch casing and tri-cone drill bit below 112 feet. (4) Water elevation for perched groundwater encountered during drilling = 382.2 feet (146.3 feet depth) with the borehole at 148 feet on February 26, 2001. (5) N: 172964.99, E: 1701309.78. (6) Top of PVC steel casing elevation = 530.41 feet. (7) Borehole ID = H-2. (8) Regional aquifer elevation = 291.8 feet at 16:00 on March 15, 2001.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY Hawkins

BORING NO. MW-80
PAGE 2 of 14
REFERENCE ELEV. 528.50
TOTAL DEPTH 270.0'
DATE COMPLETED 2/27/01

SAMPLE METHOD	SAMPLE NUMBER	PID (In ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	20							some coarse sand, some fines, moist. (ADVANCE OUTWASH)
G	24			25				23.0 to 52.0 feet: SANDY SILTY GRAVEL (GM), gray fines, fine to medium, subround to subangular gravel, some fines, some fine to coarse sand, moist. (ADVANCE OUTWASH)
G	28			30				@ 28.0 feet: sands decreasing.
G	34			35				@ 34.0 feet: sands increasing.
				40				

REMARKS

(1) See General Remarks. (2) Water added during drilling below 8 feet. (3) Drilled using nominal 12-inch casing and down-hole hammer to 112 feet, nominal 9 5/8-inch casing and tri-cone drill bit below 112 feet. (4) Water elevation for perched groundwater encountered during drilling = 382.2 feet (146.3 feet depth) with the borehole at 148 feet on February 26, 2001. (5) N: 172964.99, E: 1701309.78. (6) Top of PVC steel casing elevation = 530.41 feet. (7) Borehole ID = H-2. (8) Regional aquifer elevation = 291.8 feet at 16:00 on March 15, 2001.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY Hawkins

BORING NO. MW-80
PAGE 3 of 14
REFERENCE ELEV. 528.50
TOTAL DEPTH 270.0'
DATE COMPLETED 2/27/01

SAMPLE METHOD	SAMPLE NUMBER	PID (In ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	43			45				<p>23.0 to 52.0 feet: SANDY SILTY GRAVEL (GM), continued.</p> <p>@ 50.0 feet: scattered coarse gravel.</p> <p>52.0 to 68.0 feet: SILTY SANDY GRAVEL (GM), gray fines, fine to coarse, subround to subangular gravel, some fine to coarse sand, some fines, moist. (ADVANCE OUTWASH)</p>
G	49			50				
G	54			55				
G	59			60				

REMARKS

(1) See General Remarks. (2) Water added during drilling below 8 feet. (3) Drilled using nominal 12-inch casing and down-hole hammer to 112 feet, nominal 9 5/8-inch casing and tri-cone drill bit below 112 feet. (4) Water elevation for perched groundwater encountered during drilling = 382.2 feet (146.3 feet depth) with the borehole at 148 feet on February 26, 2001. (5) N: 172964.99, E: 1701309.78. (6) Top of PVC steel casing elevation = 530.41 feet. (7) Borehole ID = H-2. (8) Regional aquifer elevation = 291.8 feet at 16:00 on March 15, 2001.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY Hawkins

BORING NO. MW-80
PAGE 4 of 14
REFERENCE ELEV. 528.50
TOTAL DEPTH 270.0'
DATE COMPLETED 2/27/01

SAMPLE METHOD	SAMPLE NUMBER	PID (In ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	66			65	█			<p>52.0 to 68.0 feet: SILTY SANDY GRAVEL (GM), continued.</p>
G	75			70	█			<p>68.0 to 86.0 feet: SILTY GRAVEL (GM), olive-brown fines, fine to medium, subround to subangular gravel, some fines, few fine to coarse sand, moist. (ADVANCE OUTWASH)</p>
				75	█			
				80				

REMARKS

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UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY Hawkins

BORING NO. MW-80
PAGE 5 of 14
REFERENCE ELEV. 528.50
TOTAL DEPTH 270.0'
DATE COMPLETED 2/27/01

SAMPLE METHOD	SAMPLE NUMBER	PID (In ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	84		85	85	85		85	68.0 to 86.0 feet: SILTY GRAVEL (GM) , continued. @ 83.0 feet: color change to yellow-brown.
G	88		90	90	90		90	86.0 to 96.0 feet: SANDY GRAVEL WITH SILT (GW-GM) , yellow-brown fines, fine to coarse, round to subangular gravel, some fine to coarse sand, few fines, moist. (ADVANCE OUTWASH)
G	93		95	95	95		95	96.0 to 102.0 feet: SANDY GRAVEL (GP) , yellow-brown sand, fine to medium, subround to subangular gravel, some fine to coarse sand, trace fines, moist. (ADVANCE OUTWASH)
G	99		100	100	100		100	

REMARKS

(1) See General Remarks. (2) Water added during drilling below 8 feet. (3) Drilled using nominal 12-inch casing and down-hole hammer to 112 feet, nominal 9 5/8-inch casing and tri-cone drill bit below 112 feet. (4) Water elevation for perched groundwater encountered during drilling = 382.2 feet (146.3 feet depth) with the borehole at 148 feet on February 26, 2001. (5) N: 172964.99, E: 1701309.78. (6) Top of PVC steel casing elevation = 530.41 feet. (7) Borehole ID = H-2. (8) Regional aquifer elevation = 291.8 feet at 16:00 on March 15, 2001.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY Hawkins

BORING NO. MW-80
PAGE 6 of 14
REFERENCE ELEV. 528.50
TOTAL DEPTH 270.0'
DATE COMPLETED 2/27/01

SAMPLE METHOD	SAMPLE NUMBER	PID (In ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
				96.0			96.0 to 102.0 feet: SANDY GRAVEL (GP), continued.	
G	103			103			102.0 to 128.0 feet: SANDY SILTY GRAVEL (GM), yellow-brown fines, fine to medium subangular gravel, some fines, some fine to coarse sand, moist. (ADVANCE OUTWASH)	
G	109			110			@ 112.0 feet: telescope casing. Poor sample recovery to 122 feet.	
				115				
				120				

REMARKS

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UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY Hawkins

BORING NO. MW-80
PAGE 7 of 14
REFERENCE ELEV. 528.50
TOTAL DEPTH 270.0'
DATE COMPLETED 2/27/01

SAMPLE METHOD	SAMPLE NUMBER	PID (In ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	124			125	[Sample]		[Lithology]	102.0 to 128.0 feet: SANDY SILTY GRAVEL (GM), continued.
				130			[Lithology]	128.0 to 135.5 feet: SANDY SILTY GRAVEL (GM), yellow-brown fines, fine to medium, subround to subangular gravel, some fines, some fine to coarse sand, moist. (ADVANCE OUTWASH)
G	135			135	[Sample]		[Lithology]	135.5 to 138.5 feet: SANDY SILT (ML), yellow-brown, some fine to medium sand, trace fine gravel, moist. (ADVANCE OUTWASH)
				140			[Lithology]	138.5 to 142.5 feet: SILTY SAND (SM), brown, fine to medium sand, little fines, moist. (ADVANCE OUTWASH)

REMARKS

(1) See General Remarks. (2) Water added during drilling below 8 feet. (3) Drilled using nominal 12-inch casing and down-hole hammer to 112 feet, nominal 9 5/8-inch casing and tri-cone drill bit below 112 feet. (4) Water elevation for perched groundwater encountered during drilling = 382.2 feet (146.3 feet depth) with the borehole at 148 feet on February 26, 2001. (5) N: 172964.99, E: 1701309.78. (6) Top of PVC steel casing elevation = 530.41 feet. (7) Borehole ID = H-2. (8) Regional aquifer elevation = 291.8 feet at 16:00 on March 15, 2001.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY Hawkins

BORING NO. MW-80
PAGE 8 of 14
REFERENCE ELEV. 528.50
TOTAL DEPTH 270.0'
DATE COMPLETED 2/27/01

SAMPLE METHOD	SAMPLE NUMBER	PID (In ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
				145	143.5			138.5 to 142.5 feet: SILTY SAND (SM), continued.
			▽ 2/26/01 @ 12:00 PM					142.5 to 148.5 feet: GRAVELLY SAND (SP), brown, medium to coarse sand, some fine to medium subround gravel, moist to wet. (ADVANCE OUTWASH)
				150	149.5			148.5 to 153.5 feet: GRAVELLY SAND WITH SILT (SP-SM), brown, fine to medium sand, few coarse sand, few fine to coarse subround gravel, few fines, moist to wet. (ADVANCE OUTWASH)
				155	155.5			153.5 to 157.5 feet: SILTY SAND (SM), brown, fine to medium sand, some fines, trace fine to medium gravel, moist. (ADVANCE OUTWASH)
				160	158.5			157.5 to 172.5 feet: SANDY GRAVEL WITH SILT (GP-GM), brown fines, fine to medium, subround to subangular gravel, some fine to coarse sand, few fines, moist. (ADVANCE OUTWASH)

REMARKS

(1) See General Remarks. (2) Water added during drilling below 8 feet. (3) Drilled using nominal 12-inch casing and down-hole hammer to 112 feet, nominal 9 5/8-inch casing and tri-cone drill bit below 112 feet. (4) Water elevation for perched groundwater encountered during drilling = 382.2 feet (146.3 feet depth) with the borehole at 148 feet on February 26, 2001. (5) N: 172964.99, E: 1701309.78. (6) Top of PVC steel casing elevation = 530.41 feet. (7) Borehole ID = H-2. (8) Regional aquifer elevation = 291.8 feet at 16:00 on March 15, 2001.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY Hawkins

BORING NO. MW-80
PAGE 9 of 14
REFERENCE ELEV. 528.50
TOTAL DEPTH 270.0'
DATE COMPLETED 2/27/01

SAMPLE METHOD	SAMPLE NUMBER	PID (in ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	163.5		165	165	165		165	<p>157.5 to 172.5 feet: SANDY GRAVEL WITH SILT (GP-GM), continued.</p> <p>@ 166.0 feet: sand increasing, color change to yellow-brown.</p> <p>172.5 to 177.5 feet: SANDY GRAVEL (GP), yellow-brown sand, fine to medium, subround to subangular gravel, some coarse sand, trace fines, moist. (ADVANCE OUTWASH)</p> <p>177.5 to 182.5 feet: SILTY GRAVELLY SAND (SM), yellow-brown fines, fine to coarse sand, some fine to medium gravel, some fines, moist. (ADVANCE OUTWASH)</p>
G	169.5		170	170	170		170	
G	174.5		175	175	175		175	
			180	180	180		180	

REMARKS

(1) See General Remarks. (2) Water added during drilling below 8 feet. (3) Drilled using nominal 12-inch casing and down-hole hammer to 112 feet, nominal 9 5/8-inch casing and tri-cone drill bit below 112 feet. (4) Water elevation for perched groundwater encountered during drilling = 382.2 feet (146.3 feet depth) with the borehole at 148 feet on February 26, 2001. (5) N: 172964.99, E: 1701309.78. (6) Top of PVC steel casing elevation = 530.41 feet. (7) Borehole ID = H-2. (8) Regional aquifer elevation = 291.8 feet at 16:00 on March 15, 2001.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY Hawkins

BORING NO. MW-80
PAGE 10 of 14
REFERENCE ELEV. 528.50
TOTAL DEPTH 270.0'
DATE COMPLETED 2/27/01

SAMPLE METHOD	SAMPLE NUMBER	PID (in ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
				185	185.5		185	177.5 to 182.5 feet: SILTY GRAVELLY SAND (SM), continued.
G	185.5				187.5		187.5	182.5 to 186.5 feet: SANDY GRAVEL WITH SILT (GP-GM), yellow-brown fines, fine subround gravel, some coarse sand, few fines, moist. (ADVANCE OUTWASH)
G	187.5			190			190	186.5 to 191.5 feet: SANDY SILT (ML), yellow-brown, nonplastic, some fine to medium sand, trace medium to coarse subround gravel, moist. (ADVANCE OUTWASH)
G	192.5			195			195	191.5 to 197.5 feet: SAND WITH SILT (SP-SM), yellow-brown, fine sand, few fines, moist. (ADVANCE OUTWASH)
G	198.5			200			200	197.5 to 202.5 feet: SILTY SAND (SM), yellow-brown, fine sand, trace medium sand, some fines, moist. (ADVANCE OUTWASH)

REMARKS

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UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY Hawkins

BORING NO. MW-80
PAGE 11 of 14
REFERENCE ELEV. 528.50
TOTAL DEPTH 270.0'
DATE COMPLETED 2/27/01

SAMPLE METHOD	SAMPLE NUMBER	PID (in ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
				205				197.5 to 202.5 feet: SILTY SAND (SM), continued.
G	201.5							
G	203.5							202.5 to 210.5 feet: SAND WITH GRAVEL (SW), yellow-brown, fine to coarse sand, few fine subround to angular gravel, trace fines, much iron oxide coating on sands and gravels, moist. (ADVANCE OUTWASH)
				210				
G	211.5							210.5 to 223.5 feet: GRAVEL WITH SILT (GP-GM), gray fines, fine to medium subround to subangular gravel, trace flattened clasts, few fines, few fine to coarse sand, many clasts have brown iron oxide coatings, moist. (ADVANCE OUTWASH)
				215				
G	218.5							
				220				

REMARKS

(1) See General Remarks. (2) Water added during drilling below 8 feet. (3) Drilled using nominal 12-inch casing and down-hole hammer to 112 feet, nominal 9 5/8-inch casing and tri-cone drill bit below 112 feet. (4) Water elevation for perched groundwater encountered during drilling = 382.2 feet (146.3 feet depth) with the borehole at 148 feet on February 26, 2001. (5) N: 172964.99, E: 1701309.78. (6) Top of PVC steel casing elevation = 530.41 feet. (7) Borehole ID = H-2. (8) Regional aquifer elevation = 291.8 feet at 16:00 on March 15, 2001.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY Hawkins

BORING NO. MW-80
PAGE 12 of 14
REFERENCE ELEV. 528.50
TOTAL DEPTH 270.0'
DATE COMPLETED 2/27/01

SAMPLE METHOD	SAMPLE NUMBER	PID (in ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
				225				210.5 to 223.5 feet: GRAVEL WITH SILT (GP-GM), continued.
				230				223.5 to 228.5 feet: GRAVEL (GW), broken fine to coarse subround gravel. (ADVANCE OUTWASH)
G	230.5			235	█			228.5 to 232.5 feet: SILTY SANDY GRAVEL (GM), yellow-brown fines, fine to medium gravel, few coarse gravel, some fine to coarse sand, some fines, moist. (ADVANCE OUTWASH)
G	233.5			235	█			232.5 to 236.5 feet: SANDY GRAVEL (GP), yellow-brown sand, fine to medium, subround to subangular gravel, some medium to coarse sand, trace fines, moist to wet below 235.0 feet. (ADVANCE OUTWASH)
			ATD 2/27/01	235				
G	236.5			240	█			236.5 to 240.0 feet: SILTY SAND (SM), yellow brown, fine sand, some fines, wet. (ADVANCE OUTWASH)
			3/15/01	240				

REMARKS

(1) See General Remarks. (2) Water added during drilling below 8 feet. (3) Drilled using nominal 12-inch casing and down-hole hammer to 112 feet, nominal 9 5/8-inch casing and tri-cone drill bit below 112 feet. (4) Water elevation for perched groundwater encountered during drilling = 382.2 feet (146.3 feet depth) with the borehole at 148 feet on February 26, 2001. (5) N: 172964.99, E: 1701309.78. (6) Top of PVC steel casing elevation = 530.41 feet. (7) Borehole ID = H-2. (8) Regional aquifer elevation = 291.8 feet at 16:00 on March 15, 2001.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY Hawkins

BORING NO. MW-80
PAGE 13 of 14
REFERENCE ELEV. 528.50
TOTAL DEPTH 270.0'
DATE COMPLETED 2/27/01

SAMPLE METHOD	SAMPLE NUMBER	PID (in ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
				240				240.0 to 249.0 feet: SANDY SILT (ML) , gray, nonplastic, some fine sand, trace woody debris. (ADVANCE OUTWASH)
G	243				[Sample]			
				245				249.0 to 254.5 feet: SILTY SANDY GRAVEL (GW) , yellow-brown, fine to coarse, subround to subangular gravel, some fine to medium sand, some fines. (ADVANCE OUTWASH)
G	245				[Sample]			
				250				254.5 to 257.0 feet: SAND (SP) , gray, fine to medium sand, trace to some fines. (PRE-VASHON DEPOSITS)
G	249				[Sample]			
				255				257.0 to 263.0 feet: SANDY GRAVEL (GP) , gray, fine to medium, subround to round gravel, trace cobbles, some fine to medium sand, trace fines. (PRE-VASHON DEPOSITS)
G	252				[Sample]			
G	255				[Sample]			
				260				

REMARKS

(1) See General Remarks. (2) Water added during drilling below 8 feet. (3) Drilled using nominal 12-inch casing and down-hole hammer to 112 feet, nominal 9 5/8-inch casing and tri-cone drill bit below 112 feet. (4) Water elevation for perched groundwater encountered during drilling = 382.2 feet (146.3 feet depth) with the borehole at 148 feet on February 26, 2001. (5) N: 172964.99, E: 1701309.78. (6) Top of PVC steel casing elevation = 530.41 feet. (7) Borehole ID = H-2. (8) Regional aquifer elevation = 291.8 feet at 16:00 on March 15, 2001.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY Hawkins

BORING NO. MW-80
PAGE 14 of 14
REFERENCE ELEV. 528.50
TOTAL DEPTH 270.0'
DATE COMPLETED 2/27/01

SAMPLE METHOD	SAMPLE NUMBER	PID (in ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	260							257.0 to 263.0 feet: SANDY GRAVEL (GP), continued.
G	264			265				263.0 to 266.0 feet: SILTY SANDY GRAVEL (GW-GM), gray fines, fine to coarse, round to subangular gravel, some fine to coarse sand, few to some fines, trace cobbles. (PRE-VASHON DEPOSITS)
G	266							266.0 to 270.0 feet: SANDY GRAVEL (GW), gray sand, fine to coarse gravel, round to subangular, some coarse sand, trace fines. (PRE-VASHON DEPOSITS)
G	267							
								Total depth drilled = 270.0 feet. Total depth sampled = 269.0 feet.
								WELL COMPLETION DETAILS +2.5 to 249.3 feet: nominal 4-inch O.D., flush-threaded, Schedule 80 PVC blank riser pipe. 249.3 to 258.8 feet: nominal 4-inch O.D., flush-threaded, Schedule 80 PVC screen with 0.020-inch machined slots and 0.125-inch spacers. 258.8 to 259.3 feet: nominal 4-inch O.D. flush-threaded Schedule 80 PVC blank riser casing with end cap. 248.0 to 249.0 feet: stainless steel centralizer. 258.0 to 259.0 feet: stainless steel centralizer.
								0 to 3.0 feet: concrete. 3.0 to 5.0 feet: PureGold® medium bentonite chips. 5.0 to 152.0 feet: PureGold® bentonite grout. 152.0 to 246.0 feet: PureGold® medium bentonite chips. 246.0 to 265.0 feet: 20-40 Colorado™ silica sand. 265.0 to 270.0 feet: slough.

REMARKS

(1) See General Remarks. (2) Water added during drilling below 8 feet. (3) Drilled using nominal 12-inch casing and down-hole hammer to 112 feet, nominal 9 5/8-inch casing and tri-cone drill bit below 112 feet. (4) Water elevation for perched groundwater encountered during drilling = 382.2 feet (146.3 feet depth) with the borehole at 148 feet on February 26, 2001. (5) N: 172964.99, E: 1701309.78. (6) Top of PVC steel casing elevation = 530.41 feet. (7) Borehole ID = H-2. (8) Regional aquifer elevation = 291.8 feet at 16:00 on March 15, 2001.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME Area 5 Permit Compliance
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY Udaloy/Thurber

BORING NO. MW-81
PAGE 1 of 11
REFERENCE ELEV. 492.20
TOTAL DEPTH 199.0'
DATE COMPLETED 10/3/00

SAMPLE METHOD	SAMPLE NUMBER	PID (in ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
				0				0 to 2.0 feet: GRAVEL (GP), coarse, angular, drill-pad fill; mixed with topsoil. (FILL)
G	3			5				2.0 to 5.0 feet: SILTY SAND (SM), yellow-brown, fine to medium, some fines, trace fine to medium gravel, damp. (TOPSOIL/FILL)
G	5			5				5.0 to 13.0 feet: SILTY GRAVEL (GP-GM), red-brown fines to 6.0 feet, yellow-brown fines below, medium to coarse, trace fine, some fine to medium sand, few cobbles and boulders, damp. (TILL) @ 6.0 feet: cobbles or boulder. @ 8.0 to 9.5 feet: basalt boulder.
G	6			6				
G	10			10				@ 12.5 feet: add water for drilling.
				15				13.0 to 15.0 feet: GRAVEL (GP), yellow-brown fines, medium to coarse, some sand, trace fines. (TILL)
G	15			15				15.0 to 35.0 feet: SILTY GRAVEL (GW-GM), light gray to gray-brown, fines, fine to coarse, subrounded to subangular, few fines, little medium to coarse sand, clast supported, difficult drilling. (TILL)
				20				

REMARKS

(1) See General Remarks. (2) Water added during drilling below 17 feet. (3) Tri-cone drill bit, 12-inch-diameter casing to 98 feet, 9 5/8-inch casing below 98 feet. (4) N: 172113.99, E: 1702568.87. (5) Reference Elevation = Ground Surface. (6) Top of PVC Casing Elevation = 493.66 feet. (7) Boring ID = MW-L. (8) No perched groundwater noted. (9) Regional groundwater elevation = 310.5 feet at 07:30 October 3, 2000.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME Area 5 Permit Compliance
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY Udaloy/Thurber

BORING NO. MW-81
PAGE 2 of 11
REFERENCE ELEV. 492.20
TOTAL DEPTH 199.0'
DATE COMPLETED 10/3/00

SAMPLE METHOD	SAMPLE NUMBER	PID (in ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	22.5			22.5	1		15.0 to 20.0 feet: SILTY GRAVEL (GP-GM), continued. @ 20.0 to 23.0 feet: gray-brown fines.	
G	26			26	1		23.0 to 35.0 feet: decreased fines.	
G	29			29	1		35.0 feet: color changes to light gray.	
G	35.5			35.5	1		35.0 to 74.0 feet: SILTY GRAVEL (GM), light gray to gray-brown, medium to coarse, trace fine gravel, subrounded to subangular, little fines, little medium to coarse sand, trace cobbles, uniform drilling action, difficult drilling. (TILL)	

REMARKS

(1) See General Remarks. (2) Water added during drilling below 17 feet. (3) Tri-cone drill bit, 12-inch-diameter casing to 98 feet, 9 5/8-inch casing below 98 feet. (4) N: 172113.99, E: 1702568.87. (5) Reference Elevation = Ground Surface. (6) Top of PVC Casing Elevation = 493.66 feet. (7) Boring ID = MW-L. (8) No perched groundwater noted. (9) Regional groundwater elevation = 310.5 feet at 07:30 October 3, 2000.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME Area 5 Permit Compliance
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY Udaloy/Thurber

BORING NO. MW-81
PAGE 4 of 11
REFERENCE ELEV. 492.20
TOTAL DEPTH 199.0'
DATE COMPLETED 10/3/00

SAMPLE METHOD	SAMPLE NUMBER	PID (in ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	64			65	■			35.0 to 74.0 feet: SILTY GRAVEL (GM), continued. @ 66.0 feet: increased fines, trace cobbles.
G	71			70	■			
G	76			75	■			74.0 to 86.0 feet: SILTY GRAVEL (GP-GM), brownish-gray fines, fine to medium, subrounded to rounded (includes rounded flattened medium gravel and subrounded spherical fine gravel), little coarse sand, trace fine to medium sand, few fines, trace coarse gravel. Drills more easily than overlying soils. (ADVANCE OUTWASH)
				80				

REMARKS

(1) See General Remarks. (2) Water added during drilling below 17 feet. (3) Tri-cone drill bit, 12-inch-diameter casing to 98 feet, 9 5/8-inch casing below 98 feet. (4) N: 172113.99, E: 1702568.87. (5) Reference Elevation = Ground Surface. (6) Top of PVC Casing Elevation = 493.66 feet. (7) Boring ID = MW-L. (8) No perched groundwater noted. (9) Regional groundwater elevation = 310.5 feet at 07:30 October 3, 2000.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME Area 5 Permit Compliance
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY Udaloy/Thurber

BORING NO. MW-81
PAGE 5 of 11
REFERENCE ELEV. 492.20
TOTAL DEPTH 199.0'
DATE COMPLETED 10/3/00

SAMPLE METHOD	SAMPLE NUMBER	PID (in ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	80							74.0 to 86.0 feet: SILTY GRAVEL (GP-GM), continued.
G	83							
G	84							
				85				@ 86.0 feet: driller notes very easy and smooth drilling.
G	87							86.0 to 93.0 feet: SILTY GRAVELLY SAND (SW-SM), yellow-brown fines, few fines, little fine to medium subrounded gravel, trace coarse gravel, drills easily, gravels dispersed throughout matrix. (ADVANCE OUTWASH)
				90				
G	93							93.0 to 94.5 feet: SILTY GRAVEL (GP-GM), yellow-brown fines, medium to coarse, subrounded, some sand, few fines. (ADVANCE OUTWASH)
				95				94.5 to 114.0 feet: SILTY GRAVELLY SAND (SW-SM), reddish yellow-brown fines, few fines, few fine to medium subrounded gravel, drills easily, gravels dispersed throughout matrix. (ADVANCE OUTWASH)
G	97							
				100				

REMARKS

(1) See General Remarks. (2) Water added during drilling below 17 feet. (3) Tri-cone drill bit, 12-inch-diameter casing to 98 feet, 9 5/8-inch casing below 98 feet. (4) N: 172113.99, E: 1702568.87. (5) Reference Elevation = Ground Surface. (6) Top of PVC Casing Elevation = 493.66 feet. (7) Boring ID = MW-L. (8) No perched groundwater noted. (9) Regional groundwater elevation = 310.5 feet at 07:30 October 3, 2000.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME Area 5 Permit Compliance
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY Udaloy/Thurber

BORING NO. MW-81
PAGE 6 of 11
REFERENCE ELEV. 492.20
TOTAL DEPTH 199.0'
DATE COMPLETED 10/3/00

SAMPLE METHOD	SAMPLE NUMBER	PID (in ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
				105	■		■	94.5 to 114.0 feet: SILTY GRAVELLY SAND (SW-SM), continued. @ 111.0 to 112.0 feet: thin (<1-inch) beds of gray silt. 114.0 to 131.0 feet: GRAVELLY SAND (SP), yellow brown to gray-brown fines, medium to coarse, subrounded to subangular, some fine to coarse subrounded to rounded gravel, trace fines, trace fine sand, trace cobbles, common orange-brown coatings on gravels. (ADVANCE OUTWASH) @ 118.0 feet: predominantly gravel.
G	105							
G	108			110	■			
G	115			115	■			
G	118			120	■			

REMARKS

(1) See General Remarks. (2) Water added during drilling below 17 feet. (3) Tri-cone drill bit, 12-inch-diameter casing to 98 feet, 9 5/8-inch casing below 98 feet. (4) N: 172113.99, E: 1702568.87. (5) Reference Elevation = Ground Surface. (6) Top of PVC Casing Elevation = 493.66 feet. (7) Boring ID = MW-L. (8) No perched groundwater noted. (9) Regional groundwater elevation = 310.5 feet at 07:30 October 3, 2000.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME Area 5 Permit Compliance
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY Udaloy/Thurber

BORING NO. MW-81
PAGE 7 of 11
REFERENCE ELEV. 492.20
TOTAL DEPTH 199.0'
DATE COMPLETED 10/3/00

SAMPLE METHOD	SAMPLE NUMBER	PID (In ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
				125				114.0 to 131.0 feet: GRAVELLY SAND (SP), continued.
G	123							
				130				
G	128							
				135				
G	132							131.0 to 134.0 feet: SAND (SP), yellow-brown fines, coarse, subrounded to subangular, few medium sand, few fine to medium gravel, trace fines, no formation water. (ADVANCE OUTWASH)
G	135							134.0 to 136.5 feet: SANDY GRAVEL (GP), yellow-brown fines, coarse, little to some fine to medium sand, trace fines, no formation water. (ADVANCE OUTWASH)
G	137							136.5 to 141.0 feet: SAND (SP), yellow-brown fines, fine to medium, few coarse subrounded gravel (gravel may be carrydown). (ADVANCE OUTWASH)
				140				

REMARKS

(1) See General Remarks. (2) Water added during drilling below 17 feet. (3) Tri-cone drill bit, 12-inch-diameter casing to 98 feet, 9 5/8-inch casing below 98 feet. (4) N: 172113.99, E: 1702568.87. (5) Reference Elevation = Ground Surface. (6) Top of PVC Casing Elevation = 493.66 feet. (7) Boring ID = MW-L. (8) No perched groundwater noted. (9) Regional groundwater elevation = 310.5 feet at 07:30 October 3, 2000.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME Area 5 Permit Compliance
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY Udaloy/Thurber

BORING NO. MW-81
PAGE 8 of 11
REFERENCE ELEV. 492.20
TOTAL DEPTH 199.0'
DATE COMPLETED 10/3/00

SAMPLE METHOD	SAMPLE NUMBER	PID (in ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	142			145	[Sample]		[Lithology]	136.5 to 141.0 feet: SAND (SP), continued.
G	147			150	[Sample]		[Lithology]	141.0 to 154.0 feet: SILTY SAND (SP-SM), yellow-brown fines, fine, little to few fines, gravels absent. Fines content decreases downhole. (ADVANCE OUTWASH)
G	153			155	[Sample]		[Lithology]	154.0 to 161.0 feet: SILTY GRAVELLY SAND (SW-SM), yellow-brown fines, fine to coarse, trace medium to coarse gravel, few fines. (ADVANCE OUTWASH)
G	158			160	[Sample]		[Lithology]	

REMARKS

(1) See General Remarks. (2) Water added during drilling below 17 feet. (3) Tri-cone drill bit, 12-inch-diameter casing to 98 feet, 9 5/8-inch casing below 98 feet. (4) N: 172113.99, E: 1702568.87. (5) Reference Elevation = Ground Surface. (6) Top of PVC Casing Elevation = 493.66 feet. (7) Boring ID = MW-L. (8) No perched groundwater noted. (9) Regional groundwater elevation = 310.5 feet at 07:30 October 3, 2000.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME Area 5 Permit Compliance
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY Udaloj/Thurber

BORING NO. MW-81
PAGE 9 of 11
REFERENCE ELEV. 492.20
TOTAL DEPTH 199.0'
DATE COMPLETED 10/3/00

SAMPLE METHOD	SAMPLE NUMBER	PID (in ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
				165	162		154.0 to 161.0 feet: SILTY GRAVELLY SAND (SW-SM), continued.	
G	162				165		161.0 to 164.5 feet: SILTY SAND (SP-SM), gray-brown fines, fine to medium, few fines, few coarse sand to fine gravel, fines upward. (ADVANCE OUTWASH)	
G	165						164.5 to 184.0 feet; GRAVEL (GP), gray-brown fines, medium to coarse, subrounded to subangular, trace fines, few to little sand. Common reddish-brown coatings on gravels. (ADVANCE OUTWASH)	
G	168			170				
G	177			175			@ 177.0 feet: trace silt as matrix and clast coatings.	
				180				

REMARKS

(1) See General Remarks. (2) Water added during drilling below 17 feet. (3) Tri-cone drill bit, 12-inch-diameter casing to 98 feet, 9 5/8-inch casing below 98 feet. (4) N: 172113.99, E: 1702568.87. (5) Reference Elevation = Ground Surface. (6) Top of PVC Casing Elevation = 493.66 feet. (7) Boring ID = MW-L. (8) No perched groundwater noted. (9) Regional groundwater elevation = 310.5 feet at 07:30 October 3, 2000.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME Area 5 Permit Compliance
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY Udaloy/Thurber

BORING NO. MW-81
PAGE 10 of 11
REFERENCE ELEV. 492.20
TOTAL DEPTH 199.0'
DATE COMPLETED 10/3/00

SAMPLE METHOD	SAMPLE NUMBER	PID (in ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
								164.5 to 184.0 feet; GRAVEL (GP), continued. @ 180.5 feet: drilling action suggests bedded soils.
G	184			185	[Sample]			184.0 to 197.0 feet: GRAVEL (GP), yellow-brown fines, medium to coarse, subrounded to subangular, trace fines, few to little sand, wet. Common red-brown staining on gravels. (ADVANCE OUTWASH)
G	187				[Sample]			
G	188				[Sample]			@ 188.5 feet: drilling action suggests numerous thin sand interbeds.
				190				
G	192				[Sample]			
				195				@ 195.0 to 196.0 feet: woody debris (1/2-inch-diameter sticks) in cuttings.
G	195				[Sample]			
G	198				[Sample]			197.0 to 199.0 feet: SANDY GRAVEL (GP), grayish-yellow fines, medium to coarse, subrounded to subangular, little fine to medium sand, trace fines, wet. (ADVANCE OUTWASH)
				200				Bottom of cased hole = 199.0 feet. Bottom of drilling = 199.0 feet.

REMARKS

(1) See General Remarks. (2) Water added during drilling below 17 feet. (3) Tri-cone drill bit, 12-inch-diameter casing to 98 feet, 9 5/8-inch casing below 98 feet. (4) N: 172113.99, E: 1702568.87. (5) Reference Elevation = Ground Surface. (6) Top of PVC Casing Elevation = 493.66 feet. (7) Boring ID = MW-L. (8) No perched groundwater noted. (9) Regional groundwater elevation = 310.5 feet at 07:30 October 3, 2000.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME Area 5 Permit Compliance
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY Udalay/Thurber

BORING NO. MW-81
PAGE 11 of 11
REFERENCE ELEV. 492.20
TOTAL DEPTH 199.0'
DATE COMPLETED 10/3/00

SAMPLE METHOD	SAMPLE NUMBER	PID (in ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
				<div style="display: flex; flex-direction: column; align-items: center;"> <div style="margin-bottom: 20px;">205</div> <div style="margin-bottom: 20px;">210</div> <div style="margin-bottom: 20px;">215</div> <div style="margin-bottom: 20px;">220</div> </div>				<p>Bottom depth sampled = 199.0 feet.</p> <p>WELL COMPLETION DETAILS</p> <p>+2.2 to 183.0 feet: nominal 4-inch O.D., flush-threaded, Schedule 80 PVC blank riser pipe.</p> <p>183.0 to 192.5 feet: nominal 4-inch O.D., flush-threaded, Schedule 80 PVC screen with 0.020-inch machined slots and 0.125-inch spacers.</p> <p>192.5 to 193.0 feet: nominal 4-inch O.D. flush-threaded Schedule 80 PVC blank riser casing with end cap.</p> <p>181.0 to 182.0 feet: stainless steel centralizer.</p> <p>191.5 to 192.5 feet: stainless steel centralizer.</p> <p>0 to 2.0 feet: concrete.</p> <p>2.0 to 10.0 feet: PureGold® medium bentonite chips.</p> <p>10.0 to 174.0 feet: PureGold® bentonite grout.</p> <p>174.0 to 179.1 feet: PureGold® medium bentonite chips.</p> <p>179.1 to 198.5 feet: 20-40 Colorado™ silica sand.</p> <p>198.5 to 199.0 feet: slough.</p>

REMARKS

(1) See General Remarks. (2) Water added during drilling below 17 feet. (3) Tri-cone drill bit, 12-inch-diameter casing to 98 feet, 9 5/8-inch casing below 98 feet. (4) N: 172113.99, E: 1702568.87. (5) Reference Elevation = Ground Surface. (6) Top of PVC Casing Elevation = 493.66 feet. (7) Boring ID = MW-L. (8) No perched groundwater noted. (9) Regional groundwater elevation = 310.5 feet at 07:30 October 3, 2000.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME Area 5 Permit Compliance
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY Udaloy

BORING NO. MW-85
PAGE 1 of 14
REFERENCE ELEV. 529.80
TOTAL DEPTH 270.0'
DATE COMPLETED 12/1/00

SAMPLE METHOD	SAMPLE NUMBER	PID (in ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	5			5	[Sample]		[Litho Column]	0 to 0.5 foot: GRAVEL (GP), gray, medium to coarse, angular. (FILL) 0.5 to 4.0 feet: SILTY SAND (SM), dark brown, fine, some fines, common tree roots, moist. (TOPSOIL/LOESS)
G	10			10	[Sample]		[Litho Column]	4.0 to 12.5 feet: GRAVELLY SILTY SAND (SM), grayish-yellow fines to 9.0 feet, gray-brown fines below 9.0 feet, fine, little fines, some fine to coarse subrounded to subangular gravel, trace cobbles, moist. (WEATHERED TILL)
G	15			15	[Sample]		[Litho Column]	12.5 to 24.0 feet: SILTY GRAVEL (GM), gray-brown fines, medium to coarse, subrounded to subangular, little to some fines, little to some fine to medium sand, trace cobbles. Slow and difficult drilling. (TILL) @ 13.0 feet: add water for drilling. @ 17.0 to 19.0 feet: little fines.
				20			[Litho Column]	

REMARKS

(1) See General Remarks. (2) Water added during drilling below 13 feet. (3) 12-inch-diameter casing and down-hole hammer to 103 feet, 9 5/8-inch casing and tri-cone below 103 feet. (4) N: 173694.52, E: 1701828.95. (5) Reference Elevation = Ground Surface. (6) Top of PVC Casing Elevation = 531.76 feet. (7) Boring ID = MW-M. (8) No perched groundwater noted. (9) Regional groundwater elevation = 285.8 feet at 08:50 November 29, 2000.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME Area 5 Permit Compliance
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY Udaloy

BORING NO. MW-85
PAGE 2 of 14
REFERENCE ELEV. 529.80
TOTAL DEPTH 270.0'
DATE COMPLETED 12/1/00

SAMPLE METHOD	SAMPLE NUMBER	PID (in ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	20							12.5 to 24.0 feet: SILTY GRAVEL (GM), continued.
G	25			25				24.0 to 44.0 feet: SILTY GRAVEL (GM), light gray fines, medium to coarse, subrounded to subangular, little to some fines, little to some sand, trace cobbles. (TILL)
G	30			30				@ 32.5 to 36.0 feet: little fines (GP-GM).
G	35			35				@ 39.0 to 40.0 feet: some fine to medium sand, little light gray fines, easier drilling.
				40				

REMARKS

(1) See General Remarks. (2) Water added during drilling below 13 feet. (3) 12-inch-diameter casing and down-hole hammer to 103 feet, 9 5/8-inch casing and tri-cone below 103 feet. (4) N: 173694.52, E: 1701828.95. (5) Reference Elevation = Ground Surface. (6) Top of PVC Casing Elevation = 531.76 feet. (7) Boring ID = MW-M. (8) No perched groundwater noted. (9) Regional groundwater elevation = 285.8 feet at 08:50 November 29, 2000.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME Area 5 Permit Compliance
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY Udaloy

BORING NO. MW-85
PAGE 3 of 14
REFERENCE ELEV. 529.80
TOTAL DEPTH 270.0'
DATE COMPLETED 12/1/00

SAMPLE METHOD	SAMPLE NUMBER	PID (in ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	40				40.0		40.0	40.0 to 44.0 feet: SILTY GRAVEL (GM) , continued. @ 40.0 to 44.0 feet: brownish-gray fines, easier drilling.
G	45			45.0	45.0		44.0	44.0 to 54.0 feet: SILTY GRAVEL (GM) , yellow-brown fines, medium to coarse, rounded and subrounded to subangular, little fines, some fine to medium sand, trace cobbles. Relatively easy drilling. Possible paleosol. (ADVANCE OUTWASH)
G	50			50.0	50.0		54.0	
G	55			55.0	55.0		54.0	54.0 to 88.0 feet: SILTY GRAVEL (GM) , gray-brown fines, medium to coarse, rounded and subrounded to subangular, little fines, some fine to medium sand, trace cobbles. (ADVANCE OUTWASH)
				60.0			60.0	

REMARKS

(1) See General Remarks. (2) Water added during drilling below 13 feet. (3) 12-inch-diameter casing and down-hole hammer to 103 feet, 9 5/8-inch casing and tri-cone below 103 feet. (4) N: 173694.52, E: 1701828.95. (5) Reference Elevation = Ground Surface. (6) Top of PVC Casing Elevation = 531.76 feet. (7) Boring ID = MW-M. (8) No perched groundwater noted. (9) Regional groundwater elevation = 285.8 feet at 08:50 November 29, 2000.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME Area 5 Permit Compliance
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY Udaloy

BORING NO. MW-85
PAGE 4 of 14
REFERENCE ELEV. 529.80
TOTAL DEPTH 270.0'
DATE COMPLETED 12/1/00

SAMPLE METHOD	SAMPLE NUMBER	PID (in ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	60			54.0	[Sample]		[Lithologic Column]	54.0 to 88.0 feet: SILTY GRAVEL (GM), continued. @ 63.0 to 68.0 feet: little fines, gradational to SILTY SANDY GRAVEL (GP-GM).
G	65			65.0	[Sample]		[Lithologic Column]	
G	70			70.0	[Sample]		[Lithologic Column]	
G	75			75.0	[Sample]		[Lithologic Column]	
				80.0			[Lithologic Column]	

REMARKS

(1) See General Remarks. (2) Water added during drilling below 13 feet. (3) 12-inch-diameter casing and down-hole hammer to 103 feet, 9 5/8-inch casing and tri-cone below 103 feet. (4) N: 173694.52, E: 1701828.95. (5) Reference Elevation = Ground Surface. (6) Top of PVC Casing Elevation = 531.76 feet. (7) Boring ID = MW-M. (8) No perched groundwater noted. (9) Regional groundwater elevation = 285.8 feet at 08:50 November 29, 2000.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME Area 5 Permit Compliance
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY Udaloy

BORING NO. MW-85
PAGE 5 of 14
REFERENCE ELEV. 529.80
TOTAL DEPTH 270.0'
DATE COMPLETED 12/1/00

SAMPLE METHOD	SAMPLE NUMBER	PID (In ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	80			80	■		●●●●●	54.0 to 88.0 feet: SILTY GRAVEL (GM), continued. @ 80.0 feet: trace of fine subrounded gravel.
G	85			85	■		●●●●●	
G	90			90	■		●●●●●	88.0 to 113.0 feet: SILTY SANDY GRAVEL (GP-GM), gray-brown fines, medium to coarse, subrounded to subangular, few fines, some fine to medium sand, trace cobbles. (ADVANCE OUTWASH)
G	95			95	■		●●●●●	
				100			●●●●●	

REMARKS

(1) See General Remarks. (2) Water added during drilling below 13 feet. (3) 12-inch-diameter casing and down-hole hammer to 103 feet, 9 5/8-inch casing and tri-cone below 103 feet. (4) N: 173694.52, E: 1701828.95. (5) Reference Elevation = Ground Surface. (6) Top of PVC Casing Elevation = 531.76 feet. (7) Boring ID = MW-M. (8) No perched groundwater noted. (9) Regional groundwater elevation = 285.8 feet at 08:50 November 29, 2000.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME Area 5 Permit Compliance
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY Udaloy

BORING NO. MW-85
PAGE 7 of 14
REFERENCE ELEV. 529.80
TOTAL DEPTH 270.0'
DATE COMPLETED 12/1/00

SAMPLE METHOD	SAMPLE NUMBER	PID (in ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	120						113.0 to 128.5 feet: GRAVEL (GP), continued.	
G	125			125			128.5 to 136.0 feet: SANDY GRAVEL (GP), gray-brown fines, fine to medium, trace to few fines, some fine to coarse sand. (ADVANCE OUTWASH)	
G	130			130			136.0 to 147.0 feet: SAND (SW), brown fines, trace fines, trace subrounded to subangular gravel. (ADVANCE OUTWASH)	
G	135			135				
				140				

REMARKS

(1) See General Remarks. (2) Water added during drilling below 13 feet. (3) 12-inch-diameter casing and down-hole hammer to 103 feet, 9 5/8-inch casing and tri-cone below 103 feet. (4) N: 173694.52, E: 1701828.95. (5) Reference Elevation = Ground Surface. (6) Top of PVC Casing Elevation = 531.76 feet. (7) Boring ID = MW-M. (8) No perched groundwater noted. (9) Regional groundwater elevation = 285.8 feet at 08:50 November 29, 2000.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME Area 5 Permit Compliance
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY Udaloy

BORING NO. MW-85
PAGE 8 of 14
REFERENCE ELEV. 529.80
TOTAL DEPTH 270.0'
DATE COMPLETED 12/1/00

SAMPLE METHOD	SAMPLE NUMBER	PID (in ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
				145	145			136.0 to 147.0 feet: SAND (SW), continued. @ 140.0 to 144.0 feet: poor returns.
G	145							
				150	150			147.0 to 154.0 feet: SILTY SAND (SP-SM), brown fines, fine to medium, trace to few fines, few coarse sand, trace to few fine subrounded to subangular gravel. (ADVANCE OUTWASH)
G	150							
				155	155			154.0 to 181.0 feet: SANDY GRAVEL (GP), yellow-brown fines, medium to coarse, subrounded to subangular, trace fines, some fine to medium sand, trace to few cobbles. Some yellow-brown fines at upper contact. (ADVANCE OUTWASH)
G	155							
				160	160			
G	158							

REMARKS

(1) See General Remarks. (2) Water added during drilling below 13 feet. (3) 12-inch-diameter casing and down-hole hammer to 103 feet, 9 5/8-inch casing and tri-cone below 103 feet. (4) N: 173694.52, E: 1701828.95. (5) Reference Elevation = Ground Surface. (6) Top of PVC Casing Elevation = 531.76 feet. (7) Boring ID = MW-M. (8) No perched groundwater noted. (9) Regional groundwater elevation = 285.8 feet at 08:50 November 29, 2000.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME Area 5 Permit Compliance
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY Udaloy

BORING NO. MW-85
PAGE 9 of 14
REFERENCE ELEV. 529.80
TOTAL DEPTH 270.0'
DATE COMPLETED 12/1/00

SAMPLE METHOD	SAMPLE NUMBER	PID (in ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	165			165	■		●	154.0 to 181.0 feet: SANDY GRAVEL (GP), continued. @ 163.0 feet: few yellow-brown to orange-brown fines, relatively easy drilling (loose gravels). @ 176.0 to 177.0 feet: bed of SILTY SAND (SP-SM), yellow-brown fines, fine to medium, trace fine gravel.
G	172			170	■		●	
G	176			175	■		●	
G	178			180	■		●	

REMARKS

(1) See General Remarks. (2) Water added during drilling below 13 feet. (3) 12-inch-diameter casing and down-hole hammer to 103 feet, 9 5/8-inch casing and tri-cone below 103 feet. (4) N: 173694.52, E: 1701828.95. (5) Reference Elevation = Ground Surface. (6) Top of PVC Casing Elevation = 531.76 feet. (7) Boring ID = MW-M. (8) No perched groundwater noted. (9) Regional groundwater elevation = 285.8 feet at 08:50 November 29, 2000.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME Area 5 Permit Compliance
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY Udaloy

BORING NO. MW-85
PAGE 10 of 14
REFERENCE ELEV. 529.80
TOTAL DEPTH 270.0'
DATE COMPLETED 12/1/00

SAMPLE METHOD	SAMPLE NUMBER	PID (in ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	183			185	[Sample]		[Litho Column]	154.0 to 181.0 feet: SANDY GRAVEL (GP), continued. @ 181.0 feet: drilling smooths, penetration rate increases significantly. 181.0 to 190.0 feet: SILTY SAND (SM), brown fines, fine, some fines. Gradational to underlying SILTY SAND (SP-SM), position of basal contact is uncertain. (ADVANCE OUTWASH)
G	188			190	[Sample]		[Litho Column]	@ 186.0 to 188.0 feet: poor returns. 190.0 to 202.0 feet: SILTY SAND (SP-SM), yellow-brown fines, fine, few fines, trace medium to coarse sand, trace coal. (ADVANCE OUTWASH)
G	192			195	[Sample]		[Litho Column]	
G	197			200	[Sample]		[Litho Column]	@ 197.0 to 200.0 feet: poor sample recovery, formation appears gradational to SILTY SAND (SM).
G	199			200	[Sample]		[Litho Column]	

REMARKS

(1) See General Remarks. (2) Water added during drilling below 13 feet. (3) 12-inch-diameter casing and down-hole hammer to 103 feet, 9 5/8-inch casing and tri-cone below 103 feet. (4) N: 173694.52, E: 1701828.95. (5) Reference Elevation = Ground Surface. (6) Top of PVC Casing Elevation = 531.76 feet. (7) Boring ID = MW-M. (8) No perched groundwater noted. (9) Regional groundwater elevation = 285.8 feet at 08:50 November 29, 2000.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME Area 5 Permit Compliance
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY Udaloy

BORING NO. MW-85
PAGE 11 of 14
REFERENCE ELEV. 529.80
TOTAL DEPTH 270.0'
DATE COMPLETED 12/1/00

SAMPLE METHOD	SAMPLE NUMBER	PID (in ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
				190.0				190.0 to 202.0 feet: SILTY SAND (SP-SM), continued.
G	202.5			205				202.0 to 206.0 feet: SANDY GRAVEL (GP), yellow-brown fines, fine to medium, trace fines, some fine to medium sand. Gradational with underlying SILTY GRAVEL, position of basal contact is uncertain. (ADVANCE OUTWASH) @ 205.0 to 206.0 feet: gravelly fine to medium sand.
G	209			210				206.0 to 211.0 feet: SILTY GRAVEL (GP-GM), yellow-brown fines, medium to coarse, few fines, some fine to medium sand. Gradational with underlying SILTY GRAVEL, position of basal contact is uncertain. (ADVANCE OUTWASH)
G	214			215				211.0 to 217.0 feet: SILTY GRAVEL (GM), yellow-brown fines, fine to coarse, subrounded to subangular, little fines, some fine to medium sand, trace cobbles. Gradational with underlying SILTY GRAVEL, position of basal contact is uncertain. (ADVANCE OUTWASH)
G	219			220				217.0 to 231.0 feet: SILTY GRAVEL (GW-GM), yellow-brown fines, fine to coarse, subrounded to subangular, few fines, some fine to medium sand. (ADVANCE OUTWASH)

REMARKS

(1) See General Remarks. (2) Water added during drilling below 13 feet. (3) 12-inch-diameter casing and down-hole hammer to 103 feet, 9 5/8-inch casing and tri-cone below 103 feet. (4) N: 173694.52, E: 1701828.95. (5) Reference Elevation = Ground Surface. (6) Top of PVC Casing Elevation = 531.76 feet. (7) Boring ID = MW-M. (8) No perched groundwater noted. (9) Regional groundwater elevation = 285.8 feet at 08:50 November 29, 2000.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME Area 5 Permit Compliance
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY Udaloy

BORING NO. MW-85
PAGE 12 of 14
REFERENCE ELEV. 529.80
TOTAL DEPTH 270.0'
DATE COMPLETED 12/1/00

SAMPLE METHOD	SAMPLE NUMBER	PID (in ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
				217.0				217.0 to 231.0 feet: SILT GRAVEL (GW-GM), continued.
G	225			225				@ 225.0 feet: trace cobbles, common red coatings on basalt gravel.
G	229			230				
G	234			235				231.0 to 241.0 feet: SILTY GRAVEL (GM), yellow-brown fines, fine to medium, subrounded to subangular, little fines, some fine to coarse sand. (ADVANCE OUTWASH)
				240				

REMARKS

(1) See General Remarks. (2) Water added during drilling below 13 feet. (3) 12-inch-diameter casing and down-hole hammer to 103 feet, 9 5/8-inch casing and tri-cone below 103 feet. (4) N: 173694.52, E: 1701828.95. (5) Reference Elevation = Ground Surface. (6) Top of PVC Casing Elevation = 531.76 feet. (7) Boring ID = MW-M. (8) No perched groundwater noted. (9) Regional groundwater elevation = 285.8 feet at 08:50 November 29, 2000.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME Area 5 Permit Compliance
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY Udaloy

BORING NO. MW-85
PAGE 13 of 14
REFERENCE ELEV. 529.80
TOTAL DEPTH 270.0'
DATE COMPLETED 12/1/00

SAMPLE METHOD	SAMPLE NUMBER	PID (in ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	243		08:50 11/29/00 245	245				231.0 to 241.0 feet: SILTY GRAVEL (GM), continued. 241.0 to 256.0 feet: SILTY GRAVEL (GW-GM), yellow-brown fines, fine to coarse, few to little fines, some fine to coarse sand. (ADVANCE OUTWASH)
G	248			250				
G	253			255				
G	25			260				256.0 to 267.0 feet: SANDY GRAVEL (GP), brown-gray to gray fines, medium to coarse, subrounded to rounded, trace fines, some fine to medium sand. (PRE-VASHON CHANNEL DEPOSITS)

REMARKS

(1) See General Remarks. (2) Water added during drilling below 13 feet. (3) 12-inch-diameter casing and down-hole hammer to 103 feet, 9 5/8-inch casing and tri-cone below 103 feet. (4) N: 173694.52, E: 1701828.95. (5) Reference Elevation = Ground Surface. (6) Top of PVC Casing Elevation = 531.76 feet. (7) Boring ID = MW-M. (8) No perched groundwater noted. (9) Regional groundwater elevation = 285.8 feet at 08:50 November 29, 2000.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME Area 5 Permit Compliance
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY Udaloy

BORING NO. MW-85
PAGE 14 of 14
REFERENCE ELEV. 529.80
TOTAL DEPTH 270.0'
DATE COMPLETED 12/1/00

SAMPLE METHOD	SAMPLE NUMBER	PID (in ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	262							256.0 to 267.0 feet: SANDY GRAVEL (GP), continued.
G	264			265				@ 264.0 to 267.0 feet: abundant wood and bark, gray fines.
G	268			270				267.0 to 270.0 feet: SILTY SAND (SP-SM), gray fines, fine, some fines. (PRE-VASHON DEPOSITS)
				275				Bottom of cased hole = 268.0 feet. Bottom of drilling = 270.0 feet. Bottom depth sampled = 270.0 feet. WELL COMPLETION DETAILS +2.4 to 247.2 feet: nominal 4-inch O.D., flush-threaded, Schedule 80 PVC blank riser pipe. 247.2 to 256.7 feet: nominal 4-inch O.D., flush-threaded, Schedule 80 PVC screen with 0.020-inch machined slots and 0.125-inch spacers. 256.7 to 257.2 feet: nominal 4-inch O.D. flush-threaded Schedule 80 PVC blank riser casing with end cap. 246.0 to 247.0 feet: stainless steel centralizer. 256.2 to 257.2 feet: stainless steel centralizer. 0 to 3.0 feet: concrete. 3.0 to 241.2 feet: PureGold® medium bentonite chips. 241.2 to 261.5 feet: 20-40 Colorado™ silica sand. 261.5 to 270.0 feet: slough.
				280				

REMARKS

(1) See General Remarks. (2) Water added during drilling below 13 feet. (3) 12-inch-diameter casing and down-hole hammer to 103 feet, 9 5/8-inch casing and tri-cone below 103 feet. (4) N: 173694.52, E: 1701828.95. (5) Reference Elevation = Ground Surface. (6) Top of PVC Casing Elevation = 531.76 feet. (7) Boring ID = MW-M. (8) No perched groundwater noted. (9) Regional groundwater elevation = 285.8 feet at 08:50 November 29, 2000.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary/Tricone Bit
LOGGED BY Udaloy

BORING NO. MW-87
PAGE 1 of 15
REFERENCE ELEV. 535.20
TOTAL DEPTH 272.5'
DATE COMPLETED 11/21/00

SAMPLE METHOD	SAMPLE NUMBER	PID (in ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
				0			0	0 to 2.0 feet: SANDY GRAVEL (GP), brown fines, medium to coarse, angular. (FILL/ROAD GRADE)
				5			5	2.0 to 7.0 feet: SILTY SAND (SP-SM), dark brown, fine, few fines, common organic material (roots and woody debris), damp. (LOESS/TOPSOIL)
G	4			5	5		5	
				10			10	@ 7.0 feet: add water for drilling.
G	7			10	7		10	7.0 to 14.5 feet: SILTY GRAVEL (GM), brown fines, medium to coarse, some sand, little fines. Sulfur-like odor. (TILL/STRATIFIED DRIFT)
				15			15	
G	12			15	12		15	
				20			20	14.5 to 23.0 feet: SANDY GRAVEL (GP), black fines, medium to coarse, little fine to medium sand, trace fines, pungent sulfur-like odor. No formation water. Gravels coarsen downhole, trace cobbles are present below 18.0 feet. (STRATIFIED DRIFT)
G	15.5			20	15.5		20	
G	17			20	17		20	

REMARKS

(1) See General Remarks. (2) Water added during drilling below 7 feet. (3) 12-inch-diameter casing and down-hole hammer to 113 feet, 9 5/8-inch casing and tri-cone below 113 feet. (4) N: 173493.76, E: 1700670.27. (5) Reference Elevation = Ground Surface. (6) Top of PVC Casing Elevation = 537.31 feet. (7) Boring ID = A-2. (8) Perched groundwater elevation = 431.7 feet at 10:45 November 15, 2000. (9) Regional groundwater elevation = 288.5 feet at 11:20 November 16, 2000.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary/Tri-cone Bit
LOGGED BY Udaloy

BORING NO. MW-87
PAGE 2 of 15
REFERENCE ELEV. 535.20
TOTAL DEPTH 272.5'
DATE COMPLETED 11/21/00

SAMPLE METHOD	SAMPLE NUMBER	PID (In ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	21							14.5 to 23.0 feet: SANDY GRAVEL (GP), continued.
G	25			25				23.0 to 25.0 feet: SILTY GRAVEL (GP-GM), gray fines, medium to coarse, few fines, little sand. (TILL)
G	28							25.0 to 28.0 feet: SILTY GRAVEL (GM), light gray to olive-gray fines, medium to coarse, little fines, some fine to medium sand. (TILL)
G	35			35				28.0 to 36.5 feet: SILTY GRAVEL (GP-GM), light gray fines, medium to coarse, few fines, some sand. Gravels fine upward. (TILL/ADVANCE OUTWASH)
G	39			40				@ 34.0 to 36.5 feet: mostly subrounded to subangular coarse gravels and cobbles. 36.5 to 39.0 feet: SILTY GRAVEL (GM), light gray fines, medium to coarse, subrounded to subangular, little fines, some sand. (TILL/ADVANCE OUTWASH)
								39.0 to 40.0 feet: SILTY SAND (SM), yellow-brown fines, fine, some fines. (ADVANCE OUTWASH)

REMARKS

(1) See General Remarks. (2) Water added during drilling below 7 feet. (3) 12-inch-diameter casing and down-hole hammer to 113 feet, 9 5/8-inch casing and tri-cone below 113 feet. (4) N: 173493.76, E: 1700670.27. (5) Reference Elevation = Ground Surface. (6) Top of PVC Casing Elevation = 537.31 feet. (7) Boring ID = A-2. (8) Perched groundwater elevation = 431.7 feet at 10:45 November 15, 2000. (9) Regional groundwater elevation = 288.5 feet at 11:20 November 16, 2000.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary/Tricone Bit
LOGGED BY Udaloy

BORING NO. MW-87
PAGE 3 of 15
REFERENCE ELEV. 535.20
TOTAL DEPTH 272.5'
DATE COMPLETED 11/21/00

SAMPLE METHOD	SAMPLE NUMBER	PID (in ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	44			45			40.0 to 46.0 feet: SILTY GRAVEL (GW-GM), yellow-brown fines, fine to coarse, subrounded to subangular, trace to few fines, few to some fine to medium sand. (ADVANCE OUTWASH)	
G	49			50			46.0 to 67.0 feet: SILTY GRAVEL (GP-GM), yellow-brown fines, medium to coarse, subrounded to subangular, few fines, few to some fine to medium sand, trace cobbles. (ADVANCE OUTWASH)	
G	55			55			@ 49.0 feet: little fines, some sand (GM).	
G	59			60				

REMARKS

(1) See General Remarks. (2) Water added during drilling below 7 feet. (3) 12-inch-diameter casing and down-hole hammer to 113 feet, 9 5/8-inch casing and tri-cone below 113 feet. (4) N: 173493.76, E: 1700670.27. (5) Reference Elevation = Ground Surface. (6) Top of PVC Casing Elevation = 537.31 feet. (7) Boring ID = A-2. (8) Perched groundwater elevation = 431.7 feet at 10:45 November 15, 2000. (9) Regional groundwater elevation = 288.5 feet at 11:20 November 16, 2000.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary/Tricone Bit
LOGGED BY Udaloy

BORING NO. MW-87
PAGE 4 of 15
REFERENCE ELEV. 535.20
TOTAL DEPTH 272.5'
DATE COMPLETED 11/21/00

SAMPLE METHOD	SAMPLE NUMBER	PID (in ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	65			65	■			46.0 to 67.0 feet: SILTY GRAVEL (GP-GM), continued. @ 61.0 feet: casing drives more easily, fines color is grayish-brown.
G	69			70	■			67.0 to 80.0 feet: SILTY GRAVEL (GM), gray-brown fines, fine to medium, trace coarse, subrounded to subangular, little fines, some fine to medium sand, trace cobbles. (ADVANCE OUTWASH)
G	74			75	■			@ 73.0 feet: mostly medium to coarse gravel with trace cobbles.
G	79			80	■			

REMARKS

(1) See General Remarks. (2) Water added during drilling below 7 feet. (3) 12-inch-diameter casing and down-hole hammer to 113 feet, 9 5/8-inch casing and tri-cone below 113 feet. (4) N: 173493.76, E: 1700670.27. (5) Reference Elevation = Ground Surface. (6) Top of PVC Casing Elevation = 537.31 feet. (7) Boring ID = A-2. (8) Perched groundwater elevation = 431.7 feet at 10:45 November 15, 2000. (9) Regional groundwater elevation = 288.5 feet at 11:20 November 16, 2000.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary/Tri-cone Bit
LOGGED BY Udaloy

BORING NO. MW-87
PAGE 5 of 15
REFERENCE ELEV. 535.20
TOTAL DEPTH 272.5'
DATE COMPLETED 11/21/00

SAMPLE METHOD	SAMPLE NUMBER	PID (in ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
				80.0				80.0 to 83.0 feet: SILTY SAND (SM), yellow-brown fines, fine to medium, little to some fines, poor returns, drills easily. (ADVANCE OUTWASH)
G	84			85				83.0 to 94.0 feet: SILTY GRAVEL (GP-GM), yellow-brown fines, medium to coarse, subrounded to subangular, few fines, few to little fine to coarse sand, trace cobbles. Relatively easy drilling. (ADVANCE OUTWASH)
				90				@ 90.0 feet: trace silt (ML) beds.
G	88			92				
G	92			95				94.0 to 103.0 feet: SILTY GRAVEL (GP-GM), yellow-brown fines, fine to medium, subrounded to subangular, few fines, few to little fine to medium sand, trace clots of yellow-brown sandy silt binder. (ADVANCE OUTWASH)
G	95			100				

REMARKS

(1) See General Remarks. (2) Water added during drilling below 7 feet. (3) 12-inch-diameter casing and down-hole hammer to 113 feet, 9 5/8-inch casing and tri-cone below 113 feet. (4) N: 173493.76, E: 1700670.27. (5) Reference Elevation = Ground Surface. (6) Top of PVC Casing Elevation = 537.31 feet. (7) Boring ID = A-2. (8) Perched groundwater elevation = 431.7 feet at 10:45 November 15, 2000. (9) Regional groundwater elevation = 288.5 feet at 11:20 November 16, 2000.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary/Tricone Bit
LOGGED BY Udaloy

BORING NO. MW-87
PAGE 6 of 15
REFERENCE ELEV. 535.20
TOTAL DEPTH 272.5'
DATE COMPLETED 11/21/00

SAMPLE METHOD	SAMPLE NUMBER	PID (in ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	101		▽ 10:45 11/15/00	105	[Sample]		[Lithology]	<p>94.0 to 103.0 feet: SILTY GRAVEL (GP-GM), continued. @ 100.0 to 102.0 feet: poor returns, casing hammer sluggish due to freezing weather, cuttings include medium to coarse gravel, trace cobbles. May be transitional with underlying clean gravels. (ADVANCE OUTWASH)</p>
G	105			110	[Sample]		[Lithology]	<p>103.0 to 121.0 feet: SANDY GRAVEL (GP), brown fines, medium to coarse, some fine to medium sand, trace fines. Drills easily. Poor returns at upper contact. (ADVANCE OUTWASH)</p>
G	109			115	[Sample]		[Lithology]	<p>@ 113.0 feet: base of 12-inch-diameter casing. Resume drilling using 9 5/8-inch-diameter casing and tricone drill bit. @ 113.0 to 120.0 feet: poor returns, significant bentonite carry down from telescoping. Gray-brown fines.</p>
				120			[Lithology]	

REMARKS

(1) See General Remarks. (2) Water added during drilling below 7 feet. (3) 12-inch-diameter casing and down-hole hammer to 113 feet, 9 5/8-inch casing and tri-cone below 113 feet. (4) N: 173493.76, E: 1700670.27. (5) Reference Elevation = Ground Surface. (6) Top of PVC Casing Elevation = 537.31 feet. (7) Boring ID = A-2. (8) Perched groundwater elevation = 431.7 feet at 10:45 November 15, 2000. (9) Regional groundwater elevation = 288.5 feet at 11:20 November 16, 2000.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary/Tricone Bit
LOGGED BY Udaloy

BORING NO. MW-87
PAGE 7 of 15
REFERENCE ELEV. 535.20
TOTAL DEPTH 272.5'
DATE COMPLETED 11/21/00

SAMPLE METHOD	SAMPLE NUMBER	PID (In ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	120							103.0 to 121.0 feet: SANDY GRAVEL (GP), continued. @ 121.0 feet: increased fines content.
G	125			125				121.0 to 138.0 feet: SILTY GRAVEL (GM), gray-brown to yellow-brown fines, medium to coarse, subrounded to subangular, little fines, little sand. Gravels include basalts with weathered rinds. (ADVANCE OUTWASH) @ 125.0 to 128.0 feet: few fines (GP-GM).
G	130			130				@ 133.0 to 135.0 feet: few fines (GP-GM).
G	135			135				138.0 to 147.0 feet: SILTY GRAVEL (GP-GM), yellow-brown to gray-brown fines, medium to coarse, subrounded to subangular, few to little fines, some sand. (ADVANCE OUTWASH)
				140				

REMARKS

(1) See General Remarks. (2) Water added during drilling below 7 feet. (3) 12-inch-diameter casing and down-hole hammer to 113 feet, 9 5/8-inch casing and tri-cone below 113 feet. (4) N: 173493.76, E: 1700670.27. (5) Reference Elevation = Ground Surface. (6) Top of PVC Casing Elevation = 537.31 feet. (7) Boring ID = A-2. (8) Perched groundwater elevation = 431.7 feet at 10:45 November 15, 2000. (9) Regional groundwater elevation = 288.5 feet at 11:20 November 16, 2000.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary/Tricone Bit
LOGGED BY Udaloy

BORING NO. MW-87
PAGE 8 of 15
REFERENCE ELEV. 535.20
TOTAL DEPTH 272.5'
DATE COMPLETED 11/21/00

SAMPLE METHOD	SAMPLE NUMBER	PID (in ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	140							138.0 to 147.0 feet: SILTY GRAVEL (GP-GM), continued.
G	145			145				147.0 to 156.0 feet: SAND (SW), yellow-brown fines, few fines, few medium to coarse gravel. Uncertain upper contact position. (ADVANCE OUTWASH)
G	150			150				
G	155			155				156.0 to 160.0 feet: GRAVELLY SAND (SP), yellow-brown fines, fine to medium, trace fines, some fine to medium subrounded gravel. (ADVANCE OUTWASH)
G	157							@ 159.5 to 160.5 feet: coarse gravels and cobbles.
				160				

REMARKS

(1) See General Remarks. (2) Water added during drilling below 7 feet. (3) 12-inch-diameter casing and down-hole hammer to 113 feet, 9 5/8-inch casing and tri-cone below 113 feet. (4) N: 173493.76, E: 1700670.27. (5) Reference Elevation = Ground Surface. (6) Top of PVC Casing Elevation = 537.31 feet. (7) Boring ID = A-2. (8) Perched groundwater elevation = 431.7 feet at 10:45 November 15, 2000. (9) Regional groundwater elevation = 288.5 feet at 11:20 November 16, 2000.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary/Tricone Bit
LOGGED BY Udaloy

BORING NO. MW-87
PAGE 9 of 15
REFERENCE ELEV. 535.20
TOTAL DEPTH 272.5'
DATE COMPLETED 11/21/00

SAMPLE METHOD	SAMPLE NUMBER	PID (in ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	160							160.0 to 162.0 feet: SANDY SILT (ML) , gray, little fine sand, trace to few clay (possibly interbedded silty sand and clayey silt). (ADVANCE OUTWASH)
G	161							162.0 to 166.0 feet: SILTY GRAVEL (GP-GM) , gray-brown fines, fine to medium, subrounded to subangular, few fines, some fine to medium sand. Gradational basal contact. (ADVANCE OUTWASH)
G	164			165				166.0 to 170.0 feet: SILTY GRAVEL (GP-GM) , gray-brown fines, medium to coarse, subrounded to subangular, few fines, few sand. (ADVANCE OUTWASH)
G	167			170				170.0 to 173.0 feet: SILTY GRAVEL (GM) , yellow-brown fines, fine to medium, few to little fines, few to little fine to medium sand. Possible paleosol. (ADVANCE OUTWASH)
G	171			175				173.0 to 182.0 feet: SILTY GRAVEL (GP-GM) , yellow-brown fines, medium to coarse, subrounded to subangular, few fines, little fine to medium sand. Common sandy silt clots as binder on clasts. Drill action suggests gravels are bedded. (ADVANCE OUTWASH)
G	177			180				

REMARKS

(1) See General Remarks. (2) Water added during drilling below 7 feet. (3) 12-inch-diameter casing and down-hole hammer to 113 feet, 9 5/8-inch casing and tri-cone below 113 feet. (4) N: 173493.76, E: 1700670.27. (5) Reference Elevation = Ground Surface. (6) Top of PVC Casing Elevation = 537.31 feet. (7) Boring ID = A-2. (8) Perched groundwater elevation = 431.7 feet at 10:45 November 15, 2000. (9) Regional groundwater elevation = 288.5 feet at 11:20 November 16, 2000.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary/Tricone Bit
LOGGED BY Udaloy

BORING NO. MW-87
PAGE 10 of 15
REFERENCE ELEV. 535.20
TOTAL DEPTH 272.5'
DATE COMPLETED 11/21/00

SAMPLE METHOD	SAMPLE NUMBER	PID (In ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	181			185	■		●	173.0 to 182.0 feet: SILTY GRAVEL (GP-GM), continued.
G	187			185	■		●	182.0 to 187.0 feet: SILTY GRAVEL (GP-GM), yellow-brown fines, medium to coarse, few fines, some fine to coarse sand, trace fine gravel. (ADVANCE OUTWASH)
G	190			190	■		●	187.0 to 195.0 feet: SILTY GRAVEL (GM), yellow-brown fines, medium to coarse, little fines, some fine to coarse sand, trace fine gravel. (ADVANCE OUTWASH)
G	197			195	■		●	195.0 to 202.5 feet: SILTY SAND (SP-SM), yellow-brown to orange-brown fines, fine, trace medium to coarse sand, little fines. (ADVANCE OUTWASH)
				200				

REMARKS

(1) See General Remarks. (2) Water added during drilling below 7 feet. (3) 12-inch-diameter casing and down-hole hammer to 113 feet, 9 5/8-inch casing and tri-cone below 113 feet. (4) N: 173493.76, E: 1700670.27. (5) Reference Elevation = Ground Surface. (6) Top of PVC Casing Elevation = 537.31 feet. (7) Boring ID = A-2. (8) Perched groundwater elevation = 431.7 feet at 10:45 November 15, 2000. (9) Regional groundwater elevation = 288.5 feet at 11:20 November 16, 2000.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary/Tricone Bit
LOGGED BY Udaloy

BORING NO. MW-87
PAGE 11 of 15
REFERENCE ELEV. 535.20
TOTAL DEPTH 272.5'
DATE COMPLETED 11/21/00

SAMPLE METHOD	SAMPLE NUMBER	PID (In ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	200							195.0 to 202.5 feet: SILTY SAND (SP-SM), continued.
G	205			205				202.5 to 211.0 feet: SILTY SAND (SM), yellow-brown fines, fine, trace medium to coarse sand, some fines. Gradational upper contact. (ADVANCE OUTWASH)
G	210			210				211.0 to 218.0 feet: SILTY SAND (SP-SM), yellow-brown fines, fine to medium, trace to few fines, some fine to medium subrounded to subangular gravel. (ADVANCE OUTWASH)
G	212							
G	219			220				218.0 to 221.0 feet: SILTY SAND (SM), yellow-brown fines, fine, some fines. (ADVANCE OUTWASH)

REMARKS

(1) See General Remarks. (2) Water added during drilling below 7 feet. (3) 12-inch-diameter casing and down-hole hammer to 113 feet, 9 5/8-inch casing and tri-cone below 113 feet. (4) N: 173493.76, E: 1700670.27. (5) Reference Elevation = Ground Surface. (6) Top of PVC Casing Elevation = 537.31 feet. (7) Boring ID = A-2. (8) Perched groundwater elevation = 431.7 feet at 10:45 November 15, 2000. (9) Regional groundwater elevation = 288.5 feet at 11:20 November 16, 2000.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary/Tricone Bit
LOGGED BY Udaloy

BORING NO. MW-87
PAGE 12 of 15
REFERENCE ELEV. 535.20
TOTAL DEPTH 272.5'
DATE COMPLETED 11/21/00

SAMPLE METHOD	SAMPLE NUMBER	PID (in ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
				218.0				218.0 to 221.0 feet: SILTY SAND (SM), continued.
G	223			225				221.0 to 230.0 feet: SILTY GRAVEL (GM), yellow-brown fines, medium to coarse, subrounded to subangular, little fines, some fine to medium sand. (ADVANCE OUTWASH)
G	228			230				230.0 to 239.0 feet: SILTY GRAVEL (GP-GM), yellow-brown fines, subrounded to subangular, little fines, some sand. Gravels fine upward: mostly fine to medium at 230.0 to 232.0 feet, mostly medium to coarse at 232.0 to 237.0 feet, mostly coarse with cobbles at 237.0 to 239.0 feet. (ADVANCE OUTWASH)
G	234			235				
G	238			240				239.0 to 248.0 feet: SILTY SAND (SM), yellow-brown fines, fine, some fines. (ADVANCE OUTWASH)

REMARKS

(1) See General Remarks. (2) Water added during drilling below 7 feet. (3) 12-inch-diameter casing and down-hole hammer to 113 feet, 9 5/8-inch casing and tri-cone below 113 feet. (4) N: 173493.76, E: 1700670.27. (5) Reference Elevation = Ground Surface. (6) Top of PVC Casing Elevation = 537.31 feet. (7) Boring ID = A-2. (8) Perched groundwater elevation = 431.7 feet at 10:45 November 15, 2000. (9) Regional groundwater elevation = 288.5 feet at 11:20 November 16, 2000.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary/Tricone Bit
LOGGED BY Udaloy

BORING NO. MW-87
PAGE 13 of 15
REFERENCE ELEV. 535.20
TOTAL DEPTH 272.5'
DATE COMPLETED 11/21/00

SAMPLE METHOD	SAMPLE NUMBER	PID (in ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	241							239.0 to 248.0 feet: SILTY SAND (SM), continued.
G	247		11:20 11/16/00					@ 247.0 feet: poor returns (ran out of water for drilling).
G	250							248.0 to 269.0 feet: SILTY SAND (SM), gray fines, fine, some fines, trace fine to medium gravel, trace wood. (PRE-VASHON DEPOSITS)
G	252							
G	256							

REMARKS

(1) See General Remarks. (2) Water added during drilling below 7 feet. (3) 12-inch-diameter casing and down-hole hammer to 113 feet, 9 5/8-inch casing and tri-cone below 113 feet. (4) N: 173493.76, E: 1700670.27. (5) Reference Elevation = Ground Surface. (6) Top of PVC Casing Elevation = 537.31 feet. (7) Boring ID = A-2. (8) Perched groundwater elevation = 431.7 feet at 10:45 November 15, 2000. (9) Regional groundwater elevation = 288.5 feet at 11:20 November 16, 2000.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary/Tricone Bit
LOGGED BY Udaloy

BORING NO. MW-87
PAGE 14 of 15
REFERENCE ELEV. 535.20
TOTAL DEPTH 272.5'
DATE COMPLETED 11/21/00

SAMPLE METHOD	SAMPLE NUMBER	PID (In ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	260							248.0 to 269.0 feet: SILTY SAND (SM), continued.
G	265			265				@ 265.0 feet: lacks gravel, gradational to fine SANDY SILT (ML).
G	268							269.0 to 275.0 feet: SANDY GRAVEL (GP), gray fines, medium to coarse, subrounded and rounded with few subangular, some fine to coarse sand, trace fines. (PRE-VASHON CHANNEL DEPOSITS)
G	271			270				
G	273							
G	274			275				Bottom of cased hole = 272.5 feet. Bottom of drilling = 275.0 feet. Bottom depth sampled = 275.0 feet.
								See Page 15 for Well Completion Details
				280				

REMARKS

(1) See General Remarks. (2) Water added during drilling below 7 feet. (3) 12-inch-diameter casing and down-hole hammer to 113 feet, 9 5/8-inch casing and tri-cone below 113 feet. (4) N: 173493.76, E: 1700670.27. (5) Reference Elevation = Ground Surface. (6) Top of PVC Casing Elevation = 537.31 feet. (7) Boring ID = A-2. (8) Perched groundwater elevation = 431.7 feet at 10:45 November 15, 2000. (9) Regional groundwater elevation = 288.5 feet at 11:20 November 16, 2000.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary/Tricone Bit
LOGGED BY Udaloy

BORING NO. MW-87
PAGE 15 of 15
REFERENCE ELEV. 535.20
TOTAL DEPTH 272.5'
DATE COMPLETED 11/21/00

SAMPLE METHOD	SAMPLE NUMBER	PID (in ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
				285				<p>WELL COMPLETION DETAILS</p> <p>+2.9 to 251.3 feet: nominal 4-inch O.D., flush-threaded, Schedule 80 PVC blank riser pipe.</p> <p>251.3 to 260.8 feet: nominal 4-inch O.D., flush-threaded, Schedule 80 PVC screen with 0.020-inch machined slots and 0.125-inch spacers.</p> <p>260.8 to 261.3 feet: nominal 4-inch O.D. flush-threaded Schedule 80 PVC blank riser casing with end cap.</p> <p>250.0 to 251.0 feet: stainless steel centralizer.</p> <p>260.0 to 261.0 feet: stainless steel centralizer.</p> <p>0 to 2.0 foot: concrete.</p> <p>2.0 to 20.0 feet: PureGold® medium bentonite chips.</p> <p>20.0 to 187.0 feet: PureGold® bentonite grout.</p> <p>187.0 to 246.5 feet: PureGold® bentonite chips.</p> <p>246.5 to 262.0 feet: 20-40 Colorado™ silica sand.</p> <p>262.0 to 275.0 feet: slough.</p>
				290				
				295				
				300				

REMARKS

(1) See General Remarks. (2) Water added during drilling below 7 feet. (3) 12-inch-diameter casing and down-hole hammer to 113 feet, 9 5/8-inch casing and tri-cone below 113 feet. (4) N: 173493.76, E: 1700670.27. (5) Reference Elevation = Ground Surface. (6) Top of PVC Casing Elevation = 537.31 feet. (7) Boring ID = A-2. (8) Perched groundwater elevation = 431.7 feet at 10:45 November 15, 2000. (9) Regional groundwater elevation = 288.5 feet at 11:20 November 16, 2000.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME CHRLF Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY Stevens/Udaloy

BORING NO. MW-91
PAGE 1 of 18
REFERENCE ELEV. 529.70
TOTAL DEPTH 331.0'
DATE COMPLETED 10/26/01

SAMPLE METHOD	SAMPLE NUMBER	BLOW COUNTS (PER 6 INCHES)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
				0				0 to 3.0 feet: SILT (ML), reddish-brown silt, few fine to coarse sand, trace fine to medium subangular to subrounded gravel, damp, common woody debris. (TOPSOIL)
G	4			5				3.0 to 7.0 feet: SILT (ML), grayish-yellow silt, few fine to medium sand, few fine to medium subangular to subrounded gravel, damp. (LOESS)
G	7			8				7.0 to 10.0 feet: SILT (ML), grayish-yellow, some fine to medium sand, little fine to coarse subangular to subrounded gravel, gravels have silt coatings. (WEATHERED TILL)
G	8			10				10.0 to 13.8 feet: SILTY GRAVEL (GP-GM), grayish-yellow, medium to coarse, subangular to subrounded, little to few fine to medium sand, few silt, clast supported, mixed volcanics composition, common white coatings. (WEATHERED TILL?) @ 12.0 feet: add water.
G	14			15				13.8 to 16.5 feet: SILTY GRAVEL (GM), grayish-yellow, medium to coarse, subangular to subrounded, matrix supported, little fine to medium sand, few to little silt. (TILL) @ 13.8 to 14.0 feet: SILT (ML), yellow-brown, trace fine sand, trace fine subrounded gravel.
G	15			18				16.5 to 22.0 feet: SILTY GRAVEL (GM), light gray, fine to coarse, subangular to subrounded, little fines, little fine to medium sand, trace clay, trace cobbles. (TILL)
				20				

REMARKS

(1) See General Remarks. (2) Water added during drilling below 12 feet. (3) Down-hole hammer and 12 1/4-inch-diameter casing to 150 feet, tri-cone bit and 10 5/8-inch-diameter casing below 150 feet. (4) Reference elevation = ground surface. (5) N: 173423.94, E: 1701023.09. (6) Top of PVC elevation = 532.02 feet. (7) Boring ID = MW-91. (8) Perched groundwater noted at 150.8 feet below grade at 13:30 on 10/16/2001. (9) Regional groundwater elevation = 283.49 feet at 15:40 on 1/25/02 after development.

LOG OF EXPLORATORY BORING

PROJECT NAME CHRLF Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY Stevens/Udaloy

BORING NO. MW-91
PAGE 2 of 18
REFERENCE ELEV. 529.70
TOTAL DEPTH 331.0'
DATE COMPLETED 10/26/01

SAMPLE METHOD	SAMPLE NUMBER	BLOW COUNTS (PER 6 INCHES)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	20			16.5	16.5-22.0		16.5-22.0	16.5 to 22.0 feet: SILTY GRAVEL (GM), continued. @ 22.0 feet: brownish tint.
G	23			22.0	22.0-36.5		22.0-36.5	22.0 to 36.5 feet: SILTY GRAVEL (GP-GM), yellow-brown, medium to coarse, subangular to subrounded, some fine to medium sand, trace fine gravel, few fines, trace clay, trace cobbles.
G	27			27.0	27.0-28.5		27.0-28.5	@ 27.0 to 28.5 feet: grades to GM, gray fines.
G	28			29.0	29.0-31.0		29.0-31.0	@ 29.0 to 31.0 feet: possible wet zone.
G	32			34.0	34.0-36.0		34.0-36.0	@ 34.0 to 36.0 feet: grades to GM.
G	35			36.5	36.5-43.0		36.5-43.0	36.5 to 43.0 feet: SILTY GRAVEL (GW-GM/GP-GM), yellow-brown to yellow-gray, medium to coarse, some fine to coarse sand, trace cobbles. Mixed volcanics and basalt. Gradational upper contact.

REMARKS

(1) See General Remarks. (2) Water added during drilling below 12 feet. (3) Down-hole hammer and 12¼-inch-diameter casing to 150 feet, tri-cone bit and 10 5/8-inch-diameter casing below 150 feet. (4) Reference elevation = ground surface. (5) N: 173423.94, E: 1701023.09. (6) Top of PVC elevation = 532.02 feet. (7) Boring ID = MW-91. (8) Perched groundwater noted at 150.8 feet below grade at 13:30 on 10/16/2001. (9) Regional groundwater elevation = 283.49 feet at 15:40 on 1/25/02 after development.

LOG OF EXPLORATORY BORING

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LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY Stevens/Udaloy

BORING NO. MW-91
PAGE 3 of 18
REFERENCE ELEV. 529.70
TOTAL DEPTH 331.0'
DATE COMPLETED 10/26/01

SAMPLE METHOD	SAMPLE NUMBER	BLOW COUNTS (PER 6 INCHES)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	41							36.5 to 43.0 feet: SILTY GRAVEL (GW-GM), continued.
G	45			45				43.0 to 46.0 feet: SILTY GRAVEL (GM), yellow-gray, fine to coarse, some fine to medium sand, little fines, trace cobbles.
G	48			50				46.0 to 62.0 feet: SILTY GRAVEL (GW-GM), yellow-gray, fine to coarse, subangular to subrounded, some fine to medium sand, few fines, trace cobbles.
G	54			55				@ 54.0 to 56.0 feet: increase in silt content, yellow-gray (gradational to GM).
G	56							
G	58			60				

REMARKS

(1) See General Remarks. (2) Water added during drilling below 12 feet. (3) Down-hole hammer and 12¼-inch-diameter casing to 150 feet, tri-cone bit and 10 5/8-inch-diameter casing below 150 feet. (4) Reference elevation = ground surface. (5) N: 173423.94, E: 1701023.09. (6) Top of PVC elevation = 532.02 feet. (7) Boring ID = MW-91. (8) Perched groundwater noted at 150.8 feet below grade at 13:30 on 10/16/2001. (9) Regional groundwater elevation = 283.49 feet at 15:40 on 1/25/02 after development.

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PROJECT NAME CHRLF Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY Stevens/Udaloy

BORING NO. MW-91
PAGE 4 of 18
REFERENCE ELEV. 529.70
TOTAL DEPTH 331.0'
DATE COMPLETED 10/26/01

SAMPLE METHOD	SAMPLE NUMBER	BLOW COUNTS (PER 6 INCHES)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	61							46.0 to 62.0 feet: SILTY GRAVEL (GW-GM) , continued. @ 60.0 to 62.0 feet: trace flattened and oblate gravel.
G	62.5							62.0 to 65.0 feet: SILTY SAND WITH GRAVEL (SW-SM) , dark brown, fine to coarse, some fine to medium gravel, few fines. Possible paleosol.
G	65			65				65.0 to 71.0 feet: SILTY GRAVEL (GP-GM) , brown gray, fine to medium, subrounded to subangular, few to little fines, some fine to medium sand, grades coarser downhole. @ 65.0 feet: GM, brown gray.
G	72							71.0 to 73.0 feet: SILTY SAND (SM) fine, some silt, few coarse sand (subangular to angular, possible carry-down).
G	74.5			75				73.0 to 75.5 feet: SILTY SAND (SP-SM) , medium to coarse, little silt, few fine to medium subangular to subrounded gravel.
G	78							75.5 to 80.0 feet: SILTY GRAVEL (GP-GM) , fine to medium, little silt, subangular to subrounded, few medium to coarse subangular to subrounded sand.
				80				

REMARKS

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BORING NO. MW-91
PAGE 5 of 18
REFERENCE ELEV. 529.70
TOTAL DEPTH 331.0'
DATE COMPLETED 10/26/01

SAMPLE METHOD	SAMPLE NUMBER	BLOW COUNTS (PER 6 INCHES)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	81			80.0	82.0		80.0 to 82.0 feet: SILTY GRAVEL (GP-GM), brown, fine to medium, little medium to coarse sand, few silt (sand and gravel are subangular to subrounded).	
G	84			82.0	85.5		82.0 to 85.5 feet: SILTY GRAVEL (GP-GM), brown, medium to coarse, few medium to coarse sand, few silt (sand and gravel are subangular to subrounded).	
G	87			85.5	90.0		85.5 to 90.0 feet: SILTY SAND (SP-SM), brown, medium to coarse sand, few fine to medium gravel (sand and gravel are subangular to subrounded).	
G	89.5			90.0	98.5		90.0 to 98.5 feet: SILTY SAND (SP-SM), brown, medium to coarse, subangular to subrounded, few silt, few fine subangular to subrounded gravel (gravels are mixed volcanics and basalt).	
				98.5	103.5		98.5 to 103.5 feet: SILTY GRAVEL (GP-GM), brown, medium to coarse, subangular to subrounded, few silt, few fine subangular to subrounded sand (gravels are volcanics	

REMARKS

(1) See General Remarks. (2) Water added during drilling below 12 feet. (3) Down-hole hammer and 12¼-inch-diameter casing to 150 feet, tri-cone bit and 10 5/8-inch-diameter casing below 150 feet. (4) Reference elevation = ground surface. (5) N: 173423.94, E: 1701023.09. (6) Top of PVC elevation = 532.02 feet. (7) Boring ID = MW-91. (8) Perched groundwater noted at 150.8 feet below grade at 13:30 on 10/16/2001. (9) Regional groundwater elevation = 283.49 feet at 15:40 on 1/25/02 after development.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

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DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
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BORING NO. MW-91
PAGE 6 of 18
REFERENCE ELEV. 529.70
TOTAL DEPTH 331.0'
DATE COMPLETED 10/26/01

SAMPLE METHOD	SAMPLE NUMBER	BLOW COUNTS (PER 6 INCHES)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	101				■			and basalt).
G	104.5			105	■			103.5 to 127.0 feet: SILTY SAND (SP-SM), brown, medium to coarse subangular to subrounded, few silt, few fine to medium subangular to subrounded gravels (gravel lithologies same as above).
G	106.5				■			
G	108.5			110	■			
G	113.5			115	■			
				120				

REMARKS

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BORING NO. MW-91
PAGE 7 of 18
REFERENCE ELEV. 529.70
TOTAL DEPTH 331.0'
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SAMPLE METHOD	SAMPLE NUMBER	BLOW COUNTS (PER 6 INCHES)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	121			125	■		●	103.5 to 127.0 feet: SILTY SAND (SP-SM), continued.
G	128			130	■		●	127.0 to 140.0 feet: SILTY GRAVEL (GP-GM), brown, fine to medium, subangular to subrounded, little medium to coarse subangular to subrounded sand, few silt (gravel lithologies same as above).
G	131			135	■		●	@ 131.0 feet: same as above.
G	137.5			140	■		●	@ 137.5 feet: same as above.

REMARKS

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BORING NO. MW-91
PAGE 8 of 18
REFERENCE ELEV. 529.70
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SAMPLE METHOD	SAMPLE NUMBER	BLOW COUNTS (PER 6 INCHES)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	140.5							140.0 to 149.5 feet: SILTY SAND (SP-SM) , brown, medium to coarse, subangular to subrounded, with few fine subrounded gravel and few silt.
G	144.5			145				@ 144.5 to 148.5 feet: few fine to medium subangular to subrounded gravel.
G	148.5							149.5 to 153.0 feet: SILTY GRAVEL (GP-GM) , black to gray medium gravel (mostly subrounded) with few silt, some coarse subrounded sand (lithologies predominantly basalt with some andesite, quartzite and granitics).
G	153		∇ 13:30 10/16/01					153.0 to 155.5 feet: SILTY GRAVEL (GP-GM) , black to gray medium to coarse gravel with few silt and medium to coarse sand (same lithology as above).
G	158							155.5 to 161.5 feet: SILTY SAND (SP-SM) , gray, medium coarse subangular to subrounded sand, few silt, few fine to medium gravel (mixed volcanics and basalt composition).

REMARKS

(1) See General Remarks. (2) Water added during drilling below 12 feet. (3) Down-hole hammer and 12¼-inch-diameter casing to 150 feet, tri-cone bit and 10 5/8-inch-diameter casing below 150 feet. (4) Reference elevation = ground surface. (5) N: 173423.94, E: 1701023.09. (6) Top of PVC elevation = 532.02 feet. (7) Boring ID = MW-91. (8) Perched groundwater noted at 150.8 feet below grade at 13:30 on 10/16/2001. (9) Regional groundwater elevation = 283.49 feet at 15:40 on 1/25/02 after development.

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BORING NO. MW-91
PAGE 9 of 18
REFERENCE ELEV. 529.70
TOTAL DEPTH 331.0'
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SAMPLE METHOD	SAMPLE NUMBER	BLOW COUNTS (PER 6 INCHES)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
				155				155.5 to 161.5 feet: SILTY SAND (SP-SM), continued.
G	162			162	■			161.5 to 172.0 feet: SILTY SAND (SP-SM), brown-gray, medium to coarse, subangular to subrounded, few silt, trace fine to medium gravel (lithology same as above).
G	164			164	■			
				165				
G	168			168	■			@ 168.0 to 172.0 feet: few fine to medium gravel.
				170				
G	172			172	■			172.0 to 174.0 feet: SILTY SAND (SP-SM), brown-gray, fine to medium, subrounded, few silt, few subrounded gravel. Coarsening downward, rougher drilling.
G	174			174	■			174.0 to 176.5 feet: SILTY SAND (SP-SM), brown-gray, medium to coarse, subrounded, few silt, few fine sand, few subrounded gravel. Fining downward.
				175				
G	177.5			177.5	■			176.5 to 182.5 feet: SILTY SAND (SP-SM), brown-gray, medium to coarse, subrounded, few silt, few fine sand, few to little subrounded gravel. Gravel content increases downhole.
				180				

REMARKS

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LOG OF EXPLORATORY BORING

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DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY Stevens/Udaloy

BORING NO. MW-91
PAGE 10 of 18
REFERENCE ELEV. 529.70
TOTAL DEPTH 331.0'
DATE COMPLETED 10/26/01

SAMPLE METHOD	SAMPLE NUMBER	BLOW COUNTS (PER 6 INCHES)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	181							176.5 to 182.5 feet: SILTY SAND (SP-SM), continued.
G	184			185				182.5 to 187.5 feet: SILTY GRAVEL (GP-GM), brown to gray, fine to medium, subangular to subrounded, few silt, few fine to medium sand.
G	189.5			190				187.5 to 191.5 feet: SAND (SP), brown, fine to medium sand, trace silt, trace gravel.
G	193.5			195				191.5 to 211.0 feet: SILTY SAND (SP-SM), brown, fine to medium, few silt, trace gravel. Gravels increase and coarsen down hole.
G	197			200				

REMARKS

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UDALOY ENVIRONMENTAL SERVICES

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PROJECT NAME CHRLF Monitoring Well Improvements
LOCATION Cedar Hills Landfill
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DRILL METHOD Air Rotary
LOGGED BY Stevens/Udaloy

BORING NO. MW-91
PAGE 11 of 18
REFERENCE ELEV. 529.70
TOTAL DEPTH 331.0'
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SAMPLE METHOD	SAMPLE NUMBER	BLOW COUNTS (PER 6 INCHES)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
				200				191.5 to 211.0 feet: SILTY SAND (SP-SM), continued.
G	201.5			201.5	■			@ 202.0 feet: few coarse sand and little fine to medium gravel.
G	203.5			203.5	■			
				205				
G	208			208	■			@ 208.0 feet: few gravel.
				210				
G	211.5			211.5	■			211.0 to 221.5 feet: SILTY SAND (SP-SM), brown, medium to coarse, few fine sand, few gravel, trace silt. Uncertain upper contact.
				215				
G	215			215	■			@ 215.0 feet: slightly coarser.
				217.5				
G	217.5			217.5	■			
				220				

REMARKS

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LOG OF EXPLORATORY BORING

PROJECT NAME **CHRLF Monitoring Well Improvements**
 LOCATION **Cedar Hills Landfill**
 DRILLED BY **Cascade Drilling, Inc.**
 DRILL METHOD **Air Rotary**
 LOGGED BY **Stevens/Udaloy**

BORING NO. **MW-91**
 PAGE **12 of 18**
 REFERENCE ELEV. **529.70**
 TOTAL DEPTH **331.0'**
 DATE COMPLETED **10/26/01**

SAMPLE METHOD	SAMPLE NUMBER	BLOW COUNTS (PER 6 INCHES)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
				225				211.0 to 221.5 feet: SILTY SAND (SP-SM), continued.
G	221.5				■			221.5 to 229.5 feet: SILTY GRAVEL (GP-GM), brown, fine to medium, subangular to subrounded, few silt, few fine to coarse sand.
G	223.5				■			@ 225.5 to 226.5 feet: SAND (SP), brown, medium to coarse with few subangular to subrounded gravel and trace silt.
G	227.5				■			
				230				229.5 to 232.5 feet: SILTY SAND (SP-SM), brown, medium to coarse, little fine to medium gravel, few silt (sand and gravel are subangular to subrounded).
G	230.5				■			
G	233.5				■			232.5 to 235.5 feet: SILTY GRAVEL (GP-GM), brown, medium to coarse subrounded gravel, few fine to coarse sand, trace silt (sand is subangular to subrounded).
				235				
G	236.5				■			235.5 to 240.0 feet: SILTY SAND (SP-SM), brown, medium to coarse, few fine gravel, few silt (sand and gravel are subangular to subrounded).
				240				

REMARKS

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DRILL METHOD Air Rotary
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BORING NO. MW-91
PAGE 13 of 18
REFERENCE ELEV. 529.70
TOTAL DEPTH 331.0'
DATE COMPLETED 10/26/01

SAMPLE METHOD	SAMPLE NUMBER	BLOW COUNTS (PER 6 INCHES)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	240							240.0 to 243.5 feet: SILTY GRAVEL (GP-GM), brown, fine to medium, subrounded, little fine to coarse sand, trace to few silt.
G	243.5			245				243.5 to 245.5 feet: SILTY GRAVEL (GP-GM), brown, medium to coarse, subrounded, few fine to coarse sand, few silt.
G	246.5							245.5 to 247.5 feet: SILT (ML), gray, few medium to coarse sand.
G	250.5			250				247.5 to 254.5 feet: SILTY GRAVEL (GP-GM), gray, fine to medium, subrounded, little fine to coarse subangular to subrounded sand, few silt (silt pieces in sample approximately 2-inches diameter).
G	253							@ 253.0 feet: Coarsens downward.
G	256.5			255				254.5 to 260.0 feet: SILTY GRAVEL (GP-GM), gray, medium to coarse gravel (subrounded, mostly basalt with other lithologies, quartzite, granitics, andesite), little medium to coarse subrounded sand, few to little silt.
				260				

REMARKS

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BORING NO. MW-91
PAGE 14 of 18
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DATE COMPLETED 10/26/01

SAMPLE METHOD	SAMPLE NUMBER	BLOW COUNTS (PER 6 INCHES)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	260.5				■		●	260.0 to 274.0 feet: GRAVEL (GP), gray fines, fine to medium, subangular to subrounded, little medium to coarse subangular to subrounded sand, few silt, few fine sand to 263.5 feet, little fine sand below (gravel lithology: basalt, granitics, andesite and quartzite, some gravel with green stain [epidote or chlorite?]). 274.0 to 281.0 feet: GRAVEL (GP), gray fines, fine to medium, subangular to subrounded, little medium to coarse sand, few to little coarse gravel, few fine sand, few silt.
G	263.5			265	■		●	
G	267			270	■		●	
G	271.5				■		●	
G	274			275	■		●	
G	275.5				■		●	
G	279.5			280	■		●	

REMARKS

(1) See General Remarks. (2) Water added during drilling below 12 feet. (3) Down-hole hammer and 12¼-inch-diameter casing to 150 feet, tri-cone bit and 10 5/8-inch-diameter casing below 150 feet. (4) Reference elevation = ground surface. (5) N: 173423.94, E: 1701023.09. (6) Top of PVC elevation = 532.02 feet. (7) Boring ID = MW-91. (8) Perched groundwater noted at 150.8 feet below grade at 13:30 on 10/16/2001. (9) Regional groundwater elevation = 283.49 feet at 15:40 on 1/25/02 after development.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME CHRLF Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY Stevens/Udaloy

BORING NO. MW-91
PAGE 15 of 18
REFERENCE ELEV. 529.70
TOTAL DEPTH 331.0'
DATE COMPLETED 10/26/01

SAMPLE METHOD	SAMPLE NUMBER	BLOW COUNTS (PER 6 INCHES)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
				274.0			274.0 to 281.0 feet: GRAVEL (GP), continued.	
G	281			281.0	■		281.0 to 282.5 feet: SAND (SP), gray, medium to coarse, few subangular to subrounded gravel, trace fine sand, trace silt.	
				282.5			282.5 to 286.5 feet: SAND (SP), gray, fine to medium, few fine to medium subangular to subrounded gravel, trace fine sand, trace silt.	
G	284.5			284.5	■			
G	286.5			286.5	■		286.5 to 297.5 feet: SAND (SP), gray, medium to coarse sand with few to little fine to medium subangular to subrounded gravel, trace silt, trace coarse subrounded gravel, trace wood.	
G	289.5			289.5	■		@ 291.0 feet: casing drives with difficulty.	
G	294.5			294.5	■		297.5 to 304.5 feet: SANDY SILT (ML), gray silt, little fine sand, trace medium to coarse sand, trace wood debris. Contact position uncertain, may be at 291.0 feet. @ 298.0 feet: drilling smoother.	
				300				

REMARKS

(1) See General Remarks. (2) Water added during drilling below 12 feet. (3) Down-hole hammer and 12¼-inch-diameter casing to 150 feet, tri-cone bit and 10 5/8-inch-diameter casing below 150 feet. (4) Reference elevation = ground surface. (5) N: 173423.94, E: 1701023.09. (6) Top of PVC elevation = 532.02 feet. (7) Boring ID = MW-91. (8) Perched groundwater noted at 150.8 feet below grade at 13:30 on 10/16/2001. (9) Regional groundwater elevation = 283.49 feet at 15:40 on 1/25/02 after development.

LOG OF EXPLORATORY BORING

PROJECT NAME CHRLF Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY Stevens/Udaloy

BORING NO. MW-91
PAGE 16 of 18
REFERENCE ELEV. 529.70
TOTAL DEPTH 331.0'
DATE COMPLETED 10/26/01

SAMPLE METHOD	SAMPLE NUMBER	BLOW COUNTS (PER 6 INCHES)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
				297.5				297.5 to 304.5 feet: SANDY SILT (ML), continued.
SB	304.5			305				304.5 to 331.0 feet: SILTY SAND (SM), gray, fine, little to some silt, trace medium to coarse subrounded sand, trace wood debris. Uncertain upper contact.
SB	306							
G	307.5			310				
				315				
G	317			320				

REMARKS

(1) See General Remarks. (2) Water added during drilling below 12 feet. (3) Down-hole hammer and 12¼-inch-diameter casing to 150 feet, tri-cone bit and 10 5/8-inch-diameter casing below 150 feet. (4) Reference elevation = ground surface. (5) N: 173423.94, E: 1701023.09. (6) Top of PVC elevation = 532.02 feet. (7) Boring ID = MW-91. (8) Perched groundwater noted at 150.8 feet below grade at 13:30 on 10/16/2001. (9) Regional groundwater elevation = 283.49 feet at 15:40 on 1/25/02 after development.

LOG OF EXPLORATORY BORING

PROJECT NAME CHRLF Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY Stevens/Udaloy

BORING NO. MW-91
PAGE 17 of 18
REFERENCE ELEV. 529.70
TOTAL DEPTH 331.0'
DATE COMPLETED 10/26/01

SAMPLE METHOD	SAMPLE NUMBER	BLOW COUNTS (PER 6 INCHES)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
				304.5	304.5 to 331.0 feet: SILTY SAND (SM), continued. @ 320.0 feet: may be more fine sand, less silt.			
G	323			325	325			
G	325			327.5	327.5			@ 327.0 feet: slightly more wood debris.
G	327.5			330	330			
G	330			335				Boring terminated at 331.0 feet below ground surface on October 26, 2001.
				340				See Page 18 for Well Completion Details.

REMARKS

(1) See General Remarks. (2) Water added during drilling below 12 feet. (3) Down-hole hammer and 12¼-inch-diameter casing to 150 feet, tri-cone bit and 10 5/8-inch-diameter casing below 150 feet. (4) Reference elevation = ground surface. (5) N: 173423.94, E: 1701023.09. (6) Top of PVC elevation = 532.02 feet. (7) Boring ID = MW-91. (8) Perched groundwater noted at 150.8 feet below grade at 13:30 on 10/16/2001. (9) Regional groundwater elevation = 283.49 feet at 15:40 on 1/25/02 after development.

LOG OF EXPLORATORY BORING

PROJECT NAME **CHRLF Monitoring Well Improvements**
 LOCATION **Cedar Hills Landfill**
 DRILLED BY **Cascade Drilling, Inc.**
 DRILL METHOD **Air Rotary**
 LOGGED BY **Stevens/Udaloy**

BORING NO. **MW-91**
 PAGE **18 of 18**
 REFERENCE ELEV. **529.70**
 TOTAL DEPTH **331.0'**
 DATE COMPLETED **10/26/01**

SAMPLE METHOD	SAMPLE NUMBER	BLOW COUNTS (PER 6 INCHES)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
				345				<p>WELL COMPLETION DETAILS</p> <p>+2.78 to 268.9 feet: Nominal 6-inch O.D., flush-threaded, Schedule 40 PVC blank riser pipe.</p> <p>268.9 to 278.9 feet: Nominal 6-inch O.D., flush-threaded to PVC, stainless steel welded v-wire screen with 0.125-inch slots.</p> <p>278.9 to 289.0 feet: Nominal 6-inch O.D., welded, stainless steel welded v-wire screen with 0.020-inch slots.</p> <p>289.0 to 294.0 feet: Nominal 6-inch O.D., welded, stainless steel sump.</p> <p>258.9 to 259.5 feet: Stainless steel centralizer.</p> <p>268.6 to 269.3 feet: Stainless steel centralizer.</p> <p>278.6 to 279.2 feet: Stainless steel centralizer.</p> <p>288.7 to 289.3 feet: Stainless steel centralizer.</p> <p>0 to 3.0 feet: Concrete.</p> <p>3.0 to 10.0 feet: Pure Gold® medium bentonite chips.</p> <p>10.0 to 20.8 feet: Pure Gold® medium bentonite grout.</p> <p>20.8 to 25.0 feet: 20x40 Colorado™ Silica Sand.</p> <p>25.0 to 145.0 feet: Alternating lifts of 8 feet of medium bentonite chips and 2 feet of 10x20 silica sand.</p> <p>145.0 to 149.6 feet: pea gravel.</p> <p>149.6 to 240.7 feet: Pure Gold® medium bentonite chips.</p> <p>240.7 to 258.0 feet: 20x40 Colorado™ Silica Sand.</p> <p>258.0 to 260.4 feet: 10x20 Colorado™ Silica Sand.</p> <p>260.4 to 263.5 feet: pea gravel.</p> <p>263.5 to 294.9 feet: Native formation sand and gravel.</p> <p>294.9 to 300.5 feet: pea gravel.</p> <p>300.5 to 321.9 feet: Pure Gold® medium bentonite chips.</p> <p>321.9 to 328.3 feet: pea gravel.</p> <p>328.3 to 330.0 feet: Slough.</p>
				350				
				355				
				360				

REMARKS

(1) See General Remarks. (2) Water added during drilling below 12 feet. (3) Down-hole hammer and 12¾-inch-diameter casing to 150 feet, tri-cone bit and 10 5/8-inch-diameter casing below 150 feet. (4) Reference elevation = ground surface. (5) N: 173423.94, E: 1701023.09. (6) Top of PVC elevation = 532.02 feet. (7) Boring ID = MW-91. (8) Perched groundwater noted at 150.8 feet below grade at 13:30 on 10/16/2001. (9) Regional groundwater elevation = 283.49 feet at 15:40 on 1/25/02 after development.

LOG OF EXPLORATORY BORING

PROJECT NAME CHRLF Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY K. Trotman/CH2M Hill

BORING NO. MW-93
PAGE 1 of 19
REFERENCE ELEV. 630.17
TOTAL DEPTH 350.0'
DATE COMPLETED 6/24/02

SAMPLE METHOD	SAMPLE NUMBER	BLOW COUNTS (PER 6 INCHES)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	2							0 to 2.5 feet: SILTY SAND (SM) , dark brown, fine to medium, scattered organics (tree roots), moist to wet. (FILL)
G	5			5				2.5 to 7.0 feet: SILTY GRAVEL WITH SAND (GM) , brown, fine to medium, rounded to subrounded, few clay, wet (capillary saturation). (WEATHERED TILL) @ 5.0 feet: clay content decreases.
G	8.5			10				7.0 to 11.0 feet: SAND WITH SILT (SP-SM) , brown, fine, few basalt gravel, trace cobble, moist. (TILL)
G	14			15				11.0 to 33.0 feet: SILTY GRAVEL WITH SAND (GM) , gray-brown, coarse, rounded, little fine to coarse sand. (TILL) @ 13.0 feet: started injecting water. @ 14.0 feet: becomes more gravelly.
G	18			20				@ 18.0 feet: silt content increases, gravel to 3-inch.

REMARKS

(1) See General Remarks. (2) Water added during drilling below 13 feet. (3) Drilled using nominal 12-inch casing to 85.5 feet, nominal 9 5/8-inch casing below 85.5 feet. (4) Perched groundwater encountered at Fill/Till contact. Perched groundwater encountered at about 53 to 40 feet below grade, may be drainage from Fill/Till contact. (5) Regional aquifer static water level: 320.35 feet elevation on July 18, 2002, after well development. (6) Top of PVC casing elevation: 632.15 feet. (7) N:169851.24 E:1702259.35. (8) Borehole ID = MW-W.

LOG OF EXPLORATORY BORING

PROJECT NAME **CHRLF Monitoring Well Improvements**
 LOCATION **Cedar Hills Landfill**
 DRILLED BY **Cascade Drilling, Inc.**
 DRILL METHOD **Air Rotary**
 LOGGED BY **K. Trotman/CH2M Hill**

BORING NO. **MW-93**
 PAGE **2 of 19**
 REFERENCE ELEV. **630.17**
 TOTAL DEPTH **350.0'**
 DATE COMPLETED **6/24/02**

SAMPLE METHOD	SAMPLE NUMBER	BLOW COUNTS (PER 6 INCHES)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	23			25				<p>11.0 to 33.0 feet: SILTY GRAVEL WITH SAND (GM), continued.</p> <p>@ 23.0 feet: color change to gray.</p> <p>@ 24.0 feet: silty sand layers present, fine to medium, trace clay.</p>
G	29			30				
G	30			30				
G	34			35				<p>@ 33.0 feet: encountered basalt boulder.</p>
G	35			35				<p>33.0 to 40.0 feet: GRAVEL WITH SILT AND SAND (GP-GM), gray, fine, little medium to coarse sand, occasional organics. Note: significant formation water encountered after borehole stands open for two days during drill rig repairs, may be drainage from perched groundwater at Fill/Till contact.</p>
				40				

REMARKS

(1) See General Remarks. (2) Water added during drilling below 13 feet. (3) Drilled using nominal 12-inch casing to 85.5 feet, nominal 9 5/8-inch casing below 85.5 feet. (4) Perched groundwater encountered at Fill/Till contact. Perched groundwater encountered at about 53 to 40 feet below grade, may be drainage from Fill/Till contact. (5) Regional aquifer static water level: 320.35 feet elevation on July 18, 2002, after well development. (6) Top of PVC casing elevation: 632.15 feet. (7) N:169851.24 E:1702259.35. (8) Borehole ID = MW-W.

LOG OF EXPLORATORY BORING

PROJECT NAME **CHRLF Monitoring Well Improvements**
 LOCATION **Cedar Hills Landfill**
 DRILLED BY **Cascade Drilling, Inc.**
 DRILL METHOD **Air Rotary**
 LOGGED BY **K. Trotman/CH2M Hill**

BORING NO. **MW-93**
 PAGE **3 of 19**
 REFERENCE ELEV. **630.17**
 TOTAL DEPTH **350.0'**
 DATE COMPLETED **6/24/02**

SAMPLE METHOD	SAMPLE NUMBER	BLOW COUNTS (PER 6 INCHES)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	41			40.0	[Sample]		[Lithology]	40.0 to 43.0 feet: GRAVEL WITH SILT (GP-GM) , brownish gray, medium to coarse, subangular to subrounded, few silt, few fine to medium sand, trace clay.
G	43			43.0	[Sample]		[Lithology]	@ 43.0 feet: no formation water, sand content increases. 43.0 to 45.5 feet: GRAVEL WITH SILT (GP-GM) , brownish gray, fine, subrounded, few to little medium to coarse sand, trace clay.
G	45			45.0	[Sample]		[Lithology]	45.5 to 47.5 feet: SILTY GRAVEL (GM) , gray-brown, few to little fine to medium sand, little fines, trace clay, gradational upper contact.
G	47.5			47.5	[Sample]		[Lithology]	47.5 to 52.5 feet: GRAVEL WITH SILT AND COBBLES (GP-GM) , gray-brown, coarse, subrounded, few fine.
G	48.5			48.5	[Sample]		[Lithology]	
G	54			52.5	[Sample]		[Lithology]	52.5 to 76.5 feet: GRAVEL WITH SILT (GP-GM) , brown, medium to coarse, subrounded, trace to few medium to coarse sand, few fines.
G	57			57.0	[Sample]		[Lithology]	

REMARKS

(1) See General Remarks. (2) Water added during drilling below 13 feet. (3) Drilled using nominal 12-inch casing to 85.5 feet, nominal 9 5/8-inch casing below 85.5 feet. (4) Perched groundwater encountered at Fill/Till contact. Perched groundwater encountered at about 53 to 40 feet below grade, may be drainage from Fill/Till contact. (5) Regional aquifer static water level: 320.35 feet elevation on July 18, 2002, after well development. (6) Top of PVC casing elevation: 632.15 feet. (7) N:169851.24 E:1702259.35. (8) Borehole ID = MW-W.

LOG OF EXPLORATORY BORING

PROJECT NAME CHRLF Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY K. Trotman/CH2M Hill

BORING NO. MW-93
PAGE 5 of 19
REFERENCE ELEV. 630.17
TOTAL DEPTH 350.0'
DATE COMPLETED 6/24/02

SAMPLE METHOD	SAMPLE NUMBER	BLOW COUNTS (PER 6 INCHES)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	84			85				76.5 to 89.5 feet: SILTY GRAVEL (GM), continued.
G	89			90				89.5 to 96.0 feet: GRAVEL WITH SILT (GP-GM), brown, coarse, subrounded, little medium to coarse sand, few fines. @ 93.0 feet: grades sandier (some medium to coarse sand).
G	94.5			95				96.0 to 104.0 feet: SILT (ML), gray to dark gray, few to little clay, high dry strength.
G	97			100				

REMARKS

(1) See General Remarks. (2) Water added during drilling below 13 feet. (3) Drilled using nominal 12-inch casing to 85.5 feet, nominal 9 5/8-inch casing below 85.5 feet. (4) Perched groundwater encountered at Fill/Till contact. Perched groundwater encountered at about 53 to 40 feet below grade, may be drainage from Fill/Till contact. (5) Regional aquifer static water level: 320.35 feet elevation on July 18, 2002, after well development. (6) Top of PVC casing elevation: 632.15 feet. (7) N:169851.24 E:1702259.35. (8) Borehole ID = MW-W.

LOG OF EXPLORATORY BORING

PROJECT NAME CHRLF Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY K. Trotman/CH2M Hill

BORING NO. MW-93
PAGE 6 of 19
REFERENCE ELEV. 630.17
TOTAL DEPTH 350.0'
DATE COMPLETED 6/24/02

SAMPLE METHOD	SAMPLE NUMBER	BLOW COUNTS (PER 6 INCHES)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	101				■		▨	96.0 to 104.0 feet: SILT (ML), continued.
G	104			105	■		▨	104.0 to 110.0 feet: GRAVEL WITH SILT (GP-GM), gray brown, coarse, subrounded, few medium to coarse sand, grades siltier with depth.
G	109			110	■		▨	110.0 to 127.0 feet: SILTY GRAVEL WITH SAND (GM), brown, coarse, subrounded, few to little medium to coarse sand, little fines, trace cobbles.
G	112.5			115	■		▨	
G	115.5			120	■		▨	@ 116.0 feet: grades sandier (some fine to medium sand).

REMARKS

(1) See General Remarks. (2) Water added during drilling below 13 feet. (3) Drilled using nominal 12-inch casing to 85.5 feet, nominal 9 5/8-inch casing below 85.5 feet. (4) Perched groundwater encountered at Fill/Till contact. Perched groundwater encountered at about 53 to 40 feet below grade, may be drainage from Fill/Till contact. (5) Regional aquifer static water level: 320.35 feet elevation on July 18, 2002, after well development. (6) Top of PVC casing elevation: 632.15 feet. (7) N:169851.24 E:1702259.35. (8) Borehole ID = MW-W.

LOG OF EXPLORATORY BORING

PROJECT NAME CHRLF Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY K. Trotman/CH2M Hill

BORING NO. MW-93
PAGE 7 of 19
REFERENCE ELEV. 630.17
TOTAL DEPTH 350.0'
DATE COMPLETED 6/24/02

SAMPLE METHOD	SAMPLE NUMBER	BLOW COUNTS (PER 6 INCHES)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	120							110.0 to 127.0 feet: SILTY GRAVEL WITH SAND (GM), continued.
G	125			125				@ 125.0 feet: cobble content increases (few).
G	127							127.0 to 130.0 feet: SAND WITH SILT (SP-SM), yellow brown to yellowish orange, fine to medium.
SB	128	3 21 50/2"						
G	132			130				130.0 to 137.0 feet: GRAVEL WITH SILT AND SAND (GP-GM), yellow brown, fine, subrounded to rounded, little medium to coarse sand.
								@ 136.0 feet: grades sandier and siltier downhole.
G	138							137.0 to 141.0 feet: SILTY GRAVEL WITH SAND (GM), yellow brown, fine, some fine to medium sand, little fines.
				140				

REMARKS

(1) See General Remarks. (2) Water added during drilling below 13 feet. (3) Drilled using nominal 12-inch casing to 85.5 feet, nominal 9 5/8-inch casing below 85.5 feet. (4) Perched groundwater encountered at Fill/Till contact. Perched groundwater encountered at about 53 to 40 feet below grade, may be drainage from Fill/Till contact. (5) Regional aquifer static water level: 320.35 feet elevation on July 18, 2002, after well development. (6) Top of PVC casing elevation: 632.15 feet. (7) N:169851.24 E:1702259.35. (8) Borehole ID = MW-W.

LOG OF EXPLORATORY BORING

PROJECT NAME CHRLF Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY K. Trotman/CH2M Hill

BORING NO. MW-93
PAGE 8 of 19
REFERENCE ELEV. 630.17
TOTAL DEPTH 350.0'
DATE COMPLETED 6/24/02

SAMPLE METHOD	SAMPLE NUMBER	BLOW COUNTS (PER 6 INCHES)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
				145	141.5		137.0 to 141.0 feet: SILTY GRAVEL WITH SAND (GM), continued.	
G	141.5				145		141.0 to 145.0 feet: SAND WITH SILT (SP-SM), brown to yellow brown, fine, few fines.	
G	145						145.0 to 156.5 feet: GRAVEL WITH SAND AND SILT (GP-GM), yellow brown, coarse, subrounded to rounded, some fine sand.	
G	148.5			150				
G	152.5			155				
G	157			160			156.5 to 169.5 feet: SILTY GRAVEL WITH SAND (GM), yellow brown, fine, subrounded, little medium sand, little fines. Note: gradational upper contact.	

REMARKS

(1) See General Remarks. (2) Water added during drilling below 13 feet. (3) Drilled using nominal 12-inch casing to 85.5 feet, nominal 9 5/8-inch casing below 85.5 feet. (4) Perched groundwater encountered at Fill/Till contact. Perched groundwater encountered at about 53 to 40 feet below grade, may be drainage from Fill/Till contact. (5) Regional aquifer static water level: 320.35 feet elevation on July 18, 2002, after well development. (6) Top of PVC casing elevation: 632.15 feet. (7) N:169851.24 E:1702259.35. (8) Borehole ID = MW-W.

LOG OF EXPLORATORY BORING

PROJECT NAME CHRLF Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY K. Trotman/CH2M Hill

BORING NO. MW-93
PAGE 9 of 19
REFERENCE ELEV. 630.17
TOTAL DEPTH 350.0'
DATE COMPLETED 6/24/02

SAMPLE METHOD	SAMPLE NUMBER	BLOW COUNTS (PER 6 INCHES)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	162			162	162		162	156.5 to 169.5 feet: SILTY GRAVEL WITH SAND (GM), continued. @ 162.0 feet: coarser gravel, few medium to coarse sand.
G	166			165	166		166	@ 165.0 feet: fine gravel, little medium to coarse sand.
G	169.5			170	169.5		169.5	169.5 to 186.5 feet: GRAVEL WITH SILT (GP-GM), yellow brown, fine, subrounded to rounded, trace to few medium to coarse sand. Gravel coarsens downward.
G	174			175	174		174	
G	178			180	178		178	

REMARKS

(1) See General Remarks. (2) Water added during drilling below 13 feet. (3) Drilled using nominal 12-inch casing to 85.5 feet, nominal 9 5/8-inch casing below 85.5 feet. (4) Perched groundwater encountered at Fill/Till contact. Perched groundwater encountered at about 53 to 40 feet below grade, may be drainage from Fill/Till contact. (5) Regional aquifer static water level: 320.35 feet elevation on July 18, 2002, after well development. (6) Top of PVC casing elevation: 632.15 feet. (7) N:169851.24 E:1702259.35. (8) Borehole ID = MW-W.

LOG OF EXPLORATORY BORING

PROJECT NAME CHRLF Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY K. Trotman/CH2M Hill

BORING NO. MW-93
PAGE 10 of 19
REFERENCE ELEV. 630.17
TOTAL DEPTH 350.0'
DATE COMPLETED 6/24/02

SAMPLE METHOD	SAMPLE NUMBER	BLOW COUNTS (PER 6 INCHES)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
				185				169.5 to 186.5 feet: GRAVEL WITH SILT (GP-GM), continued.
G	184							
				190				186.5 to 189.5 feet: GRAVEL WITH SILT AND SAND (GP-GM), yellow brown, coarse, subrounded, little medium to coarse sand, few cobbles.
G	187							
				195				189.5 to 194.5 feet: SILTY GRAVEL AND SAND (GM), yellow brown, coarse, subrounded, little medium to coarse sand, trace cobbles, grades less silt downhole.
G	192							
G	194							194.5 to 204.5 feet: GRAVEL WITH SILT (GP-GM), yellow brown, medium to coarse, subrounded, few medium sand.
G	197							
				200				

REMARKS

(1) See General Remarks. (2) Water added during drilling below 13 feet. (3) Drilled using nominal 12-inch casing to 85.5 feet, nominal 9 5/8-inch casing below 85.5 feet. (4) Perched groundwater encountered at Fill/Till contact. Perched groundwater encountered at about 53 to 40 feet below grade, may be drainage from Fill/Till contact. (5) Regional aquifer static water level: 320.35 feet elevation on July 18, 2002, after well development. (6) Top of PVC casing elevation: 632.15 feet. (7) N:169851.24 E:1702259.35. (8) Borehole ID = MW-W.

LOG OF EXPLORATORY BORING

PROJECT NAME CHRLF Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY K. Trotman/CH2M Hill

BORING NO. MW-93
PAGE 11 of 19
REFERENCE ELEV. 630.17
TOTAL DEPTH 350.0'
DATE COMPLETED 6/24/02

SAMPLE METHOD	SAMPLE NUMBER	BLOW COUNTS (PER 6 INCHES)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
								194.5 to 204.5 feet: GRAVEL WITH SILT (GP-GM), continued.
G	202							
G	204.5			205				204.5 to 208.0 feet: SILTY GRAVEL WITH SAND (GM), yellow brown, fine, subrounded to rounded, little to some medium to coarse sand.
G	207.5							
SB	208.5	75 50/5"		210				208.0 to 218.0 feet: SILTY SAND (SM), yellow brown, fine to medium, subrounded to rounded, trace coarse sand and fine gravel. Interbeds of gravel with sand and sand, orange staining in sand layers.
G	212							@ 212.0 feet: sand coarsens to medium to coarse, few gravel (fine).
G	215.5			215				
G	217							@ 217.0 feet: fine to medium sand, few coarse sand and fine gravel.
SB	218	27 80						218.0 to 223.0 feet: SILT WITH CLAY (ML), dark gray, trace fine sand, clay present as laminations.
				220				

REMARKS

(1) See General Remarks. (2) Water added during drilling below 13 feet. (3) Drilled using nominal 12-inch casing to 85.5 feet, nominal 9 5/8-inch casing below 85.5 feet. (4) Perched groundwater encountered at Fill/Till contact. Perched groundwater encountered at about 53 to 40 feet below grade, may be drainage from Fill/Till contact. (5) Regional aquifer static water level: 320.35 feet elevation on July 18, 2002, after well development. (6) Top of PVC casing elevation: 632.15 feet. (7) N:169851.24 E:1702259.35. (8) Borehole ID = MW-W.

LOG OF EXPLORATORY BORING

PROJECT NAME CHRLF Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY K. Trotman/CH2M Hill

BORING NO. MW-93
PAGE 12 of 19
REFERENCE ELEV. 630.17
TOTAL DEPTH 350.0'
DATE COMPLETED 6/24/02

SAMPLE METHOD	SAMPLE NUMBER	BLOW COUNTS (PER 6 INCHES)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
			▽ 12:07 08/05/02	225	228			218.0 to 223.0 feet: SILT WITH CLAY (ML), continued.
G	222							
G	223.5							223.0 to 226.5 feet: SILTY SAND WITH GRAVEL (SM), gray, medium to coarse, little fine gravel, subrounded.
G	227							226.5 to 231.0 feet: SAND WITH SILT (SP-SM), gray, fine to medium, trace to few coarse sand and fine gravel.
SB	228	1 60/5"						
				230				231.0 to 238.0 feet: SILTY SAND (SM), gray brown, fine to medium.
G	235							
G	237							@ 237.0 feet: occasional to scattered organics (wood fragments to 2-inches).
SB	238	50 50						238.0 to 263.0 feet: SAND (SP), gray, fine, faintly cross bedded, trace fines, occasional organics.
				240				

REMARKS

(1) See General Remarks. (2) Water added during drilling below 13 feet. (3) Drilled using nominal 12-inch casing to 85.5 feet, nominal 9 5/8-inch casing below 85.5 feet. (4) Perched groundwater encountered at Fill/Till contact. Perched groundwater encountered at about 53 to 40 feet below grade, may be drainage from Fill/Till contact. (5) Regional aquifer static water level: 320.35 feet elevation on July 18, 2002, after well development. (6) Top of PVC casing elevation: 632.15 feet. (7) N:169851.24 E:1702259.35. (8) Borehole ID = MW-W.

LOG OF EXPLORATORY BORING

PROJECT NAME CHRLF Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY K. Trotman/CH2M Hill

BORING NO. MW-93
PAGE 13 of 19
REFERENCE ELEV. 630.17
TOTAL DEPTH 350.0'
DATE COMPLETED 6/24/02

SAMPLE METHOD	SAMPLE NUMBER	BLOW COUNTS (PER 6 INCHES)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
				238.0				238.0 to 263.0 feet: SAND (SP), continued.
G	242.5				[Sample]			
G	244			245	[Sample]			
				250				
G	252.5				[Sample]			@ 255.0 feet: color change to yellow brown.
				255				
G	257				[Sample]			
SB	258	21 100/4"			[Sample]			@ 258.0 feet: planar bedding.
				260				

REMARKS

(1) See General Remarks. (2) Water added during drilling below 13 feet. (3) Drilled using nominal 12-inch casing to 85.5 feet, nominal 9 5/8-inch casing below 85.5 feet. (4) Perched groundwater encountered at Fill/Till contact. Perched groundwater encountered at about 53 to 40 feet below grade, may be drainage from Fill/Till contact. (5) Regional aquifer static water level: 320.35 feet elevation on July 18, 2002, after well development. (6) Top of PVC casing elevation: 632.15 feet. (7) N:169851.24 E:1702259.35. (8) Borehole ID = MW-W.

LOG OF EXPLORATORY BORING

PROJECT NAME **CHRLF Monitoring Well Improvements**
 LOCATION **Cedar Hills Landfill**
 DRILLED BY **Cascade Drilling, Inc.**
 DRILL METHOD **Air Rotary**
 LOGGED BY **K. Trotman/CH2M Hill**

BORING NO. **MW-93**
 PAGE **14 of 19**
 REFERENCE ELEV. **630.17**
 TOTAL DEPTH **350.0'**
 DATE COMPLETED **6/24/02**

SAMPLE METHOD	SAMPLE NUMBER	BLOW COUNTS (PER 6 INCHES)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	261							238.0 to 263.0 feet: SAND (SP), continued. @ 260.0 feet: increasing organics (scattered).
SB	262	28 50/4"						@ 262.0 feet: grades siltier.
G	264			265				263.0 to 272.0 feet: SAND WITH SILT (SP-SM), yellow brown, fine, trace coarse sand and fine gravel.
G	267							
SB	268	20 60/3"		270				@ 268.0 feet: faint planar bedding.
G	271							
G	273			275				272.0 to 278.0 feet: SILT (ML), gray.
G	278			280				278.0 to 291.5 feet: SAND WITH GRAVEL AND SILT (SP-SM), brown to gray brown, medium, little fine gravel, few fines, gravel grades coarser downhole.

REMARKS

(1) See General Remarks. (2) Water added during drilling below 13 feet. (3) Drilled using nominal 12-inch casing to 85.5 feet, nominal 9 5/8-inch casing below 85.5 feet. (4) Perched groundwater encountered at Fill/Till contact. Perched groundwater encountered at about 53 to 40 feet below grade, may be drainage from Fill/Till contact. (5) Regional aquifer static water level: 320.35 feet elevation on July 18, 2002, after well development. (6) Top of PVC casing elevation: 632.15 feet. (7) N:169851.24 E:1702259.35. (8) Borehole ID = MW-W.

LOG OF EXPLORATORY BORING

PROJECT NAME CHRLF Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY K. Trotman/CH2M Hill

BORING NO. MW-93
PAGE 15 of 19
REFERENCE ELEV. 630.17
TOTAL DEPTH 350.0'
DATE COMPLETED 6/24/02

SAMPLE METHOD	SAMPLE NUMBER	BLOW COUNTS (PER 6 INCHES)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	281.5				■			278.0 to 291.5 feet: SAND WITH GRAVEL AND SILT (SP-SM), continued. @ 289.0 feet: siltier, yellow brown to orange brown.
G	284.5			285	■			
G	287				■			
G	292			295	■		291.5 to 297.5 feet: GRAVEL WITH SILT AND SAND (GP-GM), gray brown, coarse, subangular to subrounded, little fine sand, few coarse sand, few fines.	
G	297.5			300	■		297.5 to 304.0 feet: GRAVEL WITH SAND (GP), gray brown, medium to coarse, subrounded, scattered to numerous organics (wood fragments).	

REMARKS

(1) See General Remarks. (2) Water added during drilling below 13 feet. (3) Drilled using nominal 12-inch casing to 85.5 feet, nominal 9 5/8-inch casing below 85.5 feet. (4) Perched groundwater encountered at Fill/Till contact. Perched groundwater encountered at about 53 to 40 feet below grade, may be drainage from Fill/Till contact. (5) Regional aquifer static water level: 320.35 feet elevation on July 18, 2002, after well development. (6) Top of PVC casing elevation: 632.15 feet. (7) N:169851.24 E:1702259.35. (8) Borehole ID = MW-W.

LOG OF EXPLORATORY BORING

PROJECT NAME CHRLF Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY K. Trotman/CH2M Hill

BORING NO. MW-93
PAGE 16 of 19
REFERENCE ELEV. 630.17
TOTAL DEPTH 350.0'
DATE COMPLETED 6/24/02

SAMPLE METHOD	SAMPLE NUMBER	BLOW COUNTS (PER 6 INCHES)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	302			305			297.5 to 304.0 feet: GRAVEL WITH SAND (GP), continued.	
G	306.5						304.0 to 314.0 feet: GRAVEL WITH SILT (GP-GM), gray brown to olive gray, coarse, few fine to medium sand, few fines.	
							@ 308.5 feet: color change to yellow-brown.	
G	311			310			314.0 to 317.0 feet: SILTY SAND WITH GRAVEL (SM), yellow brown, medium to coarse, subrounded, little gravel.	
G	315			315			317.0 to 323.5 feet: GRAVEL WITH SAND (GP), gray brown, medium to coarse, subrounded, little fine to medium sand.	
				320				

REMARKS

(1) See General Remarks. (2) Water added during drilling below 13 feet. (3) Drilled using nominal 12-inch casing to 85.5 feet, nominal 9 5/8-inch casing below 85.5 feet. (4) Perched groundwater encountered at Fill/Till contact. Perched groundwater encountered at about 53 to 40 feet below grade, may be drainage from Fill/Till contact. (5) Regional aquifer static water level: 320.35 feet elevation on July 18, 2002, after well development. (6) Top of PVC casing elevation: 632.15 feet. (7) N:169851.24 E:1702259.35. (8) Borehole ID = MW-W.

LOG OF EXPLORATORY BORING

PROJECT NAME CHRLF Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY K. Trotman/CH2M Hill

BORING NO. MW-93
PAGE 17 of 19
REFERENCE ELEV. 630.17
TOTAL DEPTH 350.0'
DATE COMPLETED 6/24/02

SAMPLE METHOD	SAMPLE NUMBER	BLOW COUNTS (PER 6 INCHES)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	320							317.0 to 323.5 feet: GRAVEL WITH SAND (GP), continued.
G	324			325				323.5 to 328.0 feet: GRAVEL WITH SILT AND SAND (GP-GM), yellow brown, coarse, subrounded, little medium to coarse sand, few cobbles, few fines. @ 326.0 feet: color change to brown, little cobbles. 328.0 to 331.0 feet: SILTY SAND (SM), gray, fine, little fines. 331.0 to 334.0 feet: GRAVEL WITH SILT AND SAND (GP-GM), gray brown (dark brown silt), fine, little medium to coarse sand, few coarse gravel. 334.0 to 335.0 feet: SILTY SAND (SM), gray brown, medium, few coarse gravel, subrounded. 335.0 to 339.0 feet: GRAVEL WITH SILT AND SAND (GP-GM), gray brown, fine, subangular to subrounded, little coarse gravel, medium to coarse sand, few fines. 339.0 to 346.0 feet: WELL GRADED GRAVEL WITH SAND (GW), gray brown, subrounded to rounded, little
				330				
				335				
				340				

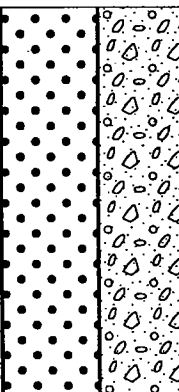
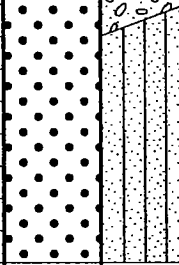
REMARKS

(1) See General Remarks. (2) Water added during drilling below 13 feet. (3) Drilled using nominal 12-inch casing to 85.5 feet, nominal 9 5/8-inch casing below 85.5 feet. (4) Perched groundwater encountered at Fill/Till contact. Perched groundwater encountered at about 53 to 40 feet below grade, may be drainage from Fill/Till contact. (5) Regional aquifer static water level: 320.35 feet elevation on July 18, 2002, after well development. (6) Top of PVC casing elevation: 632.15 feet. (7) N:169851.24 E:1702259.35. (8) Borehole ID = MW-W.

LOG OF EXPLORATORY BORING

PROJECT NAME CHRLF Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY K. Trotman/CH2M Hill

BORING NO. MW-93
PAGE 18 of 19
REFERENCE ELEV. 630.17
TOTAL DEPTH 350.0'
DATE COMPLETED 6/24/02

SAMPLE METHOD	SAMPLE NUMBER	BLOW COUNTS (PER 6 INCHES)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
				345				medium to coarse sand.
				350				346.0 to 350.0 feet: SILTY SAND (SM), gray, fine, trace coarse sand, occasional organics (wood fragments), interbedded layers of silty fine sand and fine sand with silt. (PRE-VASHON DEPOSITS)
				355				Boring terminated at 350.0 feet below ground surface on June 24, 2002.
				360				See Page 19 for Well Completion Details.

REMARKS

(1) See General Remarks. (2) Water added during drilling below 13 feet. (3) Drilled using nominal 12-inch casing to 85.5 feet, nominal 9 5/8-inch casing below 85.5 feet. (4) Perched groundwater encountered at Fill/Till contact. Perched groundwater encountered at about 53 to 40 feet below grade, may be drainage from Fill/Till contact. (5) Regional aquifer static water level: 320.35 feet elevation on July 18, 2002, after well development. (6) Top of PVC casing elevation: 632.15 feet. (7) N:169851.24 E:1702259.35. (8) Borehole ID = MW-W.

LOG OF EXPLORATORY BORING

PROJECT NAME CHRLF Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY K. Trotman/CH2M Hill

BORING NO. MW-93
PAGE 19 of 19
REFERENCE ELEV. 630.17
TOTAL DEPTH 350.0'
DATE COMPLETED 6/24/02

SAMPLE METHOD	SAMPLE NUMBER	BLOW COUNTS (PER 6 INCHES)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
				365				<p>WELL COMPLETION DETAILS</p> <p>+2.42 to 310.3 feet: Nominal 4-inch O.D., flush-threaded, Schedule 80 PVC blank riser pipe.</p> <p>310.3 to 320.1 feet: Nominal 4-inch O.D., flush-threaded, Schedule 80 PVC well screen with 0.020-inch machined slots and 0.125-inch spacers.</p> <p>311.6 to 323.0 feet: Nominal 3-inch O.D. flush-threaded Schedule 40 PVC screen with 0.020-inch machined slots attached using stainless steel screws to a Schedule 80 PVC end plug with stainless steel toggles (see report text).</p> <p>320.1 to 320.5 feet: Nominal 4-inch O.D., flush-threaded, Schedule 80 PVC blank casing with end cap.</p> <p>309.3 to 310.3 feet: stainless steel centralizer.</p> <p>320.1 to 321.1 feet: stainless steel centralizer.</p> <p>0 to 2.0 feet: Concrete.</p> <p>2.0 to 307.7 feet: Pure Gold® medium bentonite chips.</p> <p>307.7 to 319.6 feet: 20x40 Colorado™ Silica Sand.</p> <p>319.6 to 322.0 feet: 8x12 Colorado™ Silica Sand.</p> <p>322.0 to 350.0 feet: Pea gravel.</p>
				370				
				375				
				380				

REMARKS

(1) See General Remarks. (2) Water added during drilling below 13 feet. (3) Drilled using nominal 12-inch casing to 85.5 feet, nominal 9 5/8-inch casing below 85.5 feet. (4) Perched groundwater encountered at Fill/Till contact. Perched groundwater encountered at about 53 to 40 feet below grade, may be drainage from Fill/Till contact. (5) Regional aquifer static water level: 320.35 feet elevation on July 18, 2002, after well development. (6) Top of PVC casing elevation: 632.15 feet. (7) N:169851.24 E:1702259.35. (8) Borehole ID = MW-W.

LOG OF EXPLORATORY BORING

PROJECT NAME CHRLF Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY G. Emens

BORING NO. MW-99
PAGE 1 of 15
REFERENCE ELEV. 491.77
TOTAL DEPTH 287.0'
DATE COMPLETED 8/30/02

SAMPLE METHOD	SAMPLE NUMBER	BLOW COUNTS (PER 6 INCHES)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	5			5			0 - 0.5	0 to 0.5 foot: CRUSHED ROCK. (FILL)
G	10			10				0.5 to 6.5 feet: SILTY SAND (SM); dark reddish brown fines, fine to medium, trace fine gravel, subrounded to rounded, little silt, trace clay, trace organics, moist. (TOPSOIL) @ 3.5 feet: color grades to brown, increase in fine gravel. @ 6.0 feet: basalt cobbles, hard drilling, driller adds water. @ 6.5 to 7.0 feet: grades to gravels.
G	15			15				6.5 to 82.0 feet: SILTY GRAVEL (GM), brown fines, mostly fine, subangular to rounded, few fine to coarse sand, little silt, trace clay. (TILL) @ 14.5 feet: color grades to light gray, addition of trace coarse gravel, sand increases to little. @ 18.5 feet: color grades to brownish gray.
				20				

REMARKS

(1) See General Remarks. (2) Water added during drilling below 6 feet. (3) Drilled using nominal 12-inch O.D. casing and down-hole hammer to 86 feet, nominal 9 5/8-inch I.D. casing and tri-cone below 86 feet. (4) No perched groundwater encountered during drilling. (5) Regional aquifer static water level: 289.47 feet elevation on September 3, 2002, after well development. (6) N:172098.73 E:1702556.06. (7) Top of PVC well casing: 493.64 feet elevation.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME
LOCATION
DRILLED BY
DRILL METHOD
LOGGED BY

CHRLF Monitoring Well Improvements
Cedar Hills Landfill
Cascade Drilling, Inc.
Air Rotary
G. Emens

BORING NO. MW-99
PAGE 2 of 15
REFERENCE ELEV. 491.77
TOTAL DEPTH 287.0'
DATE COMPLETED 8/30/02

SAMPLE METHOD	SAMPLE NUMBER	BLOW COUNTS (PER 6 INCHES)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	20				■		●	6.5 to 82.0 feet: SILTY GRAVEL (GM), continued.
				25	■		●	@ 22.0 feet: color change to gray.
G	25				■		●	@ 27.0 feet: increase in coarse gravel fraction.
				30	■		●	@ 28.5 feet: color change to brownish gray.
G	30				■		●	@ 36.0 feet: decrease in silt content.
				35	■		●	@ 38.0 feet: color grades to gray.
				40	■		●	

REMARKS

(1) See General Remarks. (2) Water added during drilling below 6 feet. (3) Drilled using nominal 12-inch O.D. casing and down-hole hammer to 86 feet, nominal 9 5/8-inch I.D. casing and tri-cone below 86 feet. (4) No perched groundwater encountered during drilling. (5) Regional aquifer static water level: 289.47 feet elevation on September 3, 2002, after well development. (6) N:172098.73 E:1702556.06. (7) Top of PVC well casing: 493.64 feet elevation.

LOG OF EXPLORATORY BORING

PROJECT NAME CHRLF Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY G. Emens

BORING NO. MW-99
PAGE 3 of 15
REFERENCE ELEV. 491.77
TOTAL DEPTH 287.0'
DATE COMPLETED 8/30/02

SAMPLE METHOD	SAMPLE NUMBER	BLOW COUNTS (PER 6 INCHES)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	40							6.5 to 82.0 feet: SILTY GRAVEL (GM), continued.
				45				@ 42.5 feet: hard drilling.
G	45							@ 48.0 feet: decrease in silt content.
				50				@ 49.0 feet: decrease in sand, increase in silt content.
G	50							@ 54.0 feet: hard drilling.
				55				
G	55							
				60				

REMARKS

(1) See General Remarks. (2) Water added during drilling below 6 feet. (3) Drilled using nominal 12-inch O.D. casing and down-hole hammer to 86 feet, nominal 9 5/8-inch I.D. casing and tri-cone below 86 feet. (4) No perched groundwater encountered during drilling. (5) Regional aquifer static water level: 289.47 feet elevation on September 3, 2002, after well development. (6) N:172098.73 E:1702556.06. (7) Top of PVC well casing: 493.64 feet elevation.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME CHRLF Monitoring Well Improvements
 LOCATION Cedar Hills Landfill
 DRILLED BY Cascade Drilling, Inc.
 DRILL METHOD Air Rotary
 LOGGED BY G. Emens

BORING NO. MW-99
 PAGE 4 of 15
 REFERENCE ELEV. 491.77
 TOTAL DEPTH 287.0'
 DATE COMPLETED 8/30/02

SAMPLE METHOD	SAMPLE NUMBER	BLOW COUNTS (PER 6 INCHES)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	60							6.5 to 82.0 feet: SILTY GRAVEL (GM), continued. @ 61.0 feet: hard drilling. @ 62.0 feet: silt content increases, decrease in medium to coarse sand.
G	65			65				@ 66.5 feet: decrease in silt. @ 67.0 feet: few cobbles.
G	70			70				@ 70.0 feet: cobbles.
G	75			75				@ 74.5 feet: color grades to brownish gray.
				80				

REMARKS

(1) See General Remarks. (2) Water added during drilling below 6 feet. (3) Drilled using nominal 12-inch O.D. casing and down-hole hammer to 86 feet, nominal 9 5/8-inch I.D. casing and tri-cone below 86 feet. (4) No perched groundwater encountered during drilling. (5) Regional aquifer static water level: 289.47 feet elevation on September 3, 2002, after well development. (6) N:172098.73 E:1702556.06. (7) Top of PVC well casing: 493.64 feet elevation.

LOG OF EXPLORATORY BORING

PROJECT NAME CHRLF Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY G. Emens

BORING NO. MW-99
PAGE 5 of 15
REFERENCE ELEV. 491.77
TOTAL DEPTH 287.0'
DATE COMPLETED 8/30/02

SAMPLE METHOD	SAMPLE NUMBER	BLOW COUNTS (PER 6 INCHES)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	80			80	[Sample]		[Litho Column]	6.5 to 82.0 feet: SILTY GRAVEL (GM), continued.
G	85			85	[Sample]		[Litho Column]	82.0 to 94.0 feet: SILTY GRAVEL (GP-GM), grayish brown fines, mostly fine, subangular to rounded, some fine to coarse sand, mostly medium to coarse, few silt.
G	90			90	[Sample]		[Litho Column]	@ 88.0 feet: color grades to brown.
G	95			95	[Sample]		[Litho Column]	94.0 to 97.0 feet: SILTY SAND (SM), brown fines, fine to coarse, little fine to coarse, subangular to rounded gravel, little silt.
				100			[Litho Column]	97.0 to 111.0 feet: GRAVELLY SAND (SP-SM); brown fines, mostly medium to coarse, some fine to coarse, subangular to rounded gravel, few fines.

REMARKS

(1) See General Remarks. (2) Water added during drilling below 6 feet. (3) Drilled using nominal 12-inch O.D. casing and down-hole hammer to 86 feet, nominal 9 5/8-inch I.D. casing and tri-cone below 86 feet. (4) No perched groundwater encountered during drilling. (5) Regional aquifer static water level: 289.47 feet elevation on September 3, 2002, after well development. (6) N:172098.73 E:1702556.06. (7) Top of PVC well casing: 493.64 feet elevation.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME
LOCATION
DRILLED BY
DRILL METHOD
LOGGED BY

CHRLF Monitoring Well Improvements
Cedar Hills Landfill
Cascade Drilling, Inc.
Air Rotary
G. Emens

BORING NO. MW-99
PAGE 6 of 15
REFERENCE ELEV. 491.77
TOTAL DEPTH 287.0'
DATE COMPLETED 8/30/02

SAMPLE METHOD	SAMPLE NUMBER	BLOW COUNTS (PER 6 INCHES)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	100				[Sample]			97.0 to 111.0 feet: GRAVELLY SAND (SP-SM); continued. @ 101.0 feet: interbeds of siltier material.
G	105			105	[Sample]			@ 106.0 feet: increase in fine sand. @ 108.0 feet: trace fine gravel.
G	110			110	[Sample]			111.0 to 112.0 feet: SILT (ML), brownish gray. 112.0 to 127.5 feet: GRAVELLY SAND (SP-SM), reddish brown fines, mostly medium to coarse, some fine subangular to rounded gravel, few silt.
G	115			115	[Sample]			
				120				

REMARKS

(1) See General Remarks. (2) Water added during drilling below 6 feet. (3) Drilled using nominal 12-inch O.D. casing and down-hole hammer to 86 feet, nominal 9 5/8-inch I.D. casing and tri-cone below 86 feet. (4) No perched groundwater encountered during drilling. (5) Regional aquifer static water level: 289.47 feet elevation on September 3, 2002, after well development. (6) N:172098.73 E:1702556.06. (7) Top of PVC well casing: 493.64 feet elevation.

LOG OF EXPLORATORY BORING

PROJECT NAME CHRLF Monitoring Well Improvements
 LOCATION Cedar Hills Landfill
 DRILLED BY Cascade Drilling, Inc.
 DRILL METHOD Air Rotary
 LOGGED BY G. Emens

BORING NO. MW-99
 PAGE 7 of 15
 REFERENCE ELEV. 491.77
 TOTAL DEPTH 287.0'
 DATE COMPLETED 8/30/02

SAMPLE METHOD	SAMPLE NUMBER	BLOW COUNTS (PER 6 INCHES)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	120				[Sample]			112.0 to 127.5 feet: SILTY GRAVELLY SAND (SP-SM), continued. @ 121.5 feet: decrease in silt content. @ 123.0 feet: possible SP.
G	125			125	[Sample]			@ 125.0 feet: silt increases, color grades to grayish-brown, some gravel.
G	130			130	[Sample]			127.5 to 129.0 feet: SANDY GRAVEL (GW-GM), grayish brown fines, fine to coarse, medium to coarse sand, few silt. 129.0 to 138.0 feet: GRAVELLY SAND (SP-SM), orangish brown fines, mostly medium, little fine and coarse, little fine subangular to rounded gravel, few silt. @ 133.5 feet: silt content varies.
G	135			135	[Sample]			138.0 to 139.0 feet: SAND (SP) 139.0 to 154.0 feet: SILTY SAND (SP-SM), orangish brown fines, fine to medium, mostly fine, few silt.
				140				

REMARKS

(1) See General Remarks. (2) Water added during drilling below 6 feet. (3) Drilled using nominal 12-inch O.D. casing and down-hole hammer to 86 feet, nominal 9 5/8-inch I.D. casing and tri-cone below 86 feet. (4) No perched groundwater encountered during drilling. (5) Regional aquifer static water level: 289.47 feet elevation on September 3, 2002, after well development. (6) N:172098.73 E:1702556.06. (7) Top of PVC well casing: 493.64 feet elevation.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME
LOCATION
DRILLED BY
DRILL METHOD
LOGGED BY

CHRLF Monitoring Well Improvements
Cedar Hills Landfill
Cascade Drilling, Inc.
Air Rotary
G. Emens

BORING NO. MW-99
PAGE 8 of 15
REFERENCE ELEV. 491.77
TOTAL DEPTH 287.0'
DATE COMPLETED 8/30/02

SAMPLE METHOD	SAMPLE NUMBER	BLOW COUNTS (PER 6 INCHES)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	140			139.0	140.0		139.0 to 154.0 feet: SILTY SAND (SP-SM), continued.	
				142.0	144.0		@ 142.0 to 144.0 feet: silt varies from few to trace.	
G	145			145.0	146.0			
G	150			150.0	151.0			
G	155			155.0	156.0		@ 154.0 feet: fine gravels.	154.0 to 156.5 feet: SILTY SAND (SW-SM), orangish brown fines, fine to coarse, mostly medium, few fine, subangular to rounded gravel, few silt.
				156.5	163.0		156.5 to 163.0 feet: SAND (SP), orangish brown fines, fine to medium, trace silt.	
				160.0				

REMARKS

(1) See General Remarks. (2) Water added during drilling below 6 feet. (3) Drilled using nominal 12-inch O.D. casing and down-hole hammer to 86 feet, nominal 9 5/8-inch I.D. casing and tri-cone below 86 feet. (4) No perched groundwater encountered during drilling. (5) Regional aquifer static water level: 289.47 feet elevation on September 3, 2002, after well development. (6) N:172098.73 E:1702556.06. (7) Top of PVC well casing: 493.64 feet elevation.

LOG OF EXPLORATORY BORING

PROJECT NAME CHRLF Monitoring Well Improvements
 LOCATION Cedar Hills Landfill
 DRILLED BY Cascade Drilling, Inc.
 DRILL METHOD Air Rotary
 LOGGED BY G. Emens

BORING NO. MW-99
 PAGE 9 of 15
 REFERENCE ELEV. 491.77
 TOTAL DEPTH 287.0'
 DATE COMPLETED 8/30/02

SAMPLE METHOD	SAMPLE NUMBER	BLOW COUNTS (PER 6 INCHES)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	160			155.5	160.0		155.5	156.5 to 163.0 feet: SAND (SP), continued. @ 160.0 feet: fine gravel. @ 161.0 feet: color grading to grayish brown. @ 163.0 feet: silt increases. 163.0 to 168.0 feet: SILTY SAND (SP-SM), brown fines, fine to medium, little coarse, few fine, subangular to rounded gravel, few silt.
G	165			165.0	167.0		165.0	@ 167.0 feet: color becomes grayish brown. 168.0 to 172.0 feet: SILTY SAND (SM), grayish brown fines, fine to medium, little silt.
G	170			170.0	172.0		170.0	@ 172.0 feet: color becomes brown. 172.0 to 177.5 feet: SILTY SAND (SP-SM), brown fines, medium to coarse, few fine, subangular to rounded gravel, few fines.
G	175			175.0	177.5		175.0	@ 175.0 feet: gravel content increases. 177.5 to 197.0 feet: SANDY GRAVEL (GP-GM), orange-brown fines, fine, subangular to rounded, some medium to coarse sand, few silt.
				180.0				

REMARKS

(1) See General Remarks. (2) Water added during drilling below 6 feet. (3) Drilled using nominal 12-inch O.D. casing and down-hole hammer to 86 feet, nominal 9 5/8-inch I.D. casing and tri-cone below 86 feet. (4) No perched groundwater encountered during drilling. (5) Regional aquifer static water level: 289.47 feet elevation on September 3, 2002, after well development. (6) N:172098.73 E:1702556.06. (7) Top of PVC well casing: 493.64 feet elevation.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME CHRLF Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY G. Emens

BORING NO. MW-99
PAGE 10 of 15
REFERENCE ELEV. 491.77
TOTAL DEPTH 287.0'
DATE COMPLETED 8/30/02

SAMPLE METHOD	SAMPLE NUMBER	BLOW COUNTS (PER 6 INCHES)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	180				180			177.5 to 197.0 feet: SANDY GRAVEL (GP-GM), continued.
					182			@ 182.0 feet: silt content decreases.
G	185				185			@ 185.0 feet: silt content increases.
					187			@ 187.0 feet: coarse gravel.
G	190				190			@ 189.5 feet: color grades to brown.
			▼ 09/03/02		192			@ 192.0 feet: fining upward sequence.
					193			@ 193.0 feet: color grades to grayish brown.
G	195				195			@ 195.0 feet: color grades to brown.
					197			@ 197.0 feet: silt decreases.
					197.5			197.0 to 202.0 feet: GRAVEL (GP), brown fines, mostly fine, trace coarse, subangular to rounded, little medium to coarse sand, trace silt.
					200			

REMARKS

(1) See General Remarks. (2) Water added during drilling below 6 feet. (3) Drilled using nominal 12-inch O.D. casing and down-hole hammer to 86 feet, nominal 9 5/8-inch I.D. casing and tri-cone below 86 feet. (4) No perched groundwater encountered during drilling. (5) Regional aquifer static water level: 289.47 feet elevation on September 3, 2002, after well development. (6) N:172098.73 E:1702556.06. (7) Top of PVC well casing: 493.64 feet elevation.

LOG OF EXPLORATORY BORING

PROJECT NAME CHRLF Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY G. Emens

BORING NO. MW-99
PAGE 11 of 15
REFERENCE ELEV. 491.77
TOTAL DEPTH 287.0'
DATE COMPLETED 8/30/02

SAMPLE METHOD	SAMPLE NUMBER	BLOW COUNTS (PER 6 INCHES)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	200			197.0				197.0 to 202.0 feet: GRAVEL (GP), continued.
G	205		▽ 09/03/02	205				202.0 to 234.5 feet: GRAVEL (GW), grayish brown fines, fine to coarse, subangular to rounded, little medium to coarse sand, trace silt.
G	210			210				@ 212.0 feet: color becomes orangish brown.
G	215			215				@ 213.5 feet: color becomes grayish brown.
				220				@ 215.0 feet: color becomes orangish brown.
								@ 219.0 feet: color becomes brownish gray.

REMARKS

(1) See General Remarks. (2) Water added during drilling below 6 feet. (3) Drilled using nominal 12-inch O.D. casing and down-hole hammer to 86 feet, nominal 9 5/8-inch I.D. casing and tri-cone below 86 feet. (4) No perched groundwater encountered during drilling. (5) Regional aquifer static water level: 289.47 feet elevation on September 3, 2002, after well development. (6) N:172098.73 E:1702556.06. (7) Top of PVC well casing: 493.64 feet elevation.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME CHRLF Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY G. Emens

BORING NO. MW-99
PAGE 12 of 15
REFERENCE ELEV. 491.77
TOTAL DEPTH 287.0'
DATE COMPLETED 8/30/02

SAMPLE METHOD	SAMPLE NUMBER	BLOW COUNTS (PER 6 INCHES)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	220			220	[Sample]		[Lithology]	202.0 to 234.5 feet: GRAVEL (GW), continued.
G	225			225	[Sample]		[Lithology]	@ 222.5 feet: color becomes gray.
G	230			230	[Sample]		[Lithology]	@ 227.0 feet: color becomes grayish brown. @ 229.0 feet: color grades to gray. @ 232.5 feet: wood chips.
				235			[Lithology]	234.5 to 248.0 feet: SILTY SAND (SM), gray fines, fine to medium, some silt, few wood and organic debris. @ 236.0 feet: poor recovery - no sample.
				240			[Lithology]	

REMARKS

(1) See General Remarks. (2) Water added during drilling below 6 feet. (3) Drilled using nominal 12-inch O.D. casing and down-hole hammer to 86 feet, nominal 9 5/8-inch I.D. casing and tri-cone below 86 feet. (4) No perched groundwater encountered during drilling. (5) Regional aquifer static water level: 289.47 feet elevation on September 3, 2002, after well development. (6) N:172098.73 E:1702556.06. (7) Top of PVC well casing: 493.64 feet elevation.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME CHRLF Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY G. Emens

BORING NO. MW-99
PAGE 13 of 15
REFERENCE ELEV. 491.77
TOTAL DEPTH 287.0'
DATE COMPLETED 8/30/02

SAMPLE METHOD	SAMPLE NUMBER	BLOW COUNTS (PER 6 INCHES)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	240			234.5	[Sample]		[Lithologic Column]	234.5 to 248.0 feet: SILTY SAND (SM), continued. @ 243.0 feet: trace coarse sand.
G	245			245	[Sample]		[Lithologic Column]	@ 247.0 feet: trace coarse sand, few gravels.
G	250			250	[Sample]		[Lithologic Column]	248.0 to 252.5 feet: SILTY SAND (SP-SM), gray fines, fine to medium, trace coarse, few to trace silt. @ 251.0 feet: silt increases.
G	255			255	[Sample]		[Lithologic Column]	252.5 to 259.0 feet: SILT (ML), gray, trace to few wood and organic debris, poor recovery. @ 258.0 feet: addition of fine sand.
				260			[Lithologic Column]	259.0 to 267.0 feet: SILTY SAND (SM), gray fines, fine, some silt, wood debris. Poor recovery - no sample.

REMARKS

(1) See General Remarks. (2) Water added during drilling below 6 feet. (3) Drilled using nominal 12-inch O.D. casing and down-hole hammer to 86 feet, nominal 9 5/8-inch I.D. casing and tri-cone below 86 feet. (4) No perched groundwater encountered during drilling. (5) Regional aquifer static water level: 289.47 feet elevation on September 3, 2002, after well development. (6) N:172098.73 E:1702556.06. (7) Top of PVC well casing: 493.64 feet elevation.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME CHRLF Monitoring Well Improvements
LOCATION Cedar Hills Landfill
DRILLED BY Cascade Drilling, Inc.
DRILL METHOD Air Rotary
LOGGED BY G. Emens

BORING NO. MW-99
PAGE 14 of 15
REFERENCE ELEV. 491.77
TOTAL DEPTH 287.0'
DATE COMPLETED 8/30/02

SAMPLE METHOD	SAMPLE NUMBER	BLOW COUNTS (PER 6 INCHES)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	270			265				259.0 to 267.0 feet: SILTY SAND (SM), continued. @ 262.0 feet: hard driving, easy drilling. @ 265.0 feet: becomes brownish gray. No sample - poor recovery. 267.0 to 269.0 feet: SILTY SAND (SP-SM), brownish gray fines, fine to medium, few silt. @ 269.0 feet: coarse sand, trace to few fine gravels.
G	275			270				269.0 to 274.5 feet: GRAVELLY SAND (SW-SM), brownish gray fines, fine to coarse, mostly medium to coarse, little subangular to rounded gravel, trace to few silt, few coarse wood (3-inches). @ 272.0 feet: color grades to light brown. 274.5 to 280.5 feet: SANDY GRAVEL (GP-GM), light brown fines, mostly fine, subangular to rounded, some medium to coarse sand, few fine sand, few to trace silt, few coarse wood (2- to 3-inches).
				275				
				280				

REMARKS

(1) See General Remarks. (2) Water added during drilling below 6 feet. (3) Drilled using nominal 12-inch O.D. casing and down-hole hammer to 86 feet, nominal 9 5/8-inch I.D. casing and tri-cone below 86 feet. (4) No perched groundwater encountered during drilling. (5) Regional aquifer static water level: 289.47 feet elevation on September 3, 2002, after well development. (6) N:172098.73 E:1702556.06. (7) Top of PVC well casing: 493.64 feet elevation.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME CHRLF Monitoring Well Improvements
 LOCATION Cedar Hills Landfill
 DRILLED BY Cascade Drilling, Inc.
 DRILL METHOD Air Rotary
 LOGGED BY G. Emens

BORING NO. MW-99
 PAGE 15 of 15
 REFERENCE ELEV. 491.77
 TOTAL DEPTH 287.0'
 DATE COMPLETED 8/30/02

SAMPLE METHOD	SAMPLE NUMBER	BLOW COUNTS (PER 6 INCHES)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	280			285		290	295	<p>274.5 to 280.5 feet: SANDY GRAVEL (GP-GM), continued. 280.5 to 287.0 feet: SILT (ML), brownish gray.</p> <p>@ 281.5 feet: hard driving, easy drilling, poor recovery.</p> <p>@ 284.0 feet: heavy organics, possible 4- to 6-inch-diameter tree. @ 285.0 feet: poor recovery - no sample.</p> <p>@ 286.0 feet: addition of fine sand.</p> <p>Bottom of boring at 287.0 feet.</p> <p>WELL COMPLETION DETAILS +1.6 to 270.0 feet: Nominal 4-inch O.D., flush-threaded, Schedule 80 PVC blank riser pipe. 270.0 to 279.0 feet: Nominal 4-inch O.D., flush-threaded, Schedule 80 PVC well screen with 0.020-inch machined slots and 0.125-inch spacers. 279.0 to 279.8 feet: Nominal 4-inch O.D., flush-threaded, Schedule 80 PVC blank casing with end cap. 268.0 to 269.0 feet: Stainless steel centralizer. 278.0 to 279.0 feet: Stainless steel centralizer.</p> <p>0 to 4.5 feet: Concrete. 4.5 to 266.9 feet: Pure Gold® medium bentonite chips. 266.9 to 283.3 feet: 20x40 Colorado™ Silica Sand. 283.3 to 285.0 feet: Bentonite chips. 285.0 to 287.0 feet: Slough.</p> <p>Total installed PVC length: 281.40 feet.</p>
				300				

REMARKS

(1) See General Remarks. (2) Water added during drilling below 6 feet. (3) Drilled using nominal 12-inch O.D. casing and down-hole hammer to 86 feet, nominal 9 5/8-inch I.D. casing and tri-cone below 86 feet. (4) No perched groundwater encountered during drilling. (5) Regional aquifer static water level: 289.47 feet elevation on September 3, 2002, after well development. (6) N:172098.73 E:1702556.06. (7) Top of PVC well casing: 493.64 feet elevation.

UDALOY ENVIRONMENTAL SERVICES

APPENDIX A

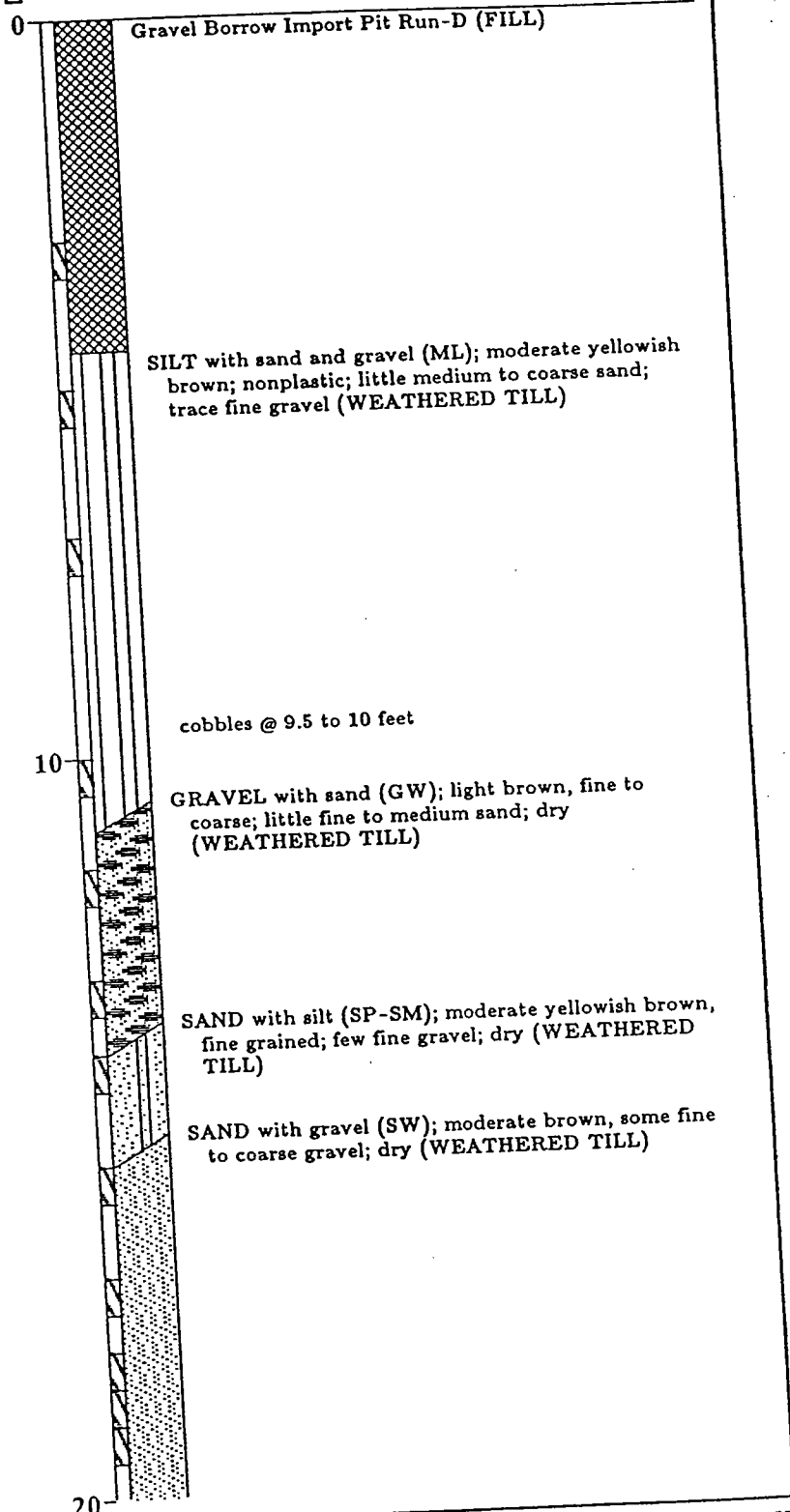
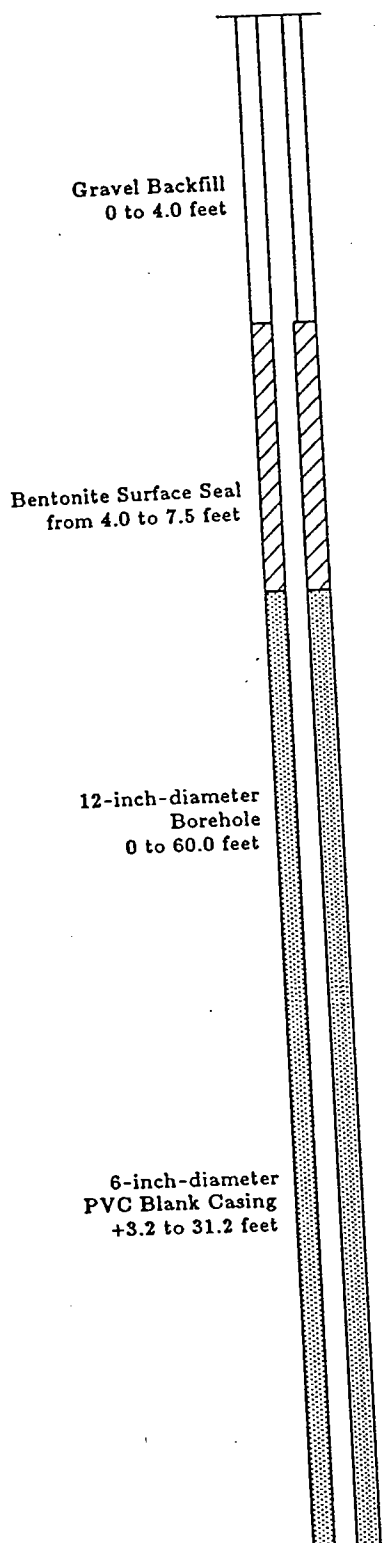
Groundwater Extraction Well Construction Logs

Stickup

3.20 ft

Depth ft
Sample

Drill Method	Air Rotary	
Boring No.	EW-17A	EW-1
TOC Elevation	554.05 ft	Date 8/10/92



Harding Lawson Associates
Engineering and Environmental Services

Log of Boring and Well Completion
EW-17A
 Cedar Hills Landfill

(sheet 1 of 3)

PLATE

1110170

Stickup

3.20 ft

Sand Pack 10 x 20
Silica Sand
7.5 to 41.5 feet

Stainless Steel
Centralizer
30.4 feet

6-inch-diameter
0.020 Slot PVC Screen
31.2 to 40.6 feet

Drill Method Air Rotary

Boring No. EW-17A EW-1

TOC Elevation 554.05 ft Date 8/10/92

Depth ft
Sample

20

SILT with gravel (ML); light olive gray; some fine to medium gravel; few fine to coarse sand; nonplastic; moist (TILL)

SILTY GRAVEL with sand (GM); light olive gray, fine to coarse; little fine to coarse sand; little fines; started adding water at 25.5 feet (STRATIFIED DRIFT)

30

SANDY SILT/SILTY SAND (ML/SM); light olive gray, fine to medium sand; few fine gravels; mostly to some fines; water added (STRATIFIED DRIFT)

40



Harding Lawson Associates
Engineering and Environmental Services

Log of Boring and Well Completion EW-17A

PLATE

(sheet 2 of 3)

Cedar Hills Landfill

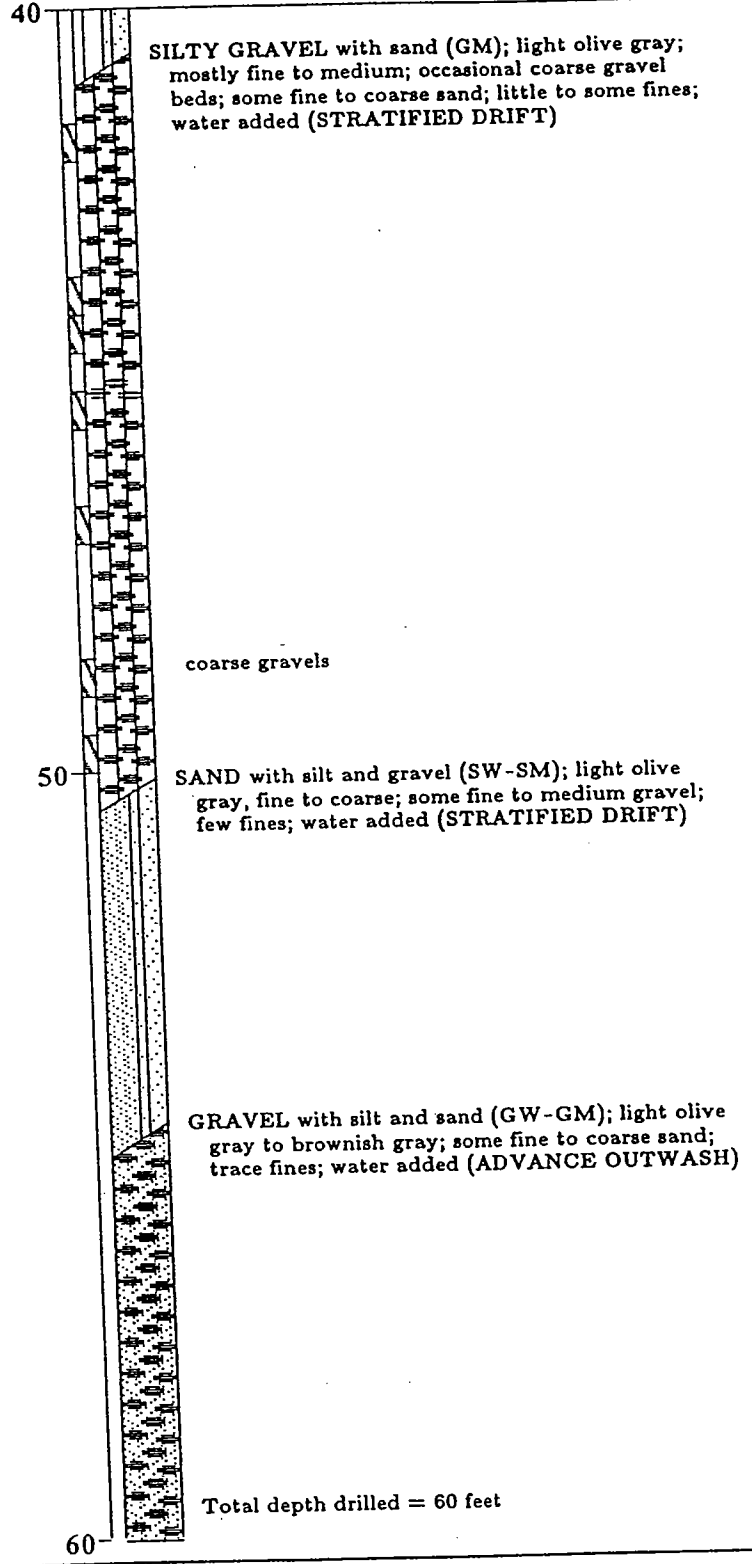
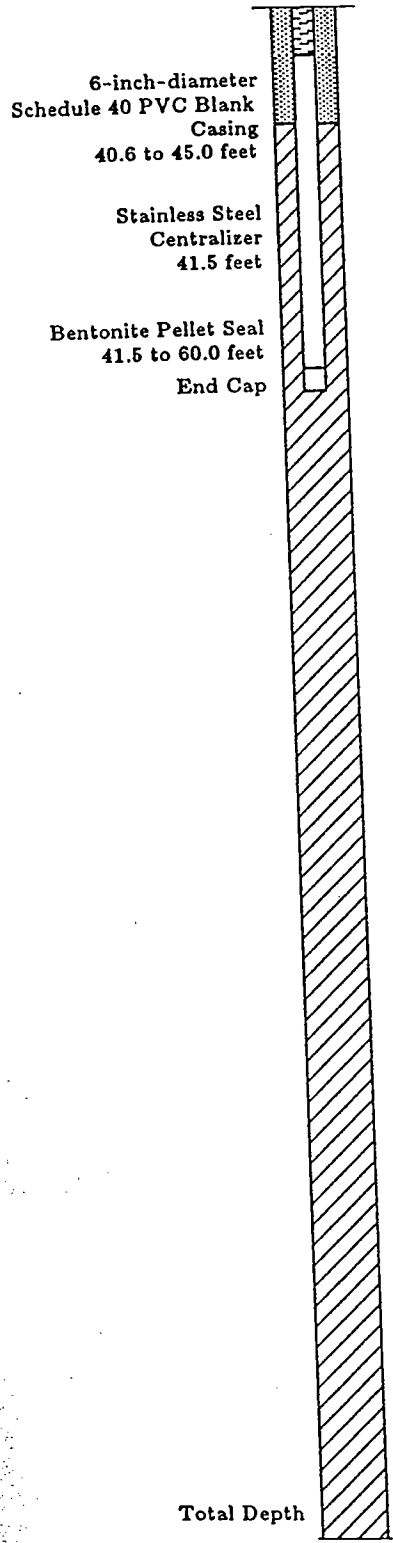
DRAWN HK	JOB NUMBER 11101-042	APPROVED	DATE 11/92	REVISED	DATE
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11101-042

stickup 3.20 ft

Drill Method Air Rotary
 Boring No. EW-17A EW-1
 TOC Elevation 554.05 ft Date 8/10/92

Depth ft
Sample



 **Harding Lawson Associates**
 Engineering and Environmental Services

Log of Boring and Well Completion
EW-17A
 Cedar Hills Landfill

(sheet 3 of 3)

PLATE

kup

2.20 ft

Gravel Backfill
0 to 4.8 feet

Bentonite Surface Seal
from 4.8 to 8.0 feet

12-inch-diameter
Borehole
0 to 71.0 feet

6-inch-diameter
PVC Blank Casing
+2.2 to 19.3 feet

Sand Pack 10 x 20
Silica Sand
8.0 to 29.5 feet

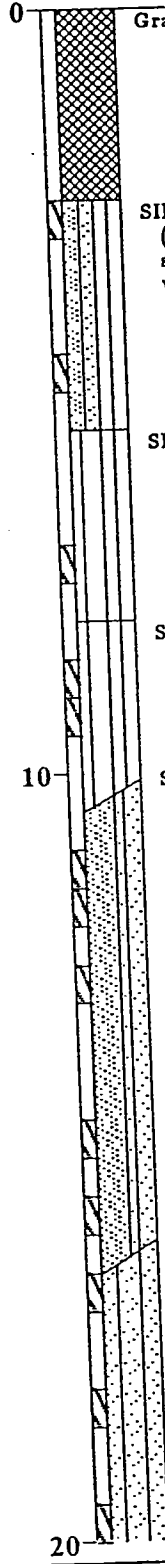
Stainless Steel
Centralizer
18.1 feet

Depth ft
Sample

Drill Method Air Rotary

Boring No. EW-12A EW-2

TOC Elevation 561.56 ft Date 7/21/92



0 Gravel Borrow Import (FILL)

SILTY SAND with gravel and sandy silt with gravel (SM/ML); dark yellowish brown, fine to coarse sand, fine to medium gravel; trace organics-roots, wood, slight damp (FILL)

SILT with gravel (ML); brownish black; little fine to medium gravel; trace organics-wood, damp (WEATHERED TILL)

SANDY SILT with gravel (ML); grayish brown; some medium to coarse sand; little to fine medium gravel; damp (WEATHERED TILL)

10 SAND with silt, gravel, and cobbles (SW-SM); olive gray; little fine to coarse gravel; slightly damp (TILL)

SILTY SAND with gravel (SM); moderate brown, fine to coarse; some fine to coarse gravel; little fines; coated clasts; damp (TILL)

20

Log of Boring and Well Completion

EW-12A

(sheet 1 of 4)

Cedar Hills Landfill

PLATE

11101/D:

Stickup 2.20 ft

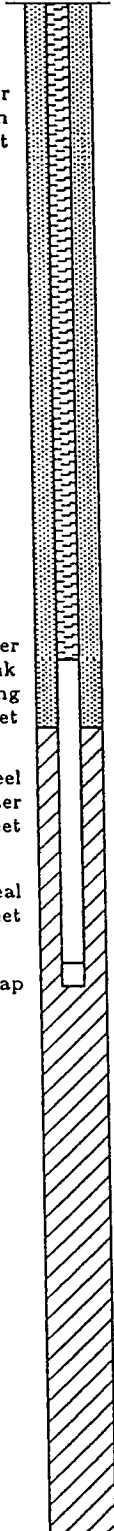
6-inch-diameter
0.020 Slot PVC Screen
19.3 to 28.6 feet

6-inch-diameter
Schedule 40 PVC Blank
Casing
28.6 to 32.9 feet

Stainless Steel
Centralizer
29.3 feet

Bentonite Pellet Seal
29.5 to 71.0 feet

End Cap



Depth ft
Sample

Drill Method	Air Rotary	
Boring No.	EW-12A	EW-2
TOC Elevation	561.56 ft	Date 7/21/92

20

SILTY SAND with gravel (SM); moderate brown, fine to medium; few fine gravel; moist (TILL)

30

start adding water @ 30 feet

SILTY GRAVEL with sand (GM); olive gray, fine to coarse; some to little fine to coarse sand; some fines; water added to remove cuttings (STRATIFIED DRIFT)

cobbles @ 35 feet

40



Harding Lawson Associates
Engineering and Environmental Services

Log of Boring and Well Completion

EW-12A

(sheet 2 of 4)

Cedar Hills Landfill

PLATE

DRAWN

JOB NUMBER

APPROVED

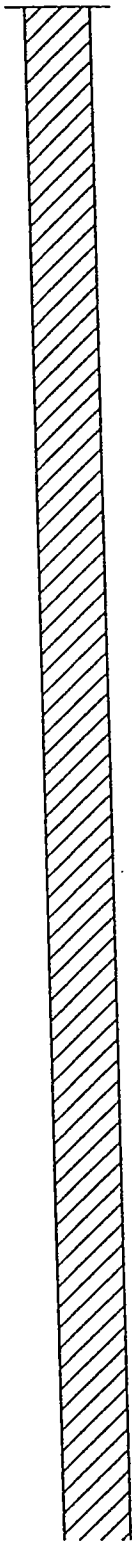
DATE

REVISED

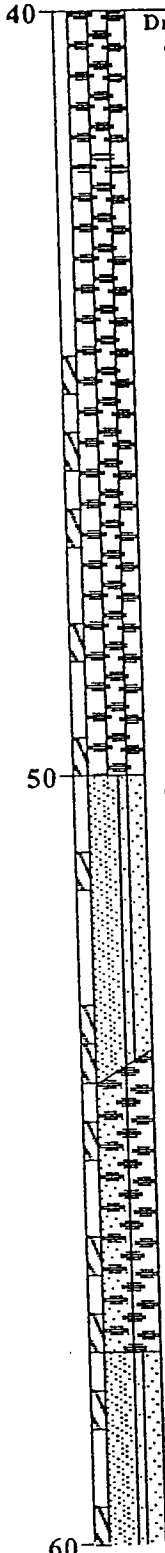
DATE

11101-042

pick up 2.20 ft



Depth ft Sample	Drill Method	Air Rotary	
	Boring No.	EW-12A	EW-2
	TOC Elevation	561.56 ft	Date 7/21/92



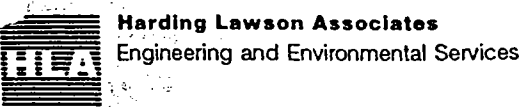
Driller tried drilling without adding water - no cuttings discharged.

increase in medium to coarse sand to approximately 40 percent

50 SAND with silt and gravel and SILTY SAND with gravel (SW-SM/SM); light brownish gray, fine to coarse; some fine to medium gravel; few to little fines; water added (STRATIFIED DRIFT)

GRAVEL with silt (GP-GM); light brownish gray, fine to medium; trace sand; water added (STRATIFIED DRIFT)

SAND with silt and gravel (SW-SM); light brown; some to little fine to coarse gravel; water added (ADVANCE OUTWASH)



Log of Boring and Well Completion EW-12A Cedar Hills Landfill

(sheet 3 of 4)

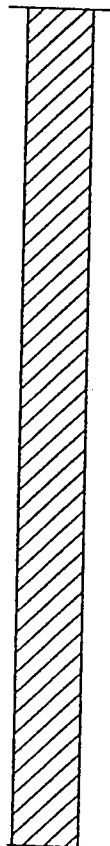
PLATE

11101/01

Stickup

2.20 ft

Total Depth



Depth ft
Sample

Drill Method Air Rotary
 Boring No. EW-12A EW-2
 TOC Elevation 561.56 ft Date 7/21/92

60

GRAVEL with silt and sand (GP-GM); light brown, fine to medium; little fine to coarse sand; water added (ADVANCE OUTWASH)

SAND with silt and gravel (SW-SM); light brown; little fine to medium gravel; water added (ADVANCE OUTWASH)

70

Total depth drilled = 71 feet

80



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Log of Boring and Well Completion EW-12A

(sheet 4 of 4)

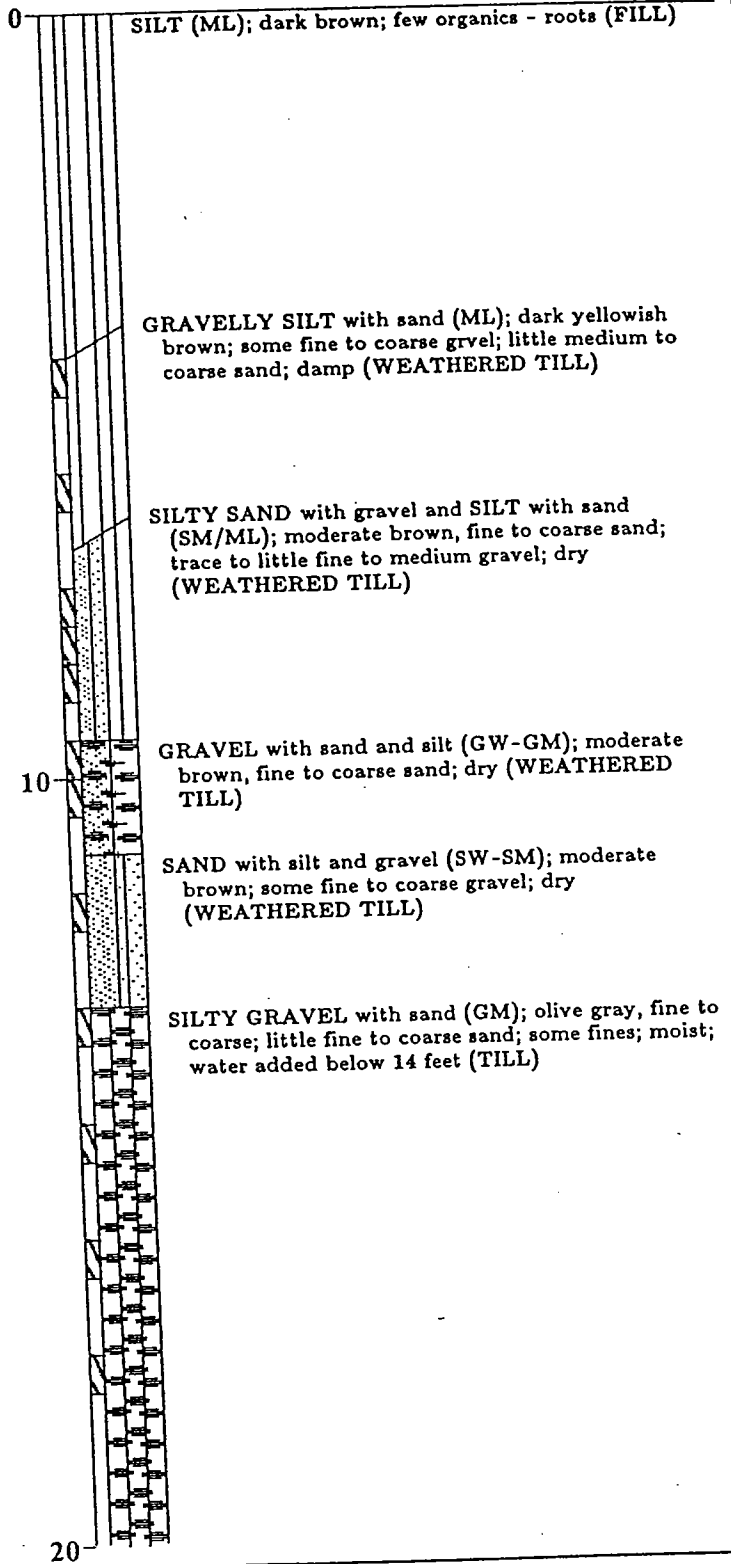
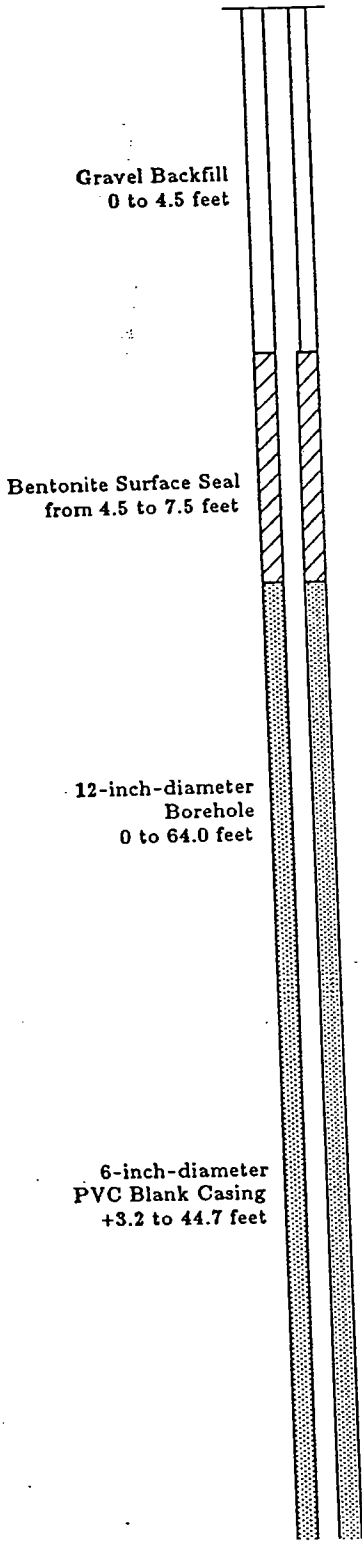
PLATE

Cedar Hills Landfill

3.20 ft

Depth ft
Sample

Drill Method	Air Rotary	
Boring No.	EW-16A	EW-3
TOC Elevation	560.15 ft	Date 8/5/92



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Log of Boring and Well Completion
EW-16A (sheet 1 of 4)

PLATE

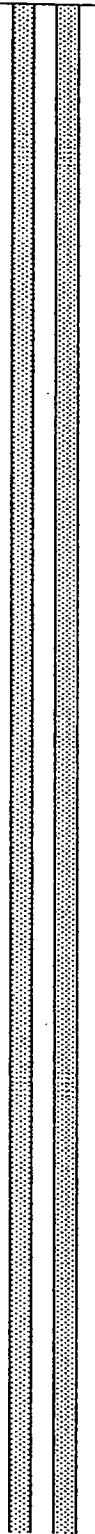
Cedar Hills Landfill

11101/D:

Stickup

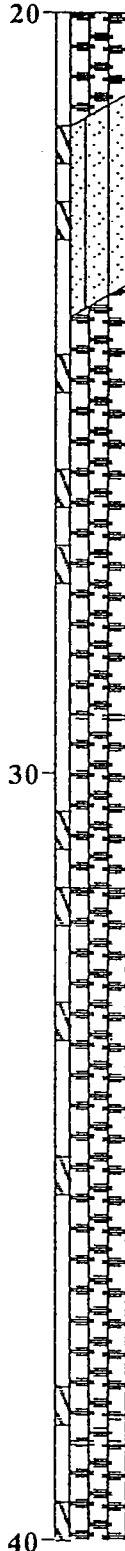
3.20 ft

Sand Pack 10 x 20
Silica Sand
7.5 to 54.4 feet



Depth ft
Sample

Drill Method Air Rotary
Boring No. EW-16A EW-3
TOC Elevation 560.15 ft Date 8/5/92



SILTY SAND with gravel (SM); olive gray, fine to coarse; little fine to coarse gravel; little fines; water added (STRATIFIED DRIFT)

SILTY GRAVEL with sand (GM); olive gray, fine to coarse; some fine to coarse sand; little fines; water added (STRATIFIED DRIFT)

coarse gravels @ 31 to 31.5 feet

SILTY GRAVEL with sand (GM); olive gray; mostly fine to medium gravel; with occasional lenses of coarse gravel; some fine to coarse sand; little fines; water added (STRATIFIED DRIFT)



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Log of Boring and Well Completion

EW-16A

(sheet 2 of 4)

Cedar Hills Landfill

DRAWN
HK

JOB NUMBER
11101-042

APPROVED

DATE
11/92

REVISED

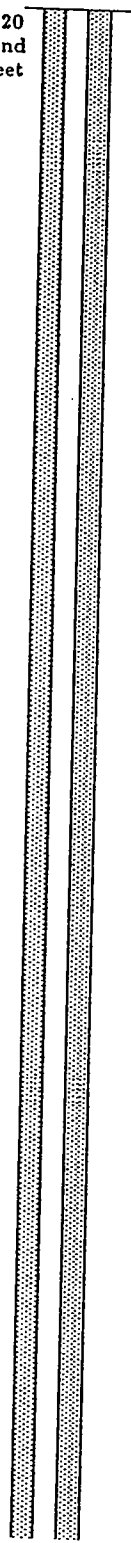
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AL/D:

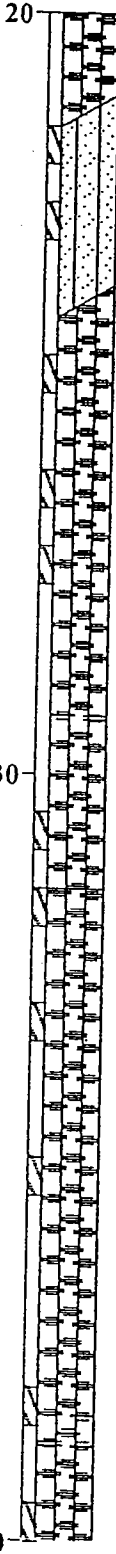
Stickup 3.20 ft

Sand Pack 10 x 20
Silica Sand
7.5 to 54.4 feet



Drill Method Air Rotary
Boring No. EW-16A EW-3
TOC Elevation 560.15 ft Date 8/5/92

Depth ft
Sample



SILTY SAND with gravel (SM); olive gray, fine to coarse; little fine to coarse gravel; little fines; water added (STRATIFIED DRIFT)

SILTY GRAVEL with sand (GM); olive gray, fine to coarse; some fine to coarse sand; little fines; water added (STRATIFIED DRIFT)

coarse gravels @ 31 to 31.5 feet

SILTY GRAVEL with sand (GM); olive gray; mostly fine to medium gravel; with occasional lenses of coarse gravel; some fine to coarse sand; little fines; water added (STRATIFIED DRIFT)



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Log of Boring and Well Completion

EW-16A

PLATE

(sheet 2 of 4)

Cedar Hills Landfill

DRAWN HK	JOB NUMBER 11101-042	APPROVED	DATE 11/92	REVISED	DATE
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stickup

3.20 ft

Depth ft
Sample

Drill Method	Air Rotary	
Boring No.	EW-16A	EW-3
TOC Elevation	560.15 ft	Date 8/5/92

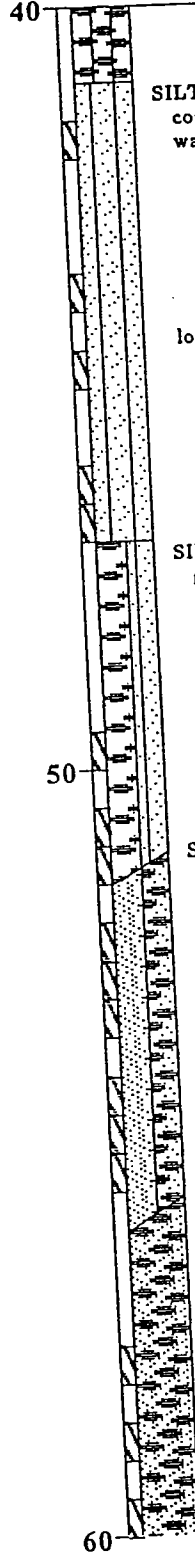
Stainless Steel Centralizer
43.9 feet

6-inch-diameter
0.020 Slot PVC Screen
44.7 to 54.0 feet

6-inch-diameter
Schedule 40 PVC Blank
Casing
54.0 to 58.2 feet

Stainless Steel
Centralizer
54.8 feet

Bentonite Pellet Seal
54.4 to 64.0 feet
End Cap



SILTY SAND with gravel (SM); olive gray, fine to coarse; some fine to coarse gravel; little fines; water added (STRATIFIED DRIFT)

loose sand lense

SILTY GRAVEL with sand to SILTY SAND with gravel (GM/SM); olive gray, fine to coarse sand and gravel; little fines; water added; moderately bedded (STRATIFIED DRIFT)

SAND with silt and gravel to GRAVEL with silt and sand (SW-SM/GP-GM); light olive gray to olive brown, fine to medium gravel with few coarse; fine to coarse sand; few fines; water added; moderately bedded (STRATIFIED DRIFT)

GRAVEL with sand and cobbles (GW); dark yellowish orange to yellowish brown; some fine to coarse sand; trace fines; water added (ADVANCED OUTWASH)

PLATE



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Log of Boring and Well Completion

EW-16A

(sheet 3 of 4)

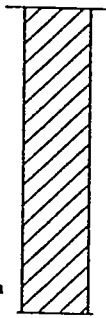
Cedar Hills Landfill

DRAWN HK	JOB NUMBER 11101-042	APPROVED	DATE 11/92	REVISED	DATE
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Stickup

3.20 ft

Total Depth



Depth ft
Sample

Drill Method

Air Rotary

Boring No.

EW-16A EW-3

TOC Elevation

560.15 ft

Date

8/5/92

60



Total depth drilled = 64 feet

70

80



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Log of Boring and Well Completion

EW-16A

(sheet 4 of 4)

PLATE

Cedar Hills Landfill

DRAWN
HK

JOB NUMBER
11101-042

APPROVED

DATE
11/92

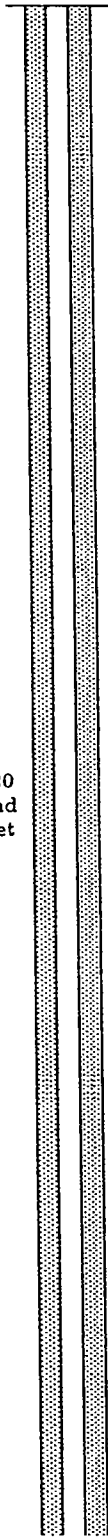
REVISED

DATE

Stickup

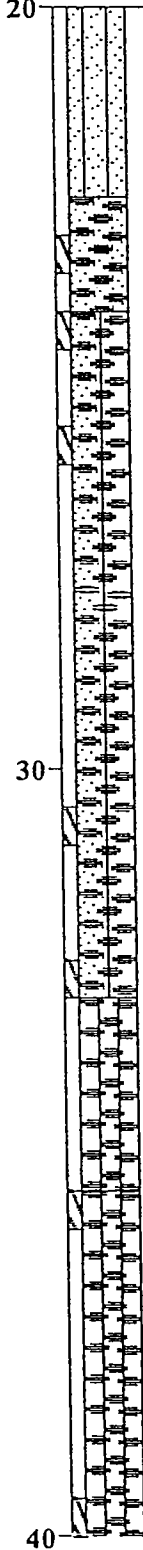
1.50 ft

Sand Pack 10 x 20
Silica Sand
8.1 to 63.1 feet



Depth ft
Sample

Drill Method	Air Rotary	
Boring No.	EW- 1A	EW-4
TOC Elevation	556.67 ft	Date 5/26/92



GRAVEL AND COBBLES (GP); black; basalt; andesite; quartzite

SILTY GRAVEL with sand and cobbles (GP-GM); olive gray, mostly fine to medium; some fine to coarse sand; few to some fines; water added (STRATIFIED DRIFT)

SILTY GRAVEL (GM); olive gray, medium to coarse; some fines; wet (STRATIFIED DRIFT)

SILTY GRAVEL with sand (GM); olive gray, fine to coarse; some fine to coarse sand; little fines; wet (STRATIFIED DRIFT)

PLATE



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Engineering and Environmental Services

Log of Boring and Well Completion

EW- 1A

(sheet 2 of 4)

Cedar Hills Landfill

DRAWN
HK

JOB NUMBER
11101-042

APPROVED

DATE
11/92

REVISED

DATE

11101/042

Stickup

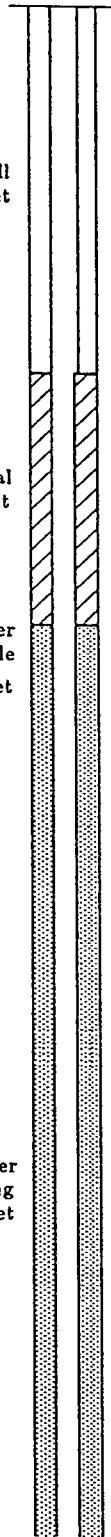
1.50 ft

Gravel Backfill
0 to 4.8 feet

Bentonite Surface Seal
from 4.8 to 8.1 feet

12-inch-diameter
Borehole
0 to 73.5 feet

6-inch-diameter
PVC Blank Casing
+1.5 to 42.3 feet



Depth ft
Sample

Drill Method Air Rotary

Boring No. EW- 1A EW-4

TOC Elevation 556.67 ft Date 5/26/92

0

GRAVELLY SAND (SW); brown, fine to coarse;
some fine to coarse gravel; few fines; moist
(SCREENED PIT RUN - FILL)

SILTY SAND with gravel (SM); dark brown, fine
grained; some fines; trace organics (root); moist
(TOP SOIL/WEATHERED TILL)

GRAVELLY SAND/SANDY GRAVEL with cobbles
(SP/GW); light gray, coarse sand; fine to coarse
gravel; dry (WEATHERED TILL)

GRAVEL with silt and sand (GW-GM); brown;
some coarse sand; few fines; water added
(WEATHERED TILL)

10

SILTY SAND with gravel (SM); brown, fine; little to
some fines; moist (WEATHERED TILL)

SILTY GRAVEL with sand and cobbles (GM); light
brown, fine to coarse; some medium to coarse sand;
little fines; water added (WEATHERED TILL)

SILTY SAND with gravel and cobbles (SM); brown,
fine; little fines; moist (WEATHERED TILL)

with boulders

20



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Log of Boring and Well Completion

EW- 1A

(sheet 1 of 4)

Cedar Hills Landfill

DRAWN
HK

JOB NUMBER
11101-042

APPROVED

DATE
11/92

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DATE

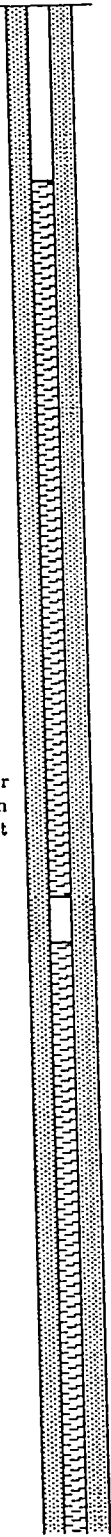
PLA

stickup

1.50 ft

Stainless Steel
Centralizer
41.7 feet

6-inch-diameter
0.020 Slot PVC Screen
42.3 to 61.7 feet



Depth ft
Sample

Drill Method

Air Rotary

Boring No.

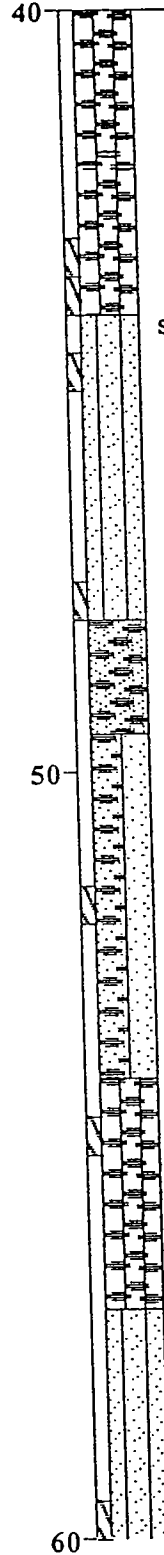
EW- 1A EW-4

TOC Elevation

556.67 ft

Date

5/26/92



SILTY SAND with gravel and cobbles (SM); olive gray, fine to coarse; some fines; little coarse gravel; dry (STRATIFIED DRIFT)

GRAVEL with sand and cobbles (GW); olive gray; some medium to coarse sand; trace fines; moist

increased formation water at 51 feet

GRAVEL with sand (GP/SP); olive gray, fine to medium; some to mostly coarse sand; trace fines; moist (STRATIFIED DRIFT)

GRAVEL with silt, sand, cobbles, and boulders (GM); olive brown, fine to medium; some fines; little coarse sand; wet (STRATIFIED DRIFT)

SILTY SAND with gravel (SM); olive brown, fine to coarse; some fine to medium gravel; little fines; moist (STRATIFIED DRIFT)

60

PLATE



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Log of Boring and Well Completion

EW- 1A

(sheet 3 of 4)

Cedar Hills Landfill

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
HK	11101-042		11/92		

11101/D:

Stickup

1.50 ft

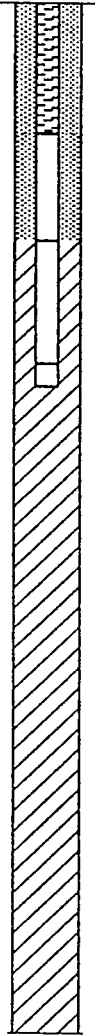
6-inch-diameter
Schedule 40 PVC Blank
Casing
61.7 to 65 feet

Stainless Steel
Centralizer
63.6 feet

End Cap

Bentonite Pellet Seal
63.1 to 73.5 feet

Total Depth



Depth ft
Sample

Drill Method

Air Rotary

Boring No.

EW- 1A EW-4

TOC Elevation

556.67 ft

Date

5/26/92

60

SILTY SAND (SM); olive brown, fine; some fines;
moist (STRATIFIED DRIFT)

SILTY GRAVEL with sand (GM); olive brown to
light yellowish brown, fine to coarse; little medium
to coarse sand; little fines; adding water
(ADVANCE OUTWASH)

SAND with silt and gravel (SW-SM); yellowish
brown, fine to coarse; some fine to medium gravel;
few fines; adding water (ADVANCE OUTWASH)

70

GRAVEL to GRAVEL with silt and sand
(GW/GW-GM); yellowish brown, fine to coarse;
few coarse sand; trace to few fines (ADVANCE
OUTWASH)

Total depth drilled = 73.5 feet

80



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Log of Boring and Well Completion

EW- 1A

(sheet 4 of 4)

Cedar Hills Landfill

DRAWN

JOB NUMBER

APPROVED

DATE

REVISED

DATE

HK

11101-042

11/92

11101/01

Stickup

1.10 ft

Gravel Backfill
0 to 3.5 feet

Bentonite Surface Seal
from 3.5 to 7.5 feet

12-inch-diameter
Borehole
0 to 69.0 feet

6-inch-diameter
PVC Blank Casing
+1.1 to 40.35 feet

Drill Method Air Rotary

Boring No. EW- 9A **EW-5**

TOC Elevation 574.52 ft Date 7/14/92

Depth ft
Sample

SILT (ML); dark reddish brown, non-plastic; little organic roots; wood; plastic; moist (FILL)

SILT with sand and gravel (ML); moderate reddish brown, non-plastic; little fine to coarse sand; few fine to medium gravel; damp (WEATHERED TILL)

SILTY SAND with gravel (SM); grayish brown; mostly fine to medium; some non-plastic fines; few fine gravel; damp (WEATHERED TILL)

GRAVEL with silt and sand (GW-GM); grayish brown; some fine to coarse sand; few cobbles; damp (FILL)

SAND with silt, cobbles, and gravel (SW-SM); light olive gray; some fine to coarse gravel; few non-plastic fines; few cobbles; damp (TILL)

boulder

GRAVEL with sand (GW); light olive gray; some fine to coarse sand; trace fines; damp (TILL)

20



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Log of Boring and Well Completion EW- 9A (sheet 1 of 4)

PE

Cedar Hills Landfill

DRAWN
HK

JOB NUMBER
11101-042

APPROVED

DATE
11/92

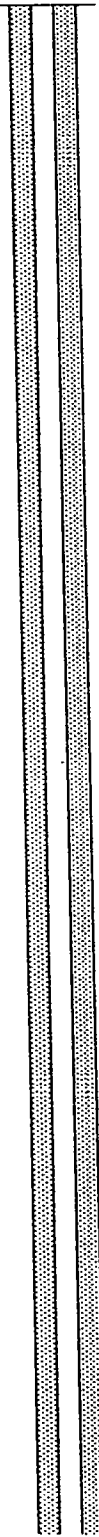
REVISED

DATE

Stickup

1.10 ft

Sand Pack 10 x 20
Silica Sand
7.5 to 50.7 feet



Depth ft
Sample

Drill Method Air Rotary

Boring No. EW- 9A EW-5

TOC Elevation 574.52 ft Date 7/14/92

20

SILT (ML); moderate yellowish brown; slightly plastic; moist (STRATIFIED DRIFT)

SILT (ML); moderate yellow brown; non-plastic; few fine to medium gravel; trace fine to medium sand; moist (STRATIFIED DRIFT)

little fine to coarse gravel below 28 feet

30

SILTY SAND with gravel (SM); fine grained; little fine gravel; some fines; damp (STRATIFIED DRIFT)

SILTY GRAVEL with sand (GM); dark yellowish brown, fine to medium; becoming fine to coarse below 37 feet; little to few fine to coarse sand; little fines; damp (STRATIFIED DRIFT)

40

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Log of Boring and Well Completion

PLATE

EW- 9A

(sheet 2 of 4)

Cedar Hills Landfill

DRAWN **HK** JOB NUMBER **11101-042**

APPROVED DATE **11/92**

REVISED DATE

11101/D:

Stickup

1.10 ft

Stainless Steel
Centralizer
39.9 feet

6-inch-diameter
0.020 Slot PVC Screen
40.35 to 49.7 feet

6-inch-diameter
Schedule 40 PVC Blank
Casing
49.7 to 54.2 feet

Stainless Steel
Centralizer
50.2 feet

Bentonite Pellet Seal
50.7 to 69.0 feet

End Cap

Drill Method Air Rotary

Boring No. EW- 9A **EW-5**

TOC Elevation 574.52 ft Date 7/14/92

Depth ft
Sample

40

SILTY GRAVEL with sand (GM); moderate olive brown, fine to coarse; some fine to coarse sand; little non-plastic fines; moist at 43 feet (STRATIFIED DRIFT)

50

started adding water

fines content variable below 52 feet

60

GRAVEL with silt, sand, and gravel (GW-GM); light olive brown; increased fine to medium subrounded gravel; some fine to coarse sand; few fines; water added (ADVANCE OUTWASH)



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Log of Boring and Well Completion EW- 9A

(sheet 3 of 4)

Cedar Hills Landfill

PLATE

11101/D:

Stickup

1.10 ft

Stainless Steel
Centralizer
39.9 feet

6-inch-diameter
0.020 Slot PVC Screen
40.35 to 49.7 feet

6-inch-diameter
Schedule 40 PVC Blank
Casing
49.7 to 54.2 feet

Stainless Steel
Centralizer
50.2 feet

Bentonite Pellet Seal
50.7 to 69.0 feet

End Cap

Drill Method Air Rotary

Boring No. EW- 9A **EW-5**

TOC Elevation 574.52 ft Date 7/14/92

Depth ft
Sample

40

SILTY GRAVEL with sand (GM); moderate olive brown, fine to coarse; some fine to coarse sand; little non-plastic fines; moist at 43 feet (STRATIFIED DRIFT)

50

started adding water

fines content variable below 52 feet

60

GRAVEL with silt, sand, and gravel (GW-GM); light olive brown; increased fine to medium subrounded gravel; some fine to coarse sand; few fines; water added (ADVANCE OUTWASH)



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Log of Boring and Well Completion EW- 9A

(sheet 3 of 4)

Cedar Hills Landfill

PLATE

11101/01

Stickup 0.90 ft

Gravel Backfill
0 to 3.3 feet

Bentonite Surface Seal
from 3.3 to 8.5 feet

12-inch-diameter
Borehole
0 to 70.0 feet

6-inch-diameter
PVC Blank Casing
+0.9 to 45.54 feet

Drill Method	Air Rotary	
Boring No.	EW-10A	EW-6
TOC Elevation	582.87 ft	Date 7/15/92

Depth ft
Sample

0

SILT (ML); reddish brown; little fine to medium sand; trace organics (roots); damp (WEATHERED TILL)

SILTY SAND with gravel (SM); reddish brown, fine to coarse; trace coarse rounded gravel; moist (WEATHERED TILL)

SANDY GRAVEL with cobbles (GW); gray brown to olive gray; trace rounded cobbles; moist (TILL)

10

20



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Log of Boring and Well Completion EW-10A (sheet 1 of 4)

PLATE

DRAWN
HK

JOB NUMBER
11101-042

Cedar Hills Landfill

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DATE

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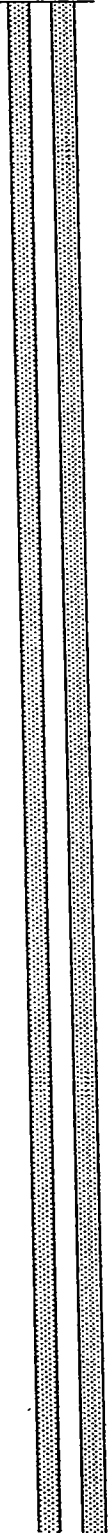
DATE

1/0:

pickup

0.90 ft

Sand Pack 10 x 20
Silica Sand
8.5 to 55.5 feet



Depth ft
Sample

Drill Method Air Rotary

Boring No. EW-10A EW-6

TOC Elevation 582.87 ft Date 7/15/92

20

GRAVELLY SILTY SAND (SM); brown; moist (TILL)

started adding water @ 23 feet

SANDY GRAVEL with cobbles (GW); brown; with rounded cobbles; adding water (STRATIFIED DRIFT)

30

SANDY GRAVEL (GW); brown; little silt; adding water (STRATIFIED DRIFT)

SILTY GRAVEL (GM); olive gray (STRATIFIED DRIFT)

40



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Log of Boring and Well Completion

EW-10A

(sheet 2 of 4)

Cedar Hills Landfill

PLATE

DRAWN
HK

JOB NUMBER
11101-042

APPROVED

DATE
11/92

REVISED

DATE

11101/D:

Stickup

0.90 ft

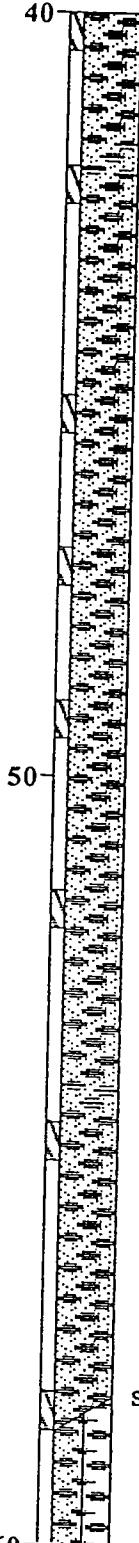
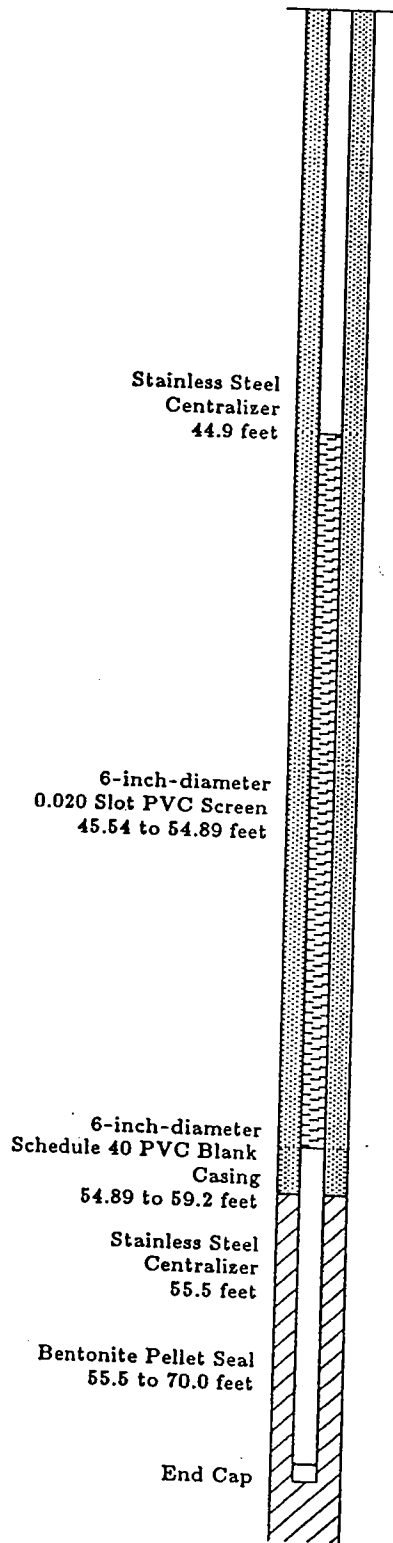
Drill Method Air Rotary

Boring No. EW-10A **EW-6**

TOC Elevation 582.87 ft Date 7/15/92

Depth ft
Sample

SANDY GRAVEL (GW); olive gray; variable amounts of fines (STRATIFIED DRIFT)



SILTY GRAVEL with sand (GW-GM); little medium to coarse sand; little fines; water added (ADVANCE OUTWASH)



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Log of Boring and Well Completion

EW-10A

(sheet 3 of 4)

PLATE

Cedar Hills Landfill

DRAWN
HK

JOB NUMBER
11101-042

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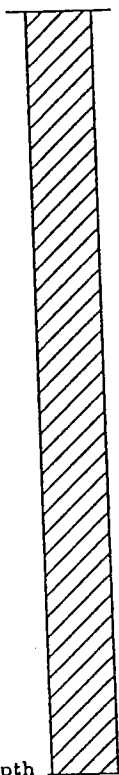
DATE

REVISED

DATE

ckup

0.90 ft

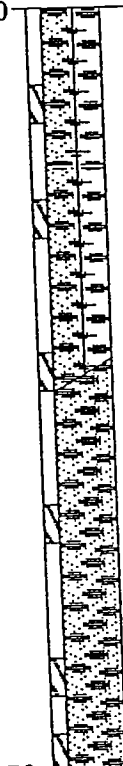


Total Depth

Depth ft
Sample

Drill Method	Air Rotary	
Boring No.	EW-10A	EW-6
TOC Elevation	582.87 ft	Date 7/15/92

60



GRAVEL with sand (GW); moderate yellowish brown; some fine to coarse sand; trace fines; water added (ADVANCE OUTWASH)

70

Total depth drilled = 70.0 feet

80



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Log of Boring and Well Completion

EW-10A

(sheet 4 of 4)

Cedar Hills Landfill

PLATE

DRAWN
HK

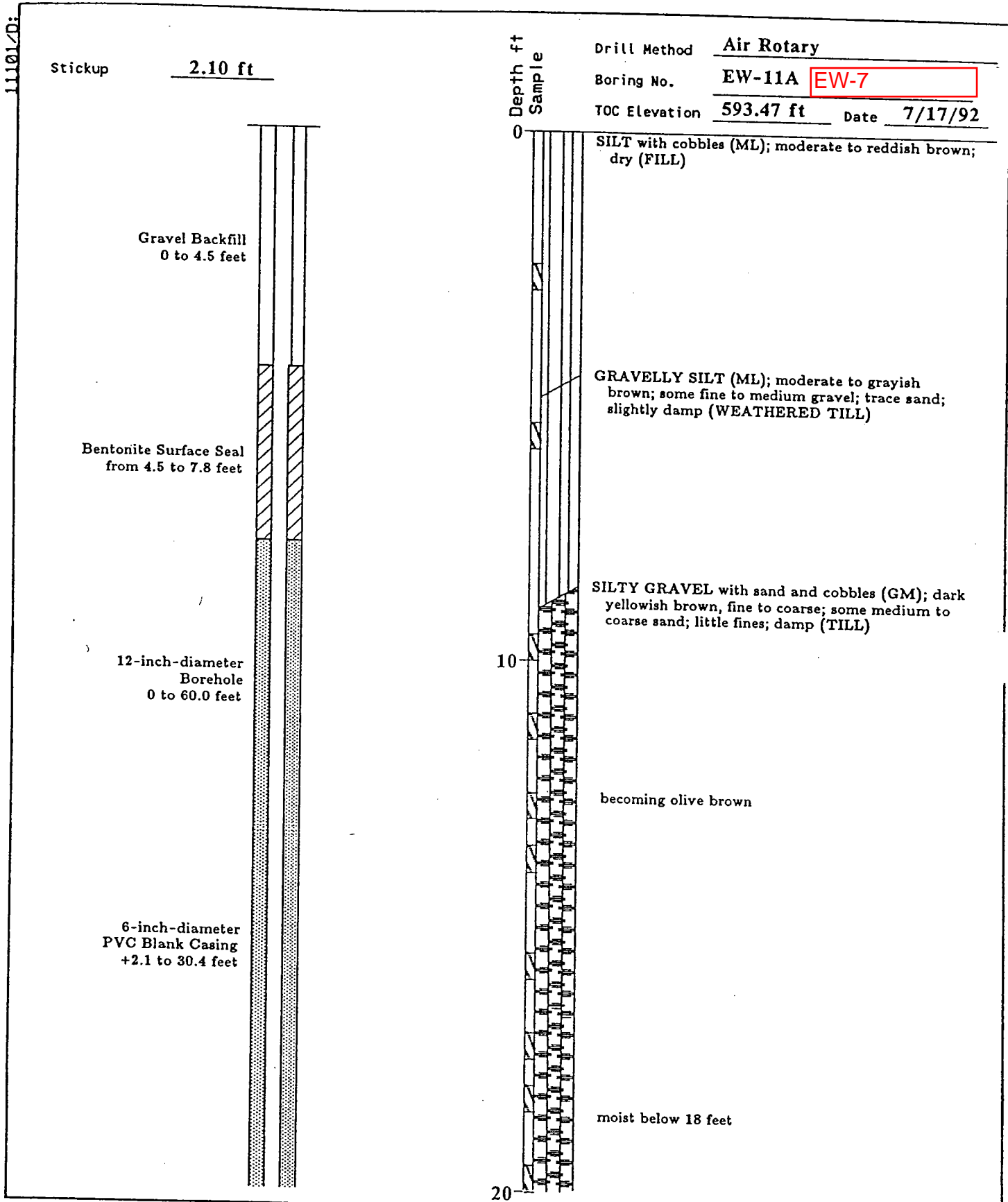
JOB NUMBER
11101-042

APPROVED

DATE
11/92

REVISED

DATE



Drill Method Air Rotary
 Boring No. EW-11A EW-7
 TOC Elevation 593.47 ft Date 7/17/92

Depth ft
 Sample

Stickup 2.10 ft

Gravel Backfill
 0 to 4.5 feet

Bentonite Surface Seal
 from 4.5 to 7.8 feet

12-inch-diameter
 Borehole
 0 to 60.0 feet

6-inch-diameter
 PVC Blank Casing
 +2.1 to 30.4 feet

SILT with cobbles (ML); moderate to reddish brown;
 dry (FILL)

GRAVELLY SILT (ML); moderate to grayish
 brown; some fine to medium gravel; trace sand;
 slightly damp (WEATHERED TILL)

SILTY GRAVEL with sand and cobbles (GM); dark
 yellowish brown, fine to coarse; some medium to
 coarse sand; little fines; damp (TILL)

becoming olive brown

moist below 18 feet



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Log of Boring and Well Completion
EW-11A
 Cedar Hills Landfill

(sheet 1 of 3)

DRAWN
 HK

JOB NUMBER
 11101-042

APPROVED

DATE
 11/92

REVISED

DATE

01/01

Stickup

2.10 ft

Sand Pack 10 x 20
Silica Sand
7.8 to 40.7 feet

Stainless Steel
Centralizer
29.7 feet

6-inch-diameter
0.020 Slot PVC Screen
30.4 to 39.73 feet

6-inch-diameter

Depth ft
Sample

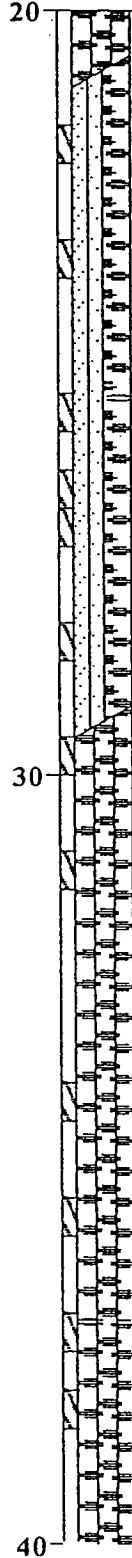
Drill Method Air Rotary

Boring No. EW-11A

EW-7

TOC Elevation 593.47 ft

Date 7/17/92



SILTY SAND with gravel and SILTY GRAVEL with sand (SM and GM); olive brown, fine to coarse gravel, fine to coarse sand; some fines; moist (TILL)

SILTY GRAVEL with sand and cobbles (GM); medium gray, fine to medium; with trace coarse gravel; some medium to coarse sand; little fines; moist; becoming fine to coarse gravels (STRATIFIED DRIFT)

few coated clasts



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Log of Boring and Well Completion EW-11A

(sheet 2 of 3)

PLATE

Cedar Hills Landfill

11101/D:

Stickup 2.10 ft

Drill Method Air Rotary
 Boring No. EW-11A **EW-7**
 TOC Elevation 593.4 Date 7/17/92

Schedule 40 PVC Blank Casing
 39.75 to 44.0 feet
 Stainless Steel Centralizer
 40.4 feet

Bentonite Pellet Seal
 40.7 to 42.0 feet

End Cap

Total Depth

Depth of Sample



start adding drilling water @ 42.0 feet

GRAVELLY SAND (GM); light olive grayish brown, fine to coarse; little fine to coarse sand; little fines; water added (ADVANCE OUT)

FINE SAND (SM); light gray to medium; little fine to medium; little fines, water added (STRATIFIED DRIFT)

GRAVELLY SAND (GM); dark yellowish brown; little sand; few fines (ADVANCE OUT)

fewer fines (CW)

Total depth drilled = 60 feet



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Log of Boring and Well Completion

EW-11A

(sheet 3 of 3)

Cedar Hills Landfill

DRAWN
 HK

JOB NUMBER
 11101-042

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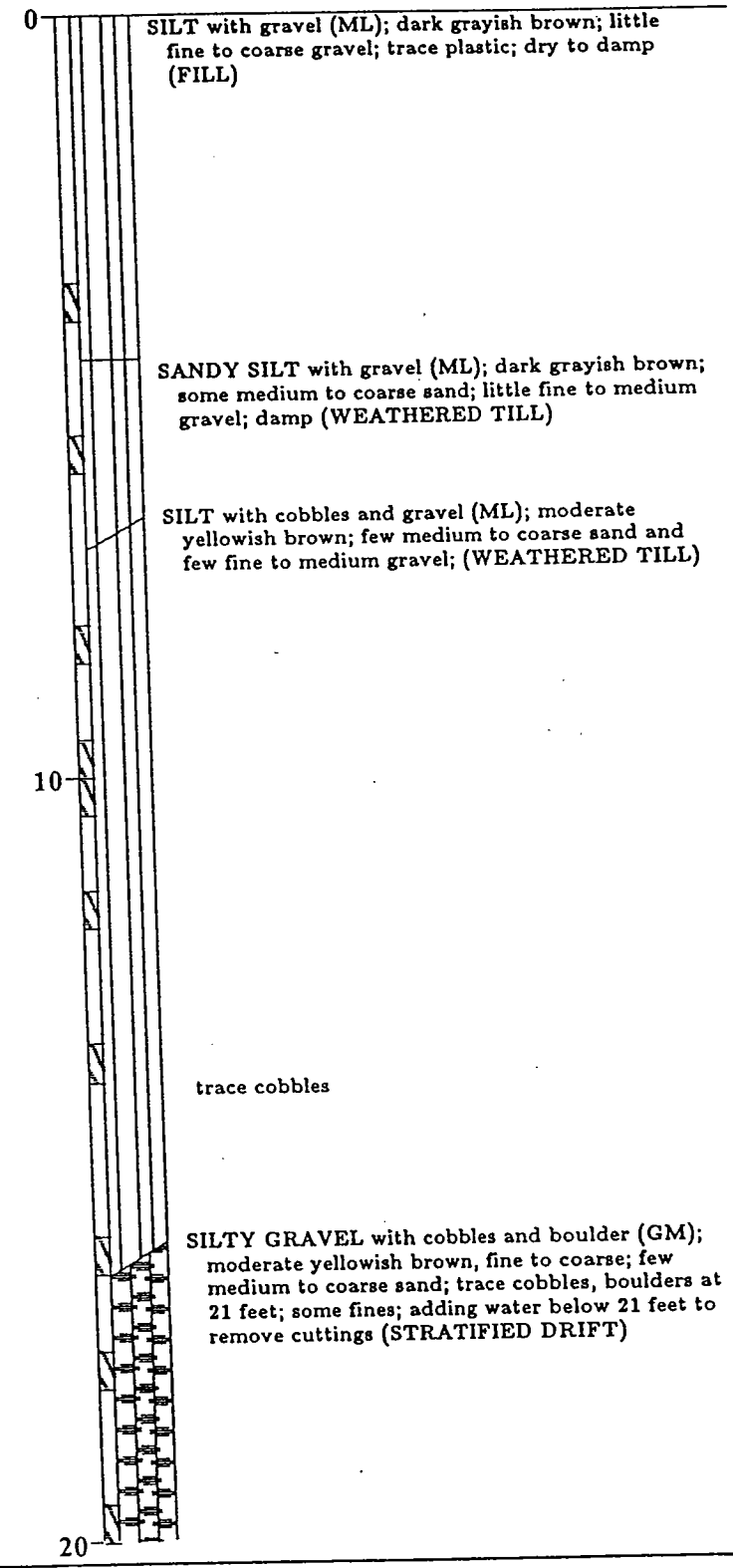
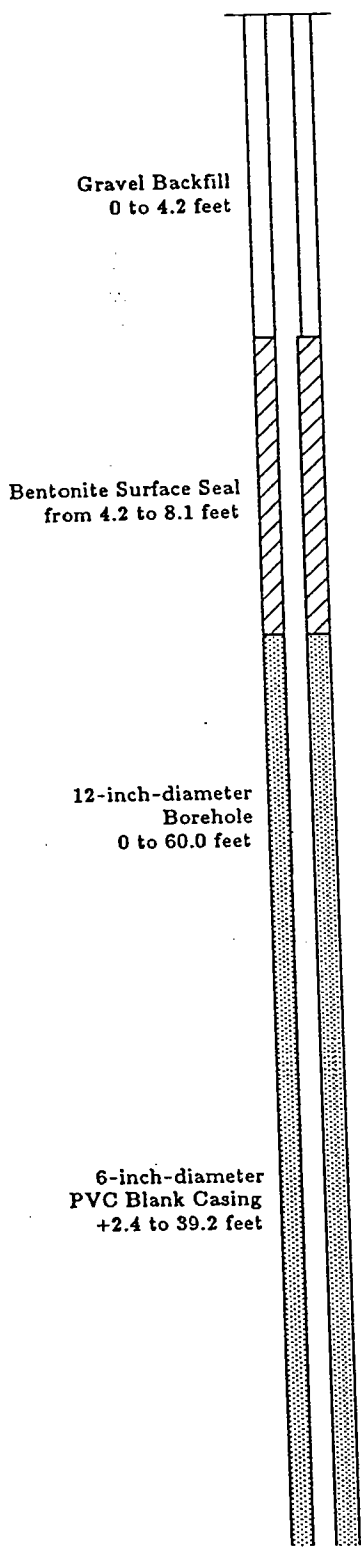
DATE
 11/92

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DATE

cup 2.40 ft

Drill Method Air Rotary
 Boring No. EW-13A EW-8
 TOC Elevation 600.38 ft Date 7/24/92



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Log of Boring and Well Completion
EW-13A (sheet 1 of 3)
Cedar Hills Landfill

PLATE

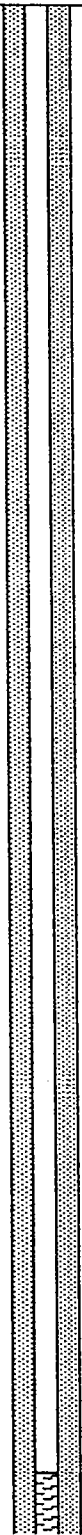
11101/D:

Stickup

2.40 ft

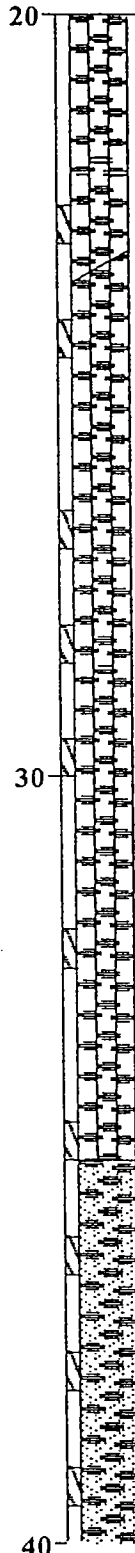
Sand Pack 10 x 20
Silica Sand
8.1 to 48.7 feet

Stainless Steel
Centralizer
38.3 feet



Depth ft
Sample

Drill Method	Air Rotary	
Boring No.	EW-13A	EW-8
TOC Elevation	600.38 ft	Date 7/24/92



SILTY GRAVEL with sand, cobbles, and boulder (GM); moderate yellowish brown becoming brownish olive gray, fine to coarse gravel; little fine to coarse sand; little fines; adding water (STRATIFIED DRIFT)

large cobbles/boulders

GRAVEL with cobble (GW); olive gray with slight brownish color; trace fines; varied lithologies; water added (STRATIFIED DRIFT)



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Log of Boring and Well Completion

EW-13A

(sheet 2 of 3)

Cedar Hills Landfill

11101/D

Pickup

2.40 ft

Drill Method	Air Rotary	
Boring No.	EW-13A	EW-8
TOC Elevation	600.38 ft	Date 7/24/92

Depth ft
Sample

6-inch-diameter
0.020 Slot PVC Screen
39.2 to 48.4 feet

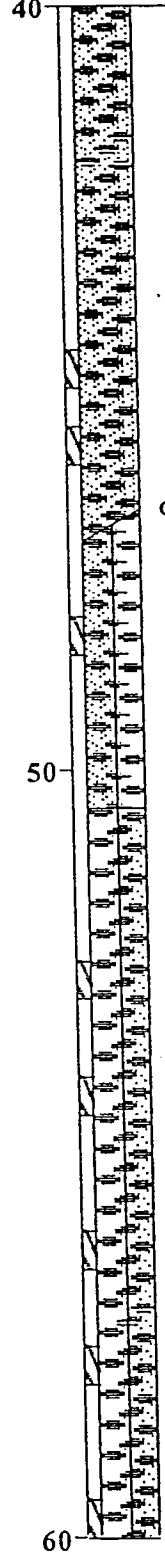
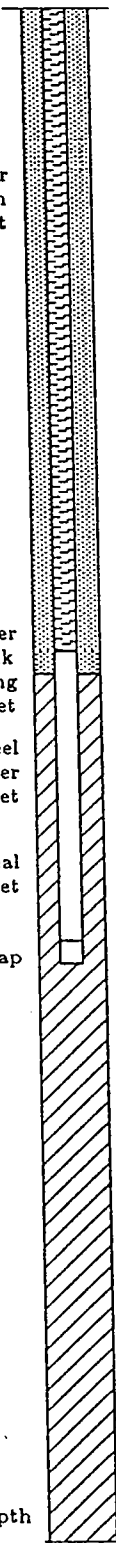
6-inch-diameter
Schedule 40 PVC Blank
Casing
48.4 to 52.5 feet

Stainless Steel
Centralizer
49.2 feet

Bentonite Pellet Seal
48.7 to 60.0 feet

End Cap

Total Depth



tricone button bit and no downhole hammer used below 43 feet

GRAVEL with silt and sand (GW-GM); slight brownish olive gray; little very fine sand; water added (STRATIFIED DRIFT)

SILTY GRAVEL with sand and GRAVEL with silt and sand (GM/GP-GM); moderate yellowish brown, fine to coarse; little to few fine to coarse sand; bedded; few to little fines; water added (ADVANCE OUTWASH)

Total depth drilled = 60 feet



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Log of Boring and Well Completion
EW-13A
Cedar Hills Landfill

(sheet 3 of 3)

PLATE

11101/04

Stickup

1.90 ft

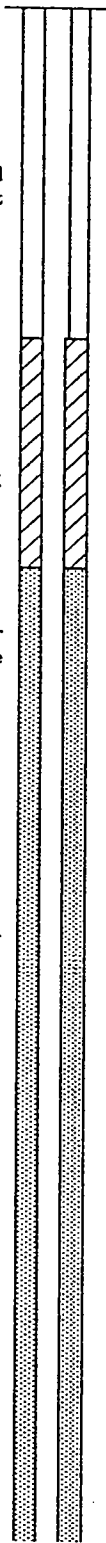
Gravel Backfill
0 to 4.3 feet

Bentonite Surface Seal
from 4.3 to 7.3 feet

12-inch-diameter
Borehole
0 to 52.6 feet

6-inch-diameter
PVC Blank Casing
+1.9 to 31.2 feet

Sand Pack 10 x 20
Silica Sand
7.3 to 41.0 feet



Depth ft
Sample

Drill Method Air Rotary

Boring No. EW- 3A **EW-9**

TOC Elevation 602.92 ft Date 6/18/92

0

Drilled with downhole percussion hammer and 12-inch button bit

SILT with gravel and cobbles (ML); moderate brown; non-plastic; little to fine to coarse gravel; few medium to coarse sand; damp (WEATHERED TILL)

SILTY SAND with gravel (SM); moderate yellowish brown, fine to coarse; some non-plastic fines; little fine to coarse gravel; damp (WEATHERED TILL)

10

SAND with silt and gravel (SW-SM); dark yellow brown, fine to coarse; some fine to medium gravel; few non-plastic fines; damp (WEATHERED TILL)

start adding water at 14 feet

CLAYEY SILT with gravel and sand (ML/CL); medium dark gray to blueish dark gray; little fine to coarse gravel, few fine to medium sand; adding water; becoming less gravelly and less silty with depth (LACUSTRINE)

20

SILT with gravel (ML); mottled medium dark gray to moderate yellowish brown; slightly plastic; few fine to coarse gravel; few fine to medium sand;



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Log of Boring and Well Completion

EW- 3A

(sheet 1 of 3)

Cedar Hills Landfill

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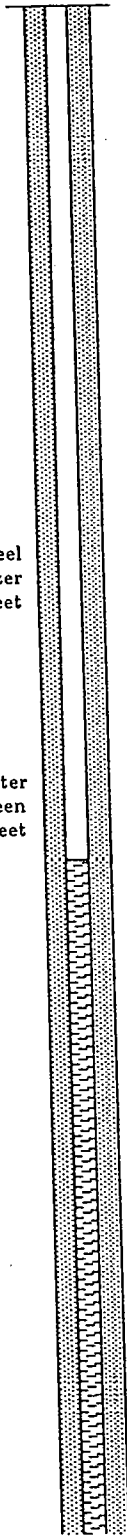
101401

Stickup

1.90 ft

Stainless Steel
Centralizer
29.0 feet

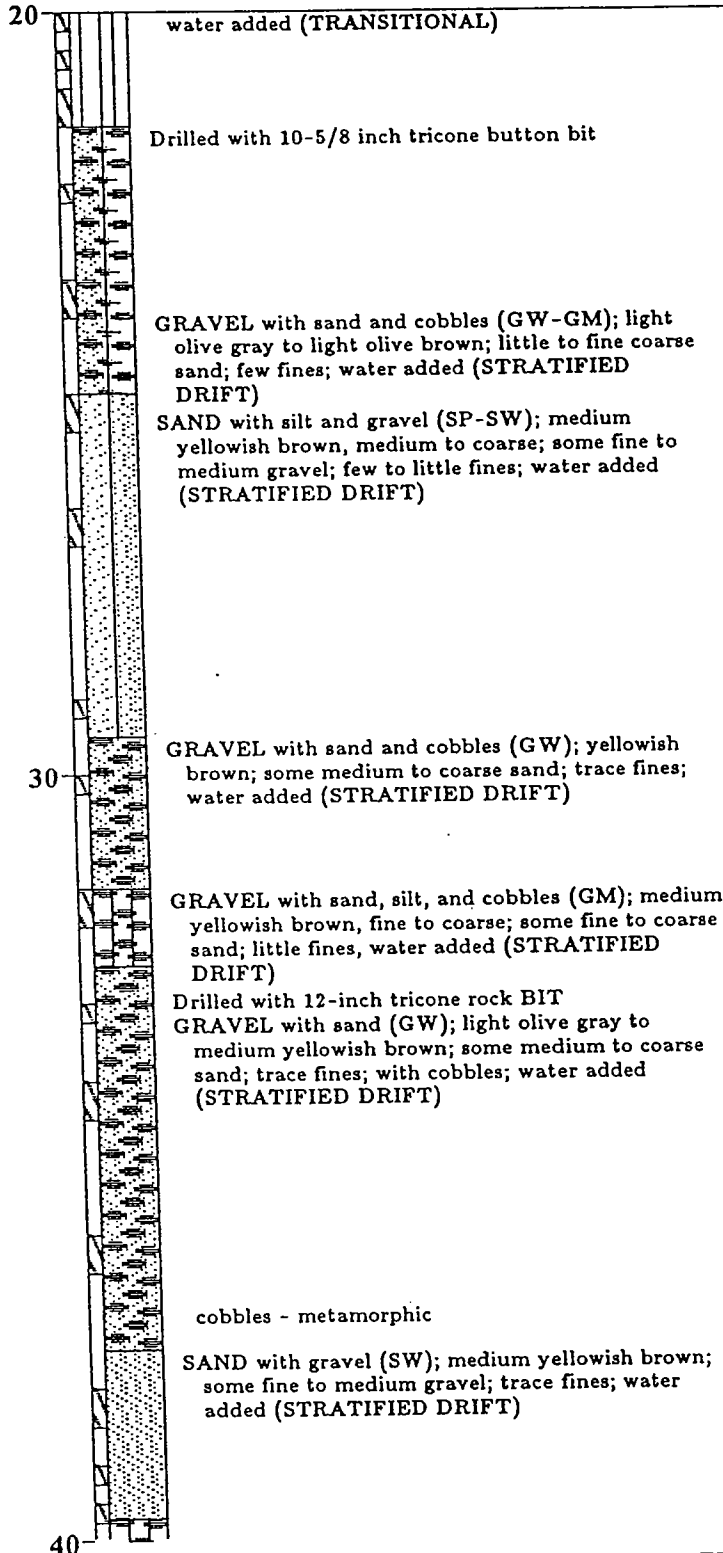
6-inch-diameter
0.020 Slot PVC Screen
31.2 to 40.5 feet



Drill Method Air Rotary

Boring No. EW- 3A EW-9

TOC Elevation 602.92 ft Date 6/18/92



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Log of Boring and Well Completion

PLATE

EW- 3A

(sheet 2 of 3)

Cedar Hills Landfill

DRAWN HK	JOB NUMBER 11101-042	APPROVED	DATE 11/92	REVISED	DATE
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11101/02

Stickup

1.90 ft

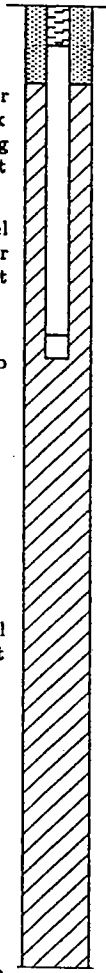
6-inch-diameter
Schedule 40 PVC Blank
Casing
40.5 to 44.6 feet

Stainless Steel
Centralizer
42.1 feet

End Cap

Bentonite Pellet Seal
41.0 to 52.6 feet

Total Depth

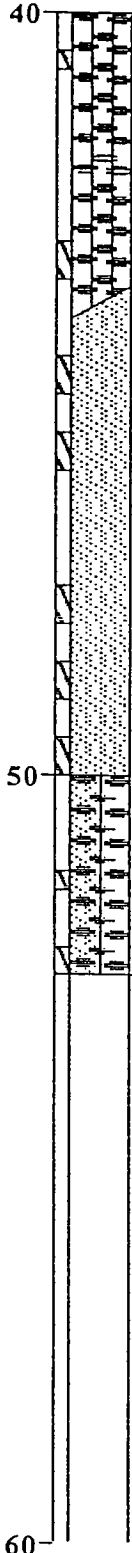


Drill Method Air Rotary

Boring No. EW- 3A EW-9

TOC Elevation 602.92 ft Date 6/18/92

Depth ft
Sample



SILTY GRAVEL with sand (GM); light olive grayish brown, fine to coarse; some fine to coarse sand; little fines, with boulders and cobbles; water added (STRATIFIED DRIFT)

SAND with gravel (SW); dusky yellow brown; some fine to medium gravel; trace fines; water added (STRATIFIED DRIFT)

GRAVEL with silt, sand, and cobbles (GW-GM); dusky yellow; some medium to coarse sand; few fines; water added (STRATIFIED DRIFT)

Total depth drilled = 52.6 feet



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Log of Boring and Well Completion

EW- 3A

(sheet 3 of 3)

Cedar Hills Landfill

11101/01

Stickup

1.10 ft

Gravel Backfill
0 to 3.5 feet

Bentonite Surface Seal
from 3.5 to 7.5 feet

12-inch-diameter
Borehole
0 to 69.0 feet

6-inch-diameter
PVC Blank Casing
+1.1 to 40.35 feet

Drill Method Air Rotary

Boring No. EW- 9A **EW-5**

TOC Elevation 574.52 ft Date 7/14/92

Depth ft
Sample

SILT (ML); dark reddish brown, non-plastic; little organic roots; wood; plastic; moist (FILL)

SILT with sand and gravel (ML); moderate reddish brown, non-plastic; little fine to coarse sand; few fine to medium gravel; damp (WEATHERED TILL)

SILTY SAND with gravel (SM); grayish brown; mostly fine to medium; some non-plastic fines; few fine gravel; damp (WEATHERED TILL)

GRAVEL with silt and sand (GW-GM); grayish brown; some fine to coarse sand; few cobbles; damp (FILL)

SAND with silt, cobbles, and gravel (SW-SM); light olive gray; some fine to coarse gravel; few non-plastic fines; few cobbles; damp (TILL)

boulder

GRAVEL with sand (GW); light olive gray; some fine to coarse sand; trace fines; damp (TILL)

20



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Log of Boring and Well Completion EW- 9A (sheet 1 of 4)

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11/92

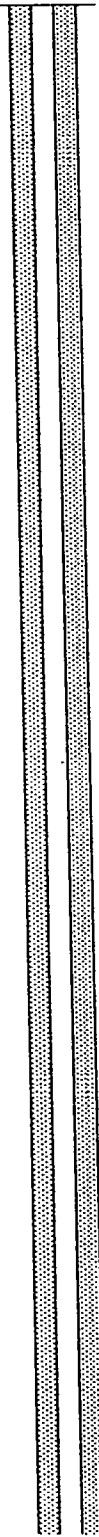
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DATE

Stickup

1.10 ft

Sand Pack 10 x 20
Silica Sand
7.5 to 50.7 feet



Depth ft
Sample

Drill Method Air Rotary

Boring No. EW- 9A EW-5

TOC Elevation 574.52 ft Date 7/14/92

20

SILT (ML); moderate yellowish brown; slightly plastic; moist (STRATIFIED DRIFT)

SILT (ML); moderate yellow brown; non-plastic; few fine to medium gravel; trace fine to medium sand; moist (STRATIFIED DRIFT)

little fine to coarse gravel below 28 feet

30

SILTY SAND with gravel (SM); fine grained; little fine gravel; some fines; damp (STRATIFIED DRIFT)

SILTY GRAVEL with sand (GM); dark yellowish brown, fine to medium; becoming fine to coarse below 37 feet; little to few fine to coarse sand; little fines; damp (STRATIFIED DRIFT)

40

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Log of Boring and Well Completion

PLATE

EW- 9A

(sheet 2 of 4)

Cedar Hills Landfill

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JOB NUMBER **11101-042**

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DATE **11/92**

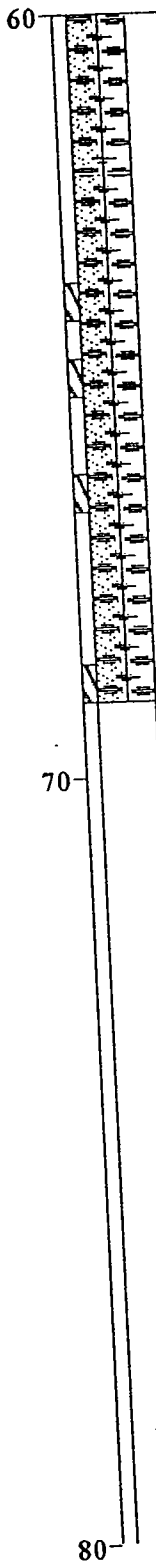
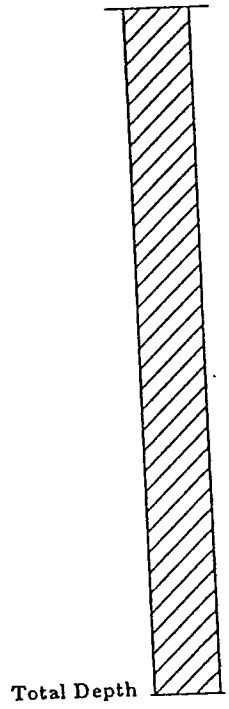
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DATE _____

ip

1.10 ft

Depth ft
Sample

Drill Method	Air Rotary	
Boring No.	EW- 9A	EW-5
TOC Elevation	574.52 ft	Date 7/14/92



Total depth drilled = 69.0 feet

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Log of Boring and Well Completion

EW- 9A

(sheet 4 of 4)

Cedar Hills Landfill

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JOB NUMBER
11101-042

APPROVED

DATE
11/92

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DATE

PLATE

11/10/92

Stickup

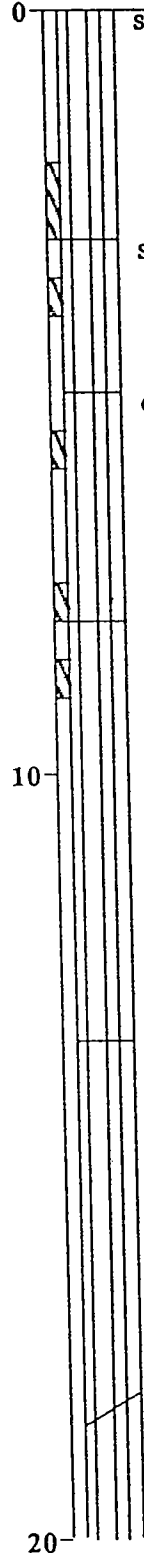
2.20 ft

Drill Method Air Rotary

Boring No. EW- 8A EW-10

TOC Elevation 609.03 ft Date 7/10/92

Depth ft
Sample



SILT (ML); moderate reddish brown; non-plastic; with few organics - wood, roots; dry (WEATHERED TILL)

SANDY SILT with gravel and cobbles (ML); moderate brown; non-plastic; little medium to coarse sand; few fine gravel; trace organics and cobbles; damp (WEATHERED TILL)

GRAVELLY SILT (ML); dusky brown; non-plastic; little fine gravel; few medium to coarse sand; few organics; moist to wet (WEATHERED TILL)

SANDY SILT with gravel, cobbles, and boulders (ML); moderate yellowish brown; non-plastic; some medium to coarse sand; some fine to coarse gravel; dry (WEATHERED TILL)

SANDY SILT with gravel (ML); olive gray; nonplastic; some fine to coarse sand; few fine to medium gravel; dry (GLACIAL TILL)

CLAYEY SILT with gravel (ML); medium gray bluish, slight to moderate plasticity; few medium to coarse sand; damp (LACUSTRINE)

Gravel Backfill
0 to 4.0 feet

Bentonite Surface Seal
from 4.0 to 8.25 feet

12-inch-diameter
Borehole
0 to 51.5 feet

6-inch-diameter
PVC Blank Casing
+2.2 to 28.28 feet

Sand Pack 10 x 20
Silica Sand
8.25 to 38.6 feet



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Log of Boring and Well Completion

EW- 8A

(sheet 1 of 3)

Cedar Hills Landfill

PLATE

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
HK	11101-042		11/92		

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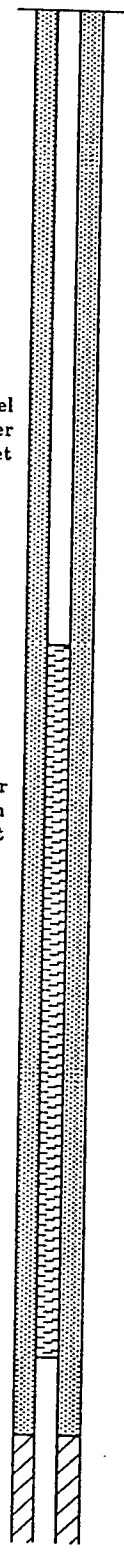
stickup

2.20 ft

Stainless Steel Centralizer
27.3 feet

6-inch-diameter
0.020 Slot PVC Screen
28.28 to 37.6 feet

Stainless Steel Centralizer
38.5 feet



Depth ft
Sample

Drill Method	Air Rotary	
Boring No.	EW- 8A	EW-10
TOC Elevation	609.03 ft	Date 7/10/92

20
30
40

SILT (ML); olive gray; nonplastic; dry (LACUSTRINE)

SILT with sand, cobbles, and boulders (ML); olive gray; little to medium to coarse sand; few fine to medium gravel; nonplastic; moist (STRATIFIED DRIFT)
boulder @ 23 feet

SILTY GRAVEL with sand and cobbles (GM); light olive gray, fine to coarse; some fine to coarse sand; little fines; water added (STRATIFIED DRIFT)

SILTY SAND with gravel (SM); light olive gray, medium to coarse; some to little fine to coarse and fine to medium gravel; little fines; moist to damp (STRATIFIED DRIFT)

decrease in fines at base of unit



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Log of Boring and Well Completion

EW- 8A

(sheet 2 of 3)

PLATE

Cedar Hills Landfill

Pickup

2.20 ft

Depth ft
Sample

Drill Method Air Rotary

Boring No. EW- 8A EW-10

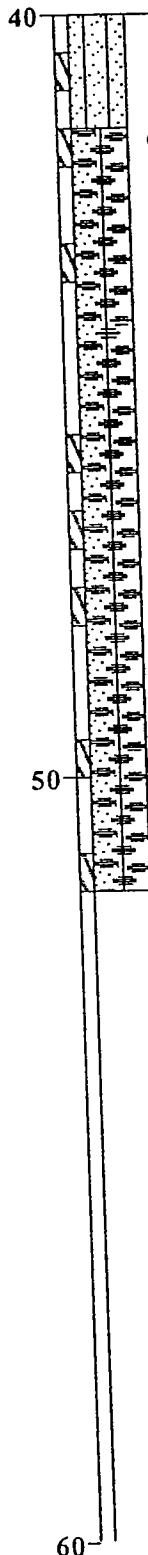
TOC Elevation 609.03 ft Date 7/10/92

6-inch-diameter
Schedule 40 PVC Blank
Casing
38.6 to 41.9 feet

End Cap

Bentonite Pellet Seal
38.6 to 51.5 feet

Total Depth



GRAVEL with silt and sand (GP-GM); moderate yellowish brown, fine to medium; some medium to coarse sand; few to little fines; damp (ADVANCE OUTWASH)

Total depth drilled = 51.5 feet

60

PLATE

Log of Boring and Well Completion

EW- 8A

(sheet 3 of 3)

Cedar Hills Landfill



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JOB NUMBER
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DATE
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1101/D:

Stickup

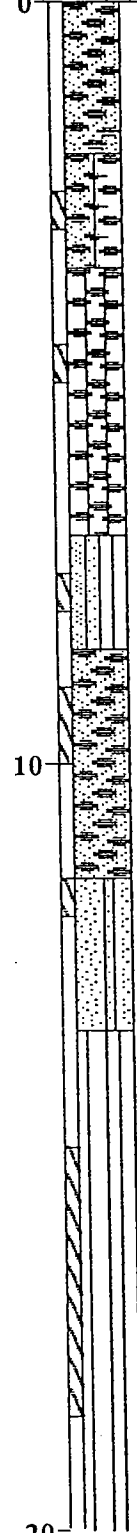
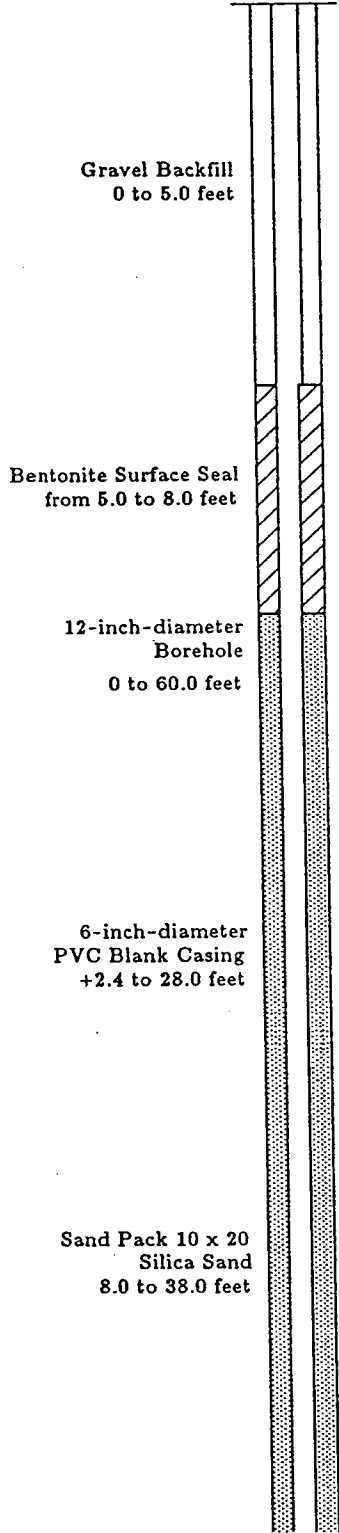
2.40 ft

Depth ft
Sample

Drill Method Air Rotary

Boring No. EW- 2A EW-11

TOC Elevation 617.60 ft Date 6/2/92



GRAVEL with sand (GW); brown, fine to coarse; some fine to coarse sand; few fines; damp (FILL)

GRAVEL with silt and sand (GW-GM); dark brown, fine to coarse; little fine to coarse sand; few fines; damp

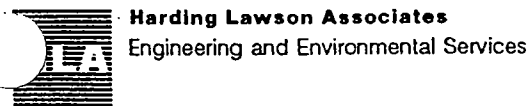
SILTY GRAVEL with sand (GM); yellowish brown, fine to medium; little fines; damp (WEATHERED TILL)
boulders @ 4.5 to 7 feet

SILTY SAND with gravel (SM/ML); dark yellowish brown, fine to medium; some to mostly fines; damp (WEATHERED TILL)

GRAVEL with sand and cobbles (GW); fine to coarse; little medium to coarse sand; trace fines; adding water (WEATHERED TILL)

SAND with silt lense (SP-SM); olive gray, fine (TILL)
boulder @ 12 to 13.5 feet

GRAVELLY SILT with sand (ML); medium dark gray; little fine to coarse gravel; little fine to medium sand; adding water (LACUSTRINE)



Log of Boring and Well Completion
EW- 2A (sheet 1 of 3)
Cedar Hills Landfill

PLATE

DRAWN HK	JOB NUMBER 11101-042	APPROVED	DATE 11/92	REVISED	DATE
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11101/01

Stickup

2.40 ft

Drill Method Air Rotary

Boring No.

EW- 2A

EW-11

TOC Elevation

617.60 ft

Date

6/2/92

Depth ft
Sample

Stainless Steel
Centralizer
27.0 feet

6-inch-diameter
0.020 Slot PVC Screen
28.0 to 37.4 feet

Bentonite Pellet Seal
38.0 to 60.0 feet
6-inch-diameter
Schedule 40 PVC Blank
Casing
37.4 to 41.5 feet

becoming less gravelly and sandy with depth

small boulder @ 30 feet

SILTY GRAVEL with sand and cobbles (GM);
medium dark gray, fine to coarse; little to medium
to coarse sand; some fines; adding water
(TRANSITIONAL)

GRAVEL with sand and cobbles (GW); light olive
gray, fine to coarse; little coarse to medium sand,
trace very fine sand; trace fines; adding water
(STRATIFIED DRIFT)

GRAVEL with sand, cobbles, and boulders (GW);
olive brown to dark yellowish brown, fine to
coarse; little medium to coarse sand, trace fine
sand; trace fines; adding water (ADVANCE
OUTWASH)

20
30
40



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Log of Boring and Well Completion

EW- 2A

(sheet 2 of 3)

Cedar Hills Landfill

DRAWN
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JOB NUMBER
11101-042

APPROVED

DATE
11/92

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DATE

up

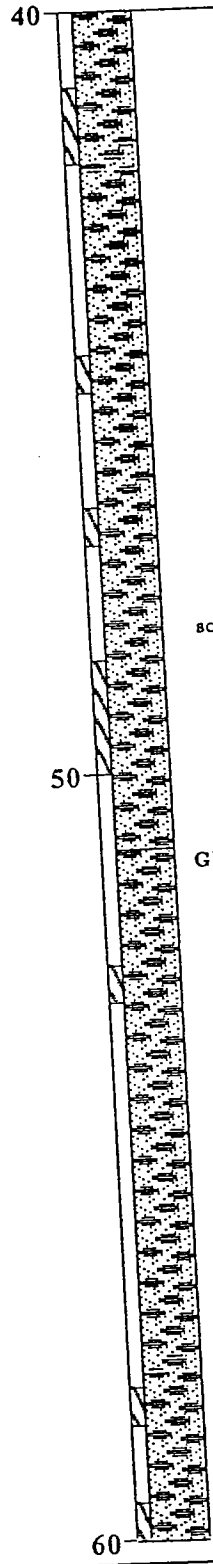
2.40 ft

Stainless Steel
Centralizer
40.5 feet
End Cap

Total Depth

Depth ft
Sample

Drill Method	Air Rotary	
Boring No.	EW- 2A	EW-11
TOC Elevation	617.60 ft	Date 6/2/92



some fine to coarse sand

GRAVEL with sand and cobbles (GW); dark yellowish brown, fine to coarse; some fine to coarse sand; trace fines (ADVANCE OUTWASH)

Total depth drilled = 60.0 feet.

Log of Boring and Well Completion
EW- 2A (sheet 3 of 3)
Cedar Hills Landfill

PLATE



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11/92

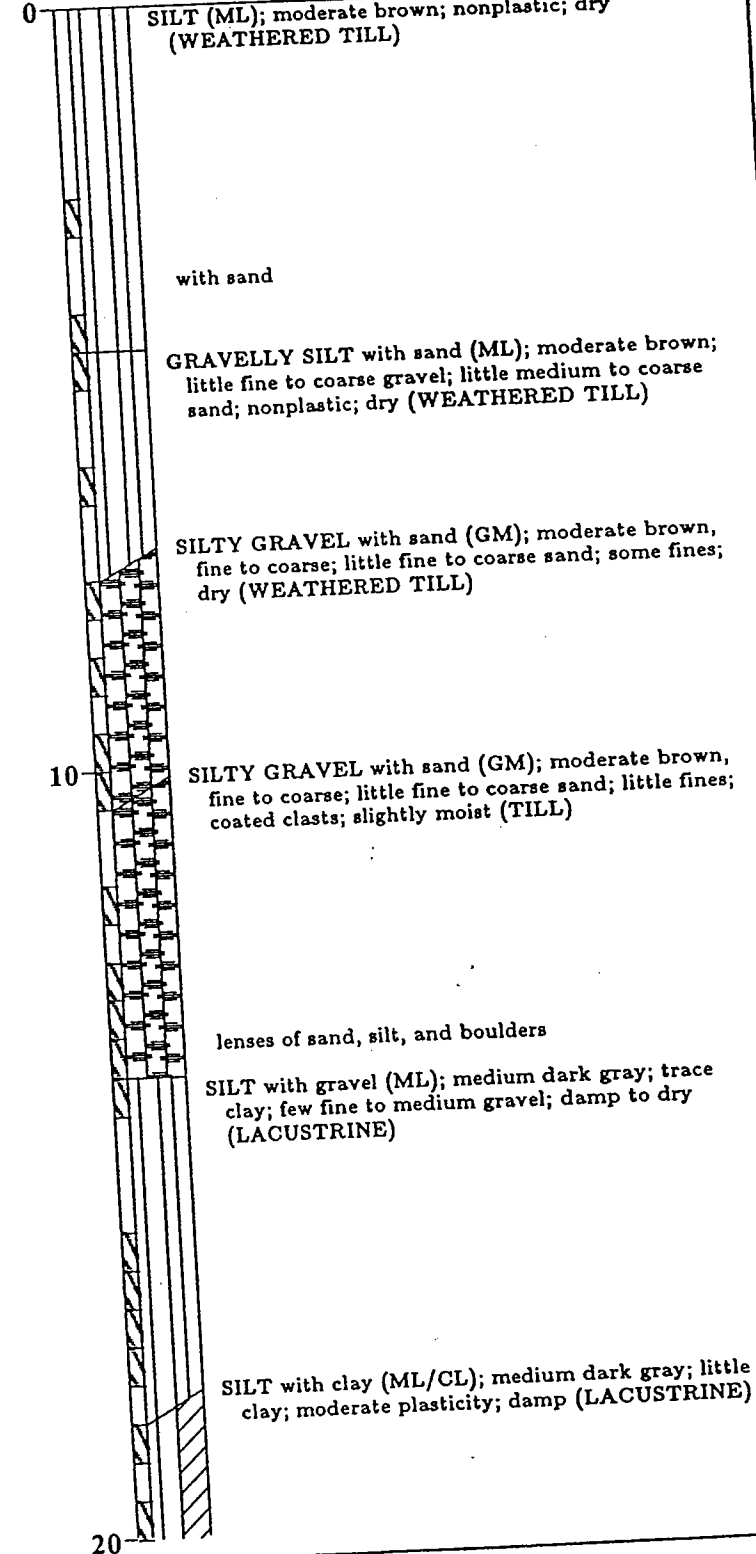
REVISED

DATE

Stickup

2.53 ft

Drill Method	Air Rotary	
Boring No.	EW-21A	EW-12
TOC Elevation	623.25 ft	Date 9/1/92



Gravel Backfill
0 to 4.3 feet

Bentonite Surface Seal
from 4.3 to 8.0 feet

12-inch-diameter
Borehole
0 to 40.5 feet

6-inch-diameter
PVC Blank Casing
+2.53 to 22.5 feet

Log of Boring and Well Completion

EW-21A

(sheet 1 of 3)

Cedar Hills Landfill

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PLATE



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JOB NUMBER
11101-042

11/19/92

pickup

2.53 ft

Sand Pack 10 x 20
Silica Sand
8.0 to 32.5 feet

Stainless Steel
Centralizer
21.6 feet

6-inch-diameter
0.020 Slot PVC Screen
22.5 to 31.8 feet

6-inch-diameter
Schedule 40 PVC Blank
Casing
31.8 to 35.8 feet

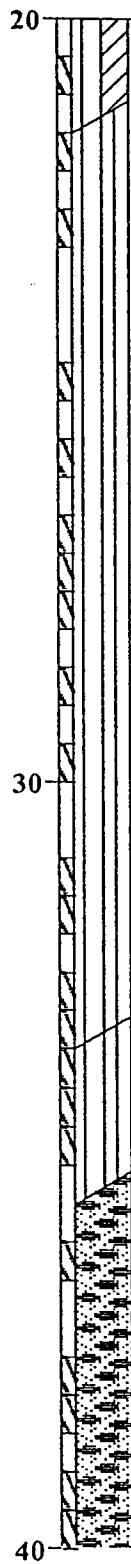
Stainless Steel
Centralizer
32.6 feet

Bentonite Pellet Seal
32.5 to 40.5 feet

End Cap

Depth ft
Sample

Drill Method	Air Rotary	
Boring No.	EW-21A	EW-12
TOC Elevation	623.25 ft	Date 9/1/92



SILT with gravel (ML); medium dark gray; trace to few clay; denser; trace to few fine gravel; slight to nonplastic; damp (LACUSTRINE)

SILT with gravel (ML); medium dark gray; little fine to coarse gravel; trace light brown silt; damp (STRATIFIED DRIFT)

SANDY GRAVEL (GW); light olive gray to moderate yellow brown, fine to coarse; some fine to coarse sand; trace fines; adding water below 35.7 feet (ADVANCE OUTWASH)



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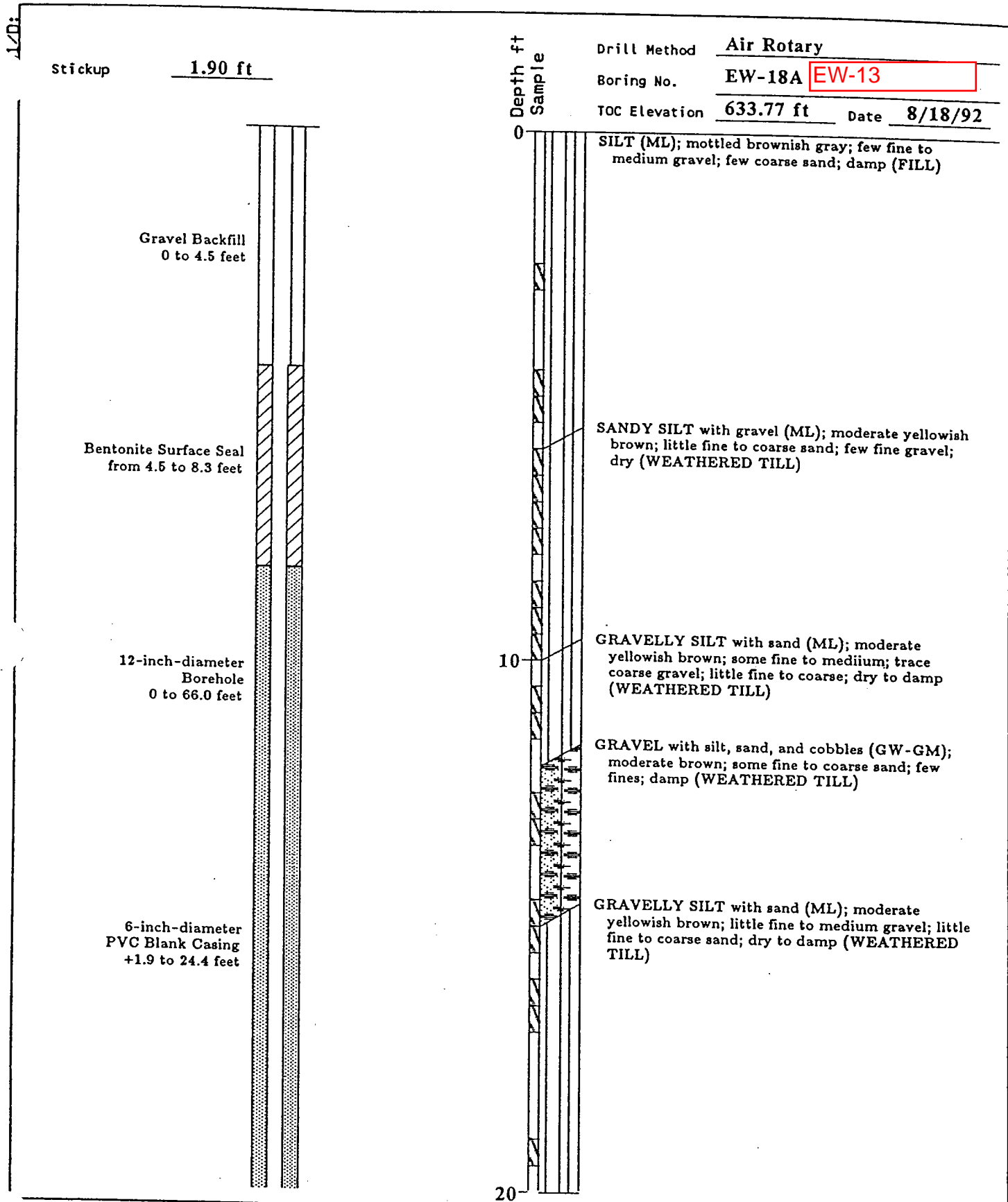
Log of Boring and Well Completion

EW-21A

(sheet 2 of 3)

PLATE

Cedar Hills Landfill



Drill Method Air Rotary
 Boring No. EW-18A EW-13
 TOC Elevation 633.77 ft Date 8/18/92

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Log of Boring and Well Completion
EW-18A
 Cedar Hills Landfill

(sheet 1 of 4)

PLATE

Stickup

1.90 ft

Sand Pack 10 x 20
Silica Sand
8.3 to 34.3 feet

Stainless Steel
Centralizer
23.4 feet

6-inch-diameter
0.020 Slot PVC Screen
24.4 to 33.7 feet

6-inch-diameter
Schedule 40 PVC Blank
Casing
33.7 to 38.1 feet

Stainless Steel
Centralizer
34.5 feet

Bentonite Pellet Seal
34.3 to 53.0 feet

End Cap

Depth ft
Sample

Drill Method Air Rotary

Boring No. EW-18A **EW-13**

TOC Elevation 633.77 ft Date 8/18/92

20

SILT with clay (ML/CL); medium dark gray; trace fine to medium gravel; slightly plastic; damp (LACUSTRINE)

SANDY SILT (ML); medium dark gray; some very fine sand; nonplastic; moist (LACUSTRINE)

30

SILT with gravel (ML); medium gray; few fine to medium gravel; trace coarse gravel; slightly moist and plasticity to 35 feet

less plasticity and dryer

started adding water at 37 feet

40

Log of Boring and Well Completion

EW-18A

(sheet 2 of 4)

Cedar Hills Landfill

PLATE



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JOB NUMBER

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DATE

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DATE

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11/92

1/20:

Stickup

1.90 ft

Drill Method Air Rotary

Boring No. EW-18A EW-13

TOC Elevation 633.77 ft Date 8/18/92

Depth ft
Sample

Sand Pack 10 x 20
Silica Sand
53.0 to 63.5 feet

light brown silt clasts at 43.5 feet
SILTY GRAVEL with cobbles (GM); olive gray, fine
to coarse; few medium to coarse sand; some fines;
water added; trace cobbles (STRATIFIED
DRIFT)

GRAVEL with sand (GW); slightly yellowish light
olive gray; some fine to coarse sand; trace fines;
water added (ADVANCE OUTWASH)

sandy lense



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Log of Boring and Well Completion

PLATE

EW-18A

(sheet 3 of 4)

Cedar Hills Landfill

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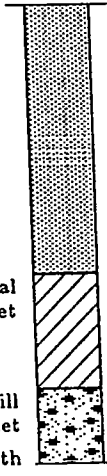
1012121

Stickup 1.90 ft

Bentonite Pellet Seal
63.5 to 63.75 feet

Gravel Backfill
65.0 to 66.0 feet

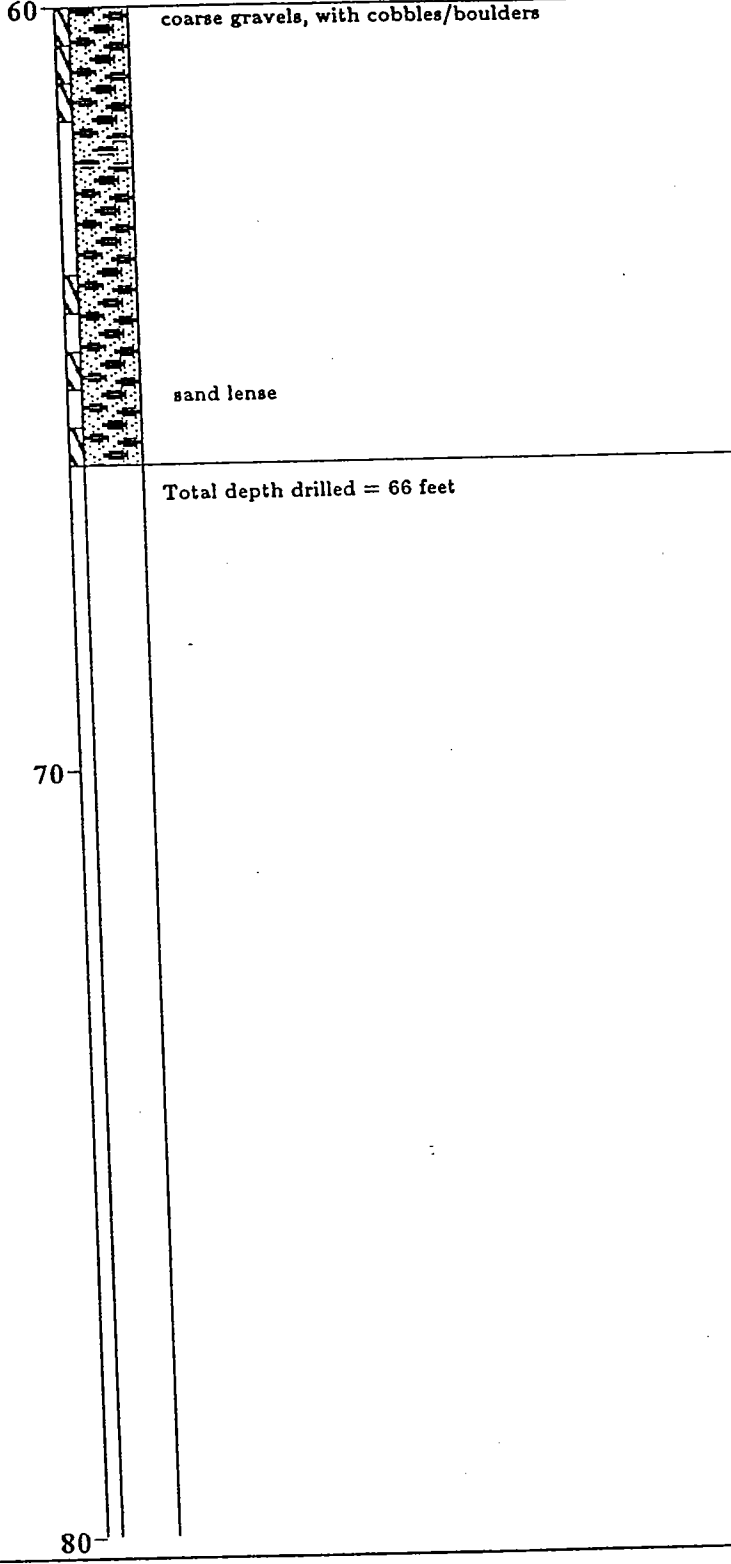
Total Depth



Drill Method Air Rotary

Boring No. EW-18A EW-13

TOC Elevation 633.77 ft Date 8/18/92



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Log of Boring and Well Completion
EW-18A (sheet 4 of 4)
Cedar Hills Landfill

PLATE

1101/04

Stickup

2.20 ft

Depth ft
Sample

Drill Method Air Rotary

Boring No. EW- 4A **EW-14**

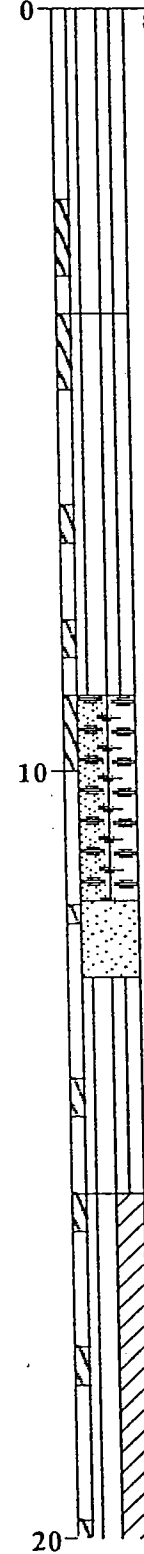
TOC Elevation 633.66 ft Date 6/25/92

Gravel Backfill
0 to 3.5 feet

Bentonite Surface Seal
from 3.5 to 8.2 feet

12-inch-diameter
Borehole
0 to 47.0 feet

6-inch-diameter
PVC Blank Casing
+2.2 to 32.6 feet



SILT with organics and gravel (ML); moderate brown; abundant roots; trace fine to medium sand; medium to coarse gravel; damp (DISTURBED TILL FILL)

SILT with gravel (ML); moderate brown, non-plastic; little to fine to medium gravel; few fine to coarse sand; damp (TILL)

GRAVEL with silt (GW-GM); moderate brown; few fine to coarse sand; damp (TILL)

SAND (SP); moderate yellowish brown, fine grained; dry (GLACIAL TILL)

GRAVELLY SILT (ML); moderate yellowish brown; some medium to coarse gravel; few fine to medium sand; dry (GLACIAL TILL)

CLAYEY SILT with gravel (ML/CL); medium dark gray; little to few fine to medium gravel; trace sand, dry (LACUSTRINE)



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Log of Boring and Well Completion

EW- 4A

(sheet 1 of 3)

Cedar Hills Landfill

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JOB NUMBER
11101-042

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11101/0:

Stickup 2.20 ft

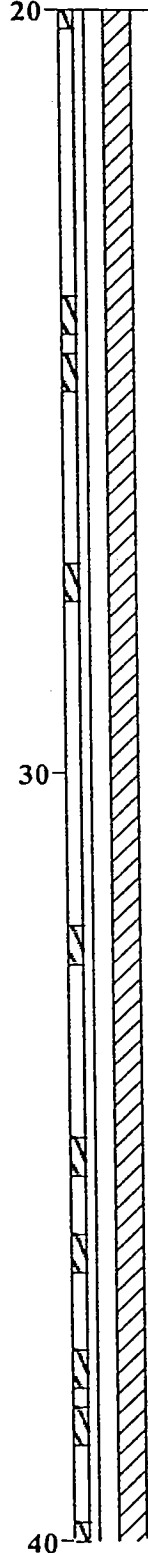
Drill Method Air Rotary
 Boring No. EW- 4A EW-14
 TOC Elevation 633.66 ft Date 6/25/92

Sand Pack 10 x 20
 Silica Sand
 8.2 to 42.5 feet

Stainless Steel
 Centralizer
 31.5 feet

6-inch-diameter
 0.020 Slot PVC Screen
 32.6 to 42 feet

Depth ft
Sample



trace fine gravel

increase in moisture content
 (moist) below 23 feet

few fine grained gravels

cobbles at 32.5 feet

trace fine gravel and fine sand, moist from 35 to 40.5 feet



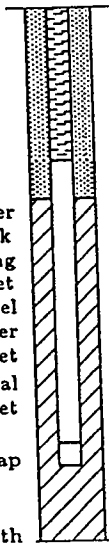
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Log of Boring and Well Completion
EW- 4A (sheet 2 of 3)
Cedar Hills Landfill

Stickup

2.20 ft

6-inch-diameter
 Schedule 40 PVC Blank
 Casing
 42.0 to 46.0 feet
 Stainless Steel
 Centralizer
 44.0 feet
 Bentonite Pellet Seal
 42.5 to 47.0 feet
 End Cap
 Total Depth



Depth ft
Sample

Drill Method Air Rotary
 Boring No. EW- 4A EW-14
 TOC Elevation 633.66 ft Date 6/25/92

40

40.5 to 42.5 feet, few fine to medium gravel, few medium to coarse sand

GRAVEL with silt and sand (GM); moderate yellowish brown, fine to medium; some fine to coarse sand; some fines (ADVANCE OUTWASH)

Total depth drilled = 47.0 feet

50

60

PLATE

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Log of Boring and Well Completion

EW- 4A

(sheet 3 of 3)

Cedar Hills Landfill

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JOB NUMBER
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DATE
11/92

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DATE

11101/01

Stickup

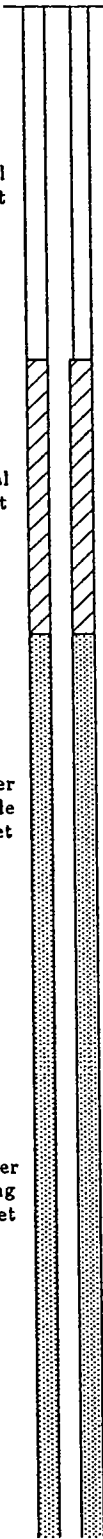
2.10 ft

Gravel Backfill
0 to 4.6 feet

Bentonite Surface Seal
from 4.6 to 8.2 feet

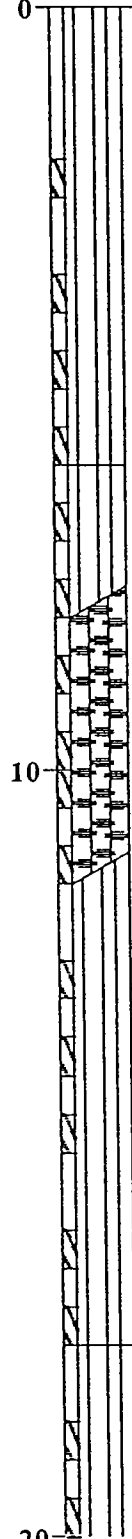
12-inch-diameter
Borehole
0 to 45.5 feet

6-inch-diameter
PVC Blank Casing
+2.1 to 29.6 feet



Depth ft
Sample

Drill Method	Air Rotary	
Boring No.	EW-15A	EW-15
TOC Elevation	635.30 ft	Date 7/29/92



SILT with gravel (ML); reddish brown; trace fine to coarse sand; trace fine gravel; few organics - roots; dry (FILL)

SILT with gravel (ML); reddish brown; few fine to medium gravels; moist (WEATHERED TILL)

SILTY GRAVEL with sand (GM); moderate yellowish brown, fine to medium; little fine to coarse sand; some fines; moist (WEATHERED TILL)

start adding water at 11.5 feet
SILT (ML); moderate yellowish brown; few to trace fine to medium gravel; few medium to coarse sand; water added (WEATHERED TILL)

SILT (ML); medium gray; trace fine gravel and medium to coarse sand; water added (LACUSTRINE)



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Log of Boring and Well Completion

EW-15A

(sheet 1 of 3)

Cedar Hills Landfill

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JOB NUMBER
11101-042

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11/92

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DATE

PL

pickup

2.10 ft

Sand Pack 10 x 20
Silica Sand
4.6 to 39.4 feet

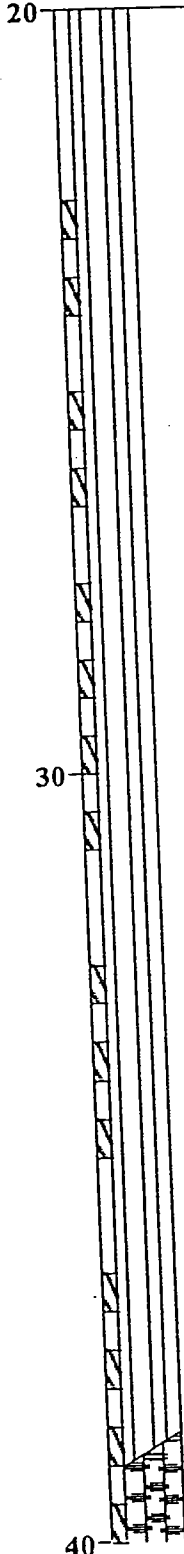
28.8' Stainless Steel
Centralizer
28.8 feet

6-inch-diameter
0.020 Slot PVC Screen
29.6 to 39.0 feet

6-inch-diameter
Schedule 40 PVC Blank
Casing
39.0 to 43.1 feet

Depth ft
Sample

Drill Method	Air Rotary	
Boring No.	EW-15A	EW-15
TOC Elevation	635.30 ft	Date 7/29/92



few fine to medium gravel and few medium to coarse sand

SILTY GRAVEL with sand (GM); medium gray, fine to medium; little medium to coarse sand; some fines; water added (STRATIFIED DRIFT)



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Log of Boring and Well Completion EW-15A

(sheet 2 of 3)

Cedar Hills Landfill

DRAWN
HK

JOB NUMBER
11101-042

APPROVED

DATE
11/92

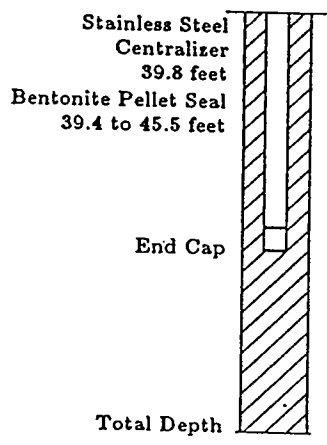
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DATE

PLATE

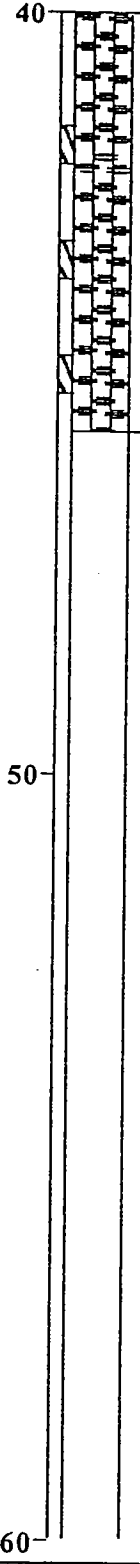
11101/D:

Stickup 2.10 ft



Drill Method Air Rotary
 Boring No. EW-15A EW-15
 TOC Elevation 635.30 ft Date 7/29/92

Depth ft
Sample



Total depth drilled = 45.5 feet



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Log of Boring and Well Completion EW-15A

(sheet 3 of 3)

Cedar Hills Landfill

11101/0:

Stickup

1.40 ft

Gravel Backfill
0 to 5.0 feet

Bentonite Surface Seal
from 5.0 to 8.0 feet

12-inch-diameter
Borehole
0 to 53.0 feet

6-inch-diameter
PVC Blank Casing
0 to 29.50 feet

Drill Method Air Rotary

Boring No. EW- 7A **EW-16**

TOC Elevation 636.88 ft Date 7/2/92

Depth ft
Sample

SILT (ML); reddish brown; non-plastic; little organics - roots and wood; dry (FILL)

SILT (ML); dark reddish brown; non-plastic; little organics - roots and wood; dry (WEATHERED TILL)

SILT (ML); grayish brown; few fine to medium gravel; trace coarse sand; non-plastic; wet (WEATHERED TILL)

SANDY SILT with gravel (ML); olive gray; some fine sand; trace fine gravel; non-plastic; wet (TILL)

SILT with gravel (ML); olive gray; damp; with a mottled dark yellowish brown to light brown SILT and a trace of fine gravel at base (TILL)

CLAYEY SILT with gravel (ML/CL); dark bluish gray; trace to few fine to medium gravel; damp (LACUSTRINE); grading to a SILT with a trace of clay

20



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Log of Boring and Well Completion EW- 7A

(sheet 1 of 3)

Cedar Hills Landfill

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JOB NUMBER
11101-042

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DATE
11/92

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DATE

11/01

pickup

1.40 ft

Sand Pack 10 x 20
Silica Sand
8.0 to 38.65 feet

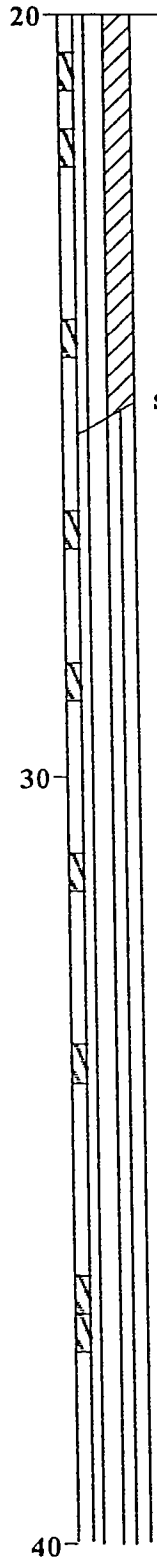
Stainless Steel
Centralizer
28.9 feet

6-inch-diameter
0.020 Slot PVC Screen
29.50 to 38.81 feet

6-inch-diameter
Schedule 40 PVC Blank
Casing
38.81 to 43.09 feet

Depth ft
Sample

Drill Method	Air Rotary	
Boring No.	EW- 7A	EW-16
TOC Elevation	636.88 ft	Date 7/2/92



slight to non-plasticity silt

SILT (ML); medium dark gray; non-plastic; moist
(LACUSTRINE)

wet to moist

little fine to medium gravel



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Log of Boring and Well Completion

EW- 7A

(sheet 2 of 3)

PLATE

Cedar Hills Landfill

11101/01

Stickup

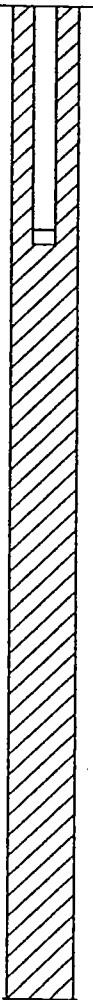
1.40 ft

Stainless Steel
Centralizer
39.5 feet

Bentonite Pellet Seal
38.65 to 53.0 feet

End Cap

Total Depth



Depth ft
Sample

Drill Method

Air Rotary

Boring No.

EW- 7A EW-16

TOC Elevation

636.88 ft

Date

7/2/92

40

SILTY GRAVEL with sand (GM); medium dark gray; some medium to coarse sand; little fines; water added to remove cuttings (STRATIFIED DRIFT)

50

GRAVEL with silt and sand (GW-GM); moderate yellowish brown; some medium to coarse sand; water added to remove cuttings (ADVANCE OUTWASH)

60

Total depth drilled = 53.0 feet



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Log of Boring and Well Completion

EW- 7A

(sheet 3 of 3)

Cedar Hills Landfill

DRAWN
HK

JOB NUMBER
11101-042

APPROVED

DATE
11/92

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DATE

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11101/0:

Stickup

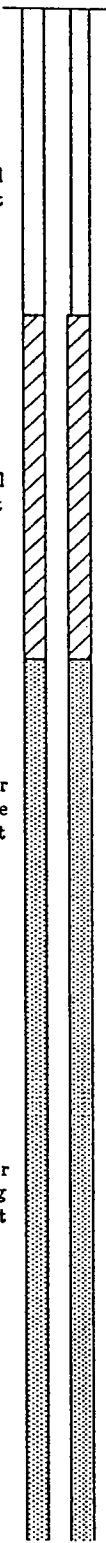
0.90 ft

Gravel Backfill
0 to 4.0 feet

Bentonite Surface Seal
from 4.0 to 8.5 feet

12-inch-diameter
Borehole
0 to 56.5 feet

6-inch-diameter
PVC Blank Casing
+0.9 to 29.5 feet



Depth ft
Sample

Drill Method Air Rotary

Boring No. EW- 5A EW-17

TOC Elevation 637.27 ft Date 6/25/92

0

Drilled with 12-inch button drag bit and downhole percussion hammer

SILT with gravel (ML); moderate reddish brown; few organics (roots and wood); trace fine to medium gravel; dry (ALLUVIUM)

SILT with gravel (ML); moderate brown; little fine to medium gravel; trace fine to medium sand; damp (ALLUVIUM)

SILTY SAND with gravel (SM); pale yellowish brown, fine to coarse-well graded sand; some non-plastic fines; little fine to medium subrounded gravel; damp (ALLUVIUM)

10

SANDY SILT (ML); pale brown; some very fine-grained sand

GRAVELLY SILT with sand (ML); moderate yellowish brown; non-plastic; some fine to coarse gravel; little fine to medium sand; dry (GLACIAL TILL)

20

CLAYEY SILT with gravel (ML/CL); dark gray; slight plasticity; trace fine to medium gravel; damp to moist (LACUSTRINE)



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Log of Boring and Well Completion

EW- 5A

(sheet 1 of 3)

Cedar Hills Landfill

DRAWN
HK

JOB NUMBER
11101-042

APPROVED

DATE
11/92

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DATE

kup

0.90 ft

Depth ft
Sample

Drill Method

Air Rotary

Boring No.

EW- 5A

EW-17

TOC Elevation

637.27 ft

Date

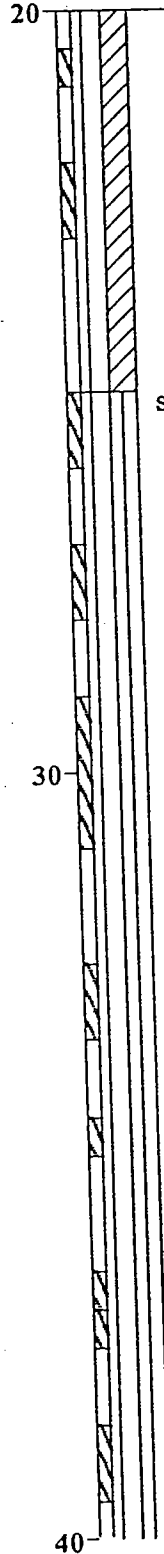
6/25/92

Sand Pack 10 x 20
Silica Sand
8.5 to 39.8 feet

Stainless Steel
Centralizer
28.1 feet

6-inch-diameter
0.020 Slot PVC Screen
29.5 to 38.9 feet

Bentonite Pellet Seal
39.8 to 56.5 feet



SILT (ML); dark gray; non-plastic; moist; becoming wet below 27 feet (LACUSTRINE)

Formation water blew out up outside of casing

SILT (ML); dark gray; non-plastic; wet, damp below 37 feet (LACUSTRINE)

damp

trace fine to medium gravel; no samples available

40

PLATE

Log of Boring and Well Completion

EW- 5A

(sheet 2 of 3)

Cedar Hills Landfill



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JOB NUMBER
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11/92

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DATE

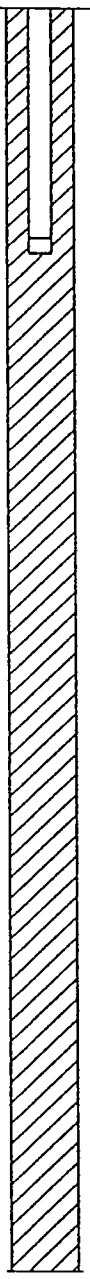
11101/D:

Stickup 0.90 ft

6-inch-diameter
Schedule 40 PVC Blank
Casing
38.9 to 44.1 feet

Stainless Steel
Centralizer
41.2 feet

End Cap



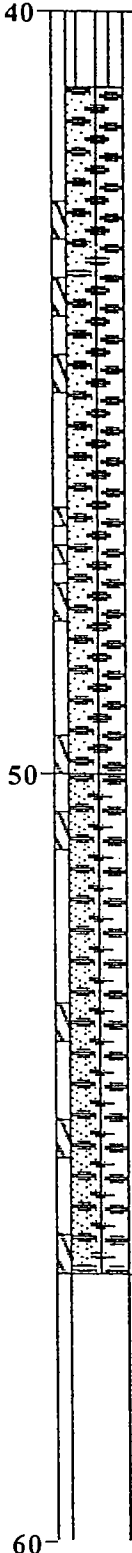
Total Depth

Depth ft
Sample

Drill Method Air Rotary

Boring No. EW- 5A EW-17

TOC Elevation 637.27 ft Date 6/25/92



between 39.5 and 42.5 feet - started adding water

SILTY GRAVEL with sand (GP-GM); olive gray, fine to medium; some medium to coarse sand; non-plastic fines; adding water (STRATIFIED DRIFT)

50

GRAVEL with silt and sand (GW-GM); moderate yellowish brown; some medium to coarse sand; few fines; adding water (ADVANCE OUTWASH)

Total depth drilled = 56.5 feet

60



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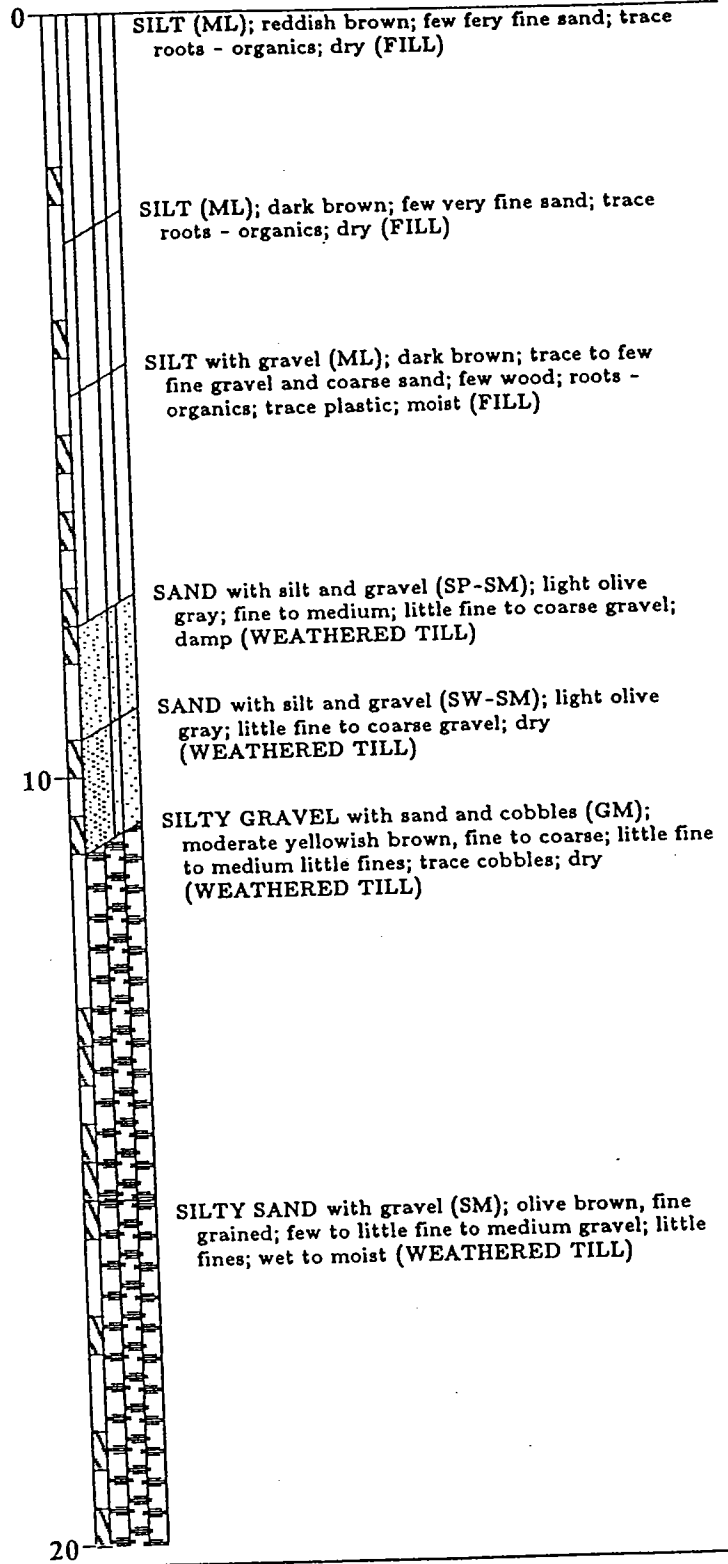
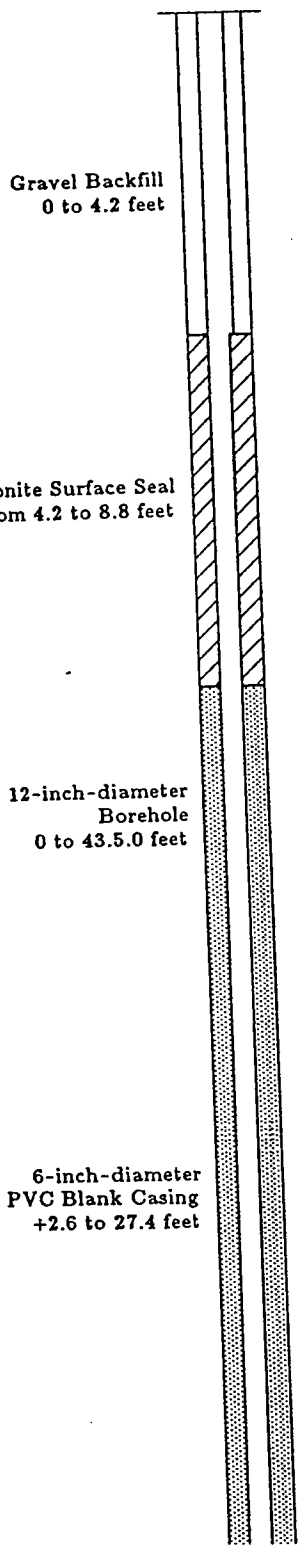
Log of Boring and Well Completion
EW- 5A
(sheet 3 of 3)
Cedar Hills Landfill

1011210

Stickup 2.60 ft

Drill Method	Air Rotary	
Boring No.	EW-23A	EW-18
TOC Elevation	639.88 ft	Date 9/4/92

Depth ft
Sample



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Log of Boring and Well Completion
EW-23A (sheet 1 of 3)
Cedar Hills Landfill

PLATE

Stickup 2.60 ft

Drill Method Air Rotary
Boring No. EW-23A EW-18
TOC Elevation 639.88 ft Date 9/4/92

Sand Pack 10 x 20
Silica Sand
8.8 to 37.5 feet

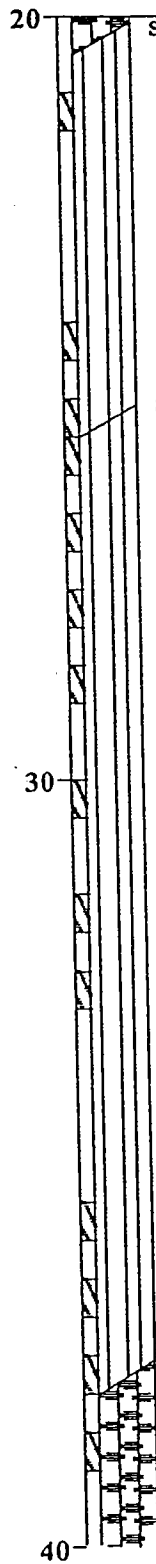
Stainless Steel
Centralizer
26.5 feet

6-inch-diameter
0.020 Slot PVC Screen
27.4 to 36.7 feet

6-inch-diameter
Schedule 40 PVC Blank
Casing
36.7 to 40.8 feet

Stainless Steel
Centralizer
37.5 feet

Bentonite Pellet Seal
37.5 to 43.5 feet



SILT with gravel (ML); olive brown; trace fine gravel and coarse sand; nonplastic; wet (TILL)

SANDY SILT (ML); medium gray; some very fine sand; moist to wet (LACUSTRINE)

moist to wet

SILTY GRAVEL with sand (GM); medium gray, fine to coarse; little medium to coarse sand; some fines; damp (WEATHERED DRIFT)



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Log of Boring and Well Completion

EW-23A

(sheet 2 of 3)

Cedar Hills Landfill

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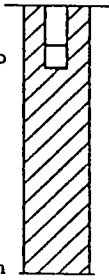
1101/D:

Stickup

2.60 ft

End Cap

Total Depth



Depth ft
Sample

Drill Method Air Rotary

Boring No.

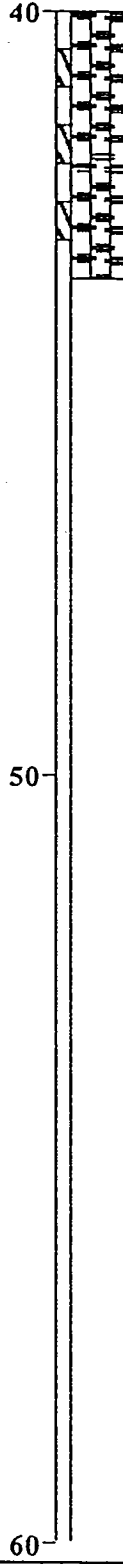
EW-23A EW-18

TOC Elevation

639.88 ft

Date

9/4/92



Total depth drilled = 43.5 feet



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Log of Boring and Well Completion

EW-23A

(sheet 3 of 3)

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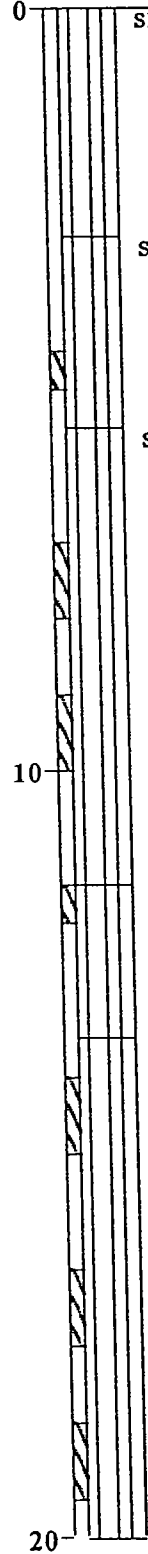
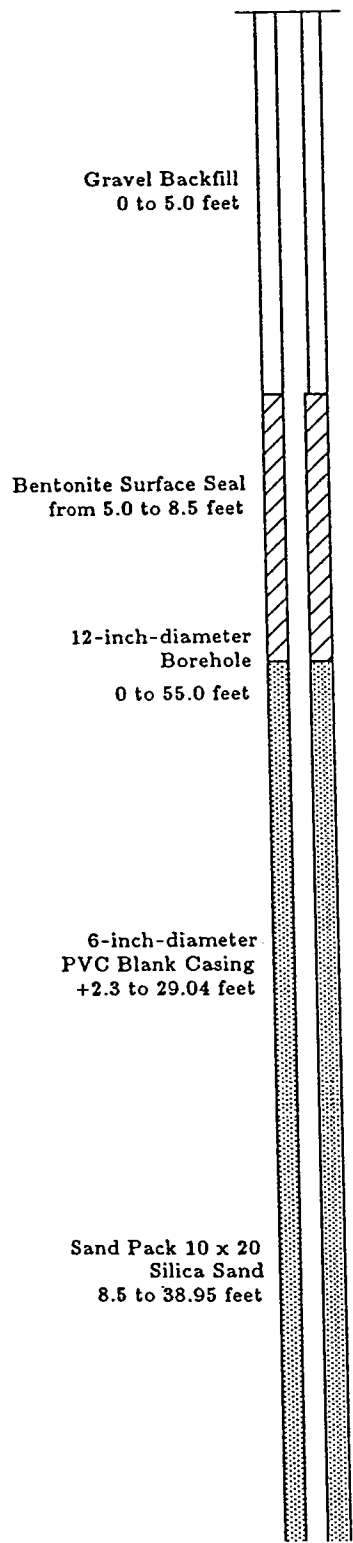
11/92

pickup

2.35 ft

Drill Method Air Rotary
 Boring No. EW- 6A EW-19
 TOC Elevation 640.00 ft Date 7/8/92

Depth ft
Sample



SILT with gravel (ML); reddish brown; non-plastic; few organics - roots; trace fine to medium gravel; dry (WEATHERED TILL)

SILT with gravel (ML); dark brownish black; few fine to medium gravel; trace coarse gravel; trace organics - roots; moist (WEATHERED TILL)

SILT with gravel (ML); medium light gray; little fine to medium gravel; little medium to coarse sand; trace roots; non-plastic; damp (TILL)

SILT with gravel (ML); light brownish gray; slight plasticity; some fine to coarse sand; little fine to medium gravel; damp (TILL)

SILT with gravel (ML); yellowish brown; slight plasticity; trace medium to coarse sand; trace fine to medium gravel; dry (STRATIFIED DRIFT)

medium gray (bluish) SILT lense



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Log of Boring and Well Completion
EW- 6A
 Cedar Hills Landfill

(sheet 1 of 3)

PLATE

11101/01

Stickup

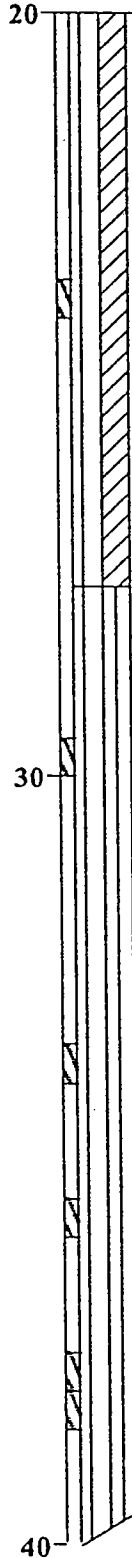
2.35 ft

Depth ft
Sample

Drill Method Air Rotary

Boring No. EW- 6A **EW-19**

TOC Elevation 640.00 ft Date 7/8/92



CLAYEY SILT (ML/CL); dark bluish gray; moderate plasticity; damp (LACUSTRINE)

SILT (ML); medium dark gray; non-plastic; wet (LACUSTRINE)

trace coarse gravel; trace coarse sand

Stainless Steel Centralizer
28.1 feet

6-inch-diameter
0.020 Slot PVC Screen
29.0 to 38.4 feet

6-inch-diameter
Schedule 40 PVC Blank
Casing
38.4 to 42.5 feet



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Log of Boring and Well Completion

EW- 6A

(sheet 2 of 3)

Cedar Hills Landfill

DRAWN
HK

JOB NUMBER
11101-042

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DATE
11/92

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Pickup

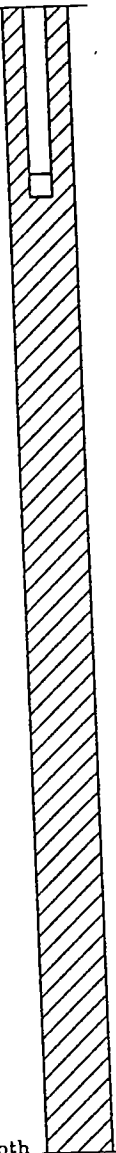
2.35 ft

Stainless Steel
Centralizer
39.5 feet

End Cap

Bentonite Pellet Seal
38.9 to 55.0 feet

Total Depth



Depth ft
Sample

Drill Method	Air Rotary	
Boring No.	EW- 6A	EW-19
TOC Elevation	640.00 ft	Date 7/8/92

40

SILTY GRAVEL with sand (GM); medium gray, medium to coarse; some fine to coarse sand; some medium gray fines; adding water to remove cuttings (STRATIFIED DRIFT)

50

GRAVEL with sand (GW); moderate yellowish brown; little medium to coarse sand; few fines; water added (ADVANCE OUTWASH)

60

Total depth drilled = 55.0 feet



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Log of Boring and Well Completion

EW- 6A

(sheet 3 of 3)

Cedar Hills Landfill

PLATE

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DATE

1110142

pickup

1.50 ft

Drill Method Air Rotary

Boring No. EW-22A **EW-20**

TOC Elevation 639.03 ft Date 9/2/92

Depth ft
Sample

0

SILT with gravel (ML); reddish brown; few fine to medium gravel; dry (FILL)

SILT (ML); dark brown; trace roots and wood organics; moist (FILL)

SANDY SILT with gravel (ML); medium gray; some fine to coarse sand; little fine to medium gravel; with plastic, egg cartons; and wood (roots); moist (FILL)

SANDY SILT with gravel (ML); medium gray; some fine to coarse sand; little fine to medium gravel; moist (FILL)

10

SANDY SILT with gravel (ML); moderate yellowish brown; some very fine sand; little medium to coarse sand; few to little fine to medium gravel; moist to wet (WEATHERED TILL)

SILT with clay (ML/CL); dark gray; moderate plasticity; slightly moist (LACUSTRINE)

SANDY SILT (ML); medium gray; some very fine sand; occasional trace fine gravel; wet (LACUSTRINE)

20

Gravel Backfill
0 to 5.0 feet

Bentonite Surface Seal
from 5.0 to 11.0 feet

12-inch-diameter
Borehole
0 to 44.0 feet

6-inch-diameter
PVC Blank Casing
+1.5 to 28.7 feet

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Engineering and Environmental Services

Log of Boring and Well Completion

PLATE

EW-22A

(sheet 1 of 3)

Cedar Hills Landfill

DRAWN
HK

JOB NUMBER
11101-042

APPROVED

DATE

REVISED

DATE

11/92

11101/0:

Stickup 1.50 ft

Drill Method	Air Rotary	
Boring No.	EW-22A	EW-20
TOC Elevation	639.03 ft	Date 9/2/92

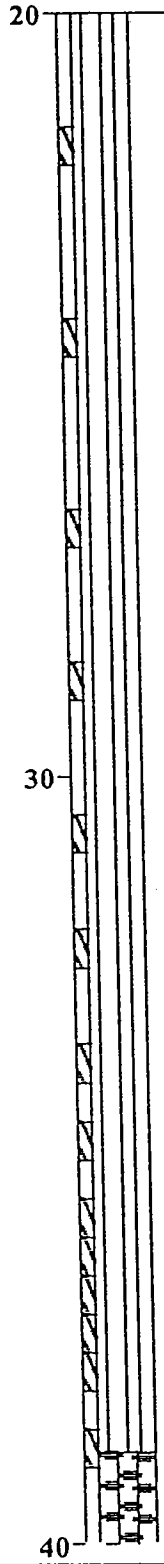
Sand Pack 10 x 20
Silica Sand
11.0 to 38.3 feet

Stainless Steel
Centralizer
27.9 feet

6-inch-diameter
0.020 Slot PVC Screen
28.7 to 38.0 feet

6-inch-diameter
Schedule 40 PVC Blank
Casing
38.0 to 39.2 feet

Depth ft
Sample



SILTY GRAVEL with sand (GM); medium gray, fine to medium; some fine to coarse sand; little fines; water added at 40 feet to remove cuttings

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Log of Boring and Well Completion
EW-22A (sheet 2 of 3)

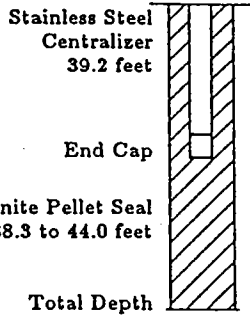
PLATE

Cedar Hills Landfill

DRAWN HK	JOB NUMBER 11101-042	APPROVED	DATE 11/92	REVISED	DATE
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cup

1.50 ft



Depth ft
Sample

Drill Method Air Rotary

Boring No. EW-22A **EW-20**

TOC Elevation 639.03 ft Date 9/2/92

40

(STRATIFIED DRIFT)

50

Total depth drilled = 44.0 feet

60



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Log of Boring and Well Completion

PLATE

EW-22A

(sheet 3 of 3)

Cedar Hills Landfill

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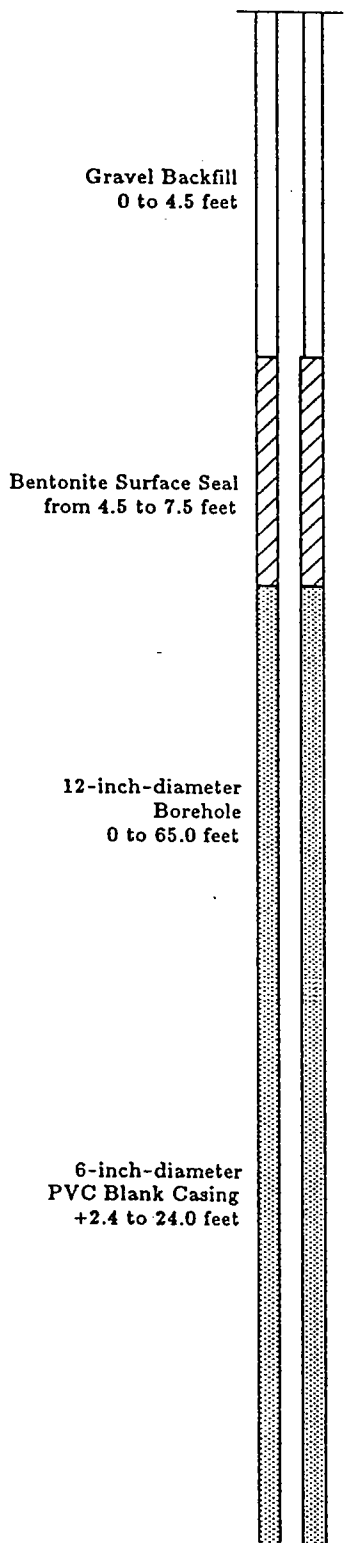
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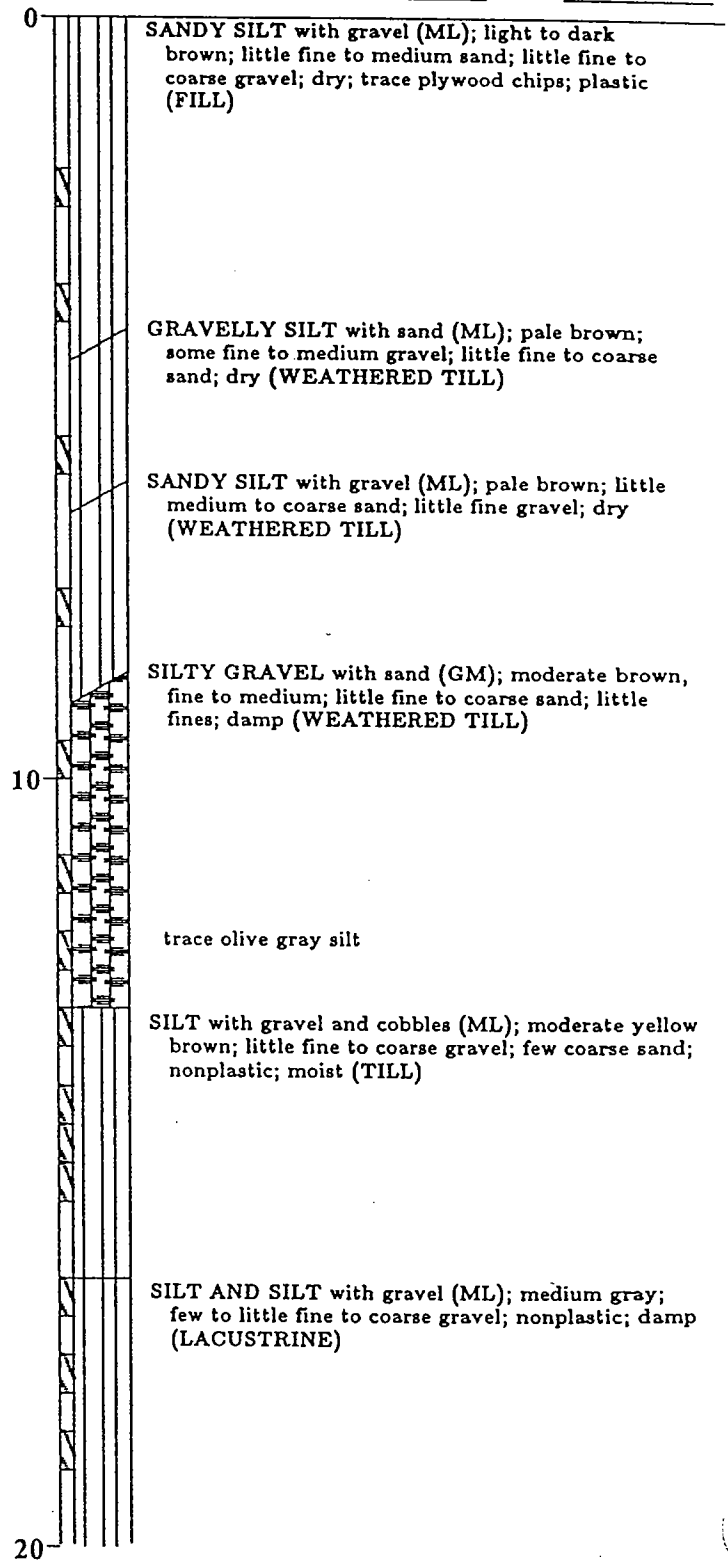
11101/D

Stickup 2.40 ft



Drill Method Air Rotary
 Boring No. EW-14A EW-21
 TOC Elevation 641.04 ft Date 9/15/92

Depth ft
Sample



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Log of Boring and Well Completion

EW-14A

(sheet 1 of 4)

PLATE

Cedar Hills Landfill

jp

2.40 ft

Sand Pack 10 x 20
Silica Sand
7.5 to 35.0 feet

Stainless Steel
Centralizer
23.1 feet

6-inch-diameter
0.020 Slot PVC Screen
24.0 to 33.4 feet

6-inch-diameter
Schedule 40 PVC Blank
Casing
33.4 to 37.5 feet

Stainless Steel
Centralizer
34.2 feet

Bentonite Pellet Seal
35.0 to 65.0 feet

End Cap

Drill Method Air Rotary

Boring No. EW-14A EW-21

TOC Elevation 641.04 ft Date 9/15/92

Depth ft
Sample

20

moist at 24 feet

SILT with gravel and sand (ML); medium gray;
nonplastic; some very fine sand; trace fine gravel;
wet (LACUSTRINE)

30

GRAVELLY SILT to SILTY GRAVEL with sand
(ML/GM); medium dark gray; denser silt; fine to
coarse gravel; little medium to coarse sand; damp
(STRATIFIED DRIFT)

(GM) below 38 feet

40

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Log of Boring and Well Completion

EW-14A

(sheet 2 of 4)

Cedar Hills Landfill

PLATE

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JOB NUMBER

11101-042

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DATE

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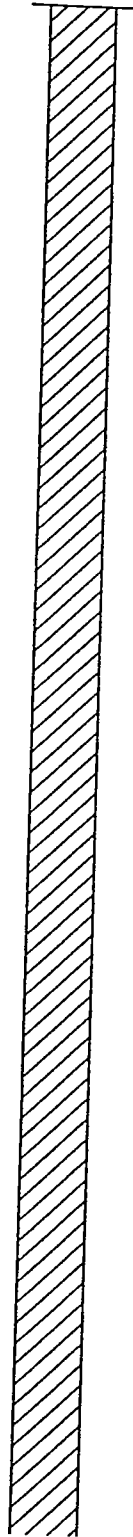
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DATE

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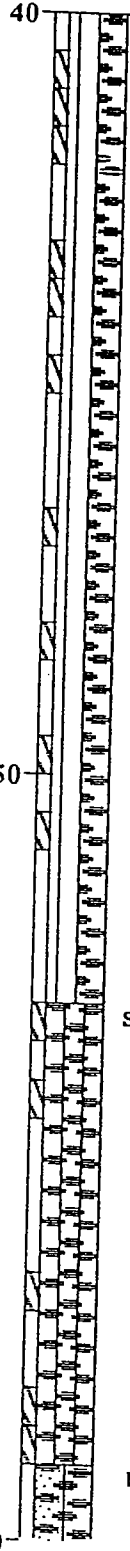
Stickup

2.40 ft



Depth ft
Sample

Drill Method Air Rotary
 Boring No. EW-14A EW-21
 TOC Elevation 641.04 ft Date 9/15/92



Total depth of replacement well = 41 feet

Original well drilled using water below 34 feet

light brown silt marker bed at 53 feet

SILTY GRAVEL with sand and cobbles (GM); olive to light olive gray; mainly fine to medium gravel; some fine to coarse sand; with little fines; water added (ADVANCE OUTWASH)

becoming (GP-GM) below 59 feet



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Log of Boring and Well Completion EW-14A

(sheet 3 of 4)

DRAWN
HK

JOB NUMBER
11101-042

APPROVED

DATE
11/92

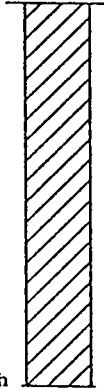
REVISED

DATE

ckup

2.40 ft

Total Depth



Depth ft
Sample

Drill Method Air Rotary

Boring No. EW-14A EW-21

TOC Elevation 641.04 ft Date 9/15/92

60



Total depth drilled = 65 feet

70

80

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Log of Boring and Well Completion

PLATE

EW-14A

(sheet 4 of 4)

Cedar Hills Landfill

DRAWN

JOB NUMBER

APPROVED

DATE

REVISED

DATE

HK

11101-042

11/92

Stickup

0.60 ft

Gravel Backfill
0 to 4.2 feet

Bentonite Surface Seal
from 4.2 to 8.5 feet

12-inch-diameter
Borehole
0 to 45.0 feet

6-inch-diameter
PVC Blank Casing
+0.60 to 30.5 feet

Depth ft
Sample

Drill Method Air Rotary

Boring No. EW-19A EW-22

TOC Elevation 639.71 ft Date 9/15/92

Drilled with 12-inch (under gauge) button drag bit and downhole percussion hammer

SILT with sand (ML); brown to light olive gray; little fine to medium sand, nonplastic, dry (FILL)

SILTY GRAVEL with sand and cobbles (GM); light to gray brown, fine to medium; little medium to coarse sand; little to some fines; dry (WEATHERED TILL)

10
SILT (ML); medium gray to light brown; few fine to medium gravel; damp (TILL)

GRAVELLY SILT (ML); brownish gray; some fine to coarse gravel; few fine to coarse sand; dry (TILL)

SILT with gravel (ML); medium gray; little fine to medium gravel; few fine to medium sand; damp (TILL)

20



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Log of Boring and Well Completion EW-19A

PLATE

(sheet 1 of 4)

DRAWN
HK

JOB NUMBER
11101-042

APPROVED

DATE
11/92

REVISED

DATE

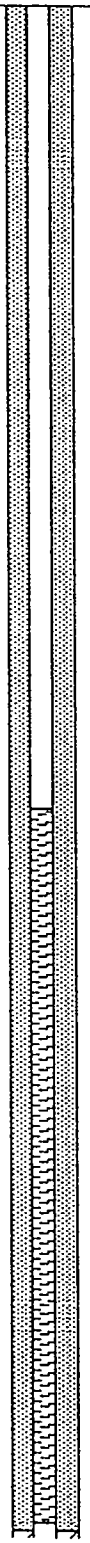
11101/D:

Stickup 0.60 ft

Sand Pack 10 x 20
Silica Sand
8.5 to 39.9 feet

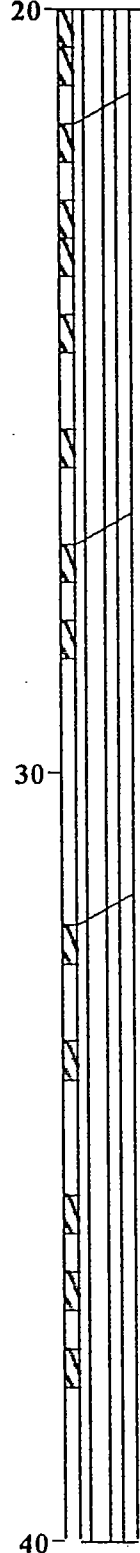
Stainless Steel
Centralizer
28.9 feet

6-inch-diameter
0.020 Slot PVC Screen
30.5 to 39.8 feet



Depth ft
Sample

Drill Method Air Rotary
Boring No. EW-19A EW-22
TOC Elevation 639.71 ft Date 9/15/92



SILT with gravel (ML); moderate to gray brown; little fine to coarse coated gravel; damp (TILL)
SILT (ML); medium dark gray; trace to few fine to medium gravel; nonplastic (LACUSTRINE)
SILT (ML); brownish gray; denser; nonplastic; damp (LACUSTRINE)
SANDY SILT (ML); medium dark gray; some very fine sand; nonplastic; moist to wet (LACUSTRINE)



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Log of Boring and Well Completion

EW-19A

(sheet 2 of 4)

Cedar Hills Landfill

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
HK	11101-042		11/92		

PLAT

Stickup 0.60 ft

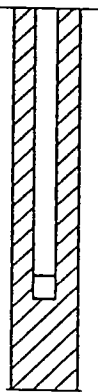
6-inch-diameter
Schedule 40 PVC Blank
Casing
39.8 to 43.8 feet

Stainless Steel
Centralizer
40.7 feet

Bentonite Pellet Seal
39.9 to 45.0 feet

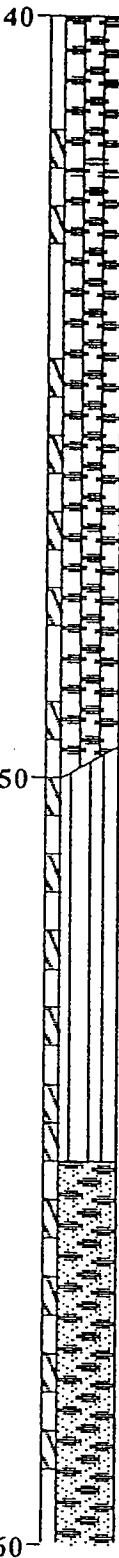
End Cap

Total Depth
= 45 feet



Depth ft
Sample

Drill Method Air Rotary
Boring No. EW-19A EW-22
TOC Elevation 639.71 ft Date 9/15/92



SILTY GRAVEL (GM); medium gray; fine to coarse multicolored gravel; trace to few medium to coarse sand; water added below 41 feet (STRATIFIED DRIFT)

Total depth of replacement well = 45 feet; original well log below 45 feet

GRAVELLY SILT (ML); medium gray; little fine to medium gravel; few fine to coarse sand; water added (STRATIFIED DRIFT)

trace light brown silt lense at 55 feet

GRAVEL with sand, cobble, and boulder (GW); pale yellowish brown, fine to coarse; little to some fine to coarse sand; trace fines; water added (ADVANCE OUTWASH)

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Log of Boring and Well Completion EW-19A

(sheet 3 of 4)

PLATE

Cedar Hills Landfill

DRAWN
HK

JOB NUMBER
11101-042

APPROVED

DATE
11/92

REVISED

DATE

Stickup

0.60 ft

Depth ft
Sample

Drill Method

Air Rotary

Boring No.

EW-19A

EW-22

TOC Elevation

639.71 ft

Date

9/15/92

60



sandier

with cobbles

increase in fines (10%)

70

Total depth drilled = 70 feet

80



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Log of Boring and Well Completion

PLATE

EW-19A

(sheet 4 of 4)

Cedar Hills Landfill

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JOB NUMBER
11101-042

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DATE
11/92

REVISED

DATE

11101020

Pickup

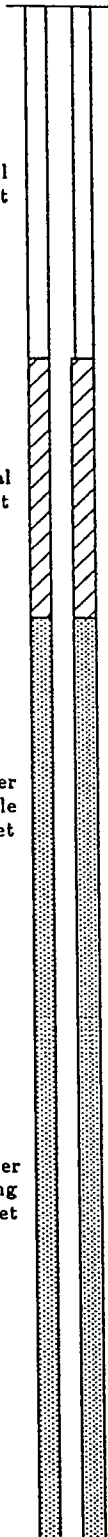
0.70 ft

Gravel Backfill
0 to 4.6 feet

Bentonite Surface Seal
from 4.6 to 8.0 feet

12-inch-diameter
Borehole
0 to 48.0 feet

6-inch-diameter
PVC Blank Casing
+0.7 to 30.7 feet



Depth ft
Sample

Drill Method

Air Rotary

Boring No.

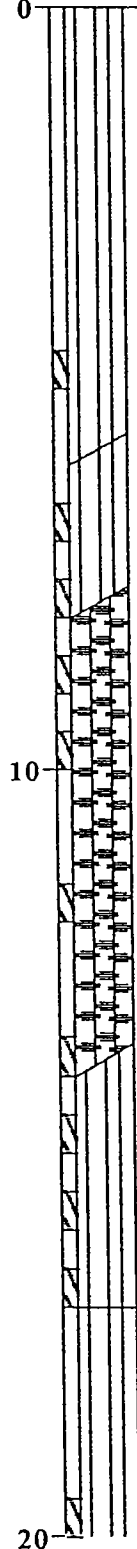
EW-20A EW-23

TOC Elevation

640.65 ft

Date

8/28/92



SILT with gravel (ML); moderate brown; few to little fine to coarse gravel; trace organics; dry (FILL)

GRAVELLY SILT with sand (ML); moderate brown; some fine to coarse gravel; little fine to medium sand; dry (WEATHERED TILL)

SILTY GRAVEL with sand (GM); moderate to pale yellowish brown, fine to coarse; some fines; little fine to coarse sand; dry (WEATHERED TILL)

SILT with gravel (ML); pale yellowish brown; little fine to medium gravel; few coarse sand; damp to moist (WEATHERED TILL)

SANDY SILT (ML); medium dark gray; some very fine sand; moist to wet (LACUSTRINE)



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Log of Boring and Well Completion

EW-20A

(sheet 1 of 3)

Cedar Hills Landfill

PLATE

stickup

0.70 ft

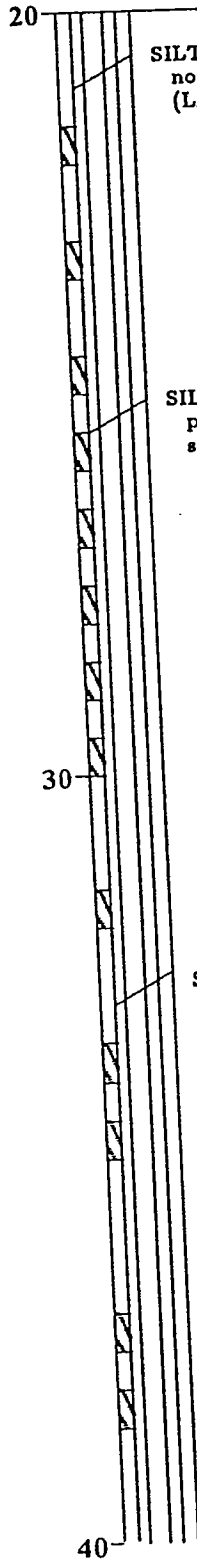
Sand Pack 10 x 20
Silica Sand
8.0 to 40.7 feet

Stainless Steel
Centralizer
29.8 feet

6-inch-diameter
0.020 Slot PVC Screen
30.7 to 40.1 feet

Depth ft
Sample

Drill Method	Air Rotary	
Boring No.	EW-20A	EW-23
TOC Elevation	640.65 ft	Date 8/28/92



SILT with gravel (ML); medium brownish gray; nonplastic; trace fine gravel and coarse sand; moist (LACUSTRINE)

SILT with gravel (ML); medium gray; dense; slight plasticity; few clay; trace fine gravel and coarse sand; damp (LACUSTRINE)

increase in percent clay content; moderate plasticity
SANDY SILT (ML); medium gray; some very fine sand; wet (LACUSTRINE)

accumulated formation water in borehole overnight
- samples below 38.5 feet wet



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Log of Boring and Well Completion

EW-20A

(sheet 2 of 3)

Cedar Hills Landfill

PLATE

DRAWN
HK

JOB NUMBER
11101-042

APPROVED

DATE
11/92

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DATE

101/D:

Stickup

0.70 ft

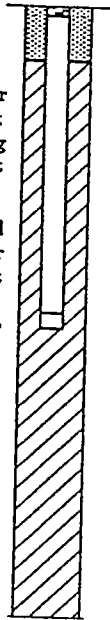
6-inch-diameter
Schedule 40 PVC Blank
Casing
40.1 to 44.2 feet

Stainless Steel
Centralizer
40.9 feet

End Cap

Bentonite Pellet Seal
40.7 to 48.0 feet

Total Depth



Depth ft
Sample

Drill Method Air Rotary

Boring No. EW-20A **EW-23**

TOC Elevation 640.65 ft Date 8/28/92

40

SILTY GRAVEL (GM); medium gray, fine to coarse;
some fines; few medium to coarse sand; water
added below 44 feet

siltier

Total depth drilled = 48 feet

50

60



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Log of Boring and Well Completion EW-20A

PLATE

(sheet 3 of 3)

Cedar Hills Landfill

DRAWN
HK

JOB NUMBER
11101-042

APPROVED

DATE
11/92

REVISED

DATE

Stickup

2.40 ft

Gravel Backfill
0 to 5.0 feet

Bentonite Surface Seal
from 5.0 to 8.0 feet

12-inch-diameter
Borehole
+2.4 to 41.0 feet

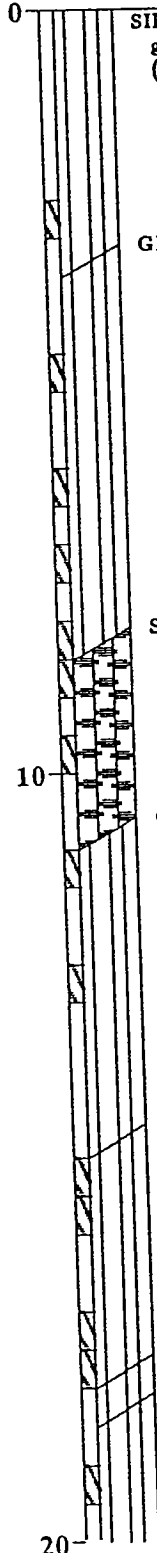
6-inch-diameter
PVC Blank Casing
0 to 24.1 feet

Depth ft
Sample

Drill Method Air Rotary

Boring No. EW-27A EW-24

TOC Elevation 643.11 ft Date 9/16/92



SILT with gravel (ML); brown; few fine to coarse gravel; few fine to medium sand; dry to damp (FILL)


GRAVELLY SILT with sand (ML); brown; little fine to coarse gravel; little fine to coarse sand; dry (WEATHERED TILL)

SILTY GRAVEL with sand and cobbles (GM); medium to light brown; fine to coarse with little fine to coarse sand; some fines; dry (WEATHERED TILL)

GRAVELLY SILT with sand (ML); brown; little fine to coarse gravel and sand; moist (TILL)

SANDY SILT (ML); medium gray to mottled orange; some very fine sand; soft; moist (LACUSTRINE)

SILT with gravel (ML); little fine to medium gravel; denser
SILT (ML); medium gray; nonplastic; dense; damp (LACUSTRINE)

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Log of Boring and Well Completion

EW-27A

(sheet 1 of 3)

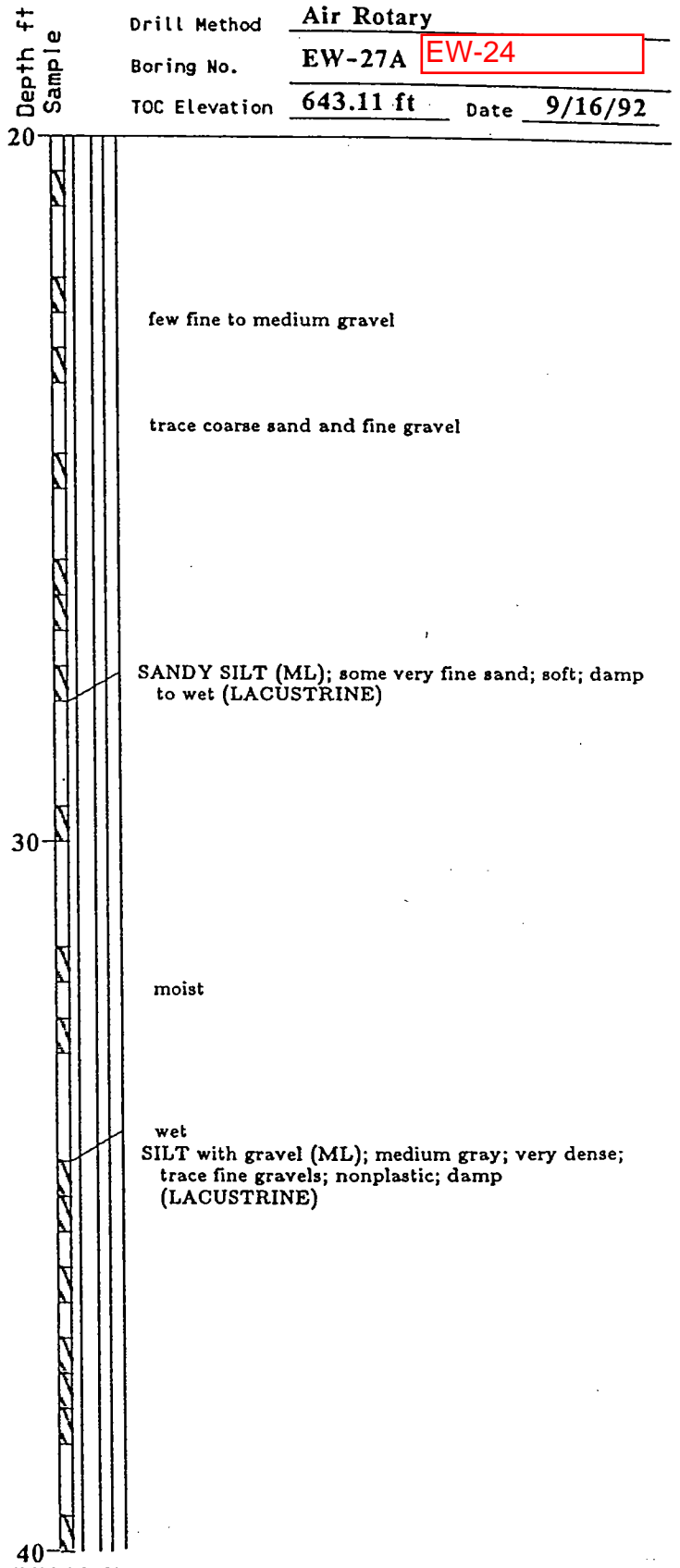
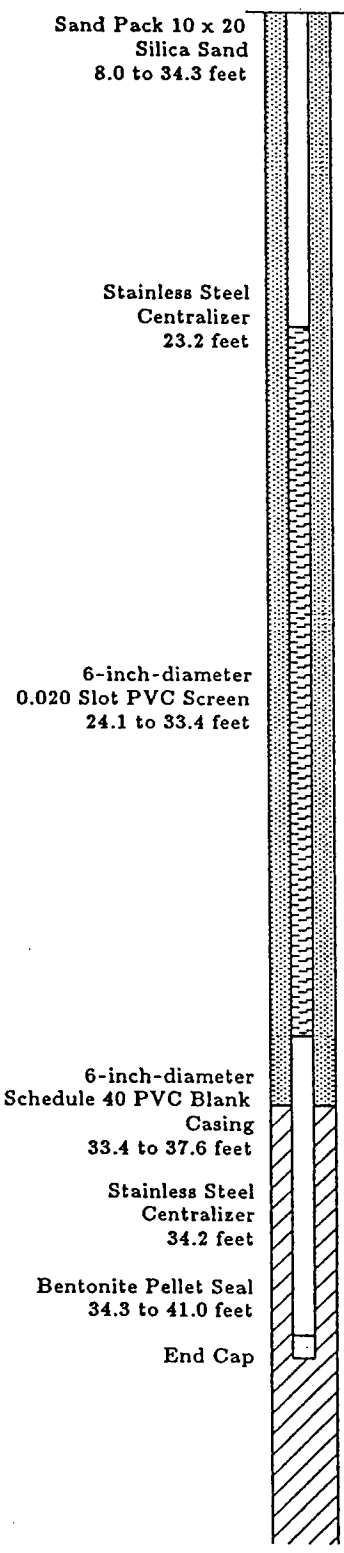
Cedar Hills Landfill

PLAT

11/16/92

Stickup 2.40 ft

Drill Method Air Rotary
 Boring No. EW-27A EW-24
 TOC Elevation 643.11 ft Date 9/16/92



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Log of Boring and Well Completion

EW-27A

(sheet 2 of 3)

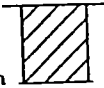
Cedar Hills Landfill

PLATE

Stickup

2.40 ft

Total Depth



Depth ft
Sample

Drill Method	Air Rotary	
Boring No.	EW-27A	EW-24
TOC Elevation	643.11 ft	Date 9/16/92



Total depth drilled = 41.0 feet

50

60



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EW-27A

(sheet 3 of 3)

Cedar Hills Landfill

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JOB NUMBER
11101-042

APPROVED

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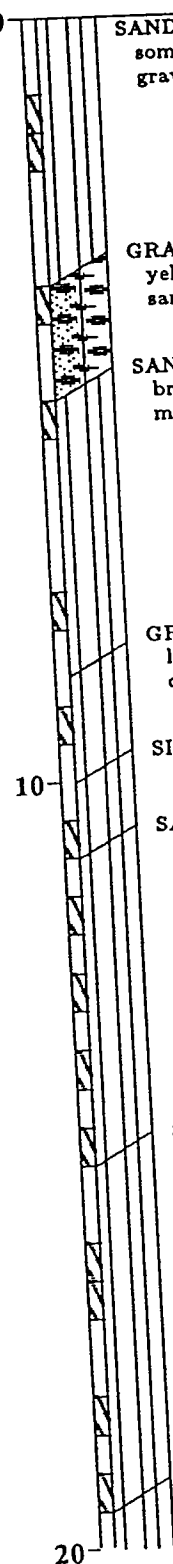
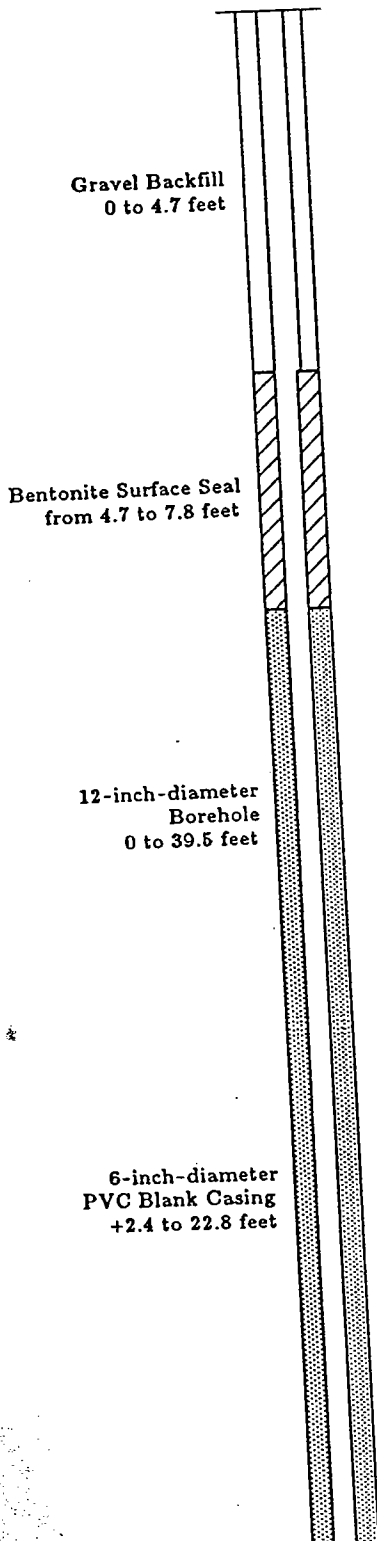
PLATE

Stickup

2.40 ft

Depth ft
Sample

Drill Method Air Rotary
 Boring No. EW-29A EW-25
 TOC Elevation 643.61 ft Date 10/6/92



SANDY SILT with gravel (ML); medium brown;
some fine to coarse sand; little fine to coarse
gravel; trace plastic; dry to damp (FILL)

GRAVEL with silt and sand (GW-GM); moderate
yellowish brown, fine to coarse; little fine to coarse
sand; damp (WEATHERED TILL)

SANDY SILT with gravel (ML); moderate yellowish
brown; some fine to coarse sand; little fine to
medium gravel; damp (WEATHERED TILL)

GRAVELLY SILT (ML); moderate yellowish brown;
little fine to coarse gravel; few to little fine to
coarse sand; damp (WEATHERED TILL)

SILT (ML); moderate yellowish brown; nonplastic;
moist (WEATHERED TILL)

SANDY SILT (ML); olive brown; some very fine
sand; moist to wet (WEATHERED TILL)

SILT with gravel (ML); olive brown; few fine gravel;
nonplastic; trace coarse sand and laminated gray
silt; moist to damp (WEATHERED TILL)

SILT (ML); medium dark gray; slight to nonplastic;
damp (LACUSTRINE)

Log of Boring and Well Completion
EW-29A
Cedar Hills Landfill

(sheet 1 of 2)

PLATE



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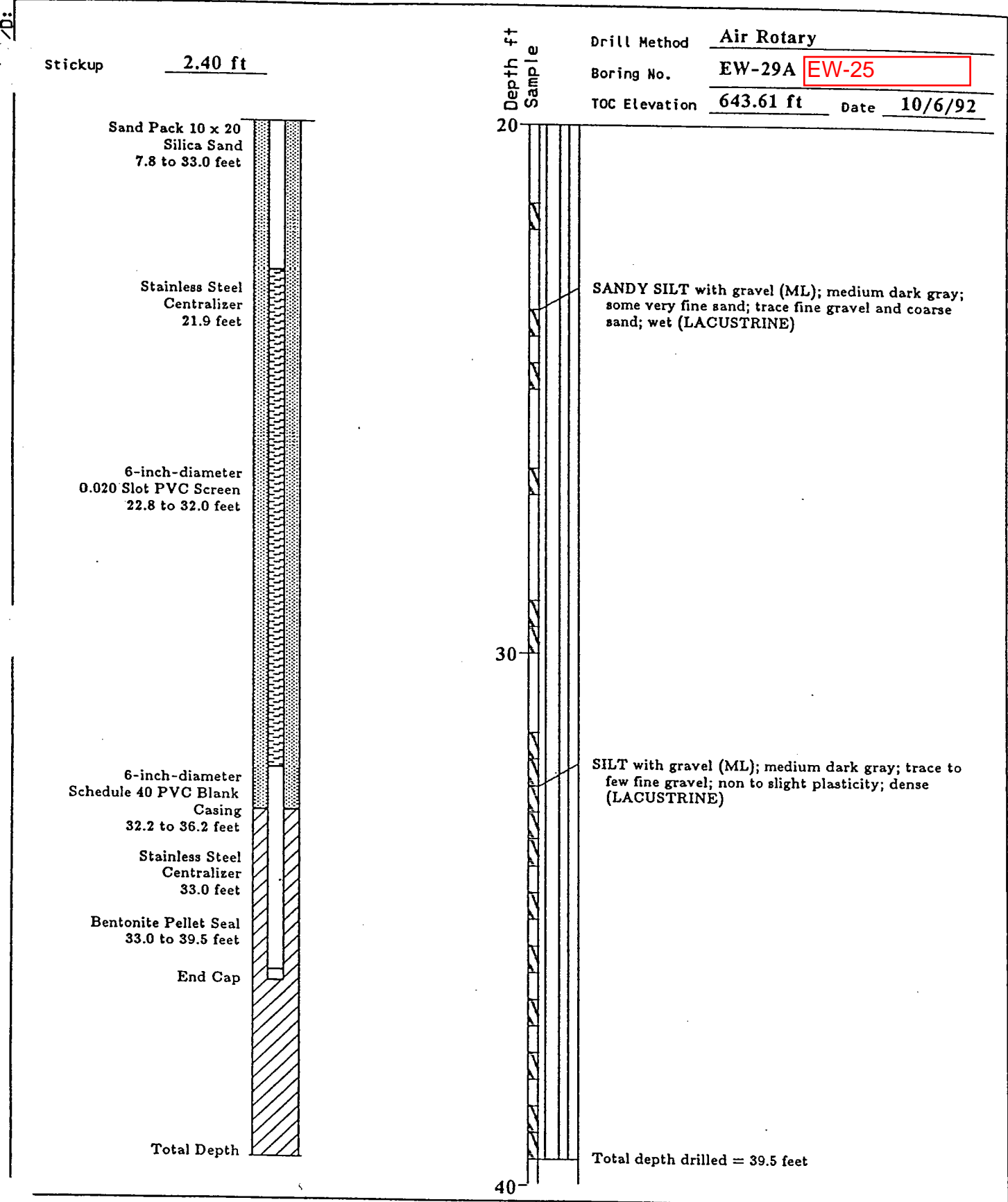
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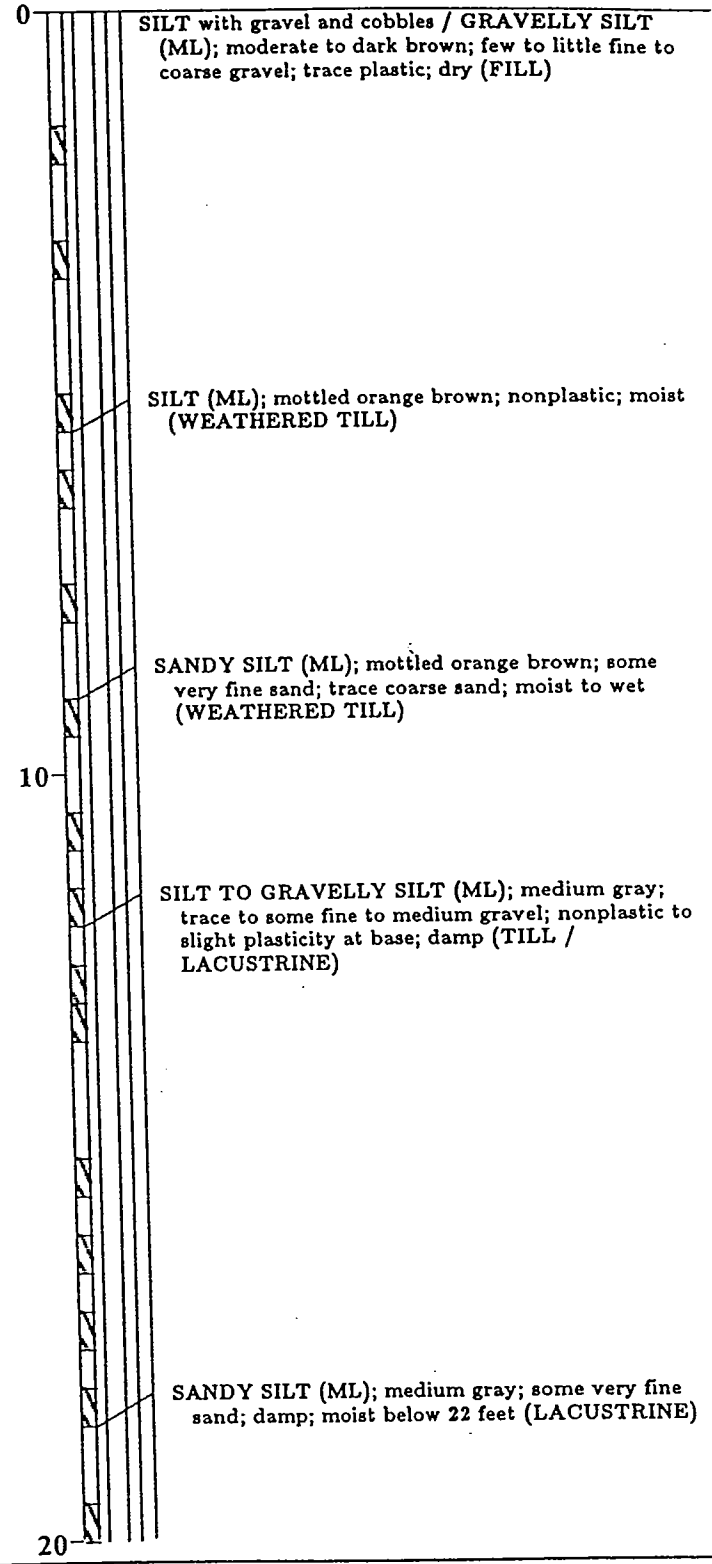
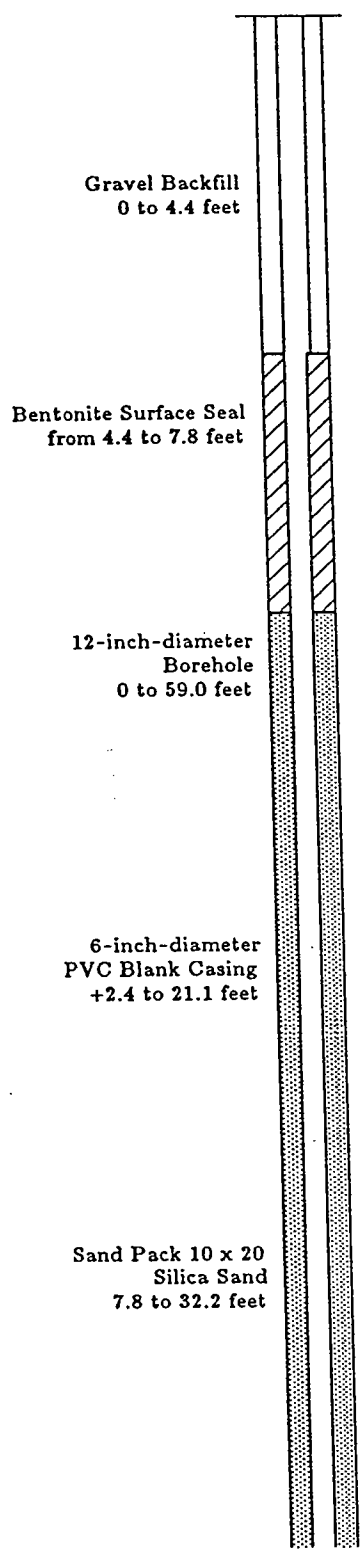
Log of Boring and Well Completion
EW-29A (sheet 2 of 2)
Cedar Hills Landfill

PLATE

Pickup 2.40 ft

Drill Method Air Rotary
Boring No. EW-24A **EW-26**
TOC Elevation 642.16 ft Date 9/9/92

Depth ft
Sample



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EW-24A (sheet 1 of 3)

Cedar Hills Landfill

PLATE

Stickup

2.40 ft

Stainless Steel
Centralizer
20.1 feet

6-inch-diameter
0.020 Slot PVC Screen
21.1 to 30.5 feet

6-inch-diameter
Schedule 40 PVC Blank
Casing
30.5 to 34.6 feet

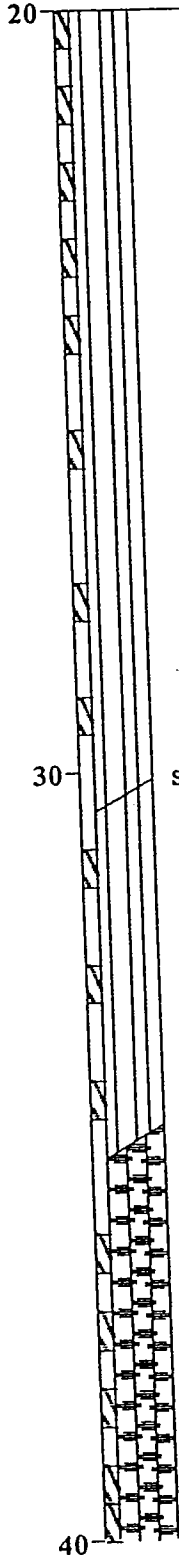
Stainless Steel
Centralizer
30.5 feet

Bentonite Pellet Seal
32.2 to 59.0 feet

End Cap

Depth ft
Sample

Drill Method	Air Rotary	
Boring No.	EW-24A	EW-26
TOC Elevation	642.16 ft	Date 9/9/92



SILT with gravel (ML); medium gray, denser; moist to damp; slight plasticity; trace fines gravel and coarse sand at base (LACUSTRINE)

SILTY GRAVEL with sand (GM); medium gray, fine to coarse; little fine to coarse sand; some fines; water added below 35 feet (STRATIFIED DRIFT)



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Log of Boring and Well Completion

EW-24A

(sheet 2 of 3)

Cedar Hills Landfill

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11101-042

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cleanup

2.40 ft

Depth ft
Sample

Drill Method Air Rotary

Boring No. EW-24A **EW-26**

TOC Elevation 642.16 ft Date 9/9/92

40

GRAVELLY SILT with sand (ML); medium gray;
some fine to coarse gravel; little fine to coarse
sand; water added (STRATIFIED DRIFT)

50

GRAVEL with silt, sand, and cobbles (GW-GM);
olive to brownish gray; little fine to coarse sand;
few cobbles; water added (ADVANCE
OUTWASH)

Total Depth

Total depth drilled = 59.0 feet

60



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Log of Boring and Well Completion

EW-24A

(sheet 3 of 3)

Cedar Hills Landfill

PLATE

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DATE
11/92

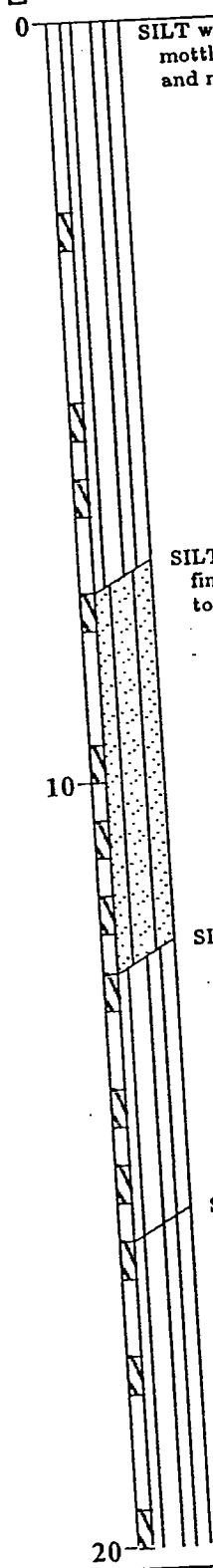
REVISED

DATE

pick up 2.20 ft

Drill Method Air Rotary
Boring No. EW-30A EW-27
TOC Elevation 640.63 ft Date 10/6/92

Depth ft
Sample



SILT with gravel (ML); moderate brown with mottled orange; slight plasticity; trace fine gravel and medium to coarse sand; moist (FILL)

SILTY SAND with gravel (SM); moderate brown, fine to medium; some fines; trace fine gravel; wet to moist

SILT with gravel (ML); mottled moderate brown to gray; little fine to medium gravel; trace fine to medium sand; damp (TILL)

SILT (ML); medium dark gray; dense; nonplastic; trace fine to medium gravel; damp (LACUSTRINE)

Gravel Backfill
0 to 4.5 feet

Bentonite Surface Seal
from 4.5 to 8.1 feet

12-inch-diameter
Borehole
0 to 37.5 feet

6-inch-diameter
PVC Blank Casing
+2.2 to 21.7 feet

Log of Boring and Well Completion
EW-30A
Cedar Hills Landfill

(sheet 1 of 2)

PLATE



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VD:

Stickup

2.20 ft

Sand Pack 10 x 20
 Silica Sand
 8.1 to 31.6 feet
 Stainless Steel
 Centralizer
 20.9 feet

6-inch-diameter
 0.020 Slot PVC Screen
 21.7 to 31.0 feet

6-inch-diameter
 Schedule 40 PVC Blank
 Casing
 31.0 to 35.1 feet
 Stainless Steel
 Centralizer
 31.8 feet

Bentonite Pellet Seal
 31.6 to 37.5 feet

End Cap

Total Depth

Depth ft
Sample

Drill Method Air Rotary

Boring No. EW-30A **EW-27**

TOC Elevation 640.63 ft Date 10/6/92

20

SANDY SILT (ML); medium dark gray; some very
 fine sand; wet to moist (LACUSTRINE)

30

SILT with gravel (ML); medium dark gray; few to
 little fine to coarse gravel; dense; damp
 (LACUSTRINE/STRATIFIED DRIFT)

Total depth drilled = 37.5 feet

40



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Log of Boring and Well Completion

PLATE

EW-30A

(sheet 2 of 2)

Cedar Hills Landfill

DRAWN HK	JOB NUMBER 11101-042	APPROVED	DATE 11/92	REVISED	DATE
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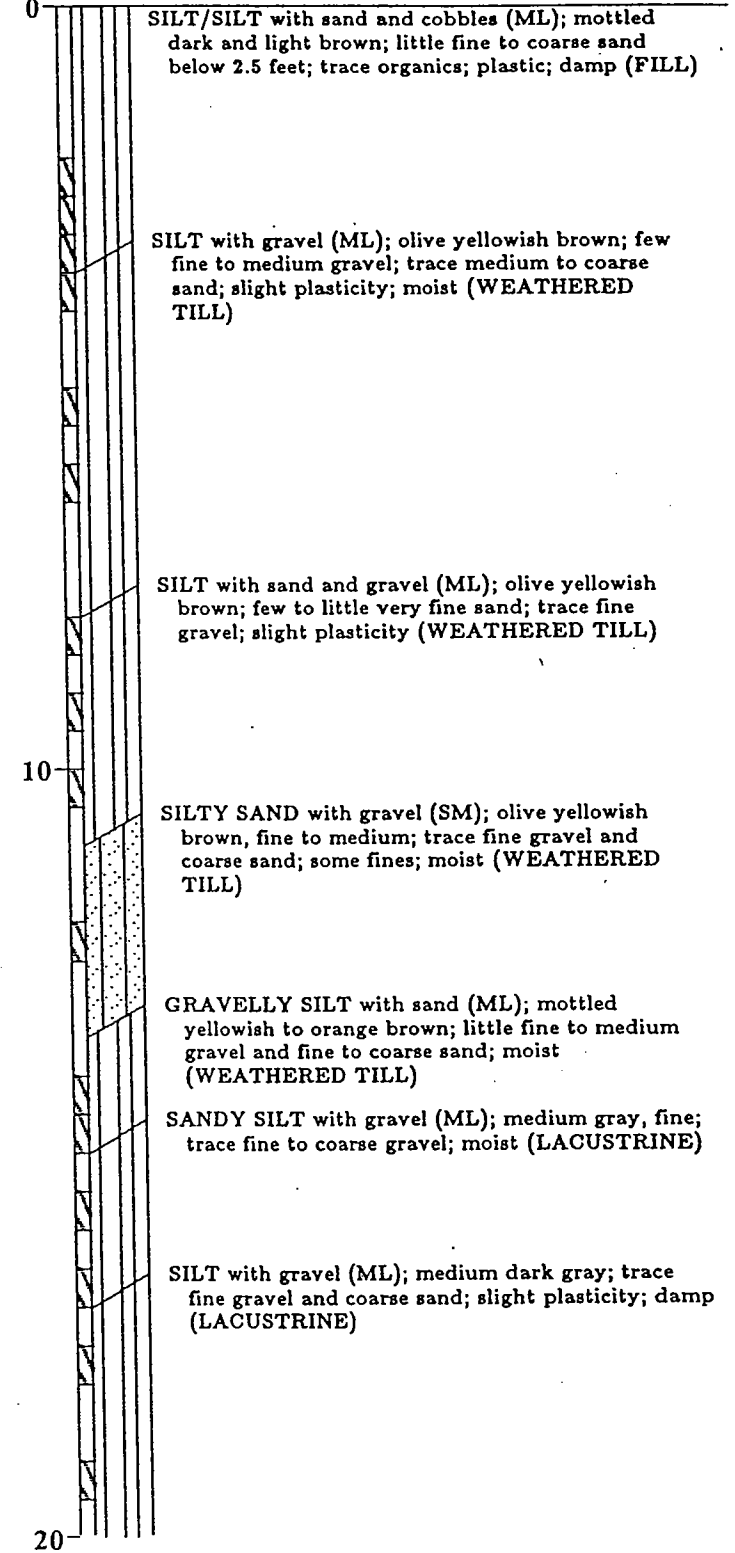
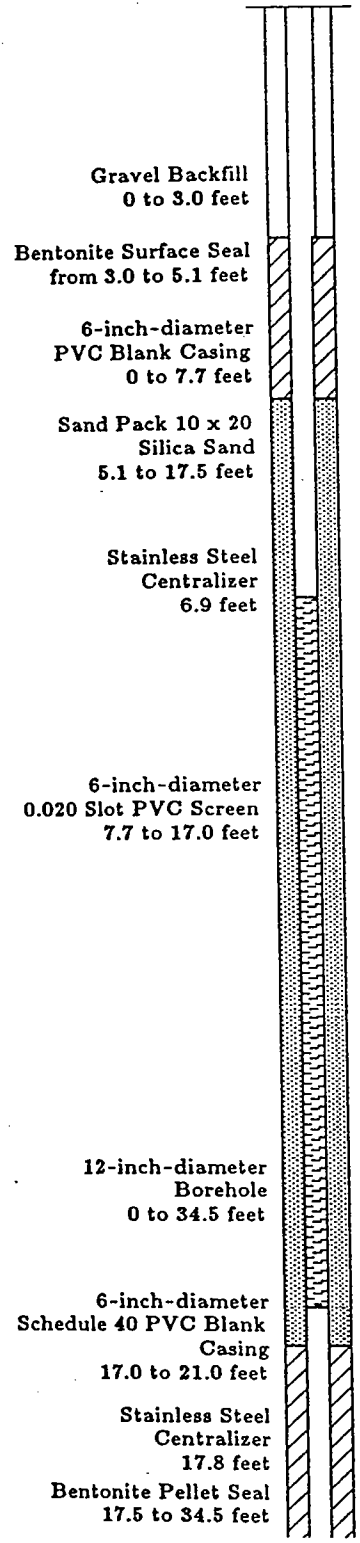
101/D:

stickup

2.10 ft

Drill Method Air Rotary
 Boring No. EW-31A EW-28
 TOC Elevation 640.86 ft Date 10/7/92

Depth ft
Sample



Harding Lawson Associates
 Engineering and Environmental Services

Log of Boring and Well Completion
EW-31A (sheet 1 of 2)

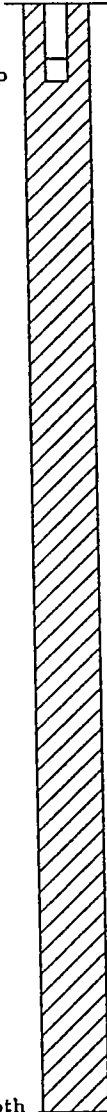
Cedar Hills Landfill

stickup

2.10 ft

End Cap

Total Depth



Depth ft
Sample

Drill Method Air Rotary

Boring No. EW-31A EW-28

TOC Elevation 640.86 ft Date 10/7/92

20

30

40

SILT (ML); medium dark gray; moderate plasticity; denser; damp (LACUSTRINE)

Total depth drilled = 34.5 feet



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Engineering and Environmental Services

Log of Boring and Well Completion

EW-31A

(sheet 2 of 2)

Cedar Hills Landfill

PLATE

DRAWN
HK

JOB NUMBER
11101-042

APPROVED

DATE
11/92

REVISED

DATE

91/D:

Stickup

2.30 ft

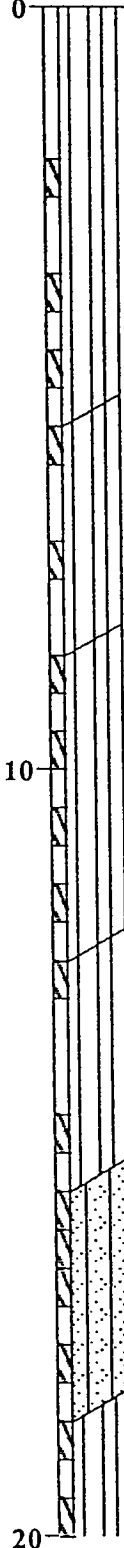
Drill Method Air Rotary

Boring No. EW-28A EW-29

TOC Elevation 638.93 ft

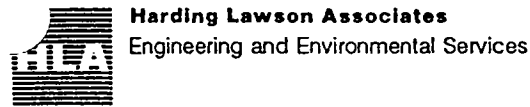
Date 9/21/92

Depth ft
Sample



- Gravel Backfill
0 to 3.2 feet
- Bentonite Surface Seal
from 3.2 to 6.2 feet
- 12-inch-diameter
Borehole
0 to 53.5 feet
- 6-inch-diameter
PVC Blank Casing
+2.3 to 8.2 feet
- Sand Pack 10 x 20
Silica Sand
6.2 to 19.0 feet
- Stainless Steel
Centralizer
7.3 feet
- 6-inch-diameter
0.020 Slot PVC Screen
8.2 to 17.5 feet
- 6-inch-diameter
Schedule 40 PVC Blank
Casing
17.5 to 21.6 feet
- Stainless Steel
Centralizer
18.3 feet

- SILT with gravel (ML); brown; trace fine gravel; dry (FILL)
- SILT with gravel (ML); brown; few fine to medium gravel; damp (WEATHERED TILL)
- SILT (ML); medium gray and mottled orange; trace fine gravel; nonplastic; damp; moderately dense (WEATHERED TILL)
- SILT (ML); mottled orangish gray; few fine to medium gravels; soft; damp (WEATHERED TILL)
- SILTY SAND (SM); medium gray, fine to medium with few coarse sand; few fine gravel; some fines; wet (WEATHERED TILL)
- SILT (ML); medium gray; few fine to medium gravel; denser; damp (TILL)



Log of Boring and Well Completion
EW-28A (sheet 1 of 3)
Cedar Hills Landfill

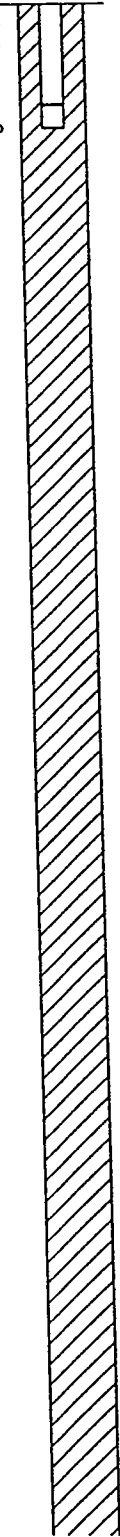
PLATE

Stickup

2.30 ft

Bentonite Pellet Seal
19.0 to 53.5 feet

End Cap



Depth ft
Sample

Drill Method	Air Rotary	
Boring No.	EW-28A	EW-29
TOC Elevation	638.93 ft	Date 9/21/92

20

SILT (ML); medium gray; slight plasticity; trace clay; damp (LACUSTRINE)

few fine gravel

30

few fine gravel; trace coarse sand; damp

40

SILT (ML); medium gray; moderate plasticity; few clay; damp to moist (LACUSTRINE)

PLATE



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Log of Boring and Well Completion EW-28A

(sheet 2 of 3)

Cedar Hills Landfill

DRAWN
HK

JOB NUMBER
11101-042

APPROVED

DATE
11/92

REVISED

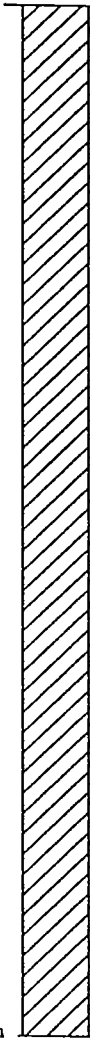
DATE

20:

Stickup

2.30 ft

Total Depth



Depth ft
Sample

Drill Method Air Rotary
 Boring No. EW-28A EW-29
 TOC Elevation 638.93 ft Date 9/21/92

40

light brown silt

SILTY GRAVEL with sand / GRAVEL with silt, sand, and cobbles (GM/GW-GM); olive to light olive gray, fine to coarse; some fine to coarse sand; little to few fines; water added to clean hole (STRATIFIED DRIFT)

50

GRAVEL with sand (GW); grayish brown, fine to coarse sand; trace fines; water added (ADVANCE OUTWASH)

Total depth drilled = 53.5 feet

60



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Log of Boring and Well Completion

PLATE

EW-28A

(sheet 3 of 3)

Cedar Hills Landfill

DRAWN
HK

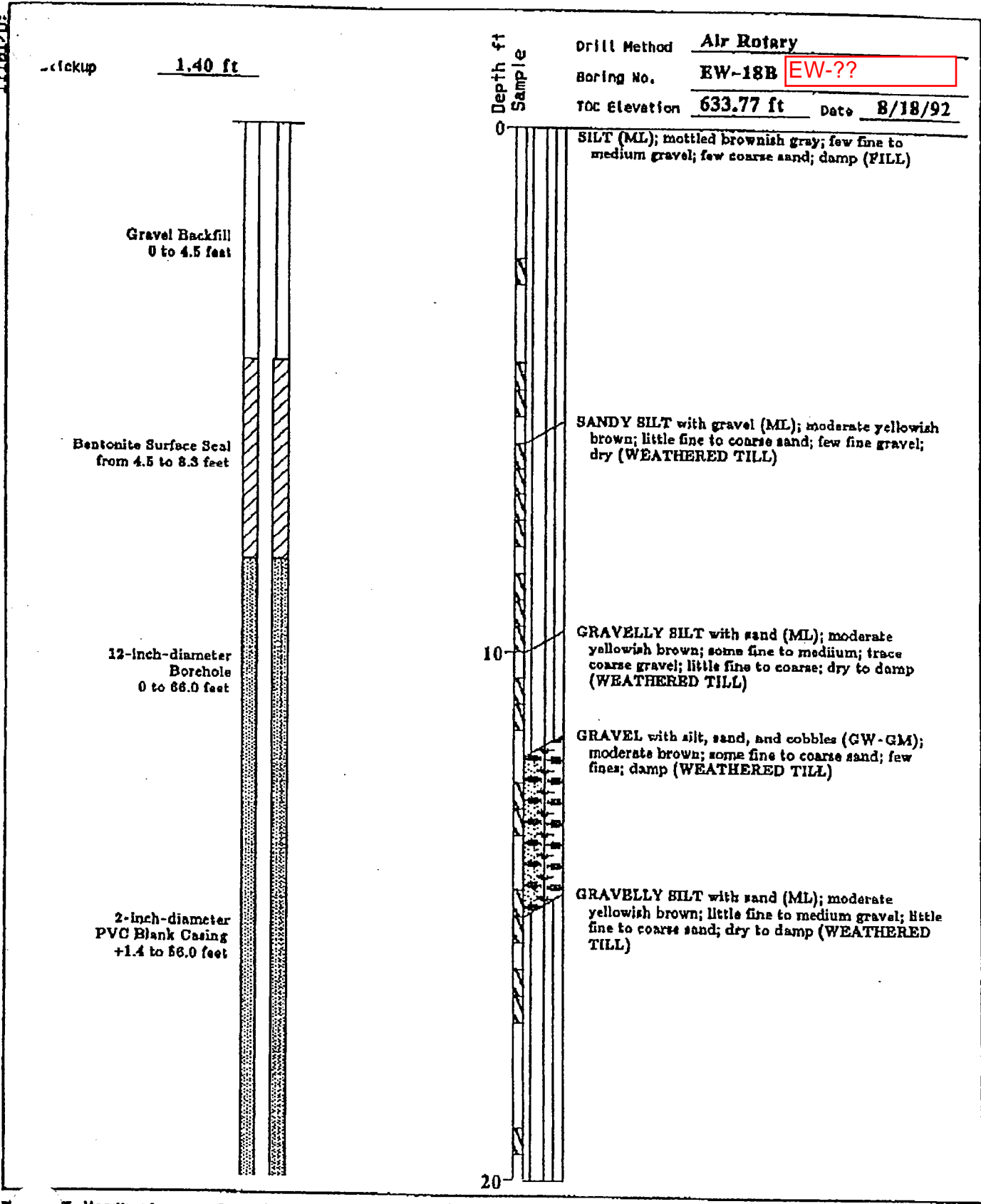
JOB NUMBER
11101-042

APPROVED

DATE
11/92

REVISED

DATE



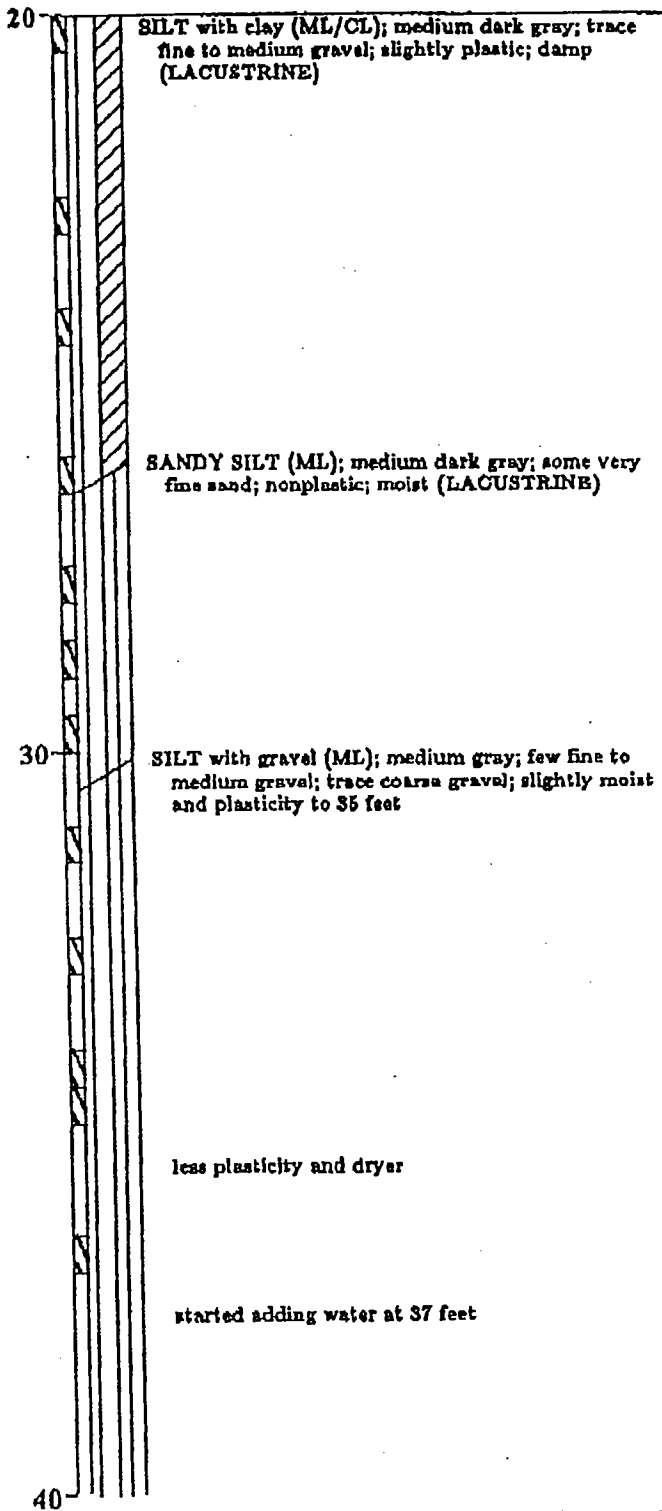
stickup 1.40 ft

Sand Pack 10 x 20
Silica Sand
8.5 to 34.5 feet

Bentonite Pellet Seal
34.5 to 53.0 feet

Depth ft
Sample

Drill Method	Air Rotary	
Boring No.	EW-18B	EW-??
TOC Elevation	633.77 ft	Date 8/18/92



SILT with clay (ML/CL); medium dark gray; trace fine to medium gravel; slightly plastic; damp (LACUSTRINE)

SANDY SILT (ML); medium dark gray; some very fine sand; nonplastic; moist (LACUSTRINE)

SILT with gravel (ML); medium gray; few fine to medium gravel; trace coarse gravel; slightly moist and plasticity to 35 feet

less plasticity and dryer

started adding water at 37 feet



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Log of Boring and Well Completion

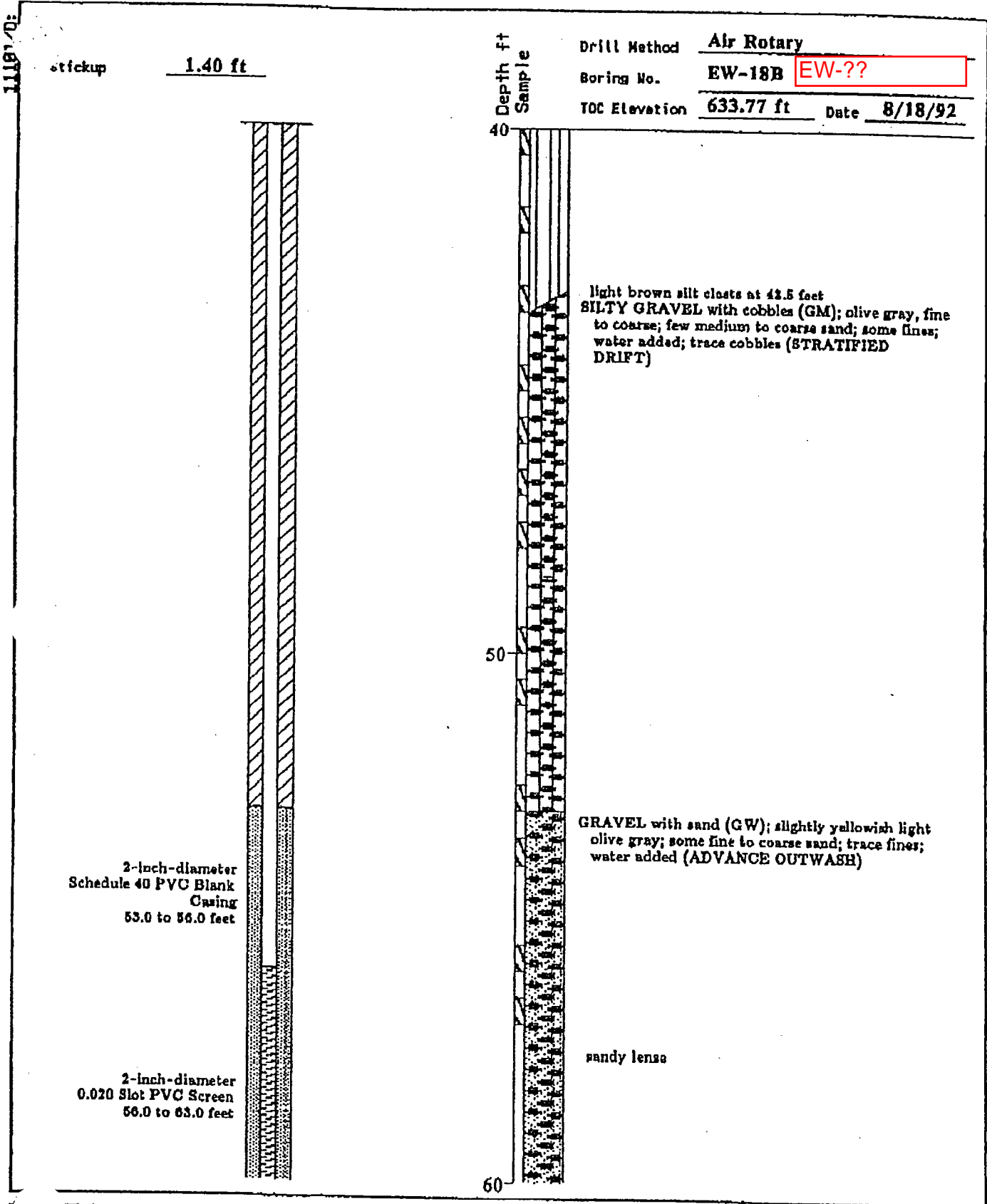
EW-18B

(sheet 2 of 4)

Cedar Hills Landfill

PLATE

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
IRC	11101-042		11/92		



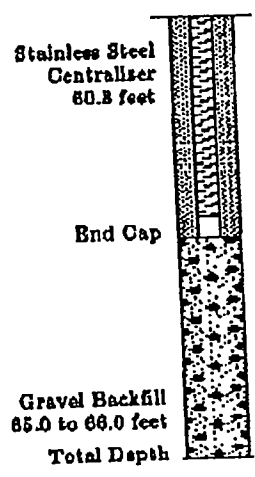
Harding Lawson Associates
 Engineering and Environmental Services

Log of Boring and Well Completion
EW-18B
 (sheet 3 of 4)

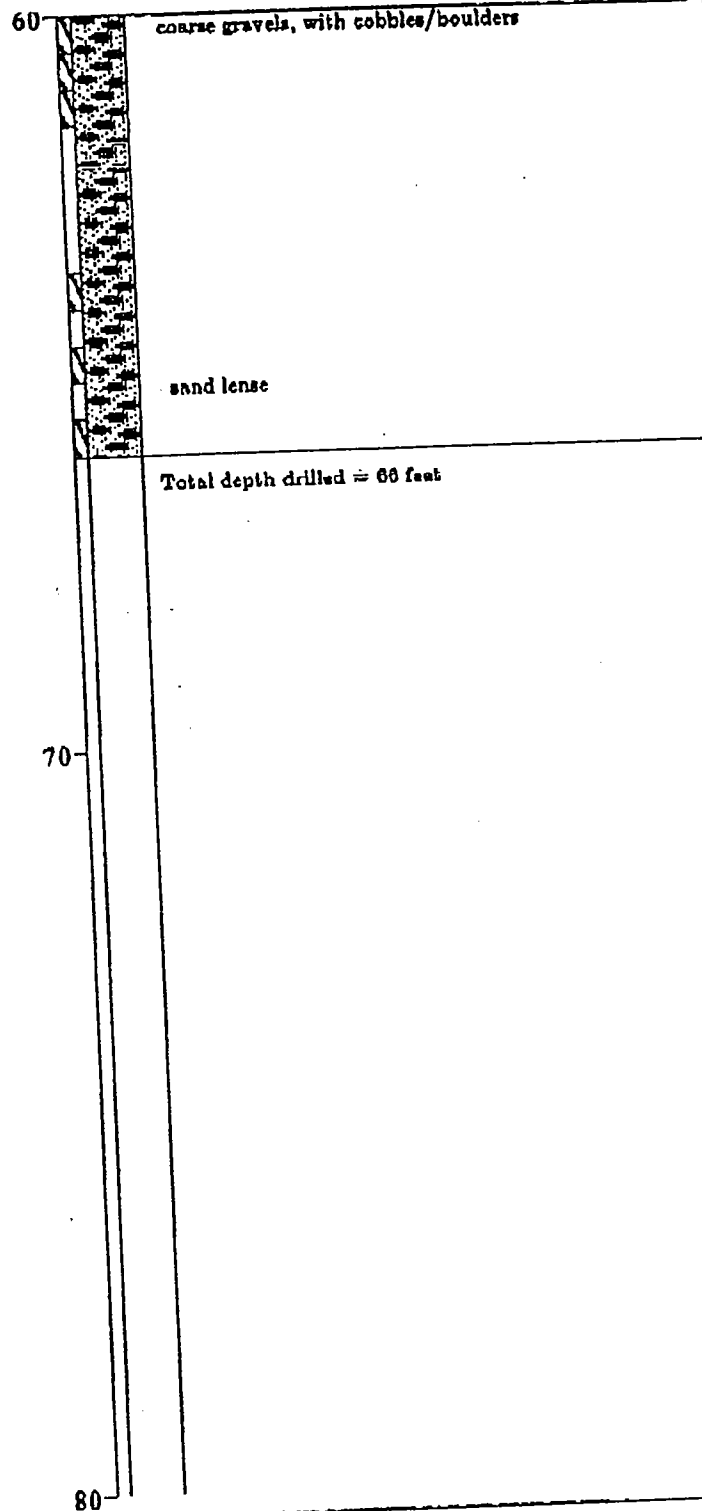
PLATE

Cedar Hills Landfill

pickup 1.40 ft



Drill Method Air Rotary
 Boring No. EW-18B EW-??
 TOC Elevation 633.77 ft Date 8/18/92



HLA Harding Lawson Associates
 Engineering and Environmental Services

Log of Boring and Well Completion
EW-18B (sheet 4 of 4)

Cedar Hills Landfill

DRAWN: NK JOB NUMBER: 11101-042 APPROVED: DATE: 11/92 REVISED: DATE:

APPENDIX A

Gas Probe Construction Logs



PROJECT CEDAR HILLS SITE DEVELOPMENT PLAN

Page 1 of 1

Location East boundary of landfill

Boring No. GP-1

Surface Elevation _____

Drilling Method Odex

Total Depth 22.5 feet

Drilled By Kring Drilling Co.

Date Completed 5/15/85

Logged By D.E. Nadler

WELL DETAILS	PENE-TRATION TIME/RATE	DEPTH (FEET)	SAMPLE		PERME-ABILITY TESTING	SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
			NO.	TYPE				
<p>1" PVC screen with 0.030" slots</p> <p>1" PVC Riser</p> <p>Bentonite and Gravel Slurry</p> <p>Bentonite Pellets</p> <p>Fine Gravel</p>		0					0.0-4.0' <u>SILTY SAND GRAVEL</u> gray, dense, dry. Gravel up to 3.0" diameter (FILL)	
		5					4.0-15.0' <u>GRAVELLY SILTY SAND, GRAVELLY SANDY SILT</u> brown to gray-brown, variable ratios of silt, sand and gravel, dry. Sand is fine to medium, gravel up to 3.0" diameter, rounded. Boulder at 6.0 to 9.0' (glacial erratic?) Higher percentage of gravel at 14.0 to 15.0'. (WEATHERED TILL)	
		10	S1	SS				
		15						15.0-21.0' <u>GRAVELLY SANDY SILT, GRAVELLY SILT</u> , gray, primarily dry but moist from 20 to 21.5'. (TILL)
		20	S2	SS				
		25					21.5-22.5' <u>SILTY GRAVEL</u> , gray, dry. (TILL)	
							Note:	
							1. SS = Split Spoon Sample	



PROJECT CEDAR HILLS SITE DEVELOPMENT PLAN

Page 1 of 1

Location East boundary of landfill

Boring No. GP-2

Surface Elevation _____

Drilling Method Odex

Total Depth 22.5 feet

Drilled By Kring Drilling Co.

Date Completed 5/16/85

Logged By D.E. Nadler

1.0" PVC screen with 0.030" slots

WELL DETAILS	PENE-TRATION TIME/RATE	DEPTH (FEET)	SAMPLE		PERME-ABILITY TESTING	SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
			NO.	TYPE				
<p>1.0" PVC screen with 0.030" slots</p> <p>Bentonite Pellets</p> <p>Gravel and Bentonite Slurry</p> <p>1/2" PVC Riser</p> <p>Fine Gravel</p>		0					0.0-3.0' <u>SILTY SANDY GRAVEL</u> , gray, dry. Rare glass fragments. (FILL)	
		5					3.0-22.2' <u>GRAVELLY SILTY SAND, SILTY SAND</u> , brown with gradational contact. gray at 16.0', dry. Sand is fine to medium, gravel up to 0.75", rounded. (WEATHERED TILL to 16'; TILL below 16')	
		10						
		15						
		20						
		25						



PROJECT CEDAR HILLS SITE DEVELOPMENT PLAN

Page 1 of 2

Location East boundary of landfill

Boring No. MW-48 (and GP-3)

Surface Elevation 594.6 feet a.s.l.

Drilling Method ODEX

Total Depth 63.0 feet

Drilled By Kring Drilling Co.

Date Completed 5/24/85

Logged By D.E. Nadler

WELL DETAILS	PENE-TRATION TIME/RATE	DEPTH (FEET)	SAMPLE		PERME-ABILITY TESTING	SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
			NO.	TYPE				
<p>0.03" slots 1" PVC screen with Fine Gravel Bent 2" PVC Riser Gravel and Bentonite Slurry</p>		0					0-6.0' <u>SANDY CLAYEY SILT and SANDY SILT</u> , dark brown to tan and mottled gray, moist, loose. (FILL)	
		5	S1	SS				
		10	S2	SS				
		15	S3	SS				
		20						
		25	S4	SS			6.0-48.5' <u>GRAVELLY SILTY SAND to SILTY GRAVELLY SAND</u> , light brown to 19.5' gray at 19.5-53.0', moist to 18', dry 18-28', saturated 28-48.5', very dense. Variable ratios of silt, sand and gravel. Gravel to 1.5" diameter, primarily 0.25-0.75" diameter, rounded. Scattered cobbles. (WEATHERED TILL to 19.5', TILL 19.5' to 53')	
		30						
		35						



WELL DETAILS	PENE-TRATION TIME/RATE	DEPTH (FEET)	SAMPLE		PERME-ABILITY TESTING	SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
			NO.	TYPE				
<p>with 0.01" slots</p> <p>2" PVC Riser</p> <p>Bentonite Pellets</p> <p>Fine Gravel</p>		35						
		40	S5	SS			41.0-42.0' <u>GRAVELLY SANDY SILT</u> zone.	
		50	S6	SS				
		60	S7	SS				
		70					NOTE: 1. SS=Split Spoon Sample.	



PROJECT CEDAR HILLS SITE DEVELOPMENT PLAN

Page 1 of 1

Location East boundary of landfill

Boring No. GP-4

Surface Elevation _____

Drilling Method Odex

Total Depth 24.0 feet

Drilled By Kring Drilling Co.

Date Completed 5/28/85

Logged By D.E. Nadler

WELL DETAILS	PENE-TRATION TIME/RATE	DEPTH (FEET)	SAMPLE		PERME-ABILITY TESTING	SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
			NO.	TYPE				
		0					0.3.0' <u>CLAYEY SANDY SILT</u> , brown, dry, dense. Some cobbles at 1-2'. (TILL)	
		5					3.0-8.0' <u>SILTY GRAVELLY SAND</u> , brown at 3-6', gray at 6-8', dry, dense. Gravel to 1", rounded, sand fine to medium. More gravel and cobbles at 6-7' (TILL)	
		10					8.0-21.0' <u>CLAYEY GRAVELLY SILT</u> and <u>GRAVELLY SANDY SILT</u> , layered tan and gray with gradational contacts, dry, dense. Gravel 0.25-0.75' diameter, rounded. (TILL)	
		15						
		20						
		25					21.0-24.0' <u>SILTY GRAVELLY SAND</u> , brown-gray, damp. (TILL)	

LOG OF EXPLORATORY BORING

PROJECT NAME Cedar Hills Landfill: Gas Probe Installations
LOCATION
DRILLED BY Tacoma Pump & Drill
DRILL METHOD Air Rotary
LOGGED BY P. J. Rowland

BORING NO. GP-5
PAGE 1 OF 2
REFERENCE ELEV. 622.00'
TOTAL DEPTH 75.00'
DATE COMPLETED 4/18/88

				GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
					5 10 15 20 25 30 35 40 45 50			<p>0.0 - 14.0 feet: GRAVELLY SAND AND SILT (GM) Brown, fine to coarse sand; medium to coarse gravel; up to 30% silt. Moderately graded, moderately dense, well rounded grains. WEATHERED GLACIAL TILL</p> <p>14.0 - 48.0 feet: GRAVELLY SANDY SILT (GM) Gray, fine to coarse sand and gravel in a very fine sand/silt matrix; 10% cobbles/boulders. Poorly graded, dense, rounded gravels, increase in gravels lower in unit. GLACIAL TILL</p> <p>--- @ 46.0 feet boulder.</p> <p>48.0 - 61.0 feet: DESCRIPTION on next page.</p>	

REMARKS



LOG OF EXPLORATORY BORING

PROJECT NAME Cedar Hills Landfill: Gas Probe Installations
LOCATION
DRILLED BY Tacoma Pump & Drill
DRILL METHOD Air Rotary
LOGGED BY P. J. Rowland

BORING NO. GP-5
PAGE 2 OF 2
REFERENCE ELEV. 622.00'
TOTAL DEPTH 75.00'
DATE COMPLETED 4/18/88

			GROUND WATER LEVELS	DEPTH IN FT.	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
				55	55		48.0 - 61.0 feet: SILTY SAND AND GRAVEL (SM) Gray to brown, fine to coarse sand and gravel; silt interbeds; occasional cobble\boulder. Stratified, well graded, moderately dense, saturated in sand and gravel horizons below 55 feet.
				60	60		GLACIAL DRIFT
				65	65		61.0 - 75.0 feet: GRAVELLY SAND (GW) Brown to gray, fine to coarse sand and gravel to 1-inch diameter; trace of silt. Bedded, well graded, well-rounded grains; moderately loose, dry.
				70	70		GLACIAL ADVANCE OUTWASH
				75	75		Total depth 75 feet.
				80	80		
				85	85		
				90	90		
				95	95		
				100	100		

REMARKS



LOG OF EXPLORATORY BORING

PROJECT NAME Cedar Hills Landfill: Gas Probe Installations
LOCATION
DRILLED BY Tacoma Pump & Drill
DRILL METHOD Air Rotary
LOGGED BY P.J. Rowland

BORING NO. GP-6A
PAGE 1 OF 5
REFERENCE ELEV. 630.00'
TOTAL DEPTH 203.00'
DATE COMPLETED 5/12/88

					GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
						5				0.0 - 8.0 feet: FILL (FILL) Re-worked soil and wood fragments (not garbage)
						10				8.0 - 20.0 feet: GRAVELLY SAND AND SILT (GM) Brown, fine to coarse sand; medium to coarse gravel; up to 50% silt. Moderately graded, moderately dense, well rounded grains. WEATHERED GLACIAL TILL
						15				
						20				20.0 - 40.0 feet: GRAVELLY SANDY SILT (GM) Gray, fine to coarse sand and gravel in a very fine sand/silt matrix (80%); 10% cobbles/boulders. Poorly graded, dense, rounded gravels, increase in gravels below 35 feet. GLACIAL TILL
						25				
						30				
						35				
						40				40.0 - 68.0 feet: SILTY SAND AND GRAVEL (SM-SP) Gray, fine to coarse sand and gravel; up to 30% silt; 10% cobbles. Well graded, moderately bedded, moderately dense, saturated? GLACIAL DRIFT
						45				
						50				

REMARKS

Eight unit well completion, these wells are shown concurrently on two separate logs; identification number GP-6A and GP-6B.



LOG OF EXPLORATORY BORING

PROJECT NAME Cedar Hills Landfill: Gas Probe Installations
LOCATION
DRILLED BY Tacoma Pump & Drill
DRILL METHOD Air Rotary
LOGGED BY P.J. Rowland

BORING NO. GP-6A
PAGE 2 OF 5
REFERENCE ELEV. 630.00'
TOTAL DEPTH 203.00'
DATE COMPLETED 5/12/88

			GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO- LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
				55				40.0 - 68.0 feet: continued from previous page.
				60				
				65				
				70				68.0 - 76.0 feet: SILTY SAND AND GRAVEL (SM) Brown, fine to coarse sands and gravels; 25% very fine sand/silt; occasional cobble/boulder. Poorly graded, stratified, moderately dense, dry. Gradual decrease in silt content toward bottom of boring. GLACIAL ADVANCE OUTWASH
				75				
				80				76.0 - 90.0 feet: SANDY GRAVEL (GW) Gray, becoming brown at 80 feet, fine to coarse sand and gravel. Well graded, well rounded, loose, dry.
				85				
				90				90.0 - 135.0 feet: SAND AND GRAVEL (GW) Brown, fine to coarse sand and gravel; 10% cobbles; no silt. Well graded, loose, well rounded grains, dry.
				95				
				100				

REMARKS

Eight unit well completion, these wells are shown concurrently on two separate logs; identification number GP-6A and GP-6B.

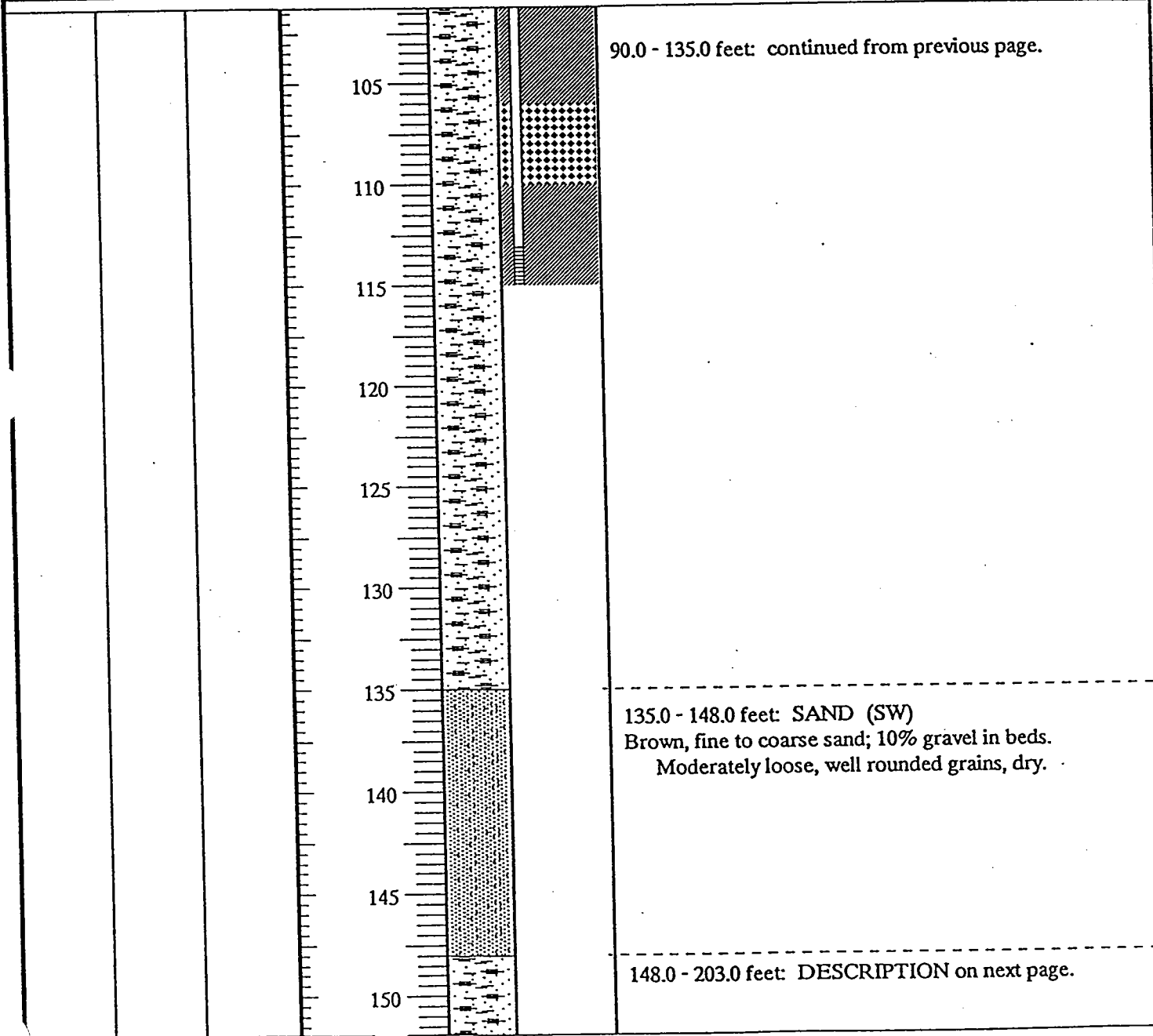


LOG OF EXPLORATORY BORING

PROJECT NAME Cedar Hills Landfill: Gas Probe Installations
LOCATION
DRILLED BY Tacoma Pump & Drill
DRILL METHOD Air Rotary
LOGGED BY P.J. Rowland

BORING NO. GP-6A
PAGE 3 OF 5
REFERENCE ELEV. 630.00'
TOTAL DEPTH 203.00'
DATE COMPLETED 5/12/88

			GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
--	--	--	---------------------	--------------	---------	--------------------	--------------	------------------------



REMARKS

Eight unit well completion, these wells are shown concurrently on two separate logs; identification number GP-6A and GP-6B.



LOG OF EXPLORATORY BORING

PROJECT NAME Cedar Hills Landfill: Gas Probe Installations
LOCATION
DRILLED BY: Tacoma Pump & Drill
DRILL METHOD Air Rotary
LOGGED BY P.J. Rowland

BORING NO. GP-6A
PAGE 4 OF 5
REFERENCE ELEV. 630.00'
TOTAL DEPTH 203.00'
DATE COMPLETED 5/12/88

			GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO- LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
				155				148.0 - 203.0 feet: SAND AND GRAVEL (GW) Brown, fine to coarse sand and gravel; 10% cobbles. Well graded, moderately loose, bedded, dry. <p style="text-align: center;">ADVANCE OUTWASH</p>
				160				
				165				
				170				
				175				
				180				
				185				
				190				
				195				
				200				

REMARKS

Eight unit well completion, these wells are shown concurrently on two separate logs; identification number GP-6A and GP-6B.



LOG OF EXPLORATORY BORING

PROJECT NAME Cedar Hills Landfill: Gas Probe Installations
LOCATION
DRILLED BY Tacoma Pump & Drill
DRILL METHOD Air Rotary
LOGGED BY P.J. Rowland

BORING NO. GP-6A
PAGE 5 OF 5
REFERENCE ELEV. 630.00'
TOTAL DEPTH 203.00'
DATE COMPLETED 5/12/88

			GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
				205				Total depth 203 feet.
				210				
				215				
				220				
				225				
				230				
				235				
				240				
				245				
				250				

REMARKS

Eight unit well completion, these wells are shown concurrently on two separate logs; identification number GP-6A and GP-6B.



LOG OF EXPLORATORY BORING

PROJECT NAME Cedar Hills Landfill: Gas Probe Installations
LOCATION
DRILLED BY Tacoma Pump & Drill
DRILL METHOD Air Rotary
LOGGED BY P.J. Rowland

BORING NO. GP-6B
PAGE 2 OF 5
REFERENCE ELEV. 630.00'
TOTAL DEPTH 203.00'
DATE COMPLETED 5/12/88

			GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO- LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
				55				40.0 - 68.0 feet: continued from previous page.
				60				68.0 - 76.0 feet: SILTY SAND AND GRAVEL (SM) Brown, fine to coarse sands and gravels; 25% very fine sand/silt; occasional cobble/boulder. Poorly graded, stratified, moderately dense, dry. Gradual decrease in silt content toward bottom of boring. GLACIAL ADVANCE OUTWASH
				65				
				70				76.0 - 90.0 feet: SANDY GRAVEL (GW) Gray, becoming brown at 80 feet, fine to coarse sand and gravel. Well graded, well rounded, loose, dry.
				75				
				80				90.0 - 135.0 feet: SAND AND GRAVEL (GW) Brown, fine to coarse sand and gravel; 10% cobbles; no silt. Well graded, loose, well rounded grains, dry.
				85				
				90				
				95				
				100				

REMARKS

Eight unit well completion, these wells are shown concurrently on two separate logs; identification number GP-6A and GP-6B.



LOG OF EXPLORATORY BORING

PROJECT NAME Cedar Hills Landfill: Gas Probe Installations
LOCATION
DRILLED BY Tacoma Pump & Drill
DRILL METHOD Air Rotary
LOGGED BY P.J. Rowland

BORING NO. GP-6B
PAGE 3 OF 5
REFERENCE ELEV. 630.00'
TOTAL DEPTH 203.00'
DATE COMPLETED 5/12/88

			GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO- LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
				105		110		90.0 - 135.0 feet: continued from previous page.
				115		120		
				125		130		135.0 - 148.0 feet: SAND (SW) Brown, fine to coarse sand; 10% gravel in beds. Moderately loose, well rounded grains, dry.
				135		140		
				145		150		148.0 - 203.0 feet: DESCRIPTION on next page

REMARKS

Eight unit well completion, these wells are shown concurrently on two separate logs; identification number GP-6A and GP-6B.

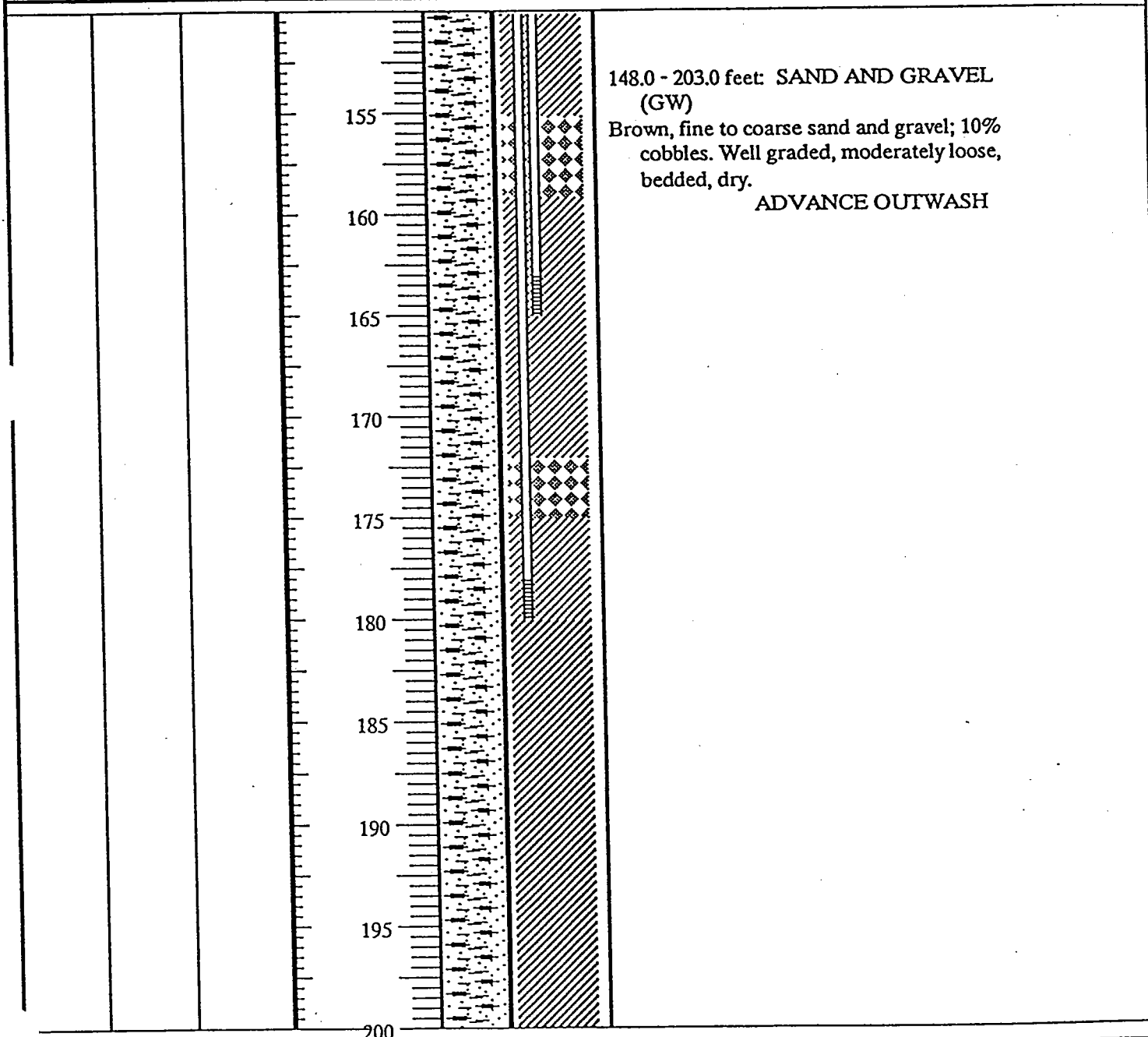


LOG OF EXPLORATORY BORING

PROJECT NAME Cedar Hills Landfill: Gas Probe Installations
LOCATION
DRILLED BY Tacoma Pump & Drill
DRILL METHOD Air Rotary
LOGGED BY P.J. Rowland

BORING NO. GP-6B
PAGE 4 OF 5
REFERENCE ELEV. 630.00'
TOTAL DEPTH 203.00'
DATE COMPLETED 5/12/88

			GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO- LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
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REMARKS

Eight unit well completion, these wells are shown concurrently on two separate logs; identification number GP-6A and GP-6B.



LOG OF EXPLORATORY BORING

PROJECT NAME Cedar Hills Landfill: Gas Probe Installations
LOCATION
DRILLED BY Tacoma Pump & Drill
DRILL METHOD Air Rotary
LOGGED BY P.J. Rowland

BORING NO. GP-6B
PAGE 5 OF 5
REFERENCE ELEV. 630.00'
TOTAL DEPTH 203.00'
DATE COMPLETED 5/12/88

			GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO- LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
				205				Total depth 203 feet.
				210				
				215				
				220				
				225				
				230				
				235				
				240				
				245				
				250				

REMARKS

Eight unit well completion, these wells are shown concurrently on two separate logs; identification number GP-6A and GP-6B.



LOG OF EXPLORATORY BORING

PROJECT NAME
LOCATION
DRILLED BY
DRILL METHOD
LOGGED BY

Cedar Hills Landfill: Gas Probe Installations
Tacoma Pump & Drill
Air Rotary
P. J. Rowland

BORING NO. GP-7
PAGE 1 OF 2
REFERENCE ELEV. 637.00'
TOTAL DEPTH 58.00'
DATE COMPLETED 5/3/88

				GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
					5 10 15 20 25 30 35 40 45 50				<p>0.0 - 12.0 feet: FILL (FILL) Re-worked soil and wood fragments (not garbage)</p> <hr/> <p>12.0 - 17.0 feet: GRAVELLY SAND AND SILT (GM) Brown, fine to coarse sand; medium to coarse gravel; up to 30% silt. Moderately graded, moderately dense, well rounded grains. WEATHERED GLACIAL TILL</p> <hr style="border-top: 1px dashed black;"/> <p>17.0 - 35.0 feet: GRAVELLY SANDY SILT (GM) Gray, fine to coarse sand and gravel; up to 50% very fine sand/silt; 10% cobbles/boulders. Poorly graded, dense, rounded gravels, increase in gravels at base of unit. GLACIAL TILL</p> <hr style="border-top: 1px dashed black;"/> <p>35.0 - 46.0 feet: SILTY SAND AND GRAVEL (SM) Gray, fine to coarse sand and gravel; up to 50% silt; 10% cobbles. Well graded, moderately bedded, moderately dense, saturated? GLACIAL DRIFT</p> <hr/> <p>46.0 - 51.0 feet: DESCRIPTION on next page.</p>

REMARKS

Boring back filled with a mixture of drill cuttings and bentonite chips



LOG OF EXPLORATORY BORING

PROJECT NAME Cedar Hills Landfill: Gas Probe Installations
LOCATION
DRILLED BY Tacoma Pump & Drill
DRILL METHOD Air Rotary
LOGGED BY P. J. Rowland

BORING NO. GP-7
PAGE 2 OF 2
REFERENCE ELEV. 637.00'
TOTAL DEPTH 58.00'
DATE COMPLETED 5/3/88

				GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
					55	55	55	55	46.0 - 51.0 feet: SAND AND GRAVEL (SW) Gray to brown, fine to coarse sand and gravel; 15% silt; occasional cobble\boulder. Stratified, well graded, well rounded, moderately dense.
					60	60	60	60	51.0 - 58.0 feet: SILTY SAND AND GRAVEL (SM) Brown, fine to coarse sands and gravels; 25% very fine sand/silt; occasional cobble/boulder. Poorly graded, stratified, moderately dense, dry. Gradual decrease in silt content toward bottom of boring. GLACIAL ADVANCE OUTWASH
					65	65	65	65	
					70	70	70	70	
					75	75	75	75	
					80	80	80	80	
					85	85	85	85	
					90	90	90	90	
					95	95	95	95	
					100	100	100	100	Total depth 58.0 feet.

REMARKS

Boring back filled with a mixture of drill cuttings and bentonite chips



LOG OF EXPLORATORY BORING

PROJECT NAME Cedar Hills Landfill: Gas Probe Installations
 LOCATION
 DRILLED BY Tacoma Pump & Drill
 DRILL METHOD Air Rotary
 LOGGED BY P. J. Rowland

BORING NO. GP-8
 PAGE 1 OF 2
 REFERENCE ELEV. 640.00'
 TOTAL DEPTH 60.00'
 DATE COMPLETED 4/30/88

				GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
					5				0.0 - 8.0 feet: FILL (FILL) Re-worked soil and wood fragments (not garbage)
					10				8.0 - 13.0 feet: GRAVELLY SAND AND SILT (GM) Brown, fine to coarse sand; medium to coarse gravel; up to 30% silt. Moderately graded, moderately dense, well rounded grains. WEATHERED GLACIAL TILL
					15				
					20				13.0 - 40.0 feet: GRAVELLY SANDY SILT (GM) Gray, fine to coarse sand and gravel; 50% very fine sand/silt matrix; 10% cobbles/boulders. Poorly graded, dense, rounded gravels, increase in gravels below 30 feet. GLACIAL TILL
					25				
					30				
					35				
					40				40.0 - 53.0 feet: SAND AND GRAVEL (SW) Gray to brown, fine to coarse sand and gravel; occasional cobble\boulder. Stratified, well graded, moderately dense.
					45				
					50				

REMARKS

Boring back filled with a mixture of drill cuttings and bentonite chips



LOG OF EXPLORATORY BORING

PROJECT NAME Cedar Hills Landfill: Gas Probe Installations
LOCATION
DRILLED BY Tacoma Pump & Drill
DRILL METHOD Air Rotary
LOGGED BY P. J. Rowland

BORING NO. GP-8
PAGE 2 OF 2
REFERENCE ELEV. 640.00'
TOTAL DEPTH 60.00'
DATE COMPLETED 4/30/88

			GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
				55				40.0 - 53.0 feet: continued from previous page.
				60				53.0 - 60.0 feet: SILTY SAND AND GRAVEL (SM) Brown, fine to coarse sands and gravels; 25% very fine sand/silt; occasional cobble / boulder. Poorly graded, stratified, moderately dense, dry. GLACIAL ADVANCE OUTWASH
				65				Total depth 60.0 feet.
				70				
				75				
				80				
				85				
				90				
				95				
				100				

REMARKS

Boring back filled with a mixture of drill cuttings and bentonite chips



LOG OF EXPLORATORY BORING

PROJECT NAME Cedar Hills Landfill: Gas Probe Installations
LOCATION
DRILLED BY Tacoma Pump & Drill
DRILL METHOD Air Rotary
LOGGED BY P. J. Rowland

BORING NO. GP-9
PAGE 1 OF 2
REFERENCE ELEV. 640.00'
TOTAL DEPTH 70.00'
DATE COMPLETED 4/29/88

				GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
					5				0.0 - 20.0 feet: GRAVELLY SAND AND SILT (GM) Brown, fine to coarse sand; medium to coarse gravel; up to 30% silt. Moderately graded, moderately dense, well rounded grains. WEATHERED GLACIAL TILL
					10				
					15				
					20				20.0 - 37.0 feet: GRAVELLY SANDY SILT (GM) Gray, fine to coarse sand and gravel; 50% very fine sand/silt matrix; 10% cobbles/boulders. Poorly graded, dense, rounded gravels, increase in gravels in lower 10 feet of unit. GLACIAL TILL
					25				
					30				
					35				
					40				37.0 - 52.0 feet: SILTY SAND AND GRAVEL (SM-SP) Gray to brown, fine to coarse sand and gravel; silt interbeds; occasional cobble\boulder. Stratified, well graded, moderately dense. GLACIAL DRIFT
					45				
					50				

REMARKS

Boring back filled with a mixture of drill cuttings and bentonite chips



LOG OF EXPLORATORY BORING

PROJECT NAME Cedar Hills Landfill: Gas Probe Installations
LOCATION
DRILLED BY Tacoma Pump & Drill
DRILL METHOD Air Rotary
LOGGED BY P. J. Rowland

BORING NO. GP-9
PAGE 2 OF 2
REFERENCE ELEV. 640.00'
TOTAL DEPTH 70.00'
DATE COMPLETED 4/29/88

			GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
				55				37.0 - 52.0 feet: continued from previous page. 52.0 - 58.0 feet: GRAVELLY SAND (GW) Brown to gray, fine to coarse sand and gravel to 1-inch diameter. Bedded, well graded, well-rounded grains, moderately loose, dry.
				60				58.0 - 70.0 feet: SILTY SAND AND GRAVEL (SM) Brown, fine to coarse sands and gravels; 25% very fine sand/silt; occasional cobble/boulder. Poorly graded, stratified, moderately dense, dry. GLACIAL ADVANCE OUTWASH
				65				
				70				Total depth 70.0 feet.
				75				
				80				
				85				
				90				
				95				
				100				

REMARKS

Boring back filled with a mixture of drill cuttings and bentonite chips



LOG OF EXPLORATORY BORING

PROJECT NAME Cedar Hills Landfill: Gas Probe Installations
LOCATION
DRILLED BY Tacoma Pump & Drill
DRILL METHOD Air Rotary
LOGGED BY P. J. Rowland

BORING NO. GP-11
PAGE 1 OF 2
REFERENCE ELEV. 562.00'
TOTAL DEPTH 100.00'
DATE COMPLETED 4/25/88

			GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
				5 10 15 20 25 30 35 40 45 50		<p>0.0 - 19.0 feet: GRAVELLY SAND AND SILT (GM) Brown, fine to coarse sand; medium to coarse gravel; up to 50% silt. Moderately graded, moderately dense, well rounded grains. WEATHERED GLACIAL TILL</p> <hr style="border-top: 1px dashed black;"/> <p>19.0 - 52.0 feet: GRAVELLY SILT (GM) Gray, fine to coarse gravels; over 50% very fine sand/silt; trace of cobbles/boulders. Poorly graded, dense, rounded gravels, saturated in places? GLACIAL TILL</p>		

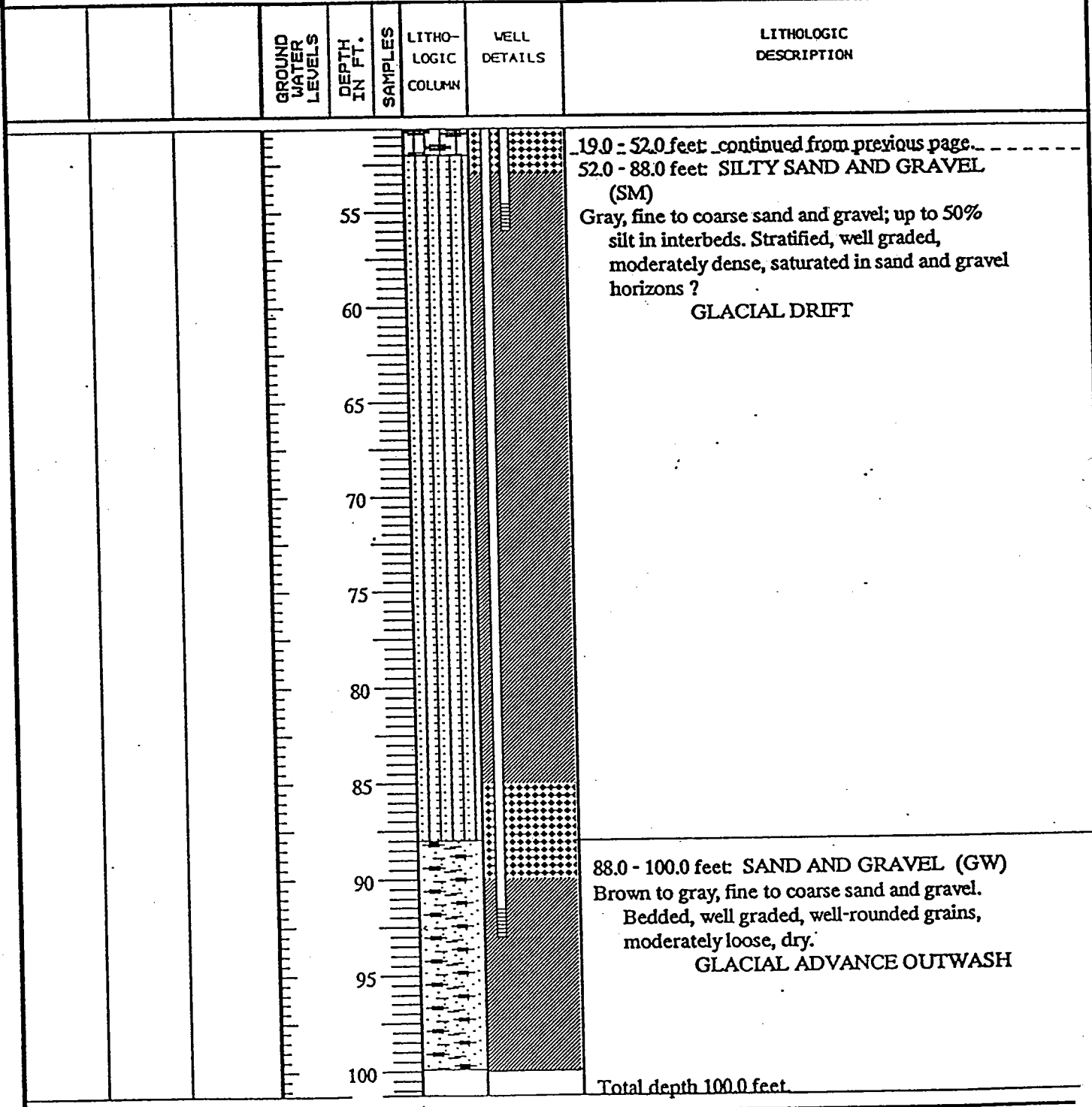
REMARKS



LOG OF EXPLORATORY BORING

PROJECT NAME Cedar Hills Landfill: Gas Probe Installations
LOCATION
DRILLED BY Tacoma Pump & Drill
DRILL METHOD Air Rotary
LOGGED BY P. J. Rowland

BORING NO. GP-11
PAGE 2 OF 2
REFERENCE ELEV. 562.00'
TOTAL DEPTH 100.00'
DATE COMPLETED 4/25/88



REMARKS



LOG OF EXPLORATORY BORING

PROJECT NAME Cedar Hills Landfill: Gas Probe Installations
LOCATION
DRILLED BY Tacoma Pump & Drill
DRILL METHOD Air Rotary
LOGGED BY P. J. Rowland

BORING NO. GP-12
PAGE 2 OF 2
REFERENCE ELEV. 575.00'
TOTAL DEPTH 90.00'
DATE COMPLETED 7/13/88

			GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
				55				GLACIAL DRIFT 43.0 - 72.0 feet: continued from previous page.
				60				
				65				
				70				
				75				72.0 - 90.0 feet: SANDY GRAVEL (GW) Brown, medium to coarse sand and gravel; trace of silt\clay. Bedded and sorted by grain size; alternating coarsening down and coarsening up sequence, well graded, well-rounded grains, moderately loose, dry. GLACIAL ADVANCE OUTWASH
				80				
				85				
				90				Total depth 90 feet.
				95				
				100				

REMARKS



LOG OF EXPLORATORY BORING

PROJECT NAME Cedar Hills Landfill: Gas Probe Installations
LOCATION
DRILLED BY Tacoma Pump & Drill
DRILL METHOD Air Rotary
LOGGED BY P. J. Rowland

BORING NO. GP-13
PAGE 2 OF 2
REFERENCE ELEV. 600.00'
TOTAL DEPTH 89.00'
DATE COMPLETED 7/21/88

				GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
					55				35.0 - 77.0 feet: continued from previous page.
					60				
					65				
					70				
					75				
					80				77.0 - 89.0 feet: GRAVELLY SAND (GW) Gray to brown, medium to coarse sand; 10% gravel; trace of silt\clay. Bedded and sorted by grain size; well graded, well-rounded grains, moderately loose, dry. GLACIAL ADVANCE OUTWASH
					85				
					90				Total depth 89 feet.
					95				
					100				

REMARKS



LOG OF EXPLORATORY BORING

PROJECT NAME Cedar Hills Landfill: Gas Probe Installations
LOCATION
DRILLED BY Tacoma Pump & Drill
DRILL METHOD Air Rotary
LOGGED BY P. J. Rowland

BORING NO. GP-14
PAGE 1 OF 2
REFERENCE ELEV. 610.00'
TOTAL DEPTH 100.00'
DATE COMPLETED 7/23/88

				GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
					5 10 15 20 25 30 35 40 45 50				<p>0.0 - 15.0 feet: GRAVELLY SAND AND SILT (GM) Brown, fine to coarse sand; medium to coarse gravel; up to 50% silt. Moderately graded, moderately dense, well rounded. WEATHERED GLACIAL TILL</p> <hr style="border-top: 1px dashed black;"/> <p>15.0 - 52.0 feet: GRAVELLY SILT (GM) Gray, 40% fine to coarse gravels in a very fine sand/silt matrix (60%); trace of cobbles/boulders. Poorly graded, dense, rounded gravels, saturated below 40 feet. GLACIAL TILL</p>

REMARKS

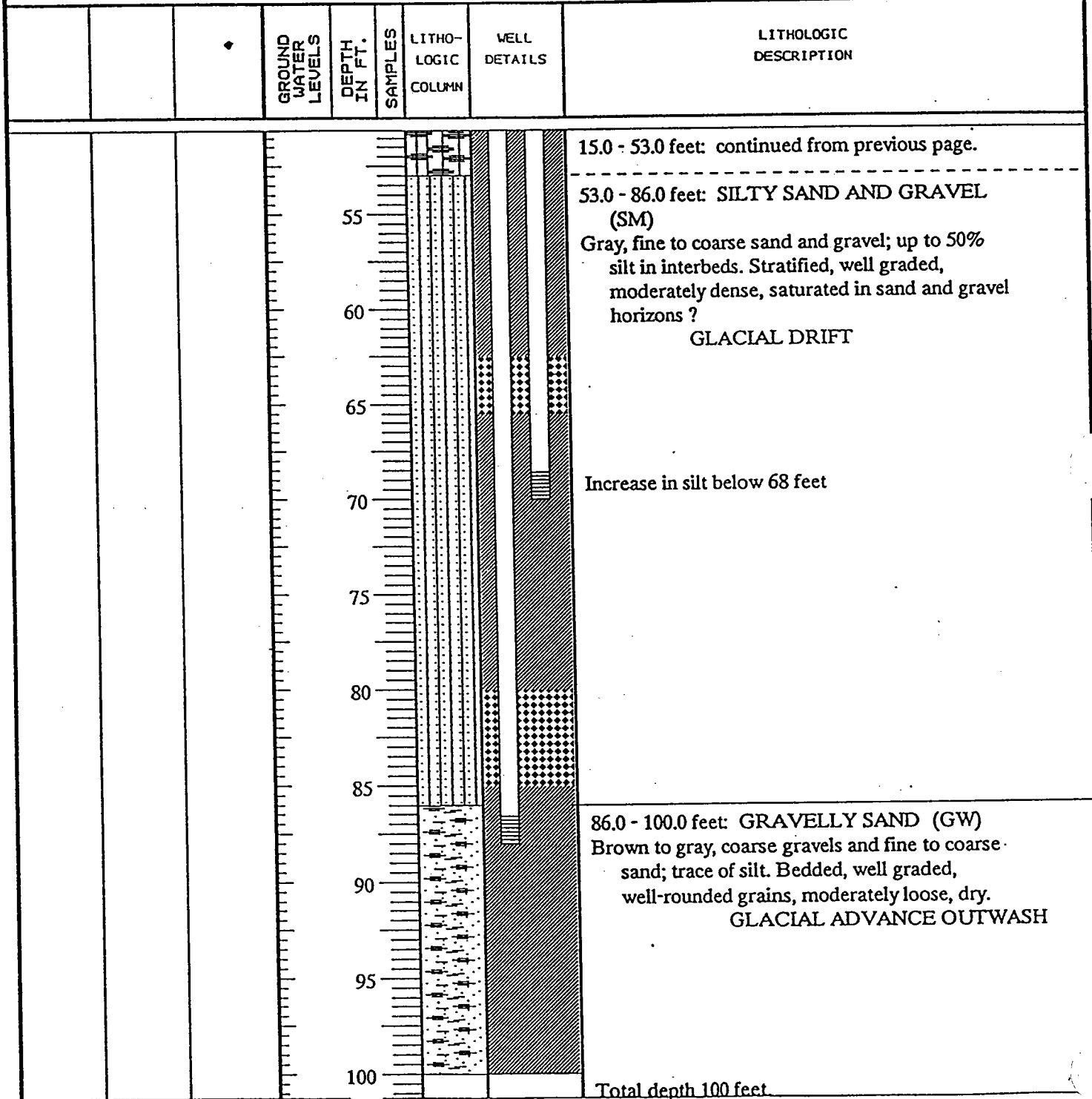
Casing could not be retrieved past 67 feet.



LOG OF EXPLORATORY BORING

PROJECT NAME Cedar Hills Landfill: Gas Probe Installations
LOCATION
DRILLED BY Tacoma Pump & Drill
DRILL METHOD Air Rotary
LOGGED BY P. J. Rowland

BORING NO. GP-14
PAGE 2 OF 2
REFERENCE ELEV. 610.00'
TOTAL DEPTH 100.00'
DATE COMPLETED 7/23/88



REMARKS

Casing could not be retrieved past 67 feet.



LOG OF EXPLORATORY BORING

PROJECT NAME Cedar Hills Landfill: Gas Probe Installations
LOCATION
DRILLED BY Tacoma Pump & Drill
DRILL METHOD Air Rotary
LOGGED BY P. J. Rowland

BORING NO. GP-15
PAGE 2 OF 2
REFERENCE ELEV. 618.00'
TOTAL DEPTH 89.00'
DATE COMPLETED 4/11/88

			GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
				55 60 65 70 75 80 85 90 95 100				<p>32.0 - 78.0 feet: continued from previous page.</p> <p>Increase in silt below 68 feet</p> <p>78.0 - 89.0 feet: GRAVELLY SAND (GW) Brown to gray, fine to coarse gravel sand; trace of silt. Bedded, well graded, well-rounded grains, moderately loose, dry. GLACIAL ADVANCE OUTWASH</p> <p>Total depth 89 feet.</p>

REMARKS



LOG OF EXPLORATORY BORING

PROJECT NAME Cedar Hills Landfill: Gas Probe Installations
LOCATION
DRILLED BY Tacoma Pump & Drill
DRILL METHOD Air Rotary
LOGGED BY P. J. Rowland

BORING NO. GP-16
PAGE 1 OF 2
REFERENCE ELEV. 627.00'
TOTAL DEPTH 70.00'
DATE COMPLETED 4/13/88

			GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
				5 10 15 20 25 30 35 40 45 50				<p>0.0 - 14.0 feet: SILTY SAND AND GRAVEL (SW) Brown, fine to coarse sand and gravel; up to 30% silt; 10% cobbles. Moderately graded, moderately dense, well rounded grains. WEATHERED GLACIAL TILL</p> <hr style="border-top: 1px dashed black;"/> <p>14.0 - 49.0 feet: GRAVELLY SILT (GP) Gray, fine to coarse sand and gravel; 50% very fine sand/silt matrix; 10% cobbles/boulders. Poorly graded, dense, rounded gravels. GLACIAL TILL</p> <hr style="border-top: 1px dashed black;"/> <p>49.0 - 50.0 feet: DESCRIPTION on next page.</p>

REMARKS



LOG OF EXPLORATORY BORING

PROJECT NAME Cedar Hills Landfill: Gas Probe Installations
LOCATION
DRILLED BY Tacoma Pump & Drill
DRILL METHOD Air Rotary
LOGGED BY P. J. Rowland

BORING NO. GP-16
PAGE 2 OF 2
REFERENCE ELEV. 627.00'
TOTAL DEPTH 70.00'
DATE COMPLETED 4/13/88

			GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO- LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
				55		55.0 - 55.0 feet		SILTY SAND AND GRAVEL (GM) Gray, fine to coarse sand and gravel; silt interbeds; occasional cobble/boulder. Stratified, well graded, moderately dense, saturated in sand and gravel horizons. GLACIAL DRIFT
				60		55.0 - 70.0 feet		GRAVELLY SAND (GW) Brown, fine to coarse gravel and sand. Bedded, well graded, well-rounded grains, moderately loose, dry. GLACIAL ADVANCE OUTWASH
				65				
				70				Total depth 70 feet.
				75				
				80				
				85				
				90				
				95				
				100				

REMARKS



LOG OF EXPLORATORY BORING

PROJECT NAME Cedar Hills Landfill: Gas Probe Installations
LOCATION
DRILLED BY T.P. & D
DRILL METHOD Air Rotary
LOGGED BY P. J. Rowland

BORING NO. GP-17
PAGE 1 OF 1
REFERENCE ELEV. 622.00'
TOTAL DEPTH 43.00'
DATE COMPLETED 3/30/88

				GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
					5				0.0 - 11.0 feet: GRAVELLY SAND AND SILT (GM) Brown, fine to coarse sand and gravel; up to 30% silt; 10% cobbles. Moderately graded, moderately dense, well rounded grains, dry. WEATHERED GLACIAL TILL
					10				11.0 - 33.0 feet: GRAVELLY SILT (GM) Gray to brown, fine to coarse sand and gravel in a very fine to fine sand matrix; 10% cobbles/boulders. Poorly graded, dense, rounded gravels, dry. GLACIAL TILL
					15				
					20				
					25				
					30				
					35				33.0 - 43.0 feet: GRAVEL AND SAND (GW) Brown to gray, fine to coarse gravel and sand; 10% silt; 10% cobbles. Bedded, well graded, well-rounded grains, moderately dense, dry. GLACIAL ADVANCE OUTWASH
					40				
					45				Total depth 43 feet.
					50				

REMARKS



LOG OF EXPLORATORY BORING

PROJECT NAME Cedar Hills Landfill: Gas Probe Installations
LOCATION
DRILLED BY Tacoma Pump & Drill
DRILL METHOD Air Rotary
LOGGED BY P. J. Rowland

BORING NO. GP-18
PAGE 1 OF 2
REFERENCE ELEV. 585.00'
TOTAL DEPTH 58.00'
DATE COMPLETED 3/28/88

			GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO- LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
				5		0.0 - 22.0 feet: GRAVELLY SILT (GM) Brown, fine to coarse gravel; up to 20% sand; 50% silt; 10% cobbles. Moderately graded, moderately dense, well rounded grains, dry. WEATHERED GLACIAL TILL		
				10				
				15				
				20				
				25		22.0 - 41.0 feet: GRAVELLY SILT (GM) Gray, fine to coarse sand and gravel in a very fine to fine sand matrix; 10% cobbles/boulders. Poorly graded, dense, rounded gravels, dry. GLACIAL TILL Increase in cobbles and boulders below 33 feet.		
				30				
				35				
				40				
				45		41.0 - 58.0 feet: GRAVEL AND SAND (GW) Brown to gray, fine to coarse gravel and sand; 10% silt; 10% cobbles. Bedded, well graded, well-rounded grains, moderately dense, dry. GLACIAL ADVANCE OUTWASH		
				50				

REMARKS



LOG OF EXPLORATORY BORING

PROJECT NAME Cedar Hills Landfill: Gas Probe Installations
LOCATION
DRILLED BY Tacoma Pump & Drill
DRILL METHOD Air Rotary
LOGGED BY P. J. Rowland

BORING NO. GP-18
PAGE 2 OF 2
REFERENCE ELEV. 585.00'
TOTAL DEPTH 58.00'
DATE COMPLETED 3/28/88

			GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO- LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
				55	55			41.0 - 58.0 feet: continued from previous page.
				60				Total depth 58 feet.
				65				
				70				
				75				
				80				
				85				
				90				
				95				
				100				

REMARKS



LOG OF EXPLORATORY BORING

PROJECT NAME Cedar Hills Landfill: Gas Probe Installations
LOCATION
DRILLED BY Tacoma Pump & Drill
DRILL METHOD Air Rotary
LOGGED BY P. J. Rowland

BORING NO. GP-20
PAGE 1 OF 2
REFERENCE ELEV. 493.00'
TOTAL DEPTH 95.00'
DATE COMPLETED 3/29/88

					GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
						5				0.0 - 28.0 feet: SILTY SAND AND GRAVEL (SM) Brown, fine to coarse sand; medium to coarse gravel; up to 50% silt; 10% cobbles. Moderately graded, moderately dense, sub-rounded. WEATHERED GLACIAL TILL Slightly damp at 12 feet.
						10				
						15				
						20				
						25				Saturated at 26 feet
						30				28.0 - 45.0 feet: GRAVELLY SILT (GM) Gray, fine to coarse gravels in a very fine sand/silt matrix; 10% cobbles/boulders. Poorly graded, dense, rounded gravels, saturated in places? GLACIAL TILL
						35				
						40				
						45				45.0 - 85.0 feet: DESCRIPTION on next page.
						50				

REMARKS



LOG OF EXPLORATORY BORING

PROJECT NAME Cedar Hills Landfill: Gas Probe Installations
LOCATION
DRILLED BY Tacoma Pump & Drill
DRILL METHOD Air Rotary
LOGGED BY P. J. Rowland

BORING NO. GP-20
PAGE 2 OF 2
REFERENCE ELEV. 493.00'
TOTAL DEPTH 95.00'
DATE COMPLETED 3/29/88

			GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
				55				45.0 - 85.0 feet: SILTY SAND AND GRAVEL (SM) Gray, fine to coarse sand and gravel; up to 50% silt in interbeds; 10% cobbles/boulders. Stratified, well graded, moderately dense, saturated in sand and gravel horizons below 70 feet. GLACIAL DRIFT
				60				
				65				
				70				
				75				
				80				
				85				85.0 - 95.0 feet: SANDY GRAVEL (GW) Brown, fine to coarse sand and gravel. Bedded, well graded, sub-angular to sub-rounded grains, moderately loose, dry. GLACIAL ADVANCE OUTWASH
				90				
				95				Total depth 95 feet.
				100				

REMARKS



PROJECT NUMBER C 10564 C	BORING NUMBER GP-45	SHEET 1 OF 3
GAS PROBE BORING LOG		

PROJECT LANDFILL GAS EXTRACTION SYSTEM SE PERIMETER LOCATION N. 167,889.12, E. 1,702,378.60
 ELEVATION 565 FEET DRILLING CONTRACTOR RAMLO DRILLING
 DRILLING METHOD AND EQUIPMENT CANTERRA CT 450 AIR ROTARY 8" Ø CASING
 WATER LEVELS _____ START 11-18-94 FINISH 11-21-94 LOGGER R.A. PARENT

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	LITHOLOGY	SOIL DESCRIPTION	COMMENTS	PROBE COMPLETION DIAGRAM
			SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	WATER LEVEL, CH ₄ %, TESTS AND INSTRUMENTATION, DRILLING OBSERVATIONS	
0.0 - 5.0			<u>SANDY SILT (ML)</u> , dark brown, moist, soft, approximately 20% fine to medium grained sand.	20.4' 8" Ø steel casing.	<p>Monument</p> <p>Concrete</p> <p>Bentonite</p> <p>Granular Backfill</p> <p>Fine Sand</p> <p>Gravel Pack</p> <p>8" Nominal Diameter Borehole.</p>
5.0 - 10.0			<u>SILTY SAND/SANDY SILT WITH GRAVEL (SM/ML)</u> , brown, moist, dense/hard, approximately 12% 2.0" minus gravel, approximately 44% fine to medium grained sand, approximately 44% passing No. 200 sieve. (Weathered Glacial Till)		
10.0 - 15.0			<u>SILTY SAND/SANDY SILT WITH GRAVEL (SM/ML)</u> , gray, damp, dense/hard, approximately 12% 2.0" minus subrounded gravel, approximately 44% fine to medium grained sand, approximately 44% passing the No. 200 sieve. (Glacial Till)	Weld on 20.0' 8" Ø steel casing. Casing length 40.4'.	
15.0 - 20.0					
20.0 - 25.0					
25.0 - 30.0					
30.0 - 35.0			<u>SILTY SAND/SANDY SILT WITH GRAVEL (SM/ML)</u> , gray, damp, dense/hard, approximately 12% 2.0" minus subrounded gravel, approximately 44% fine to medium grained sand, approximately 44% passing No. 200 sieve. (Glacial Till)	Weld on 20.0' 8" Ø steel	
35.0 - 40.0					

PROJECT NUMBER C 10584 C	BORING NUMBER GP-45	SHEET 2 OF 3
GAS PROBE BORING LOG		

PROJECT LANDFILL GAS EXTRACTION SYSTEM SE PERIMETER LOCATION N. 167,889.12, E. 1,702,378.60
 ELEVATION 565 FEET DRILLING CONTRACTOR RAMLO DRILLING
 DRILLING METHOD AND EQUIPMENT CANTERRA CT 450 AIR ROTARY 8" Ø CASING
 WATER LEVELS _____ START 11-18-94 FINISH 11-21-94 LOGGER R.A. PARENT

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	LITHOLOGY	SOIL DESCRIPTION	COMMENTS	PROBE COMPLETION DIAGRAM
			SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	WATER LEVEL, CH ₄ %, TESTS AND INSTRUMENTATION, DRILLING OBSERVATIONS	
45.0					
50.0			<u>SILTY SAND WITH GRAVEL</u> (SM), gray, damp, dense, approximately 25% 2.0" minus subrounded gravel, approximately 25% passing the No. 200 sieve. Fine to coarse grained sand. Layers of <u>SANDY SILT WITH GRAVEL</u> , (ML). (Stratified Glacial Drift)	Weld on 20.0' 8" Ø steel casing. Casing length 80.4'.	<p>The diagram shows an 8" nominal diameter borehole. From top to bottom, it depicts: Fine Sand, Bentonite, Granular Backfill, Bentonite, Fine Sand, Gravel Pack, and Fine Sand. Arrows indicate the vertical extent of each layer.</p>
55.0					
60.0					
65.0					
70.0			<u>SILTY SAND WITH GRAVEL</u> (SM), gray, moist, dense, approximately 25% 2.0" minus subrounded gravel, approximately 25% passing the No. 200 sieve. Fine to coarse grained sand. layers of <u>SANDY SILT WITH GRAVEL</u> , (ML). (Stratified Glacial Drift)	Weld on 20.0' 8" Ø steel casing. Casing length 100.4'.	
75.0					



Monitoring Well Construction Log

Project Number
040122

Well Number
GP-55

Sheet
1 of 3

Project Name: East Perched Zone Memorandum

Ground Surface Elev. 640.99

Location: Cedar Hills Regional Landfill, King County, Washington

Top of Casing Elev. 643.09

Driller/Method: Boart Longyear / Rotary Sonic

Depth to Water (ft BGS)

Sampling Method: Continuous Core

Start/Finish Date 10/20/2009-10/21/2009

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
1 - 640	Above ground completion, 8" dia steel monument						Topsoil	1
2 - 639	Concrete (0'-3')						Weathered Till Stiff, dry to slightly moist, brown, slightly sandy, gravelly SILT (ML); iron oxide staining, fine to coarse sand, mostly fine gravel.	2
3 - 638								3
4 - 637								4
5 - 636							Becomes very gravelly. Cobbles.	5
6 - 635								6
7 - 634	Bentonite chips (3.0'-58.5')						Becomes sandy. Cobbles.	7
8 - 633								8
9 - 632							Becomes slightly gravelly.	9
10 - 631								10
11 - 630							Hard, moist, brown, slightly sandy, gravelly SILT (ML); fine to coarse sand, mostly fine gravel. Very moist. Heavy iron oxide staining.	11
12 - 629								12
13 - 628								13
14 - 627	2" Sch 40 PVC casing (0'-60')						Slightly gravelly. Slightly moist, sandy, very silty GRAVEL (GM); with cobbles, with light iron oxide staining.	14
15 - 626							Till	15
16 - 625							Slightly moist, dark gray SILT (ML); trace fine gravel, trace sand.	16
17 - 624							Scattered very thin beds brown silt (15'-20').	17
18 - 623								18
19 - 622								19
20 - 621							No sand, no gravel (18'-25').	20
21 - 620								21
22 - 619								22
23 - 618								23
24 - 617							Becomes moist.	24

MONITORING WELL CEDAR HILLS PERCHING INVESTIGATION -REVISED DENSITY.GPJ April 19, 2010

Sampler Type:

- No Recovery
- Continuous Core

PID - Photoionization Detector (Headspace Measurement)

- Static Water Level
- Water Level (ATD)

Logged by: JTL

Approved by: EWM

Figure No. A- 20



Monitoring Well Construction Log

Project Number
040122

Well Number
GP-55

Sheet
2 of 3

Project Name: East Perched Zone Memorandum Ground Surface Elev. 640.99
 Location: Cedar Hills Regional Landfill, King County, Washington Top of Casing Elev. 643.09
 Driller/Method: Boart Longyear / Rotary Sonic Depth to Water (ft BGS) _____
 Sampling Method: Continuous Core Start/Finish Date 10/20/2009-10/21/2009

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)	
26 - 615	8" dia. borehole (0'-35') 6" dia. borehole (35'-70')						Stiff to hard, wet, dark gray SILT (ML); trace sand, varves.	26	
27 - 614								27	
28 - 613								Hard, slightly moist, dark gray SILT (ML); trace fine to coarse sand, trace fine to coarse gravel.	28
29 - 612									29
30 - 611								Hard, slightly moist, slightly gravelly SILT (ML); trace sand, fine gravel to cobbles.	30
31 - 610									31
32 - 609									32
33 - 608								Hard, slightly moist, dark gray SILT (ML); trace sand, trace mostly fine gravel.	33
34 - 607									34
35 - 606								Becomes moist.	35
36 - 605									36
37 - 604								Gravel is mostly coarse.	37
38 - 603									38
39 - 602								Cobbles. Becomes slightly gravelly.	39
40 - 601									40
41 - 600								Trace gravel, scattered wood.	41
42 - 599									42
43 - 598								Glacio-lacustrine Hard, slightly moist, dark gray SILT (ML); varves.	43
44 - 597									44
45 - 596								Slightly sandy, very fine sand.	45
46 - 595							Hard, slightly moist, dark gray to light brown SILT (ML).	46	
47 - 594								47	
48 - 593								48	
49 - 592								49	

MONITORING WELL CEDAR HILLS PERCHING INVESTIGATION -REVISED DENSITY.GPJ April 19, 2010

Sampler Type:

- No Recovery
- Continuous Core

PID - Photoionization Detector (Headspace Measurement)

- Static Water Level
- Water Level (ATD)

Logged by: JTL

Approved by: EWM

Figure No. A- 20



Monitoring Well Construction Log

Project Number
040122

Well Number
GP-55

Sheet
3 of 3

Project Name: East Perched Zone Memorandum

Ground Surface Elev. 640.99

Location: Cedar Hills Regional Landfill, King County, Washington

Top of Casing Elev. 643.09

Driller/Method: Boart Longyear / Rotary Sonic

Depth to Water (ft BGS)

Sampling Method: Continuous Core

Start/Finish Date 10/20/2009-10/21/2009

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
51 - 590								51
52 - 589								52
53 - 588								53
54 - 587								54
55 - 586							Varves. Becomes light brown.	55
56 - 585							Poor recovery (55.0'-59.5').	56
57 - 584								57
58 - 583								58
59 - 582	10-20 silica sand (58.5'-70.0')						Becomes gravelly, light olive gray, with brown staining. Fine to coarse gravel.	59
60 - 581							Stratified Drift Moist, olive gray, very sandy, very silty GRAVEL (GM); fine to coarse sand, fine gravel to cobbles.	60
61 - 580								61
62 - 579	2" Sch 40 PVC screen 0.020" slot (60'-70')							62
63 - 578								63
64 - 577								64
65 - 576							Very moist.	65
66 - 575							Slightly moist to moist, gray, silty, very sandy GRAVEL (ML); fine to coarse sand, fine gravel to cobbles.	66
67 - 574							Moist, olive gray, silty, very sandy GRAVEL (GM); fine to coarse sand, fine gravel to cobbles.	67
68 - 573							Very moist, light brown, slightly silty, very gravelly SAND (SP); iron oxide staining.	68
69 - 572							Moist, olive gray, silty, very sandy GRAVEL (GM); fine to coarse sand, fine gravel to cobbles.	69
70 - 571	2" PVC threaded plug							70
71 - 570							Bottom of boring (70.5').	71
72 - 569								72
73 - 568								73
74 - 567								74

MONITORING WELL CEDAR HILLS PERCHING INVESTIGATION -REVISED DENSITY.GPJ April 19, 2010

Sampler Type:

- No Recovery
- Continuous Core

PID - Photoionization Detector (Headspace Measurement)

- Static Water Level
- Water Level (ATD)

Logged by: JTL

Approved by: EWM

Figure No. A- 20



Monitoring Well Construction Log

Project Number
040122

Well Number
GP-56

Sheet
1 of 1

Project Name: East Perched Zone Memorandum

Ground Surface Elev. 641.07

Location: Cedar Hills Regional Landfill, King County, Washington

Top of Casing Elev. 643.57

Driller/Method: Boart Longyear / Rotary Sonic

Depth to Water (ft BGS)

Sampling Method: Continuous Core

Start/Finish Date 10/21/2009

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
1 - 640	Above ground completion, 8" dia steel monument						Topsoil	1
2 - 639	Concrete (0'-2')						Weathered Till Medium stiff, slightly moist, red-brown, slightly gravelly, sandy SILT (ML); iron oxide staining.	2
3 - 638	Bentonite grout (2'-3')						Hard, slightly moist, light brown, slightly sandy, gravelly SILT (ML).	3
4 - 637	Bentonite chips (3'-5')							4
5 - 636	1" schedule 40 PVC casing (0-6')						Becomes sandy.	5
6 - 635	10-20 silica sand (5'-18')						Dry, brown, silty, sandy GRAVEL (GM); fine to coarse sand, fine to coarse gravel.	6
7 - 634								7
8 - 633								8
9 - 632								9
10 - 631	1" Sch 40 PVC screen, 0.020" slot (6'-16')						Becomes light brown.	10
11 - 630							Moist, brown SILT (ML); with iron oxide staining, trace sand, trace fine gravel.	11
12 - 629							Dry, light brown, silty, gravelly SAND (SM).	12
13 - 628							Slightly moist, brown, slightly gravelly, sandy SILT (SM-ML); some dark brown and iron oxide staining.	13
14 - 627								14
15 - 626							Till	15
16 - 625	PVC end cap (16')						Hard, slightly moist to moist, dark gray SILT (ML).	16
17 - 624								17
18 - 623								18
19 - 622	Bentonite chips (18'-20')						Becomes very moist.	19
20 - 621							Bottom of boring (20').	20
21 - 620								21
22 - 619								22
23 - 618								23
24 - 617								24

MONITORING WELL CEDAR HILLS PERCHING INVESTIGATION -REVISED DENSITY.GPJ April 19, 2010

Sampler Type:

- No Recovery
- Continuous Core

PID - Photoionization Detector (Headspace Measurement)

- Static Water Level
- Water Level (ATD)

Logged by: JTL

Approved by: EWM

Figure No. A- 21



Monitoring Well Construction Log

Project Number

040122

Well Number

GP-57

Sheet

1 of 3

Project Name: East Perched Zone Memorandum

Ground Surface Elev. 637.02

Location: Cedar Hills Regional Landfill, King County, Washington

Top of Casing Elev. 639.00

Driller/Method: Boart Longyear / Rotary Sonic

Depth to Water (ft BGS)

Sampling Method: Continuous Core

Start/Finish Date 10/15/2009-10/19/2009

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
1 - 636	Above ground completion, 8" dia steel monument						Topsoil	1
2 - 635	Concrete (0'-2.5')						Fill Slightly moist to dry, brown, slightly gravelly SILT (ML); trace sand, mostly coarse gravel.	2
3 - 634							Abundant roots and organics (0'-1').	3
4 - 633	Bentonite chips (2.5'-52')						Dry (1'-4').	4
5 - 632							Weathered Till Slightly moist, dark brown, very silty, very sandy GRAVEL (GM), occasional roots and organics, dark brown to yellow brown mottling in silt.	5
6 - 631								6
7 - 630	2" Sch 40 PVC casing (0'-53.5')						Moist, brown to dark gray, silty, very sandy GRAVEL (GM-SM); mostly fine sand, mostly coarse gravel. Brown (6.5'-7.0'), dark gray (7.0'-7.5').	7
8 - 629							Slightly moist, gray to olive gray, very silty, very gravelly SAND (SM); fine to coarse sand, fine to coarse gravel.	8
9 - 628							Slightly moist, dark gray, silty, very sandy GRAVEL (GM); mostly fine gravel, mostly coarse sand. Yellow-brown mottled stains.	9
10 - 627								10
11 - 626							Becomes very silty, fine to coarse gravel, fine to coarse sand, grades from dark brown to dark gray (11'-13.5').	11
12 - 625								12
13 - 624							Becomes dark olive gray, silty, sandy; mostly fine gravel (13.5'-15').	13
14 - 623							Occasional cobbles (15').	14
15 - 622							Slightly moist, olive gray to brown, slightly gravelly, very sandy SILT (SM-ML); very fine sand, medium to coarse gravel, silt is mostly brown with gray staining.	15
16 - 621								16
17 - 620							Slightly moist, dark gray, silty, very sandy GRAVEL (GM); fine gravel to cobbles.	17
18 - 619								18
19 - 618							Slightly sandy, slightly gravelly SILT (ML); very fine to coarse sand, fine to medium gravel.	19
20 - 617							Moist, sandy, very silty GRAVEL (GM); very fine to coarse sand, fine to medium gravel.	20
21 - 616							Glacio-lacustrine Very moist, dark gray, trace sand to slightly sandy SILT (ML); occasional very thin laminae of very fine sand (varve-like).	21
22 - 615								22
23 - 614								23
24 - 613								24

Sampler Type:

- No Recovery
- Continuous Core

PID - Photoionization Detector (Headspace Measurement)

- Static Water Level
- Water Level (ATD)

Logged by: **JTL**

Approved by: **EWM**

Figure No. **A- 22**

MONITORING WELL - CEDAR HILLS PERCHING INVESTIGATION -REVISED DENSITY.GPJ April 19, 2010



Monitoring Well Construction Log

Project Number
040122

Well Number
GP-57

Sheet
2 of 3

Project Name: East Perched Zone Memorandum

Ground Surface Elev. 637.02

Location: Cedar Hills Regional Landfill, King County, Washington

Top of Casing Elev. 639.00

Driller/Method: Boart Longyear / Rotary Sonic

Depth to Water (ft BGS)

Sampling Method: Continuous Core

Start/Finish Date 10/15/2009-10/19/2009

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
26 - 611	8" borehole (0'-34.2') 6" borehole (34.4'-66.5')						Becomes very moist (25').	
27 - 610							Brown staining (26').	26
28 - 609							Becomes wet (27').	27
29 - 608							Trace very fine sand (26'-29').	28
30 - 607								29
31 - 606								30
32 - 605								31
33 - 604								32
34 - 603							Set 8" casing in 2' hydrated bentonite chips (32.0'-34.2') then resumed drilling with 6" casing.	33
35 - 602							Very moist, no sand.	34
36 - 601								35
37 - 600								36
38 - 599							Trace coarse sand and fine gravel (38').	37
39 - 598							Moist, dark gray, slightly sandy to sandy, very gravelly silt; mostly fine gravel, mostly fine to medium sand (38'-40').	38
40 - 597							6" Borehole 8" Borehole	39
41 - 596								Slightly moist, dark gray, slightly sandy, gravelly to very gravelly SILT (GM-ML), fine to coarse gravel, mostly coarse sand (very hard drilling).
42 - 595							Slightly moist, dark gray, slightly gravelly SILT (ML); trace fine sand, occasional organics and wood, occasional thin laminae of fine sandy silt.	41
43 - 594								42
44 - 593								43
45 - 592								44
46 - 591							Trace fine gravel, trace sand (46'-50').	45
47 - 590								46
48 - 589								47
49 - 588							Light brown with brown varve-like laminae (49-50').	48

MONITORING WELL CEDAR HILLS PERCHING INVESTIGATION -REVISED DENSITY.GPJ April 19, 2010

Sampler Type:

- No Recovery
- Continuous Core

PID - Photoionization Detector (Headspace Measurement)

- Static Water Level
- Water Level (ATD)

Logged by: **JTL**

Approved by: **EWM**

Figure No. **A- 22**



Monitoring Well Construction Log

Project Number
040122

Well Number
GP-57

Sheet
3 of 3

Project Name: East Perched Zone Memorandum

Ground Surface Elev. 637.02

Location: Cedar Hills Regional Landfill, King County, Washington

Top of Casing Elev. 639.00

Driller/Method: Boart Longyear / Rotary Sonic

Depth to Water (ft BGS)

Sampling Method: Continuous Core

Start/Finish Date 10/15/2009-10/19/2009

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)	
51 - 586	10-20 silica sand (52'-66.5') 2" Sch 40 PVC screen 0.020" slot (53.5'-63.5') PVC end cap						Stratified Drift Slightly moist to moist, olive gray to brown, silty, sandy GRAVEL (GM); fine to coarse sand. Fine to coarse gravel (50'-52.5').	51	
52 - 585							Becomes brown, silty to slightly silty, mostly fine gravel (52.5'-55.0').	52	
53 - 584							(Drill bit became stuck at 55', added on-site potable water.)	53	
54 - 583								54	
55 - 582								55	
56 - 581								56	
57 - 580								Cobbles and boulders (57.0'-58.5'); (very hard drilling)	57
58 - 579								58	
59 - 578								Light brown, silty, very sandy (57'-60').	59
60 - 577								Slightly moist, brown, slightly silty, very sandy GRAVEL (GW-GM).	60
61 - 576							61		
62 - 575							Slightly moist, brown to dark gray, slightly silty to silty, very gravelly SAND (SW-SM); fine gravel to cobbles, fine to coarse sand.	62	
63 - 574							Silty (63.0'-63.5').	63	
64 - 573							Cobbles (64'-65').	64	
65 - 572								65	
66 - 571								66	
67 - 570							Bottom of boring (66.5').	67	
68 - 569								68	
69 - 568								69	
70 - 567								70	
71 - 566								71	
72 - 565								72	
73 - 564								73	
74 - 563								74	

MONITORING WELL CEDAR HILLS PERCHING INVESTIGATION -REVISED DENSITY.GPJ April 19, 2010

Sampler Type:

- No Recovery
- Continuous Core

PID - Photoionization Detector (Headspace Measurement)

- Static Water Level
- Water Level (ATD)

Logged by: JTL

Approved by: EWM

Figure No. A- 22



Monitoring Well Construction Log

Project Number
040122

Well Number
GP-58

Sheet
1 of 1

Project Name: East Perched Zone Memorandum

Ground Surface Elev. 637.56

Location: Cedar Hills Regional Landfill, King County, Washington

Top of Casing Elev. 639.81

Driller/Method: Boart Longyear / Rotary Sonic

Depth to Water (ft BGS)

Sampling Method: Continuous Core

Start/Finish Date 10/20/2009

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
637	Above ground completion, 8" dia steel monument						Topsoil	
636	Concrete (0'-2')						Fill	
635	Bentonite grout 2'-3'						Slightly moist, dark brown to brown, slightly sandy, very gravelly SILT (ML); mostly fine gravel, fine to coarse sand.	
634	Bentonite chips (3'-5')							
633	1" Sch 40 PVC casing (0'-6')						Weathered Till	
632	10-20 silica sand (5'-20')						Slightly moist to moist, gray to dark gray, sandy, silty GRAVEL (GM); fine to coarse sand, fine to coarse gravel.	
631								
630								
629							Becomes moist and dark gray (8').	
628	1" Sch 40 PVC screen, 0.020" slot (6'-16')						Dark brown silt, scattered roots and organics (9-10').	
627							Boulder (10-11').	
626							Slightly moist, olive gray to brown, silty, sandy GRAVEL to very gravelly SAND (GM-SM); fine to coarse sand, fine gravel to cobbles.	
625								
624								
623							Boulder (14-15').	
622							Till	
621	PVC end cap (16.2')						Moist, olive gray, silty, gravelly SAND (SM).	
620							Moist to wet, olive gray to brown, slightly silty, gravelly SAND (SP-SM) mostly fine sand, some coarse sand.	
619							Wet and silty.	
618							Moist, brown, slightly sandy SILT (ML); trace gravel, mostly fine sand.	
617							Bottom of boring (20').	
616								
615								
614								
613								

MONITORING WELL CEDAR HILLS PERCHING INVESTIGATION -REVISED DENSITY.GPJ April 19, 2010

Sampler Type:

- No Recovery
- Continuous Core

PID - Photoionization Detector (Headspace Measurement)

- Static Water Level
- Water Level (ATD)

Logged by: **JTL**

Approved by: **EWM**

Figure No. **A- 23**



Monitoring Well Construction Log

Project Number
040122

Well Number
GP-59

Sheet
1 of 3

Project Name: East Perched Zone Memorandum

Ground Surface Elev. 633.45

Location: Cedar Hills Regional Landfill, King County, Washington

Top of Casing Elev. 635.45

Driller/Method: Boart Longyear / Rotary Sonic

Depth to Water (ft BGS)

Sampling Method: Continuous Core

Start/Finish Date 10/22/2009-10/23/2009

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
633	Above ground completion, 8" dia steel monument						Topsoil	
1							Fill	1
632	Concrete (0'-2.5')						Medium stiff, moist, dark brown, slightly sandy, gravelly SILT (ML); abundant roots, fine to coarse gravel.	
2								2
631							Dry, brown, very sandy, very silty GRAVEL (GM); mottled with dark brown stains.	
3	Bentonite grout (2.5'-4')							3
630								
4							Hard, moist, dark brown, slightly sandy, slightly gravelly SILT (ML); iron oxide staining, mostly fine gravel.	4
629								
5							Becomes gray.	5
628								
6	Bentonite chips (4'-51.5')						Becomes dark brown, with abundant roots (topsoil).	6
627								
7							Weathered Till	7
626							Hard, moist, dark olive gray, slightly sandy, very gravelly SILT (ML); trace cobbles, abundant roots and organics, fine to coarse gravel.	
8								8
625								
9								9
624								
10							Slightly moist, olive gray, slightly sandy, very silty GRAVEL (GM); mottled brown staining, fine to coarse gravel.	10
623								
11							Cobbles.	11
622								
12								12
621								
13							Becomes sandy, very silty.	13
620								
14							Cobbles.	14
619								
15							Brown.	15
618								
16								16
617								
17								17
616								
18							Till	18
615							Hard, slightly moist, gray, slightly sandy, very gravelly SILT (ML); fine to coarse gravel, mostly fine.	
19								19
614								
20								20
613								
21							Moist. Iron oxide staining.	21
612							Hard, moist, dark gray SILT (ML).	
22							Glacio-lacustrine	22
611							Wet, dark gray, very silty, gravelly SAND (SM); fine to coarse gravel, fine to coarse sand.	
23								23
610								
24							ATD, no water in open borehole after 10 minutes.	24
609								

Sampler Type:

PID - Photoionization Detector (Headspace Measurement)

Logged by: JTL

No Recovery

Static Water Level

Approved by: EWM

Continuous Core

Water Level (ATD)

Figure No. A- 24

MONITORING WELL CEDAR HILLS PERCHING INVESTIGATION -REVISED DENSITY.GPJ April 19, 2010



Monitoring Well Construction Log

Project Number
040122

Well Number
GP-59

Sheet
2 of 3

Project Name: East Perched Zone Memorandum

Ground Surface Elev. 633.45

Location: Cedar Hills Regional Landfill, King County, Washington

Top of Casing Elev. 635.45

Driller/Method: Boart Longyear / Rotary Sonic

Depth to Water (ft BGS)

Sampling Method: Continuous Core

Start/Finish Date 10/22/2009-10/23/2009

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)																																																
608	Borehole 8" dia. (0'-35')						Hard, moist to wet, dark gray, slightly sandy, slightly gravelly SILT (ML).	26																																																
607								Borehole 6" dia. (35'-65.5')					Becomes slightly gravelly, very sandy, fine to coarse sand.	27																																										
606														2" Sch 40 PVC casing (0'-53.5')					Trace sand, fine gravel.	28																																				
605																				Borehole 8" dia. (0'-35')					Becomes olive gray, trace cobbles, fine to coarse gravel.	29																														
604																										Borehole 6" dia. (35'-65.5')					Slight brown staining.	30																								
603																																2" Sch 40 PVC casing (0'-53.5')					Hard, dry, dark gray, slightly gravelly SILT (ML); trace sand.	31																		
602																																						Borehole 8" dia. (0'-35')					Hard, dry, dark gray SILT (ML); trace fine gravel, trace fine to coarse sand.	32												
601																																												Borehole 6" dia. (35'-65.5')					Cobbles.	33						
600																																																		2" Sch 40 PVC casing (0'-53.5')					Slightly moist, olive gray, very silty GRAVEL (GM); trace sand, slight iron oxide staining.	34
599																																																								Borehole 8" dia. (0'-35')
598	Borehole 6" dia. (35'-65.5')					Hard, slightly moist, brown SILT (ML); varves.	36																																																	
597							2" Sch 40 PVC casing (0'-53.5')					Slightly moist, olive gray, sandy, very silty GRAVEL (GM); with cobbles, fine to coarse sand, fine to coarse gravel.	37																																											
596													Borehole 8" dia. (0'-35')					Moist, brown to olive gray, silty, very sandy GRAVEL (GM); with cobbles, fine to coarse sand, mostly coarse, fine to coarse gravel.	38																																					
595																			Borehole 6" dia. (35'-65.5')						39																															
594																									2" Sch 40 PVC casing (0'-53.5')						40																									
593																															Borehole 8" dia. (0'-35')						41																			
592																																					Borehole 6" dia. (35'-65.5')						42													
591																																											2" Sch 40 PVC casing (0'-53.5')						43							
590																																																	Borehole 8" dia. (0'-35')						44	
589																																																							Borehole 6" dia. (35'-65.5')	
588	2" Sch 40 PVC casing (0'-53.5')																																																							
587							Borehole 8" dia. (0'-35')																																																	
586													Borehole 6" dia. (35'-65.5')																																											
585																			2" Sch 40 PVC casing (0'-53.5')																																					
584																									Borehole 8" dia. (0'-35')																															

MONITORING WELL CEDAR HILLS PERCHING INVESTIGATION -REVISED DENSITY.GPJ April 19, 2010

Sampler Type:

- No Recovery
- Continuous Core

PID - Photoionization Detector (Headspace Measurement)

- Static Water Level
- Water Level (ATD)

Logged by: **JTL**

Approved by: **EWM**

Figure No. **A- 24**



Monitoring Well Construction Log

Project Number
040122

Well Number
GP-59

Sheet
3 of 3

Project Name: East Perched Zone Memorandum

Ground Surface Elev. 633.45

Location: Cedar Hills Regional Landfill, King County, Washington

Top of Casing Elev. 635.45

Driller/Method: Boart Longyear / Rotary Sonic

Depth to Water (ft BGS)

Sampling Method: Continuous Core

Start/Finish Date 10/22/2009-10/23/2009

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
51							Becomes slightly moist, sandy, with abundant cobbles and boulders.	51
52							Becomes moist, very sandy.	52
53							Gravel mostly fine.	53
54							Very moist, olive gray, silty, very gravelly SAND (SM); with iron oxide staining, fine gravel to cobbles, mostly fine, fine to coarse sand.	54
55							(Disturbed) Slightly moist, olive gray, silty, sandy GRAVEL (GM); sand fine to coarse, gravel fine to coarse.	55
56								56
57								57
58								58
59								59
60								60
61		61						
62		62						
63		63						
64		64						
65		65						
66		66						
67		67						
68		68						
69		69						
70		70						
71		71						
72		72						
73		73						
74		74						
559							Bottom of boring (65.5').	

MONITORING WELL CEDAR HILLS PERCHING INVESTIGATION -REVISED DENSITY.GPJ April 19, 2010

Sampler Type:

PID - Photoionization Detector (Headspace Measurement)

Logged by: JTL

No Recovery

Static Water Level

Approved by: EWM

Continuous Core

Water Level (ATD)

Figure No. A- 24



Monitoring Well Construction Log

Project Number
040122

Well Number
GP-60

Sheet
1 of 1

Project Name: East Perched Zone Memorandum

Ground Surface Elev. 633.68

Location: Cedar Hills Regional Landfill, King County, Washington

Top of Casing Elev. 635.84

Driller/Method: Boart Longyear / Rotary Sonic

Depth to Water (ft BGS)

Sampling Method: Continuous Core

Start/Finish Date 10/23/2009

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
633	Above ground completion, 8" dia steel monument						Topsoil	
632	Concrete (0'-2.5')						Fill	
631	Bentonite grout (2.5'-5')						Stiff, brown, moist, gravelly, sandy SILT (ML); scattered roots and organics, iron oxide staining.	1
630	1" Sch 40 PVC casing (0-8')							2
629	Bentonite chips (5'-6.5')						Loose, slightly moist, dark brown, slightly gravelly, sandy SILT (ML); abundant organics, gravel mostly fine.	3
628	10-20 silica sand (6.5'-20')						Hard, moist, dark gray, slightly gravelly, slightly sandy SILT (ML); abundant roots	4
627							Weathered till	5
626							Hard, slightly moist, olive gray, gravelly, sandy SILT (ML); fine to coarse gravel, fine to coarse sand.	6
625								7
624								8
623	1" Sch 40 PVC screen, 0.020" slot (8'-18')						Slightly moist, olive gray, sandy, very silty GRAVEL (GM); fine to coarse gravel.	9
622							Gray.	10
621							Olive gray.	11
620							Brown.	12
619								13
618							Becomes silty, very sandy.	14
617								15
616	PVC end cap						Till	16
615							Hard, slightly moist, dark gray, sandy, gravelly silt (ML); fine gravel to cobbles.	17
614								18
613							Bottom of boring (20').	19
612								20
611								21
610								22
609								23
								24

MONITORING WELL CEDAR HILLS PERCHING INVESTIGATION -REVISED DENSITY.GPJ April 19, 2010

Sampler Type:

- No Recovery
- Continuous Core

PID - Photoionization Detector (Headspace Measurement)

- Static Water Level
- Water Level (ATD)

Logged by: **JTL**

Approved by: **EWM**

Figure No. **A- 25**



Monitoring Well Construction Log

Project Number
040122

Well Number
GP-61

Sheet
1 of 3

Project Name: East Perched Zone Memorandum

Ground Surface Elev. 561.42

Location: Cedar Hills Regional Landfill, King County, Washington

Top of Casing Elev. 563.18

Driller/Method: Boart Longyear / Rotary Sonic

Depth to Water (ft BGS)

Sampling Method: Continuous Core

Start/Finish Date 10/14/2009

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
561	Above ground completion, 8" dia steel monument						Topsoil	
1							Fill Moist, dark brown, slightly sandy GRAVEL (GW); trace silt, fine gravel to cobbles.	1
560	Concrete (0'-3')						Thin silt bed; dry, brown, very gravelly, trace sand, scattered organics (2').	2
2							Weathered Till	3
559							Dry, gray, slightly silty, sandy GRAVEL (GW); trace brown silt, fine gravel to cobbles, fine to coarse sand.	4
3								5
558								6
4	Bentonite chips (3'-51')							7
5								8
557								9
6	2" Sch 40 PVC casing (0'-53')							10
7								11
556								12
8							Becomes mottled, slightly sandy. Abundant cobbles (7'-10').	13
9								14
555								15
10							Till	16
554							Slightly moist, olive brown to gray, slightly silty, sandy GRAVEL (GW-GM); fine gravel to cobbles, fine to coarse sand, silty matrix is mostly olive brown with mottled brown yellow staining.	17
11								18
553								19
12								20
552								21
13								22
551								23
14								24
550								25
15								26
549								27
16								28
548								29
17								30
547								31
18								32
546								33
19								34
545								35
20								36
544								37
21								38
543								39
22								40
542								41
23								42
541								43
24								44
540								45
25								46
539								47
26								48
538								49
27								50
537								51
28								52
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								97
								98
								99
								100

Sampler Type: No Recovery Continuous Core
 PID - Photoionization Detector (Headspace Measurement) Static Water Level Water Level (ATD)
 Logged by: JTL Approved by: EWM Figure No. A- 26

MONITORING WELL CEDAR HILLS PERCHING INVESTIGATION -REVISED DENSITY.GPJ April 19, 2010



Monitoring Well Construction Log

Project Number

040122

Well Number

GP-61

Sheet

2 of 3

Project Name: East Perched Zone Memorandum

Ground Surface Elev. 561.42

Location: Cedar Hills Regional Landfill, King County, Washington

Top of Casing Elev. 563.18

Driller/Method: Boart Longyear / Rotary Sonic

Depth to Water (ft BGS)

Sampling Method: Continuous Core

Start/Finish Date 10/14/2009

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
536	8" borehole (0'-30') 6" borehole 30'-65.4'						Moist, silty, brown (25').	
26							Very moist to wet, olive gray to dark gray, very silty, very sandy (25-28.5').	26
535							Abundant iron-oxidation staining (26-28')	
27							Thin silty gravelly sand bed; coarse sand (27').	27
534								
28								
533								
29							Very moist, olive gray to gray-brown, silty, very gravelly SAND to very sandy GRAVEL (GM-SM); mostly fine gravel, mostly coarse sand.	29
532								
30							Abundant cobbles (29').	30
531								
31								
530								
32							Slightly moist to moist, brown to gray, silty, very sandy GRAVEL (GM).	32
529								
33							Abundant cobbles (33')	33
528								
34							Becomes slightly moist to dry, dark brown (34-45').	34
527								
35							Moist, brown, silty, very gravelly SAND (SM).	35
526								
36								
525								
37							Moist, brown, silty, very sandy GRAVEL (GM).	37
524								
38							Cobbles (38')	38
523								
39		○				Becomes slightly moist, olive gray, very sandy, very silty.	39	
522								
40								
521								
41								
520								
42						Thin silt interbeds (42-42.5').	42	
519								
43						Slightly moist, olive gray to brown, slightly silty to silty, very sandy GRAVEL (GW-GM); fine to coarse gravel, mostly fine sand.	43	
518								
44								
517								
45						Becomes very silty, yellow-brown (45-46').	45	
516								
46								
515								
47						Moist, gray to brown, gravelly, very silty SAND (SM-ML); fine to medium sand, mostly fine gravel.	47	
514								
48								
513								
49						Slightly moist, brown, silty, very sandy GRAVEL (GM)	49	
512								

Sampler Type:

- No Recovery
- Continuous Core

PID - Photoionization Detector (Headspace Measurement)

- Static Water Level
- Water Level (ATD)

Logged by: **JTL**

Approved by: **EWM**

Figure No. **A- 26**

MONITORING WELL CEDAR HILLS PERCHING INVESTIGATION -REVISED DENSITY.GPJ April 19, 2010



Monitoring Well Construction Log

Project Number
040122

Well Number
GP-61

Sheet
3 of 3

Project Name: East Perched Zone Memorandum

Ground Surface Elev. 561.42

Location: Cedar Hills Regional Landfill, King County, Washington

Top of Casing Elev. 563.18

Driller/Method: Boart Longyear / Rotary Sonic

Depth to Water (ft BGS)

Sampling Method: Continuous Core

Start/Finish Date 10/14/2009

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
511							Slightly moist, brown, slightly silty to silty, very sandy GRAVEL (GW-GM).	51
51								51
510								52
52								52
509	10-20 silica sand (51'-65.4')							52
508							Becomes dark brown, moist to very moist (52.5-53').	53
53								53
507								54
54								54
506							Dry to slightly moist, olive gray to brown, trace to slightly silty, very sandy GRAVEL (GW-GM); fine gravel to cobbles, fine to coarse sand.	55
55								55
505								56
56								56
504								57
57								57
503	2" Sch 40 PVC screen, 0.020" slot (53'-63')							58
58								58
502							Moist (59').	59
59							Abundant cobbles (59-60').	59
60								60
501							Moist, olive gray to brown, silty, very gravelly SAND (SM).	60
61								61
500							Dry, red-brown to light gray, trace to slightly silty, very sandy GRAVEL (GW); fine gravel to cobbles.	61
62								62
499								63
63	PVC end cap (63.1')							63
498								64
64							Thinly bedded, red-brown fine sand interbeds (64').	64
497								64
65								65
496							Bottom of boring (65.4').	65
66								66
495								66
67								67
494								67
68								68
493								68
69								69
492								69
70								70
491								70
71								71
490								71
72								72
489								72
73								73
488								73
74								74
487								74

MONITORING WELL CEDAR HILLS PERCHING INVESTIGATION -REVISED DENSITY.GPJ April 19, 2010

Sampler Type:

PID - Photoionization Detector (Headspace Measurement)

Logged by: JTL

No Recovery

Static Water Level

Approved by: EWM

Continuous Core

Water Level (ATD)

Figure No. A- 26



Monitoring Well Construction Log

Project Number
040122

Well Number
GP-62

Sheet
1 of 1

Project Name: East Perched Zone Memorandum

Ground Surface Elev. 563.35

Location: Cedar Hills Regional Landfill, King County, Washington

Top of Casing Elev. 565.28

Driller/Method: Boart Longyear / Rotary Sonic

Depth to Water (ft BGS)

Sampling Method: Continuous Core

Start/Finish Date 10/21/2009

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
563	Above-ground completion, 8" dia steel monument						Topsoil	
1							Fill	1
562	Concrete (0'-2.5')						Very moist, dark brown, very silty, very sandy GRAVEL (GM); abundant roots, fine to coarse sand	
2								2
561	Bentonite chips (2.5'-3')						Dry, brown, very gravelly, very sandy SILT (SM-ML); fine to coarse sand.	
3								3
560	Bentonite grout (3'-4.5')						Drill chatter (3.5').	
4								4
559							Dry, light brown GRAVEL (GW); trace silt, trace cobbles, trace sand, fine to coarse gravel.	
5							Weathered Till	5
558	Bentonite chips (4.5'-7')						Dry, light gray, silty, very sandy GRAVEL (GW-GM); fine to coarse sand, fine gravel to cobbles.	
6								6
557	1" Sch 40 PVC casing (0'-8')							
7								7
556	10-20 silica sand (7'-19.6')							
8								8
555								
9							Trace wood, trace organics; slight iron oxide staining; mottled texture.	
10							Till	10
554							Dry, light gray, trace to slightly silty, sandy GRAVEL (GW-GM); fine to coarse sand, fine to coarse gravel.	
11							Abundant coarse sand.	11
553								
12							Iron oxide staining; trace roots.	12
552								
13							Cobbles.	13
551								
14								14
550								
15							Becomes siltier; crushed rock; slightly mottled silt.	15
549								
16							Slightly moist, olive gray to brown, sandy GRAVEL (GP); trace silt, fine to coarse sand, mostly coarse, fine to coarse gravel, mostly fine.	16
548								
17							Yellow-red iron oxide staining	17
547								
18							Becomes brown and slightly silty	18
546								
19							Dark brown SILT (ML)	19
545							Very moist, brown to olive gray, silty to very silty, sandy GRAVEL (GP-GM); some reddish iron oxide staining.	
20							Becomes very silty	20
544								
21							Bottom of boring (20').	21
543								
22								22
542								
23								23
541								
24								24
540								
539								

Sampler Type:

PID - Photoionization Detector (Headspace Measurement)

Logged by: JTL

No Recovery

Static Water Level

Approved by: EWM

Continuous Core

Water Level (ATD)

Figure No. A- 27

MONITORING WELL CEDAR HILLS PERCHING INVESTIGATION -REVISED DENSITY.GPJ April 19, 2010



PROJECT Cedar Hills Landfill

Page 1 of 1

Location Southwest of Extended Care Unit

Boring No. GP-ATC-1

Surface Elevation _____

Drilling Method Air Rotary

Total Depth 21 feet

Drilled By Hayes Well Drilling

Date Completed 10/7/86

Logged By D.E. Mills

WELL DETAILS	PENE-TRATION TIME/RATE	DEPTH (FEET)	SAMPLE		PERME-ABILITY TESTING	SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
			NO.	TYPE				
		5	1	Grab			0'-5' <u>Fine sandy gravelly SILT (ML)</u> , brown, moist. Gravel fine (to 0.5-in. diameter), subangular; Trace medium sand.	
		10	2	Grab			5'-13' <u>Silty fine-medium SAND (SM)</u> , Variable quantities of silt; trace fine (to 0.75-in.) gravel, subangular. (WEATHERED TILL)	
		15	3	Grab			13'- 21' <u>Slightly silty SAND (SP-SM)</u> . gray, moist. fine gravelly between 18 and 20 feet. (UNWEATHERED TILL)	
		20	4	Grab			Bottom at 21 feet.	
		25						



BORING LOG

PROJECT Cedar Hills Landfill A.T.C. Gas Probes

Page 1 of 1

Location 75 ft. east of MH-9-on sewer line

Boring No. ATC-2a

Surface Elevation _____

Drilling Method Hand Auger

Total Depth 2.5 feet

Drilled By P. Rowland

Date Completed 10/8/86

Logged By P. Rowland

WELL DETAILS	PENE-TRATION TIME/RATE	DEPTH (FEET)	SAMPLE		PERME-ABILITY TESTING	SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
			NO.	TYPE				
		1					0-2.0' Silty sandy GRAVEL (GP), brown, wet. Sand fine to coarse; gravel to 3" dia.	
		2					2.0'-2.5' PEA-GRAVEL and SAND encasing sewer line Saturated.	
		3					Bottom at 2.5 feet.	
		4						
		5						
NOTE: No gas probe installed at this location due to the shallow saturated condition of the gravel backfill in the sewer line trench.								



PROJECT Cedar Hills - A.T.C. Gas Probes

Page 1 of 1

Location 150' east of MH-9 on sewer line

Boring No. ATC-2b

Surface Elevation _____

Drilling Method Hand Auger

Total Depth 5 feet

Drilled By P. Rowland

Date Completed 10/8/86

Logged By P. Rowland

WELL DETAILS	PENE-TRATION TIME/RATE	DEPTH (FEET)	SAMPLE		PERME-ABILITY TESTING	SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
			NO.	TYPE				
		1					0.0-5.0 <u>Silty sandy GRAVEL</u> (GP); brown, wet to 4.5 feet, saturated below.	
		2						
		3						
		4						
		5						
							Bottom at 5 feet. NOTE: Did not encounter the pea-gravel surrounding the sewer line. Till backfill was saturated at 4.5 feet. Did not install gas probe.	



PROJECT Cedar Hills A.T.C. Gas Probes

Page 1 of 1.

Location Northwest of Extended Care Unit

Boring No. GP-ATC-3

Surface Elevation _____

Drilling Method Air Rotary

Total Depth 21 feet

Drilled By Hayes Well Drilling

Date Completed 10/7/86

Logged By D.E. Mills

WELL DETAILS	PENE-TRATION TIME/RATE	DEPTH (FEET)	SAMPLE		PERME-ABILITY TESTING	SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
			NO.	TYPE				
		5	1	Grab			0-5': <u>Fine to medium sandy SILT (ML)</u> , light brown, moist. Trace fine to med. gravel (to 1.5- in.), sub-rounded.	
		10	2	Grab			5-15': <u>Gravelly silty fine-medium SAND (SM)</u> , brown, moist. Gravel to 0.5 in. dia., subangular to rounded. Trace coarse sand. (WEATHERED TILL)	
		15	3	"			Boulder at 14 feet.	
		20	4	"			15-21': <u>Slightly gravelly to gravelly SAND (SP)</u> , grey moist. Fine to med. sand. Variable gravel contents; fine (to 0.75"), sub-rounded. (UNWEATHERED TILL)	
		25					Bottom at 21 feet	



PROJECT Cedar Hills - A.T.C. Gas Probes

Page 1 of 1

Location North of Extended Care Unit

Boring No. GP-ATC-4

Surface Elevation _____

Drilling Method Air Rotary

Total Depth 21 feet

Drilled By Hayes Well Drilling

Date Completed 10/7/86

Logged By D.E. Mills

WELL DETAILS	PENE-TRATION TIME/RATE	DEPTH (FEET)	SAMPLE		PERME-ABILITY TESTING	SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
			NO.	TYPE				
		5	1	Grab		0'-1' Dark brown TOPSOIL 1'-9' Gravelly fine sandy SILT (ML), orange-brown, moist. Trace medium sand. Gravel to 0.5 in.dia., subangular.		
		10	2	Grab		9'-17' Silty fine to med. SAND (SM), orange-brown to grey-brown (toward 17'), moist. Trace coarse sand. Trace fine, subangular gravel. (WEATHERED TILL)		
		15	3	Grab				
		20	4	Grab		17'-21' Gravelly fine to medium SAND (SP), brownish grey, moist. Gravel to 0.5 in. dia., subangular. Trace silt. Possible cobbles at lower 3'. (UNWEATHERED TILL)		
		25				Bottom at 21 feet		



PROJECT Cedar Hills - A.T.C. Gas Probes

Page 1 of 1

Location South of South dormitory

Boring No. GP-ATC-5

Surface Elevation _____

Drilling Method Air Rotary

Total Depth 21 feet

Drilled By Hayes Well Drilling

Date Completed 10/7/86

Logged By D.E. Mills

WELL DETAILS	PENE-TRATION TIME/RATE	DEPTH (FEET)	SAMPLE		PERME-ABILITY TESTING	SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
			NO.	TYPE				
<p>Diagram labels: Boring Casing, Fine (to 0.75-in), rounded gravel, 0.5-in PVC w/0.25-in diameter perforations on 1.0-in centers, wrapped with fine wire mesh, Hydrated bentonite chips, Chemcock valve w/0.25-in Flush-mount valve box.</p>		5	1	Grab		<p>0'-8' <u>Fine sandy SILT (ML)</u>, brown, moist. Variable contents of fine sand; trace coarse sand. Trace fine gravel (to 0.75 in.), subangular.</p>		
		10	2	Grab		<p>8'-15' <u>Gravelly silty fine SAND (SM)</u>, brown, moist. Gravel to 0.75in., rounded. Trace medium to coarse sand.</p>		
		15	3	Grab		<p>15'-21' <u>Silty fine SAND (SM)</u>, brown to grey-brown at 21', moist. Trace fine, rounded gravel. Trace coarse sand. (WEATHERED TILL)</p>		
		20	4	Grab		<p>Bottom at 21 feet</p>		
		25						



PROJECT Cedar Hills - A.T.C. Gas Probes

Page 1 of 1

Location East of Multi-Use Building

Boring No. GP-ATC-6

Surface Elevation _____

Drilling Method Air Rotary

Total Depth 21 feet

Drilled By Hayes Well Drilling

Date Completed 10/7/86

Logged By D.E. Mills

WELL DETAILS	PENETRATION TIME/RATE	DEPTH (FEET)	SAMPLE		PERMEABILITY TESTING	SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
			NO.	TYPE				
		5	1	Grab			0'-1' Dark Brown TOPSOIL	
		10	2	"			1'-8' Sandy silty GRAVEL (GM), brown, moist. Gravel to 1.5 in. dia., subangular to rounded. Sand very fine to medium.	
		15	3	"			8'-11' Sandy SILT (ML), brown, moist. Trace fine to medium gravel. (WEATHERED TILL)	
		20	4	"			11'-15' Silty fine SAND (SM), brownish-grey, moist trace coarse sand, trace gravel.	
		25					15'-21' Slightly silty gravelly SAND (SP), fine to medium, grey, moist. Gravel to 1-in., subangular to rounded. (UNWEATHERED TILL)	
							Bottom at 21 feet	



PROJECT Cedar Hills - A.T.C. Gas Probes

Page 1 of 1

Location North of Administration Building

Boring No. GP-ATC-7

Surface Elevation _____

Drilling Method Air Rotary

Total Depth 22 feet

Drilled By Hayes Well Drilling

Date Completed 10/7/86

Logged By D.E. Mills

WELL DETAILS	PENE-TRATION TIME/RATE	DEPTH (FEET)	SAMPLE		PERME-ABILITY TESTING	SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
			NO.	TYPE				
		5				0-10' Silty fine to medium SAND (SM), orange-brown, moist. Trace fine gravel (to 0.5 in. diameter), subrounded.		
		10				10-13' Slightly silty gravelly fine SAND (SP-SM) grey-brown, moist. Gravel fine to medium rounded. (WEATHERED TILL).		
		15				13-19' Slightly silty gravelly fine SAND (SP-SM) grey, moist. Gravel fine to medium (to 1-in.), rounded.		
		20				19-22' Fine sandy SILT (ML) blue-grey, wet. Trace fine gravel. (UNWEATHERED TILL)		
		25				Bottom at 22 feet.		



PROJECT Cedar Hills - A.T.C. Gas Probes

Page 1 of 1

Location Northeast of Admin. Building

Boring No. GP-ATC-8

Surface Elevation _____

Drilling Method Air Rotary

Total Depth 22 feet

Drilled By Hayes Well Drilling

Date Completed 10/6/86

Logged By P.J. Rowland

WELL DETAILS	PENE-TRATION TIME/RATE	DEPTH (FEET)	SAMPLE		PERME-ABILITY TESTING	SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY	
			NO.	TYPE					
		5	1	Grab			0'-12' <u>Slightly silty sandy GRAVEL (GP)</u> , brown to tan, dry. Gravel to 1.5-in., rounded. Sand fine to medium. Occasional cobbles or boulders. (WEATHERED TILL)		
		10	2	"					
		15	3	"				12'-22' <u>Silty Sandy GRAVEL (GP-GM)</u> , blue-grey, moist. Gravel to 1.0-in. diameter, rounded. Sand fine to medium. Variable silt and sand ratios, generally siltier between 18 and 22 feet. (UNWEATHERED TILL)	
		20	4	"					
		25					Bottom at 22 feet		

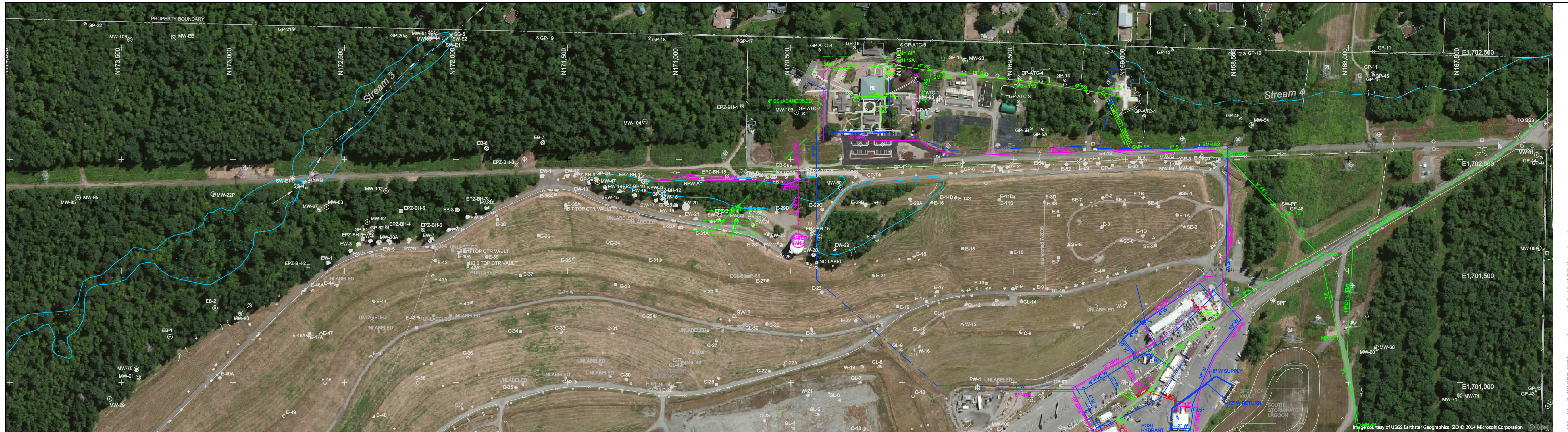
APPENDIX B

Existing Infrastructure

Appendix B

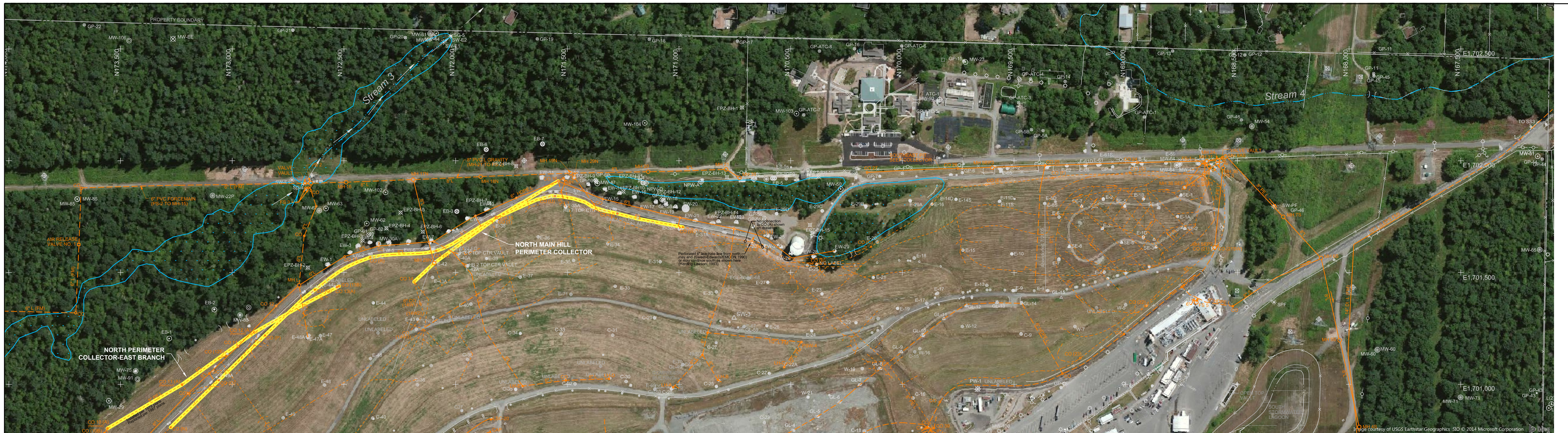
Existing Infrastructure

This Appendix provides subsurface utility maps developed by Aspect in the *Technical Memorandum on the East Main Hill Perched Zones* (Aspect, 2010) for subsurface utility lines. The user of these maps is referred to that Technical Memorandum for discussion on data sources and compilation methods for these drawings.



Legend MW-63 (Circled) Perched Zone Monitoring Well MW-80 (Circled) Regional Aquifer Monitoring Well		EB-3 (Circled) Perched Zone Piezometer EPZ-BH-1 (Circled) Borehole / Geoprobe GP-ATC-8 (Circled) Gas Probe (Letters denote individual probes in boreholes with multiple completions.)		E-35 (Circled) Gas Extraction Well EW-15 (Circled) Groundwater Extraction Well SG-5 (Circled) Staff Gage with Piezometer SW-E1 (Circled) Surface Water Monitoring Station		(Blue dashed line) Approximate route of stream flow (Blue shaded area) Approximate extent of wetland area from KCSWD (2000) maps (Blue outline) Landfill cover limits		(Blue line) Water line (Green line) Water line (Non-potable) (Red line) Sanitary Sewer line (Purple line) Sanitary Sewer drainfield line (Pink line) Liquefied Petroleum Gas		(Dotted line) Lines added to KCSWD CAD drawing based on original plans		0 200 400 800 Feet				Water, Non-Potable Water and Sanitary Sewer Map Cedar Hills Regional Landfill King County, Washington		PROJECT NO. 130088 FIGURE NO. B-1	
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CAD File: C:\Cedar Hills\2016_09_RL\F5130088_21_line water NP water LP water map.dwg 11 Date Saved: Sun 12/20/16 4:11pm 11 Lib: rscad



Legend MW-63 Perched Zone Monitoring Well MW-80 Regional Aquifer Monitoring Well EB-3 Perched Zone Piezometer EPZ-BH-1 Borehole / Geoprobe GP-ATC-8 Gas Probe (Letters denote individual probes in boreholes with multiple completions.) E-38 Gas Extraction Well SE-3 EW-15 Groundwater Extraction Well SG-5 Staff Gage with Piezometer SW-E1 Surface Water Monitoring Station Approximate route of stream flow Approximate extent of wetland area from KCSWD (2000) maps Landfill cover limits Leachate line - solid Leachate line - line type not specified Leachate line - perforated Leachate collectors of interest		0 200 400 800 Feet N Aspect CONSULTING King County Leachate System Map Cedar Hills Regional Landfill King County, Washington		DATE: Sep-2016 DESIGNED BY: JSL DRAWN BY: PMB REVIEWED BY: KSL/SCC PROJECT NO.: 130088 FIGURE NO.: B-2
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CAD Data: C:\cadd\hills\2016\09\130088-21\leachate\leachate.sxd
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Legend

MW-63	Perched Zone Monitoring Well	EB-3	Perched Zone Piezometer	E-35	Gas Extraction Well	FC-36	Approximate route of stream flow	—○—	Landfill Gas line
MW-80	Regional Aquifer Monitoring Well	GP-ATC-8	Borehole / Geoprobe	EW-15	Groundwater Extraction Well	—	Approximate extent of wetland area from KCSWD (2000) maps	—	Lines added to KCSWD CAD drawing based on original plans
				SG-5	Staff Gage with Piezometer	—	Landfill cover limits		
				SW-E1	Surface Water Monitoring Station				



Landfill Gas System Map

Cedar Hills Regional Landfill
King County, Washington

DATE: Sep-2016
DESIGNED BY: JSL
DRAWN BY: PMB
REVIEWED BY: KSL/SCC

PROJECT NO. 130088
FIGURE NO. B-3

CAD File: C:\Cedar Hills\2016\09\B-3\FPS\130088-21.dwg Landfill Gas LFG 11 Date Sheet: Sep 12, 2016 4:02pm 11 User: jsl

Image courtesy of USGS Earthstar Geographics SIO © 2014 Microsoft Corporation

APPENDIX F

LFG East and Central Header Data and LandGEM Model

Table F1 - East Header Summary from Data Summary, Analysis, and Alternatives Report (AECOM 2015)

Header	Collector ID	Collector Type	Average Flow (SCFM)	Average Methane (tpd)	Average Methane (%)	Average Oxygen (%)	Average Nitrogen (%)	Average Carbon Dioxide (%)	Average Temperature (°F)	Average Static Pressure (in WC)	% Data Open Valve
East	CHE00066	Vertical (Gas)	34	0.8	83	6.50	4.7	6	100	-17.2	1%
East	CHE00009	Vertical (Gas)	43	0.7	58	0.05	13.5	29	77	-5.2	60%
East	CHE00028	Leachate Cleanout	40	0.7	60	0.23	6.8	34	65	-0.7	4%
East	CHE00006	Vertical (Gas)	29	0.7	79	0.20	3.0	18	61	-23.2	35%
East	CHE00067	Vertical (Gas)	39	0.7	57	0.91	6.6	35	66	-23.6	25%
East	CHE00004	Vertical (Gas)	34	0.5	54	0.03	13.6	32	67	-22.5	100%
East	CHE00045	---	35	0.5	52	0.10	18.6	29	93	-0.3	1%
East	CHE00031	Vertical (Gas)	31	0.5	56	0.48	8.2	36	61	-25.3	100%
East	CHE00071	Gas/Leachate Dual Phase Vertical	36	0.5	50	0.35	11.1	38	68	-9.1	100%
East	CHE00011	---	33	0.5	51	1.63	20.1	27	45	-27.8	5%
East	CHE00055	Tee (Gas)	32	0.5	48	0.01	23.5	28	68	-0.7	35%
East	CHE00013	Vertical (Gas)	29	0.4	48	0.02	25.2	26	61	-23.1	46%
East	CHE00040	Vertical (Gas)	29	0.4	53	0.66	11.7	35	62	-4.1	100%
East	CHE00034	Tee (Gas)	30	0.4	52	0.02	12.1	36	60	-6.0	100%
East	CHE00038	Leachate Cleanout	24	0.4	55	0.35	10.3	35	77	-0.5	12%
East	CHE00042	Manhole (#28)	19	0.3	56	0.05	7.3	37	70	-5.0	24%
East	CHE00010	Vertical (Gas)	20	0.3	52	0.32	25.2	22	65	-21.2	48%
East	CHEGL059	Gas/Leachate Dual Phase Vertical	20	0.3	51	0.48	10.6	38	66	-2.5	44%
East	CHE00003	---	17	0.3	57	3.11	28.8	11	59	-26.7	8%
East	CHE00030	Vertical (Gas)	16	0.3	56	0.01	5.7	39	61	-25.1	100%
East	CHE00043	Vertical (Gas)	17	0.3	52	0.84	13.8	33	63	-1.6	53%
East	CHE00050	Vertical (Gas)	15	0.2	55	0.01	13.5	32	64	-23.1	100%
East	CHE00069	Vertical (Gas)	17	0.2	50	0.01	14.1	36	68	-1.5	20%
East	CHEGL061	Gas/Leachate Dual Phase Vertical	15	0.2	54	0.98	8.1	37	65	-2.5	70%
East	CHE00024	Vertical (Gas)	16	0.2	48	0.01	16.6	36	62	-8.8	86%
East	CHEGLSE5	Gas/Leachate Dual Phase Vertical	13	0.2	58	0.24	24.8	17	60	-25.4	15%
East	CHE00054	Vertical (Gas)	12	0.2	56	0.32	17.0	27	72	-19.6	14%
East	CHEGLSE3	Gas/Leachate Dual Phase Vertical	12	0.2	59	0.37	15.9	24	61	-18.3	14%
East	CHE0001D	Vertical (Gas)	12	0.2	61	0.02	20.4	19	61	-12.4	31%
East	CHE00070	Vertical (Gas)	14	0.2	48	0.47	15.0	36	63	-2.7	66%
East	CHE00022	Vertical (Gas)	14	0.2	47	0.02	19.9	33	60	-10.3	94%
East	CHE00048	Vertical (Gas)	13	0.2	50	0.03	17.8	32	64	-3.8	89%
East	CHEGLSE2	Gas/Leachate Dual Phase Vertical	8	0.2	66	3.63	18.3	12	81	-16.7	3%
East	CHE00035	Vertical (Gas)	12	0.2	53	0.01	11.1	36	62	-7.7	100%
East	CHE0040A	Horizontal (Leachate HB-6)	11	0.2	60	0.04	1.2	39	64	-25.6	100%
East	CHE00023	Vertical (Gas)	11	0.2	56	0.03	11.7	33	58	-4.7	53%
East	CHE00068	Vertical (Gas)	16	0.2	41	0.08	34.2	25	69	-4.5	47%
East	CHE00027	Vertical (Gas)	11	0.2	57	0.04	8.3	34	64	-18.0	89%
East	CHE00033	Vertical (Gas)	10	0.2	59	0.01	1.1	40	61	-26.5	100%
East	CHE00049	Tee (Gas)	12	0.2	49	0.01	17.9	33	66	-7.1	84%
East	CHE00039	Tee (Gas)	12	0.2	46	0.64	22.4	31	70	-4.8	24%
East	CHEGLSE1	Gas/Leachate Dual Phase Vertical	7	0.2	69	2.77	11.5	17	67	-11.4	4%
East	CHE00036	Tee (Gas)	11	0.2	50	0.03	18.2	32	62	-4.2	100%
East	CHEGL060	Gas/Leachate Dual Phase Vertical	11	0.2	51	0.34	16.3	32	64	-7.9	81%
East	CHE0043A	---	11	0.2	49	0.02	15.9	35	72	-1.5	36%
East	CHE0047A	Horizontal (Leachate HB-4)	9	0.2	61	0.06	1.9	37	65	-27.1	100%
East	CHE0056A	Horizontal (Leachate HB-3)	7	0.1	69	0.02	0.9	30	68	-27.7	100%
East	CHE00018	Vertical (Gas)	9	0.1	51	0.08	17.9	31	66	-18.5	97%
East	CHE00021	Vertical (Gas)	8	0.1	62	0.76	4.6	32	62	-26.1	97%
East	CHEGLSE8	Gas/Leachate Dual Phase Vertical	8	0.1	57	0.28	12.2	31	63	-22.7	68%
East	CHE0035A	Horizontal (Leachate HB-7)	8	0.1	52	0.32	10.3	38	53	-25.7	25%
East	CHE00E1A	Vertical (Gas)	8	0.1	55	0.53	23.7	21	64	-20.7	30%
East	CHE00017	Vertical (Gas)	8	0.1	50	0.03	20.3	30	61	-22.6	88%
East	CHE00026	Vertical (Gas)	7	0.1	56	0.09	6.3	37	63	-26.3	100%
East	CHE00032	Horizontal (Leachate HB-9)	7	0.1	58	0.20	2.3	39	65	-26.7	93%
East	CHE0001B	Vertical (Gas)	11	0.1	28	0.00	56.0	16	54	-19.0	3%
East	CHE00019	Vertical (Gas)	6	0.1	63	0.01	0.8	36	61	-26.9	100%
East	CHEGLSE6	Gas/Leachate Dual Phase Vertical	6	0.1	58	0.73	22.4	18	67	-18.6	11%
East	CHEMHFC1	Vertical (Gas)	7	0.1	45	1.63	21.1	33	69	-3.3	51%
East	CHE0038A	Horizontal (Leachate)	12	0.1	9	17.12	67.1	7	57	-0.4	6%
East	CHE0048A	Horizontal (Leachate HB-5)	4	0.1	60	1.20	7.4	32	50	-24.0	2%
East	CHE00016	Leachate Cleanout	11	0.1	20	9.12	56.1	15	60	-0.8	97%
East	CHE00053	Tee (Gas)	6	0.1	37	0.04	35.0	28	52	-3.9	14%
East	CHE00037	Vertical (Gas)	4	0.1	49	0.01	19.4	31	64	-19.6	87%
East	CHEGLSE4	Gas/Leachate Dual Phase Vertical	4	0.1	58	2.30	24.5	15	65	-18.9	9%

Header	Collector ID	Collector Type	Average Flow (SCFM)	Average Methane (tpd)	Average Methane (%)	Average Oxygen (%)	Average Nitrogen (%)	Average Carbon Dioxide (%)	Average Temperature (°F)	Average Static Pressure (in WC)	% Data Open Valve
East	CHE0032A	Horizontal (Leachate HB-8)	3	0.1	47	0.49	20.7	32	43	-27.4	17%
East	CHEGLSE7	Gas/Leachate Dual Phase Vertical	3	0.04	51	1.50	19.1	29	62	-20.9	4%
East	CHE0036A	Leachate Cleanout	3	0	1	19.60	76.7	2	63	-0.7	99%
East	CHE00047	Tee (Gas)	0	0	5	0.08	90.9	4	5	-3.5	11%
East	CHE00012	---	0	0	55	0.20	16.6	28	71	-10.5	1%
East	CHE0056B	Vertical (Leachate)	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	0%
East	CHE0049A	Leachate Cleanout	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	0%
East	CHE0046A	Leachate Cleanout	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	0%
East	CHE0042A	Horizontal (Leachate HB-2)	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	0%
East	CHE00057	Vertical (Gas)	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	0%
East	CHE00056	Tee (Gas)	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	0%
East	CHE00052	Vertical (Gas)	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	0%
East	CHE00051	---	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	0%
East	CHE00044	Vertical (Gas)	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	0%
East	CHE0001C	Leachate Cleanout	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	0%
East	CHE00014	Vertical (Double Completion E-14)	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	0%
East	CHE00005	---	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	0%

LFG collection for BEW

High Methane Production
Intermediate Methane Production
Low Methane Production
Closed or Oxygen > 2%
Nitrogen > 10%
Low Quality LFG

LFG Migration Control

Relaxed
Moderate
Aggressive
Very Aggressive
Not Viable

Notes:
 BEW = Bio Energy Washington
 SCFM = Standard Cubic Feet per Meter
 % = percent by volume
 °F = degree Fahrenheit
 in WC = inches of water column

Table F2 - Central Header Summary from Data Summary, Analysis, and Alternatives Report (AECOM 2015)

Header	Collector ID	Collector Type	Average Flow (SCFM)	Average Methane (tpd)	Average Methane (%)	Average Oxygen (%)	Average Nitrogen (%)	Average Carbon Dioxide (%)	Average Temperature (°F)	Average Static Pressure (in WC)	% Data Open Valve
Central	CHC00W30	Horizontal (Gas)	94	1.6	57.0	0.0	1.9	41	118	-7.5	100%
Central	CHC00W45	Horizontal (Gas)	68	1.1	56	0.04	1.2	42	118	-9.0	100%
Central	CHC00W34	Horizontal (Gas)	64	1.0	56	0.05	3.4	41	98	-6.2	100%
Central	CHC00C37	Vertical (Gas)	54	0.9	56	0.00	2.4	41	94	-19.3	33%
Central	CHC00W26	Sideslope	53	0.9	55	0.01	5.6	39	86	-3.3	100%
Central	CHC00W41	Horizontal (Gas)	50	0.8	57	0.12	1.6	41	75	-1.3	6%
Central	CHC00W49	Horizontal (Gas)	49	0.8	56	0.13	1.6	43	111	-4.6	100%
Central	CHC00C17	Sideslope	40	0.7	59	0.00	6.2	34	60	-1.8	12%
Central	CHC00W28	Sideslope	43	0.7	55	0.00	3.7	41	103	-7.6	100%
Central	CHC00W63	Horizontal (Gas)	42	0.7	57	0.05	2.8	41	89	-11.6	100%
Central	CHC00C20	Sideslope	39	0.7	56	0.23	7.5	36	77	-1.7	14%
Central	CHC00W75	---	27	0.6	69	0.00	3.1	28	59	-28.9	2%
Central	CHC00C35	Vertical (Gas)	31	0.5	54	0.56	4.1	41	104	-17.2	77%
Central	CHC00W29	Horizontal (Gas)	30	0.5	54	0.73	6.3	39	80	-1.1	18%
Central	CHC00W38	Horizontal (Gas)	29	0.5	57	0.09	1.2	42	98	-10.3	85%
Central	CHC00W35	Sideslope	30	0.5	55	0.00	2.6	42	92	-6.2	100%
Central	CHC00C28	Vertical (Gas)	32	0.5	51	1.23	6.6	41	77	-17.2	72%
Central	CHC00C30	Vertical (Gas)	29	0.5	56	0.02	1.0	43	116	-21.7	100%
Central	CHC00C39	Vertical (Gas)	28	0.5	56	0.04	1.3	43	97	-15.3	94%
Central	CHC00C40	Vertical (Gas)	24	0.4	57	0.00	3.5	40	61	-5.7	100%
Central	CHC00W32	Sideslope	25	0.4	54	0.00	4.2	42	90	-6.7	100%
Central	CHC00W31	Sideslope	24	0.4	54	0.00	4.0	42	105	-7.3	100%
Central	CHC0W90A	Leachate Seep (Pipe)	23	0.4	56	0.14	4.3	40	60	-7.0	6%
Central	CHC0C25A	Vertical (Leachate)	22	0.4	57	0.01	0.7	42	59	-23.6	100%
Central	CHC00W57	Horizontal (Gas)	22	0.3	53	0.55	6.4	40	73	-8.8	3%
Central	CHCNFC01	Edge	19	0.3	58	0.31	4.2	37	51	-6.4	15%
Central	CHC00C38	Horizontal (Gas)	20	0.3	54	0.85	5.6	40	61	-4.4	17%
Central	CHC00C36	Vertical	19	0.3	57	0.12	2.9	40	62	-9.4	71%
Central	CHC00W48	Horizontal (Gas)	19	0.3	54	0.24	2.1	43	74	-1.6	17%
Central	CHC00W66	Horizontal (Gas)	18	0.3	57	0.07	1.3	42	77	-13.9	100%
Central	CHC00W91	Horizontal (Gas)	18	0.3	54	0.00	9.9	36	66	-15.3	3%
Central	CHC00C15	Vertical	16	0.3	63	0.37	9.0	28	51	-16.5	15%
Central	CHC00W76	Horizontal (Gas)	17	0.3	56	0.53	5.0	39	76	-1.4	30%
Central	CHC00W36	Sideslope	18	0.3	53	0.00	6.6	40	77	-5.0	100%
Central	CHC00W46	Horizontal (Gas)	17	0.3	54	0.37	3.5	42	94	-14.2	69%
Central	CHC00W73	Horizontal (Gas)	16	0.3	57	0.57	7.8	34	80	-6.3	6%
Central	CHC00W44	Sideslope	17	0.3	53	0.09	6.2	40	74	-18.5	100%
Central	CHC00C43	Vertical (Gas)	16	0.3	56	0.03	5.8	39	65	-21.1	100%
Central	CHC00C34	Vertical (Gas)	15	0.2	56	0.31	2.9	41	60	-23.3	100%
Central	CHC00W40	Sideslope	16	0.2	53	0.01	6.2	41	65	-11.2	41%
Central	CHC00C33	Vertical (Gas)	14	0.2	57	0.01	0.7	43	60	-20.5	100%
Central	CHC00C31	Vertical (Gas)	14	0.2	55	0.15	2.6	42	61	-23.1	96%
Central	CHCGL049	Gas/Leachate Dual Phase	14	0.2	54	0.72	4.3	41	63	-16.3	19%
Central	CHC00C51	Vertical (Gas)	13	0.2	54	0.16	1.5	44	63	-24.3	100%
Central	CHC00W68	Horizontal (Gas)	13	0.2	53	0.63	7.3	39	70	-2.3	9%
Central	CHC00W47	Sideslope	12	0.2	56	0.04	2.3	42	69	-22.5	100%
Central	CHC00C27	Vertical (Gas)	12	0.2	54	0.30	5.8	40	60	-14.7	83%
Central	CHC00C41	Vertical (Gas)	11	0.2	55	0.04	1.0	44	64	-23.8	100%
Central	CHC00C46	Vertical (Gas)	8	0.2	74	0.24	1.8	24	65	-26.6	100%
Central	CHC00W64	Horizontal (Gas)	10	0.2	51	0.56	8.0	40	73	-16.7	33%
Central	CHC0C22A	Vertical (Leachate)	10	0.2	56	0.76	4.3	39	54	-23.4	88%
Central	CHC00W52	Horizontal (Gas)	10	0.2	54	0.26	4.1	41	60	-16.9	50%
Central	CHC00W85	Horizontal (Gas)	9	0.2	58	0.10	2.5	40	68	-5.8	28%
Central	CHC0C22B	Vertical (Leachate)	9	0.1	58	0.61	3.3	38	62	-22.2	38%
Central	CHC00W72	---	9	0.1	55	0.06	5.9	39	79	-18.5	7%
Central	CHC00W55	Horizontal (Gas)	8	0.1	57	0.00	4.8	38	89	-21.3	1%
Central	CHC00C29	Vertical (Gas)	8	0.1	56	0.49	2.9	41	60	-24.0	89%
Central	CHC0C25B	Vertical (Leachate)	8	0.1	50	0.44	8.2	42	63	-20.1	9%
Central	CHC00W65	Horizontal (Gas)	7	0.1	55	0.39	5.6	39	60	-23.9	20%
Central	CHC00W59	Horizontal (Gas)	7	0.1	54	0.32	2.1	43	60	-20.8	26%
Central	CHC00W13	Vertical (Gas)	14	0.3	62	0.13	3.9	34	52	-21.6	32%
Central	CHC00W58	Horizontal (Gas)	4	0.1	54	0.27	2.6	43	57	-21.7	12%
Central	CHCOG20A	GL-5, GL-6, and W-21	59	0.9	53	0.00	13.1	34	55	-1.4	1%
Central	CHCOG17A	C-16 and GL-8	41	0.7	56	0.00	14.4	30	56	-1.4	4%
Central	CHCSFC01	Edge	41	0.6	50	0.91	13.1	36	64	-2.9	64%
Central	CHCOG26A	W-25, GL-1, and C-26	43	0.6	47	0.00	17.9	35	77	-2.5	12%
Central	CHC00W16	Vertical (Gas)	31	0.5	62	0.00	12.1	26	50	-3.8	3%
Central	CHCOG23A	C-21, GL-4, and C-23	27	0.4	54	0.00	11.6	35	75	-1.1	38%
Central	CHC00C42	Vertical (Gas)	23	0.3	51	0.51	12.5	36	62	-2.2	57%
Central	CHC00W74	---	20	0.3	49	0.00	23.9	27	79	-13.7	9%
Central	CHC00W82	Horizontal (Gas)	23	0.3	39	0.15	33.6	28	62	-5.4	6%

Header	Collector ID	Collector Type	Average Flow (SCFM)	Average Methane (tpd)	Average Methane (%)	Average Oxygen (%)	Average Nitrogen (%)	Average Carbon Dioxide (%)	Average Temperature (°F)	Average Static Pressure (in WC)	% Data Open Valve
Central	CHC00W89	Horizontal (Gas)	16	0.2	53	0.12	12.8	34	65	-18.1	35%
Central	CHC0G24A	C-24, C-23, C-22, and GL-3	16	0.2	52	0.04	11.8	37	71	-1.3	56%
Central	CHC00C25	Vertical (Gas)	17	0.2	47	0.00	13.4	40	100	-3.3	63%
Central	CHC00C22	Vertical (Gas)	16	0.2	51	0.03	10.4	39	74	-7.3	97%
Central	CHC00W23	Sideslope	13	0.2	54	0.05	10.1	36	72	-1.9	64%
Central	CHC00W71	Horizontal (Gas)	13	0.2	50	0.03	16.9	33	69	-2.7	51%
Central	CHC00W70	Horizontal (Gas)	13	0.2	46	0.02	21.8	32	68	-2.8	12%
Central	CHC00W78	Horizontal	11	0.2	59	0.27	15.0	26	63	-20.3	21%
Central	CHC00W56	---	11	0.2	49	0.08	12.8	38	63	-19.5	10%
Central	CHC00C44	Vertical (Gas)	10	0.2	57	0.04	11.9	31	64	-22.8	97%
Central	CHC00W42	Sideslope	11	0.2	49	0.03	12.0	39	70	-3.2	70%
Central	CHC00W62	Horizontal (Gas)	10	0.2	51	0.88	11.1	37	68	-13.8	7%
Central	CHC00W87	Horizontal (Gas)	10	0.1	51	0.01	18.1	30	65	-8.6	68%
Central	CHC00W84	Horizontal (Gas)	10	0.1	47	0.03	22.0	31	64	-3.9	49%
Central	CHC00W86	Horizontal (Gas)	9	0.1	52	0.02	17.0	31	65	-9.6	99%
Central	CHC00W54	---	8	0.1	45	0.68	25.5	29	63	-16.0	7%
Central	CHC00C47	Vertical (Gas)	8	0.1	48	0.06	21.8	30	64	-1.8	90%
Central	CHC00W77	Horizontal (Gas)	7	0.1	51	0.41	18.5	30	80	-1.4	11%
Central	CHC00W43	Sideslope	6	0.1	47	0.02	14.0	39	69	-4.4	16%
Central	CHC00W80	Horizontal (Gas)	4	0.04	33	0.00	39.2	28	62	-4.8	6%
Central	CHC00C14	Sideslope	24	0.4	50	0.04	23.2	26	62	-1.1	45%
Central	CHC0C47A	Leachate Manhole	9	0.1	18	11.57	55.8	14	61	-0.6	99%
Central	CHC00W33	Sideslope	0	0	53	0.00	6.2	40	69	-13.6	3%
Central	CHC00W69	Leachate Transmission Pipe	0	0	50	0.70	13.9	35	66	-11.7	1%
Central	CHCGL050	Gas/Leachate Dual Phase	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	0%
Central	CHC0W50A	Apex Cleanout	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	0%
Central	CHC0G18A	C-18, W-19, and GL-7	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	0%
Central	CHC0C46A	---	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	0%
Central	CHC00W92	---	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	0%
Central	CHC00W90	---	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	0%
Central	CHC00W88	---	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	0%
Central	CHC00W83	Horizontal (Gas)	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	0%
Central	CHC00W81	Horizontal (Gas)	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	0%
Central	CHC00W67	---	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	0%
Central	CHC00W61	---	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	0%
Central	CHC00W60	---	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	0%
Central	CHC00W39	---	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	0%
Central	CHC00W37	Sideslope	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	0%
Central	CHC00W27	---	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	0%
Central	CHC00W24	Leachate Cleanout	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	0%
Central	CHC00C45	---	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	0%
Central	CHC00W8	Sideslope	43	0.8	59	0.11	10.4	30	56	-0.5	19%
Central	CHC00C5	Sideslope	41	0.6	54	0.00	19.6	27	55	-0.7	2%
Central	CHC00C11	---	29	0.4	51	0.05	16.4	32	75	-0.3	3%
Central	CHC00W7	Vertical (Gas)	10	0.2	51	0.07	19.4	29	56	-7.2	51%
Central	CHC00C9	Vertical (Gas)	11	0.2	46	0.06	29.5	25	58	-2.0	50%
Central	CHC00W5	Vertical (Gas)	11	0.1	28	0.02	44.4	27	60	-2.4	13%
Central	CHC00W12	Vertical (Gas)	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	0%
Central	CHC00W10	---	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	0%
Central	CHC00W4	Leachate Cleanout	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	0%
Central	CHC00C3	Sideslope	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	0%

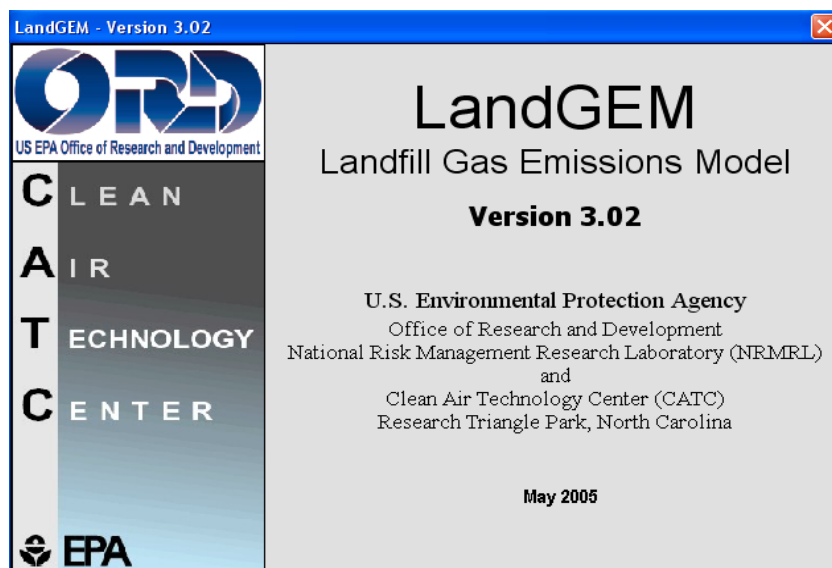
LFG collection for BEW

High Methane Production
Intermediate Methane Production
Low Methane Production
Closed or Oxygen > 2%
Nitrogen > 10%
Low Quality LFG

LFG Migration Control

Relaxed
Moderate
Aggressive
Very Aggressive
Not Viable

Notes:
 BEW = Bio Energy Washington
 SCFM = Standard Cubic Feet per Meter
 % = percent by volume
 °F = degree Fahrenheit
 in WC = inches of water column



Summary Report

Landfill Name or Identifier: Main Hill CHRLF

Date: Thursday, December 08, 2016

Description/Comments:

About LandGEM:

First-Order Decomposition Rate Equation:

$$Q_{CH_4} = \sum_{i=1}^n \sum_{j=0.1}^1 kL_o \left(\frac{M_i}{10} \right) e^{-kt_{ij}}$$

Where,

Q_{CH_4} = annual methane generation in the year of the calculation ($m^3/year$)

i = 1-year time increment

n = (year of the calculation) - (initial year of waste acceptance)

j = 0.1-year time increment

k = methane generation rate ($year^{-1}$)

L_o = potential methane generation capacity (m^3/Mg)

M_i = mass of waste accepted in the i^{th} year (Mg)

t_{ij} = age of the j^{th} section of waste mass M_i accepted in the i^{th} year (*decimal years*, e.g., 3.2 years)

LandGEM is based on a first-order decomposition rate equation for quantifying emissions from the decomposition of landfilled waste in municipal solid waste (MSW) landfills. The software provides a relatively simple approach to estimating landfill gas emissions. Model defaults are based on empirical data from U.S. landfills. Field test data can also be used in place of model defaults when available. Further guidance on EPA test methods, Clean Air Act (CAA) regulations, and other guidance regarding landfill gas emissions and control technology requirements can be found at <http://www.epa.gov/ttnatw01/landfill/landflpg.html>.

LandGEM is considered a screening tool — the better the input data, the better the estimates. Often, there are limitations with the available data regarding waste quantity and composition, variation in design and operating practices over time, and changes occurring over time that impact the emissions potential. Changes to landfill operation, such as operating under wet conditions through leachate recirculation or other liquid additions, will result in generating more gas at a faster rate. Defaults for estimating emissions for this type of operation are being developed to include in LandGEM along with defaults for conventional landfills (no leachate or liquid additions) for developing emission inventories and determining CAA applicability. Refer to the Web site identified above for future updates.

Input Review

LANDFILL CHARACTERISTICS

Landfill Open Year	1965	
Landfill Closure Year (with 80-year limit)	1991	
Actual Closure Year (without limit)	1991	
Have Model Calculate Closure Year?	No	
Waste Design Capacity	9,150,000	<i>short tons</i>

MODEL PARAMETERS

Methane Generation Rate, k	0.050	<i>year⁻¹</i>
Potential Methane Generation Capacity, L ₀	100	<i>m³/Mg</i>
NMOC Concentration	4,000	<i>ppmv as hexane</i>
Methane Content	50	<i>% by volume</i>

GASES / POLLUTANTS SELECTED

Gas / Pollutant #1:	Total landfill gas
Gas / Pollutant #2:	Methane
Gas / Pollutant #3:	Carbon dioxide
Gas / Pollutant #4:	NMOC

WASTE ACCEPTANCE RATES

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	(short tons/year)	(Mg)	(short tons)
1965	308,081	338,889	0	0
1966	308,081	338,889	308,081	338,889
1967	308,081	338,889	616,162	677,778
1968	308,081	338,889	924,242	1,016,667
1969	308,081	338,889	1,232,323	1,355,556
1970	308,081	338,889	1,540,404	1,694,444
1971	308,081	338,889	1,848,485	2,033,333
1972	308,081	338,889	2,156,566	2,372,222
1973	308,081	338,889	2,464,646	2,711,111
1974	308,081	338,889	2,772,727	3,050,000
1975	308,081	338,889	3,080,808	3,388,889
1976	308,081	338,889	3,388,889	3,727,778
1977	308,081	338,889	3,696,970	4,066,667
1978	308,081	338,889	4,005,051	4,405,556
1979	308,081	338,889	4,313,131	4,744,444
1980	308,081	338,889	4,621,212	5,083,333
1981	308,081	338,889	4,929,293	5,422,222
1982	308,081	338,889	5,237,374	5,761,111
1983	308,081	338,889	5,545,455	6,100,000
1984	308,081	338,889	5,853,535	6,438,889
1985	308,081	338,889	6,161,616	6,777,778
1986	308,081	338,889	6,469,697	7,116,667
1987	308,081	338,889	6,777,778	7,455,556
1988	308,081	338,889	7,085,859	7,794,444
1989	308,081	338,889	7,393,939	8,133,333
1990	308,081	338,889	7,702,020	8,472,222
1991	308,081	338,889	8,010,101	8,811,111
1992	0	0	8,318,182	9,150,000
1993	0	0	8,318,182	9,150,000
1994	0	0	8,318,182	9,150,000
1995	0	0	8,318,182	9,150,000
1996	0	0	8,318,182	9,150,000
1997	0	0	8,318,182	9,150,000
1998	0	0	8,318,182	9,150,000
1999	0	0	8,318,182	9,150,000
2000	0	0	8,318,182	9,150,000
2001	0	0	8,318,182	9,150,000
2002	0	0	8,318,182	9,150,000
2003	0	0	8,318,182	9,150,000
2004	0	0	8,318,182	9,150,000

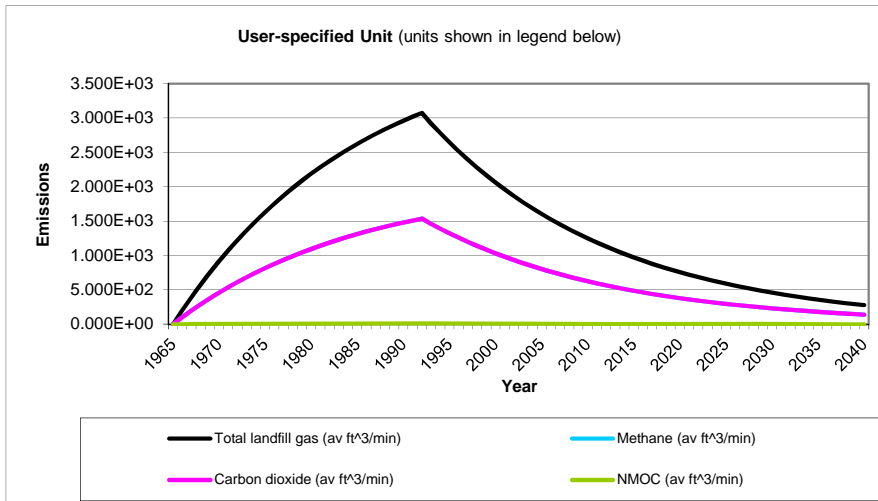
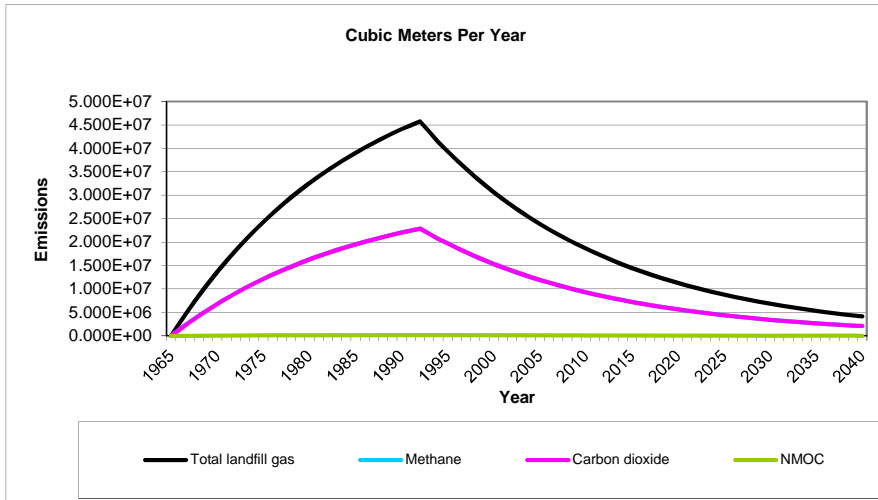
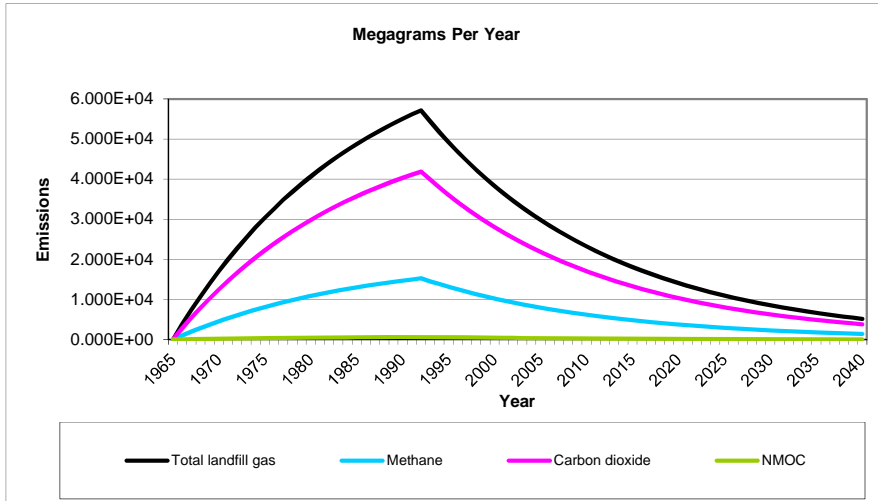
WASTE ACCEPTANCE RATES (Continued)

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	(short tons/year)	(Mg)	(short tons)
2005	0	0	8,318,182	9,150,000
2006	0	0	8,318,182	9,150,000
2007	0	0	8,318,182	9,150,000
2008	0	0	8,318,182	9,150,000
2009	0	0	8,318,182	9,150,000
2010	0	0	8,318,182	9,150,000
2011	0	0	8,318,182	9,150,000
2012	0	0	8,318,182	9,150,000
2013	0	0	8,318,182	9,150,000
2014	0	0	8,318,182	9,150,000
2015	0	0	8,318,182	9,150,000
2016	0	0	8,318,182	9,150,000
2017	0	0	8,318,182	9,150,000
2018	0	0	8,318,182	9,150,000
2019	0	0	8,318,182	9,150,000
2020	0	0	8,318,182	9,150,000
2021	0	0	8,318,182	9,150,000
2022	0	0	8,318,182	9,150,000
2023	0	0	8,318,182	9,150,000
2024	0	0	8,318,182	9,150,000
2025	0	0	8,318,182	9,150,000
2026	0	0	8,318,182	9,150,000
2027	0	0	8,318,182	9,150,000
2028	0	0	8,318,182	9,150,000
2029	0	0	8,318,182	9,150,000
2030	0	0	8,318,182	9,150,000
2031	0	0	8,318,182	9,150,000
2032	0	0	8,318,182	9,150,000
2033	0	0	8,318,182	9,150,000
2034	0	0	8,318,182	9,150,000
2035	0	0	8,318,182	9,150,000
2036	0	0	8,318,182	9,150,000
2037	0	0	8,318,182	9,150,000
2038	0	0	8,318,182	9,150,000
2039	0	0	8,318,182	9,150,000
2040	0	0	8,318,182	9,150,000
2041	0	0	8,318,182	9,150,000
2042	0	0	8,318,182	9,150,000
2043	0	0	8,318,182	9,150,000
2044	0	0	8,318,182	9,150,000

Pollutant Parameters

Gas / Pollutant Default Parameters:				User-specified Pollutant Parameters:	
	Compound	Concentration (ppmv)	Molecular Weight	Concentration (ppmv)	Molecular Weight
Gases	Total landfill gas		0.00		
	Methane		16.04		
	Carbon dioxide		44.01		
	NMOC	4,000	86.18		
Pollutants	1,1,1-Trichloroethane (methyl chloroform) - HAP	0.48	133.41		
	1,1,1,2-Tetrachloroethane - HAP/VOC	1.1	167.85		
	1,1-Dichloroethane (ethylidene dichloride) - HAP/VOC	2.4	98.97		
	1,1-Dichloroethene (vinylidene chloride) - HAP/VOC	0.20	96.94		
	1,2-Dichloroethane (ethylene dichloride) - HAP/VOC	0.41	98.96		
	1,2-Dichloropropane (propylene dichloride) - HAP/VOC	0.18	112.99		
	2-Propanol (isopropyl alcohol) - VOC	50	60.11		
	Acetone	7.0	58.08		
	Acrylonitrile - HAP/VOC	6.3	53.06		
	Benzene - No or Unknown Co-disposal - HAP/VOC	1.9	78.11		
	Benzene - Co-disposal - HAP/VOC	11	78.11		
	Bromodichloromethane - VOC	3.1	163.83		
	Butane - VOC	5.0	58.12		
	Carbon disulfide - HAP/VOC	0.58	76.13		
	Carbon monoxide	140	28.01		
	Carbon tetrachloride - HAP/VOC	4.0E-03	153.84		
	Carbonyl sulfide - HAP/VOC	0.49	60.07		
	Chlorobenzene - HAP/VOC	0.25	112.56		
	Chlorodifluoromethane	1.3	86.47		
	Chloroethane (ethyl chloride) - HAP/VOC	1.3	64.52		
	Chloroform - HAP/VOC	0.03	119.39		
	Chloromethane - VOC	1.2	50.49		
	Dichlorobenzene - (HAP for para isomer/VOC)	0.21	147		
	Dichlorodifluoromethane	16	120.91		
	Dichlorofluoromethane - VOC	2.6	102.92		
	Dichloromethane (methylene chloride) - HAP	14	84.94		
	Dimethyl sulfide (methyl sulfide) - VOC	7.8	62.13		
	Ethane	890	30.07		
	Ethanol - VOC	27	46.08		

Graphs



Results

Year	Total landfill gas			Methane		
	(Mg/year)	(m ³ /year)	(av ft ³ /min)	(Mg/year)	(m ³ /year)	(av ft ³ /min)
1965	0	0	0	0	0	0
1966	3.762E+03	3.013E+06	2.024E+02	1.005E+03	1.506E+06	1.012E+02
1967	7.341E+03	5.878E+06	3.950E+02	1.961E+03	2.939E+06	1.975E+02
1968	1.075E+04	8.604E+06	5.781E+02	2.870E+03	4.302E+06	2.891E+02
1969	1.398E+04	1.120E+07	7.523E+02	3.735E+03	5.599E+06	3.762E+02
1970	1.706E+04	1.366E+07	9.181E+02	4.558E+03	6.832E+06	4.590E+02
1971	1.999E+04	1.601E+07	1.076E+03	5.340E+03	8.005E+06	5.378E+02
1972	2.278E+04	1.824E+07	1.226E+03	6.085E+03	9.121E+06	6.128E+02
1973	2.543E+04	2.036E+07	1.368E+03	6.793E+03	1.018E+07	6.841E+02
1974	2.795E+04	2.238E+07	1.504E+03	7.467E+03	1.119E+07	7.520E+02
1975	3.035E+04	2.430E+07	1.633E+03	8.107E+03	1.215E+07	8.165E+02
1976	3.263E+04	2.613E+07	1.756E+03	8.717E+03	1.307E+07	8.779E+02
1977	3.480E+04	2.787E+07	1.873E+03	9.297E+03	1.394E+07	9.363E+02
1978	3.687E+04	2.952E+07	1.984E+03	9.848E+03	1.476E+07	9.918E+02
1979	3.883E+04	3.110E+07	2.089E+03	1.037E+04	1.555E+07	1.045E+03
1980	4.070E+04	3.259E+07	2.190E+03	1.087E+04	1.630E+07	1.095E+03
1981	4.248E+04	3.402E+07	2.285E+03	1.135E+04	1.701E+07	1.143E+03
1982	4.417E+04	3.537E+07	2.376E+03	1.180E+04	1.768E+07	1.188E+03
1983	4.578E+04	3.666E+07	2.463E+03	1.223E+04	1.833E+07	1.231E+03
1984	4.731E+04	3.788E+07	2.545E+03	1.264E+04	1.894E+07	1.273E+03
1985	4.876E+04	3.905E+07	2.624E+03	1.302E+04	1.952E+07	1.312E+03
1986	5.015E+04	4.015E+07	2.698E+03	1.339E+04	2.008E+07	1.349E+03
1987	5.146E+04	4.121E+07	2.769E+03	1.375E+04	2.060E+07	1.384E+03
1988	5.271E+04	4.221E+07	2.836E+03	1.408E+04	2.111E+07	1.418E+03
1989	5.391E+04	4.317E+07	2.900E+03	1.440E+04	2.158E+07	1.450E+03
1990	5.504E+04	4.407E+07	2.961E+03	1.470E+04	2.204E+07	1.481E+03
1991	5.612E+04	4.494E+07	3.019E+03	1.499E+04	2.247E+07	1.510E+03
1992	5.714E+04	4.576E+07	3.074E+03	1.526E+04	2.288E+07	1.537E+03
1993	5.436E+04	4.353E+07	2.924E+03	1.452E+04	2.176E+07	1.462E+03
1994	5.170E+04	4.140E+07	2.782E+03	1.381E+04	2.070E+07	1.391E+03
1995	4.918E+04	3.938E+07	2.646E+03	1.314E+04	1.969E+07	1.323E+03
1996	4.678E+04	3.746E+07	2.517E+03	1.250E+04	1.873E+07	1.259E+03
1997	4.450E+04	3.564E+07	2.394E+03	1.189E+04	1.782E+07	1.197E+03
1998	4.233E+04	3.390E+07	2.278E+03	1.131E+04	1.695E+07	1.139E+03
1999	4.027E+04	3.224E+07	2.166E+03	1.076E+04	1.612E+07	1.083E+03
2000	3.830E+04	3.067E+07	2.061E+03	1.023E+04	1.534E+07	1.030E+03
2001	3.644E+04	2.918E+07	1.960E+03	9.732E+03	1.459E+07	9.802E+02
2002	3.466E+04	2.775E+07	1.865E+03	9.258E+03	1.388E+07	9.324E+02
2003	3.297E+04	2.640E+07	1.774E+03	8.806E+03	1.320E+07	8.869E+02
2004	3.136E+04	2.511E+07	1.687E+03	8.377E+03	1.256E+07	8.436E+02
2005	2.983E+04	2.389E+07	1.605E+03	7.968E+03	1.194E+07	8.025E+02
2006	2.838E+04	2.272E+07	1.527E+03	7.580E+03	1.136E+07	7.634E+02
2007	2.699E+04	2.161E+07	1.452E+03	7.210E+03	1.081E+07	7.261E+02
2008	2.568E+04	2.056E+07	1.381E+03	6.858E+03	1.028E+07	6.907E+02
2009	2.442E+04	1.956E+07	1.314E+03	6.524E+03	9.779E+06	6.570E+02
2010	2.323E+04	1.860E+07	1.250E+03	6.206E+03	9.302E+06	6.250E+02
2011	2.210E+04	1.770E+07	1.189E+03	5.903E+03	8.848E+06	5.945E+02
2012	2.102E+04	1.683E+07	1.131E+03	5.615E+03	8.417E+06	5.655E+02
2013	2.000E+04	1.601E+07	1.076E+03	5.341E+03	8.006E+06	5.379E+02
2014	1.902E+04	1.523E+07	1.023E+03	5.081E+03	7.616E+06	5.117E+02

Results (Continued)

Year	Total landfill gas			Methane		
	(Mg/year)	(m ³ /year)	(av ft ³ /min)	(Mg/year)	(m ³ /year)	(av ft ³ /min)
2015	1.809E+04	1.449E+07	9.735E+02	4.833E+03	7.244E+06	4.867E+02
2016	1.721E+04	1.378E+07	9.260E+02	4.597E+03	6.891E+06	4.630E+02
2017	1.637E+04	1.311E+07	8.808E+02	4.373E+03	6.555E+06	4.404E+02
2018	1.557E+04	1.247E+07	8.379E+02	4.160E+03	6.235E+06	4.189E+02
2019	1.481E+04	1.186E+07	7.970E+02	3.957E+03	5.931E+06	3.985E+02
2020	1.409E+04	1.128E+07	7.581E+02	3.764E+03	5.642E+06	3.791E+02
2021	1.340E+04	1.073E+07	7.212E+02	3.580E+03	5.367E+06	3.606E+02
2022	1.275E+04	1.021E+07	6.860E+02	3.406E+03	5.105E+06	3.430E+02
2023	1.213E+04	9.712E+06	6.525E+02	3.240E+03	4.856E+06	3.263E+02
2024	1.154E+04	9.238E+06	6.207E+02	3.082E+03	4.619E+06	3.104E+02
2025	1.097E+04	8.788E+06	5.904E+02	2.931E+03	4.394E+06	2.952E+02
2026	1.044E+04	8.359E+06	5.616E+02	2.788E+03	4.180E+06	2.808E+02
2027	9.930E+03	7.951E+06	5.343E+02	2.652E+03	3.976E+06	2.671E+02
2028	9.446E+03	7.564E+06	5.082E+02	2.523E+03	3.782E+06	2.541E+02
2029	8.985E+03	7.195E+06	4.834E+02	2.400E+03	3.597E+06	2.417E+02
2030	8.547E+03	6.844E+06	4.598E+02	2.283E+03	3.422E+06	2.299E+02
2031	8.130E+03	6.510E+06	4.374E+02	2.172E+03	3.255E+06	2.187E+02
2032	7.733E+03	6.193E+06	4.161E+02	2.066E+03	3.096E+06	2.080E+02
2033	7.356E+03	5.891E+06	3.958E+02	1.965E+03	2.945E+06	1.979E+02
2034	6.997E+03	5.603E+06	3.765E+02	1.869E+03	2.802E+06	1.882E+02
2035	6.656E+03	5.330E+06	3.581E+02	1.778E+03	2.665E+06	1.791E+02
2036	6.332E+03	5.070E+06	3.407E+02	1.691E+03	2.535E+06	1.703E+02
2037	6.023E+03	4.823E+06	3.240E+02	1.609E+03	2.411E+06	1.620E+02
2038	5.729E+03	4.588E+06	3.082E+02	1.530E+03	2.294E+06	1.541E+02
2039	5.450E+03	4.364E+06	2.932E+02	1.456E+03	2.182E+06	1.466E+02
2040	5.184E+03	4.151E+06	2.789E+02	1.385E+03	2.075E+06	1.395E+02
2041	4.931E+03	3.949E+06	2.653E+02	1.317E+03	1.974E+06	1.327E+02
2042	4.691E+03	3.756E+06	2.524E+02	1.253E+03	1.878E+06	1.262E+02
2043	4.462E+03	3.573E+06	2.401E+02	1.192E+03	1.786E+06	1.200E+02
2044	4.244E+03	3.399E+06	2.283E+02	1.134E+03	1.699E+06	1.142E+02
2045	4.037E+03	3.233E+06	2.172E+02	1.078E+03	1.616E+06	1.086E+02
2046	3.840E+03	3.075E+06	2.066E+02	1.026E+03	1.538E+06	1.033E+02
2047	3.653E+03	2.925E+06	1.965E+02	9.758E+02	1.463E+06	9.827E+01
2048	3.475E+03	2.782E+06	1.870E+02	9.282E+02	1.391E+06	9.348E+01
2049	3.305E+03	2.647E+06	1.778E+02	8.829E+02	1.323E+06	8.892E+01
2050	3.144E+03	2.518E+06	1.692E+02	8.398E+02	1.259E+06	8.458E+01
2051	2.991E+03	2.395E+06	1.609E+02	7.989E+02	1.197E+06	8.046E+01
2052	2.845E+03	2.278E+06	1.531E+02	7.599E+02	1.139E+06	7.653E+01
2053	2.706E+03	2.167E+06	1.456E+02	7.229E+02	1.084E+06	7.280E+01
2054	2.574E+03	2.061E+06	1.385E+02	6.876E+02	1.031E+06	6.925E+01
2055	2.449E+03	1.961E+06	1.317E+02	6.541E+02	9.804E+05	6.587E+01
2056	2.329E+03	1.865E+06	1.253E+02	6.222E+02	9.326E+05	6.266E+01
2057	2.216E+03	1.774E+06	1.192E+02	5.918E+02	8.871E+05	5.960E+01
2058	2.108E+03	1.688E+06	1.134E+02	5.630E+02	8.438E+05	5.670E+01
2059	2.005E+03	1.605E+06	1.079E+02	5.355E+02	8.027E+05	5.393E+01
2060	1.907E+03	1.527E+06	1.026E+02	5.094E+02	7.635E+05	5.130E+01
2061	1.814E+03	1.453E+06	9.760E+01	4.845E+02	7.263E+05	4.880E+01
2062	1.726E+03	1.382E+06	9.284E+01	4.609E+02	6.909E+05	4.642E+01
2063	1.641E+03	1.314E+06	8.831E+01	4.384E+02	6.572E+05	4.416E+01
2064	1.561E+03	1.250E+06	8.400E+01	4.171E+02	6.251E+05	4.200E+01
2065	1.485E+03	1.189E+06	7.991E+01	3.967E+02	5.946E+05	3.995E+01

Results (Continued)

Year	Total landfill gas			Methane		
	(Mg/year)	(m ³ /year)	(av ft ³ /min)	(Mg/year)	(m ³ /year)	(av ft ³ /min)
2066	1.413E+03	1.131E+06	7.601E+01	3.774E+02	5.656E+05	3.801E+01
2067	1.344E+03	1.076E+06	7.230E+01	3.590E+02	5.381E+05	3.615E+01
2068	1.278E+03	1.024E+06	6.878E+01	3.415E+02	5.118E+05	3.439E+01
2069	1.216E+03	9.737E+05	6.542E+01	3.248E+02	4.868E+05	3.271E+01
2070	1.157E+03	9.262E+05	6.223E+01	3.090E+02	4.631E+05	3.112E+01
2071	1.100E+03	8.810E+05	5.920E+01	2.939E+02	4.405E+05	2.960E+01
2072	1.047E+03	8.381E+05	5.631E+01	2.796E+02	4.190E+05	2.815E+01
2073	9.956E+02	7.972E+05	5.356E+01	2.659E+02	3.986E+05	2.678E+01
2074	9.470E+02	7.583E+05	5.095E+01	2.530E+02	3.792E+05	2.548E+01
2075	9.008E+02	7.213E+05	4.847E+01	2.406E+02	3.607E+05	2.423E+01
2076	8.569E+02	6.862E+05	4.610E+01	2.289E+02	3.431E+05	2.305E+01
2077	8.151E+02	6.527E+05	4.385E+01	2.177E+02	3.263E+05	2.193E+01
2078	7.753E+02	6.209E+05	4.172E+01	2.071E+02	3.104E+05	2.086E+01
2079	7.375E+02	5.906E+05	3.968E+01	1.970E+02	2.953E+05	1.984E+01
2080	7.016E+02	5.618E+05	3.775E+01	1.874E+02	2.809E+05	1.887E+01
2081	6.673E+02	5.344E+05	3.590E+01	1.783E+02	2.672E+05	1.795E+01
2082	6.348E+02	5.083E+05	3.415E+01	1.696E+02	2.542E+05	1.708E+01
2083	6.038E+02	4.835E+05	3.249E+01	1.613E+02	2.418E+05	1.624E+01
2084	5.744E+02	4.599E+05	3.090E+01	1.534E+02	2.300E+05	1.545E+01
2085	5.464E+02	4.375E+05	2.940E+01	1.459E+02	2.188E+05	1.470E+01
2086	5.197E+02	4.162E+05	2.796E+01	1.388E+02	2.081E+05	1.398E+01
2087	4.944E+02	3.959E+05	2.660E+01	1.321E+02	1.979E+05	1.330E+01
2088	4.703E+02	3.766E+05	2.530E+01	1.256E+02	1.883E+05	1.265E+01
2089	4.473E+02	3.582E+05	2.407E+01	1.195E+02	1.791E+05	1.203E+01
2090	4.255E+02	3.407E+05	2.289E+01	1.137E+02	1.704E+05	1.145E+01
2091	4.048E+02	3.241E+05	2.178E+01	1.081E+02	1.621E+05	1.089E+01
2092	3.850E+02	3.083E+05	2.072E+01	1.028E+02	1.542E+05	1.036E+01
2093	3.662E+02	2.933E+05	1.970E+01	9.783E+01	1.466E+05	9.852E+00
2094	3.484E+02	2.790E+05	1.874E+01	9.306E+01	1.395E+05	9.372E+00
2095	3.314E+02	2.654E+05	1.783E+01	8.852E+01	1.327E+05	8.915E+00
2096	3.152E+02	2.524E+05	1.696E+01	8.420E+01	1.262E+05	8.480E+00
2097	2.999E+02	2.401E+05	1.613E+01	8.009E+01	1.201E+05	8.066E+00
2098	2.852E+02	2.284E+05	1.535E+01	7.619E+01	1.142E+05	7.673E+00
2099	2.713E+02	2.173E+05	1.460E+01	7.247E+01	1.086E+05	7.299E+00
2100	2.581E+02	2.067E+05	1.389E+01	6.894E+01	1.033E+05	6.943E+00
2101	2.455E+02	1.966E+05	1.321E+01	6.558E+01	9.829E+04	6.604E+00
2102	2.335E+02	1.870E+05	1.256E+01	6.238E+01	9.350E+04	6.282E+00
2103	2.221E+02	1.779E+05	1.195E+01	5.934E+01	8.894E+04	5.976E+00
2104	2.113E+02	1.692E+05	1.137E+01	5.644E+01	8.460E+04	5.684E+00
2105	2.010E+02	1.610E+05	1.081E+01	5.369E+01	8.048E+04	5.407E+00

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m ³ /year)	(av ft ³ /min)	(Mg/year)	(m ³ /year)	(av ft ³ /min)
1965	0	0	0	0	0	0
1966	2.757E+03	1.506E+06	1.012E+02	4.319E+01	1.205E+04	8.097E-01
1967	5.380E+03	2.939E+06	1.975E+02	8.428E+01	2.351E+04	1.580E+00
1968	7.875E+03	4.302E+06	2.891E+02	1.234E+02	3.442E+04	2.312E+00
1969	1.025E+04	5.599E+06	3.762E+02	1.605E+02	4.479E+04	3.009E+00
1970	1.251E+04	6.832E+06	4.590E+02	1.959E+02	5.465E+04	3.672E+00
1971	1.465E+04	8.005E+06	5.378E+02	2.295E+02	6.404E+04	4.303E+00
1972	1.670E+04	9.121E+06	6.128E+02	2.615E+02	7.297E+04	4.903E+00
1973	1.864E+04	1.018E+07	6.841E+02	2.920E+02	8.146E+04	5.473E+00
1974	2.049E+04	1.119E+07	7.520E+02	3.209E+02	8.954E+04	6.016E+00
1975	2.224E+04	1.215E+07	8.165E+02	3.485E+02	9.722E+04	6.532E+00
1976	2.392E+04	1.307E+07	8.779E+02	3.747E+02	1.045E+05	7.023E+00
1977	2.551E+04	1.394E+07	9.363E+02	3.996E+02	1.115E+05	7.490E+00
1978	2.702E+04	1.476E+07	9.918E+02	4.233E+02	1.181E+05	7.935E+00
1979	2.846E+04	1.555E+07	1.045E+03	4.459E+02	1.244E+05	8.357E+00
1980	2.983E+04	1.630E+07	1.095E+03	4.673E+02	1.304E+05	8.759E+00
1981	3.113E+04	1.701E+07	1.143E+03	4.877E+02	1.361E+05	9.142E+00
1982	3.237E+04	1.768E+07	1.188E+03	5.071E+02	1.415E+05	9.506E+00
1983	3.355E+04	1.833E+07	1.231E+03	5.256E+02	1.466E+05	9.852E+00
1984	3.467E+04	1.894E+07	1.273E+03	5.431E+02	1.515E+05	1.018E+01
1985	3.574E+04	1.952E+07	1.312E+03	5.598E+02	1.562E+05	1.049E+01
1986	3.675E+04	2.008E+07	1.349E+03	5.757E+02	1.606E+05	1.079E+01
1987	3.772E+04	2.060E+07	1.384E+03	5.908E+02	1.648E+05	1.108E+01
1988	3.863E+04	2.111E+07	1.418E+03	6.052E+02	1.688E+05	1.134E+01
1989	3.951E+04	2.158E+07	1.450E+03	6.189E+02	1.727E+05	1.160E+01
1990	4.034E+04	2.204E+07	1.481E+03	6.319E+02	1.763E+05	1.184E+01
1991	4.113E+04	2.247E+07	1.510E+03	6.443E+02	1.797E+05	1.208E+01
1992	4.188E+04	2.288E+07	1.537E+03	6.561E+02	1.830E+05	1.230E+01
1993	3.984E+04	2.176E+07	1.462E+03	6.241E+02	1.741E+05	1.170E+01
1994	3.789E+04	2.070E+07	1.391E+03	5.936E+02	1.656E+05	1.113E+01
1995	3.605E+04	1.969E+07	1.323E+03	5.647E+02	1.575E+05	1.058E+01
1996	3.429E+04	1.873E+07	1.259E+03	5.371E+02	1.499E+05	1.007E+01
1997	3.262E+04	1.782E+07	1.197E+03	5.109E+02	1.425E+05	9.577E+00
1998	3.102E+04	1.695E+07	1.139E+03	4.860E+02	1.356E+05	9.110E+00
1999	2.951E+04	1.612E+07	1.083E+03	4.623E+02	1.290E+05	8.666E+00
2000	2.807E+04	1.534E+07	1.030E+03	4.398E+02	1.227E+05	8.243E+00
2001	2.670E+04	1.459E+07	9.802E+02	4.183E+02	1.167E+05	7.841E+00
2002	2.540E+04	1.388E+07	9.324E+02	3.979E+02	1.110E+05	7.459E+00
2003	2.416E+04	1.320E+07	8.869E+02	3.785E+02	1.056E+05	7.095E+00
2004	2.298E+04	1.256E+07	8.436E+02	3.601E+02	1.004E+05	6.749E+00
2005	2.186E+04	1.194E+07	8.025E+02	3.425E+02	9.555E+04	6.420E+00
2006	2.080E+04	1.136E+07	7.634E+02	3.258E+02	9.089E+04	6.107E+00
2007	1.978E+04	1.081E+07	7.261E+02	3.099E+02	8.646E+04	5.809E+00
2008	1.882E+04	1.028E+07	6.907E+02	2.948E+02	8.224E+04	5.526E+00
2009	1.790E+04	9.779E+06	6.570E+02	2.804E+02	7.823E+04	5.256E+00
2010	1.703E+04	9.302E+06	6.250E+02	2.667E+02	7.441E+04	5.000E+00
2011	1.620E+04	8.848E+06	5.945E+02	2.537E+02	7.078E+04	4.756E+00
2012	1.541E+04	8.417E+06	5.655E+02	2.414E+02	6.733E+04	4.524E+00
2013	1.466E+04	8.006E+06	5.379E+02	2.296E+02	6.405E+04	4.303E+00
2014	1.394E+04	7.616E+06	5.117E+02	2.184E+02	6.092E+04	4.094E+00

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m ³ /year)	(av ft ³ /min)	(Mg/year)	(m ³ /year)	(av ft ³ /min)
2015	1.326E+04	7.244E+06	4.867E+02	2.077E+02	5.795E+04	3.894E+00
2016	1.261E+04	6.891E+06	4.630E+02	1.976E+02	5.513E+04	3.704E+00
2017	1.200E+04	6.555E+06	4.404E+02	1.880E+02	5.244E+04	3.523E+00
2018	1.141E+04	6.235E+06	4.189E+02	1.788E+02	4.988E+04	3.351E+00
2019	1.086E+04	5.931E+06	3.985E+02	1.701E+02	4.745E+04	3.188E+00
2020	1.033E+04	5.642E+06	3.791E+02	1.618E+02	4.513E+04	3.033E+00
2021	9.824E+03	5.367E+06	3.606E+02	1.539E+02	4.293E+04	2.885E+00
2022	9.344E+03	5.105E+06	3.430E+02	1.464E+02	4.084E+04	2.744E+00
2023	8.889E+03	4.856E+06	3.263E+02	1.392E+02	3.885E+04	2.610E+00
2024	8.455E+03	4.619E+06	3.104E+02	1.325E+02	3.695E+04	2.483E+00
2025	8.043E+03	4.394E+06	2.952E+02	1.260E+02	3.515E+04	2.362E+00
2026	7.651E+03	4.180E+06	2.808E+02	1.199E+02	3.344E+04	2.247E+00
2027	7.277E+03	3.976E+06	2.671E+02	1.140E+02	3.181E+04	2.137E+00
2028	6.923E+03	3.782E+06	2.541E+02	1.084E+02	3.025E+04	2.033E+00
2029	6.585E+03	3.597E+06	2.417E+02	1.032E+02	2.878E+04	1.934E+00
2030	6.264E+03	3.422E+06	2.299E+02	9.813E+01	2.738E+04	1.839E+00
2031	5.958E+03	3.255E+06	2.187E+02	9.334E+01	2.604E+04	1.750E+00
2032	5.668E+03	3.096E+06	2.080E+02	8.879E+01	2.477E+04	1.664E+00
2033	5.391E+03	2.945E+06	1.979E+02	8.446E+01	2.356E+04	1.583E+00
2034	5.128E+03	2.802E+06	1.882E+02	8.034E+01	2.241E+04	1.506E+00
2035	4.878E+03	2.665E+06	1.791E+02	7.642E+01	2.132E+04	1.432E+00
2036	4.640E+03	2.535E+06	1.703E+02	7.269E+01	2.028E+04	1.363E+00
2037	4.414E+03	2.411E+06	1.620E+02	6.915E+01	1.929E+04	1.296E+00
2038	4.199E+03	2.294E+06	1.541E+02	6.578E+01	1.835E+04	1.233E+00
2039	3.994E+03	2.182E+06	1.466E+02	6.257E+01	1.746E+04	1.173E+00
2040	3.799E+03	2.075E+06	1.395E+02	5.952E+01	1.660E+04	1.116E+00
2041	3.614E+03	1.974E+06	1.327E+02	5.661E+01	1.579E+04	1.061E+00
2042	3.438E+03	1.878E+06	1.262E+02	5.385E+01	1.502E+04	1.009E+00
2043	3.270E+03	1.786E+06	1.200E+02	5.123E+01	1.429E+04	9.602E-01
2044	3.111E+03	1.699E+06	1.142E+02	4.873E+01	1.359E+04	9.134E-01
2045	2.959E+03	1.616E+06	1.086E+02	4.635E+01	1.293E+04	8.688E-01
2046	2.815E+03	1.538E+06	1.033E+02	4.409E+01	1.230E+04	8.265E-01
2047	2.677E+03	1.463E+06	9.827E+01	4.194E+01	1.170E+04	7.862E-01
2048	2.547E+03	1.391E+06	9.348E+01	3.989E+01	1.113E+04	7.478E-01
2049	2.422E+03	1.323E+06	8.892E+01	3.795E+01	1.059E+04	7.113E-01
2050	2.304E+03	1.259E+06	8.458E+01	3.610E+01	1.007E+04	6.767E-01
2051	2.192E+03	1.197E+06	8.046E+01	3.434E+01	9.580E+03	6.437E-01
2052	2.085E+03	1.139E+06	7.653E+01	3.266E+01	9.112E+03	6.123E-01
2053	1.983E+03	1.084E+06	7.280E+01	3.107E+01	8.668E+03	5.824E-01
2054	1.887E+03	1.031E+06	6.925E+01	2.955E+01	8.245E+03	5.540E-01
2055	1.795E+03	9.804E+05	6.587E+01	2.811E+01	7.843E+03	5.270E-01
2056	1.707E+03	9.326E+05	6.266E+01	2.674E+01	7.461E+03	5.013E-01
2057	1.624E+03	8.871E+05	5.960E+01	2.544E+01	7.097E+03	4.768E-01
2058	1.545E+03	8.438E+05	5.670E+01	2.420E+01	6.751E+03	4.536E-01
2059	1.469E+03	8.027E+05	5.393E+01	2.302E+01	6.421E+03	4.315E-01
2060	1.398E+03	7.635E+05	5.130E+01	2.189E+01	6.108E+03	4.104E-01
2061	1.329E+03	7.263E+05	4.880E+01	2.083E+01	5.810E+03	3.904E-01
2062	1.265E+03	6.909E+05	4.642E+01	1.981E+01	5.527E+03	3.714E-01
2063	1.203E+03	6.572E+05	4.416E+01	1.885E+01	5.257E+03	3.532E-01
2064	1.144E+03	6.251E+05	4.200E+01	1.793E+01	5.001E+03	3.360E-01
2065	1.088E+03	5.946E+05	3.995E+01	1.705E+01	4.757E+03	3.196E-01

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m ³ /year)	(av ft ³ /min)	(Mg/year)	(m ³ /year)	(av ft ³ /min)
2066	1.035E+03	5.656E+05	3.801E+01	1.622E+01	4.525E+03	3.040E-01
2067	9.849E+02	5.381E+05	3.615E+01	1.543E+01	4.304E+03	2.892E-01
2068	9.369E+02	5.118E+05	3.439E+01	1.468E+01	4.094E+03	2.751E-01
2069	8.912E+02	4.868E+05	3.271E+01	1.396E+01	3.895E+03	2.617E-01
2070	8.477E+02	4.631E+05	3.112E+01	1.328E+01	3.705E+03	2.489E-01
2071	8.064E+02	4.405E+05	2.960E+01	1.263E+01	3.524E+03	2.368E-01
2072	7.670E+02	4.190E+05	2.815E+01	1.202E+01	3.352E+03	2.252E-01
2073	7.296E+02	3.986E+05	2.678E+01	1.143E+01	3.189E+03	2.143E-01
2074	6.940E+02	3.792E+05	2.548E+01	1.087E+01	3.033E+03	2.038E-01
2075	6.602E+02	3.607E+05	2.423E+01	1.034E+01	2.885E+03	1.939E-01
2076	6.280E+02	3.431E+05	2.305E+01	9.838E+00	2.745E+03	1.844E-01
2077	5.974E+02	3.263E+05	2.193E+01	9.358E+00	2.611E+03	1.754E-01
2078	5.682E+02	3.104E+05	2.086E+01	8.902E+00	2.483E+03	1.669E-01
2079	5.405E+02	2.953E+05	1.984E+01	8.468E+00	2.362E+03	1.587E-01
2080	5.142E+02	2.809E+05	1.887E+01	8.055E+00	2.247E+03	1.510E-01
2081	4.891E+02	2.672E+05	1.795E+01	7.662E+00	2.138E+03	1.436E-01
2082	4.652E+02	2.542E+05	1.708E+01	7.288E+00	2.033E+03	1.366E-01
2083	4.425E+02	2.418E+05	1.624E+01	6.933E+00	1.934E+03	1.300E-01
2084	4.210E+02	2.300E+05	1.545E+01	6.595E+00	1.840E+03	1.236E-01
2085	4.004E+02	2.188E+05	1.470E+01	6.273E+00	1.750E+03	1.176E-01
2086	3.809E+02	2.081E+05	1.398E+01	5.967E+00	1.665E+03	1.119E-01
2087	3.623E+02	1.979E+05	1.330E+01	5.676E+00	1.584E+03	1.064E-01
2088	3.447E+02	1.883E+05	1.265E+01	5.399E+00	1.506E+03	1.012E-01
2089	3.278E+02	1.791E+05	1.203E+01	5.136E+00	1.433E+03	9.627E-02
2090	3.119E+02	1.704E+05	1.145E+01	4.885E+00	1.363E+03	9.158E-02
2091	2.966E+02	1.621E+05	1.089E+01	4.647E+00	1.296E+03	8.711E-02
2092	2.822E+02	1.542E+05	1.036E+01	4.420E+00	1.233E+03	8.286E-02
2093	2.684E+02	1.466E+05	9.852E+00	4.205E+00	1.173E+03	7.882E-02
2094	2.553E+02	1.395E+05	9.372E+00	4.000E+00	1.116E+03	7.498E-02
2095	2.429E+02	1.327E+05	8.915E+00	3.805E+00	1.061E+03	7.132E-02
2096	2.310E+02	1.262E+05	8.480E+00	3.619E+00	1.010E+03	6.784E-02
2097	2.198E+02	1.201E+05	8.066E+00	3.443E+00	9.604E+02	6.453E-02
2098	2.090E+02	1.142E+05	7.673E+00	3.275E+00	9.136E+02	6.138E-02
2099	1.988E+02	1.086E+05	7.299E+00	3.115E+00	8.690E+02	5.839E-02
2100	1.892E+02	1.033E+05	6.943E+00	2.963E+00	8.267E+02	5.554E-02
2101	1.799E+02	9.829E+04	6.604E+00	2.819E+00	7.863E+02	5.283E-02
2102	1.712E+02	9.350E+04	6.282E+00	2.681E+00	7.480E+02	5.026E-02
2103	1.628E+02	8.894E+04	5.976E+00	2.550E+00	7.115E+02	4.781E-02
2104	1.549E+02	8.460E+04	5.684E+00	2.426E+00	6.768E+02	4.547E-02
2105	1.473E+02	8.048E+04	5.407E+00	2.308E+00	6.438E+02	4.326E-02

APPENDIX G

Cost Estimates

Table G-1 - Alternative 1 Detailed Cost Estimate

Project No. 130088, Cedar Hills Regional Landfill

King County, Washington

Alternative 1 - MNA of Groundwater

Engineer's Estimate of Alternative Probable Cost

Revision Date: September 19, 2016

Purchased Equipment Costs	Quantity	Units	Unit Cost	Extension	Description
Direct Installation Costs					
	Quantity	Units	Unit Cost	Extension	Description
DOE NOI/Decom Log	25	Each	\$54	\$1,350	
Overdrill and Decommission EWs	25	Each	\$2,500	\$62,500	Average depth of 40
Install Replacement Monitoring Wells	6	Each	\$6,000	\$36,000	Depths ranging from 30 - 40 ft bgs
Install LFG Monitoring Probes	6	Each	\$6,000	\$36,000	Depths ranging from 10 - 60 ft bgs
EW System Decommissioning	1	LS	\$25,000	\$25,000	
Total Direct Installation Cost (DI):				\$160,850.00	
Indirect Costs					
	Quantity	Units	Unit Cost	Extension	Description
Cleanup Action Plan	1	LS	\$20,000	\$20,000	
Engineering Design Report	0	LS	\$25,000	\$0	
Compliance Monitoring Plan	1	LS	\$12,000	\$12,000	
Institutional Controls - Legal Fees	1	LS	\$15,000	\$15,000	
Institutional Controls - Technical and Administrative Support	1	LS	\$7,500	\$7,500	
Total Indirect Cost (IC):				\$54,500.00	
Total Capital Investment (Subtotal):				\$215,000	
Contingency (20% Subtotal):				\$43,000	
TOTAL CAPITAL INVESTMENT (TCI) [DC + IC+ Contingency]:				\$258,000	
Annual Monitoring (years 1-5)					
	Quantity	Units	Unit Cost	Extension	Description
Groundwater Monitoring Labor	200	Hours	\$95	\$19,000	Quarterly Frequency
Gas Monitoring Event	1	LS	\$7,500	\$7,500	
Field Supplies	4	Event	\$1,000	\$4,000	
Data Management, Evaluation, and Reporting	1	Report	\$20,000	\$20,000	
Laboratory Analytical	4	Event	\$19,500	\$78,000	
Subtotal:				\$129,000	
Project Management (15%):				\$19,350	
Annual Monitoring (years 1-5)				\$148,350	
Annual Monitoring (Semi-Annual; years >5)					
	Quantity	Units	Unit Cost	Extension	Description
Groundwater Monitoring Labor	100	Hours	\$95	\$9,500	Semiannual Frequency
Field Supplies	2	Event	\$1,000	\$2,000	
Data Management, Evaluation, and Reporting	1	Report	\$20,000	\$20,000	
Laboratory Analytical	2	Event	\$19,500	\$39,000	
Subtotal:				\$71,000	
Project Management (15%):				\$10,650	
Annual Monitoring (Semi-Annual; years >5)				\$81,650	
TOTAL ALTERNATIVE COST (Actual Dollars, 30 years):				\$3,041,000	
TOTAL ALTERNATIVE COST (NPV, 30 years):				\$2,596,000	

Notes:

- The costs presented are preliminary, Feasibility Study-level estimates based on existing information, and are estimated to be within +50/-30% of actual costs
- Net Present Value (NPV) calculated using a real discount rate of 1.2% according to the Federal Office of Management and Budget (https://www.whitehouse.gov/omb/circulars_a094/a94_appx-c)

Table G-2 - Alternative 2 Detailed Cost Estimate

Project No. 130088, Cedar Hills Regional Landfill
King County, Washington

Alternative 2 - Optimized LFG Control and MNA of Groundwater Engineer's Estimate of Alternative Probable Cost

Revision Date: September 19, 2016

Purchased Equipment Costs	Quantity	Units	Unit Cost	Extension	Description
QED Precision Control Valve (3")	8	Each	\$600	\$4,800	
				<i>Equipment Subtotal (EQ):</i>	<i>\$4,800.00</i>
Taxes (5% of EQ)	1	Lump	\$240	\$240	
Freight (2% of EQ)	1	Lump	\$96	\$96	
				<i>Total Purchased Equipment Cost (PEC):</i>	<i>\$5,136.00</i>
Direct Installation Costs	Quantity	Units	Unit Cost	Extension	Description
DOE NOI/Decom Log	25	Each	\$54	\$1,350	
Overdrill and Decommission EWs	25	Each	\$2,500	\$62,500	Average depth of 40
Install Replacement Monitoring Wells	6	Each	\$6,000	\$36,000	Depths ranging from 30 - 40 ft bgs
Install LFG Monitoring Probes	6	Each	\$6,000	\$36,000	Depths ranging from 10 - 60 ft bgs
EW System Decommissioning	1	LS	\$25,000	\$25,000	
Install Precision Control Valves	8	Each	\$1,200	\$9,600	Installed by KCSWD Operations.
Implement Optimized LFG Operations on East Main Hil	1	LS	\$20,000	\$20,000	Conducted by KCSWD Operations.
				<i>Total Direct Installation Cost (DI):</i>	<i>\$190,450.00</i>
				TOTAL DIRECT COST (DC) [PEC + DI]:	\$195,586
Indirect Costs	Quantity	Units	Unit Cost	Extension	Description
Cleanup Action Plan	1	LS	\$20,000	\$20,000	
Engineering Design Report	1	LS	\$10,000	\$10,000	
Compliance Monitoring Plan	1	LS	\$12,000	\$12,000	
Institutional Controls - Legal Fees	1	LS	\$15,000	\$15,000	
Institutional Controls - Technical and Administrative Support	1	LS	\$7,500	\$7,500	
				<i>Total Indirect Cost (IC):</i>	<i>\$64,500.00</i>
				Total Capital Investment (Subtotal):	\$260,000
				Contingency (20% Subtotal):	\$52,000
				TOTAL CAPITAL INVESTMENT (TCI) [DC + IC+ Contingency]:	\$508,000
Annual Monitoring (years 1-5)	Quantity	Units	Unit Cost	Extension	Description
LFG Optimization Operations	120	Hours	\$95	\$11,400	Conducted by KCSWD Operations.
LFG Operations - Engineering Support	80	Hours	\$160	\$12,800	
Groundwater Monitoring Labor	200	Hours	\$95	\$19,000	
Gas Monitoring Event	1	LS	\$7,500	\$7,500	
Field Supplies	4	Event	\$1,000	\$4,000	
Data Management, Evaluation, and Reporting	1	Report	\$20,000	\$20,000	
Laboratory Analytical	4	Event	\$19,500	\$78,000	
				<i>Subtotal:</i>	<i>\$153,000</i>
				<i>Project Management (15%):</i>	<i>\$22,950</i>
				Annual Monitoring (years 1-5)	\$175,950
Annual Monitoring (Semi-Annual; years >5)	Quantity	Units	Unit Cost	Extension	Description
LFG Optimization Operations	120	Hours	\$95	\$11,400	
LFG Operations - Engineering Support	80	Hours	\$160	\$12,800	
Groundwater Monitoring Labor	100	Hours	\$95	\$9,500	
Field Supplies	2	Event	\$1,000	\$2,000	
Data Management, Evaluation, and Reporting	1	Report	\$20,000	\$20,000	
Laboratory Analytical	2	Event	\$19,500	\$39,000	
				<i>Subtotal:</i>	<i>\$95,000</i>
				<i>Project Management (15%):</i>	<i>\$14,250</i>
				Annual Monitoring (Semi-Annual; years >5)	\$109,250
				TOTAL ALTERNATIVE COST (Actual Dollars, 30 years):	\$4,119,000
				TOTAL ALTERNATIVE COST (NPV, 30 years):	\$3,526,000

Notes:

- The costs presented are preliminary, Feasibility Study-level estimates based on existing information, and are estimated to be within +50/-30% of actual cost;
- Net Present Value (NPV) calculated using a real discount rate of 1.2% according to the Federal Office of Management and Budget (https://www.whitehouse.gov/omb/circulars_a094/a94_appx-c)

Table G-3 - Alternative 3 Detailed Cost Estimate

Project No. 130088, Cedar Hills Regional Landfill
King County, Washington

Alternative 3 - Perimeter Gas Collection, Optimized LFG Control, and MNA of Groundwater Engineer's Estimate of Alternative Probable Cost

Revision Date: September 19, 2016

Purchased Equipment Costs	Quantity	Units	Unit Cost	Extension	Description
Wellhead Completion for Retrofitted Extraction Wells	3	Each	\$1,000	\$3,000	Includes pad, shed and other mechanical and instrumentation
QED Precision Control Valve (3")	8	Each	\$600	\$4,800	
Equipment Subtotal (EQ):				\$7,800	
Taxes (5% of EQ)	1	Lump	\$390	\$390	
Freight (2% of EQ)	1	Lump	\$156	\$156	
Total Purchased Equipment Cost (PEC):				\$8,346	
Direct Installation Costs	Quantity	Units	Unit Cost	Extension	Description
DOE NOI/Decom Log	25	Each	\$54	\$1,350	
Overdrill and Decommission EWs	25	Each	\$2,500	\$62,500	Average depth of 40
Install Replacement Monitoring Wells	6	Each	\$6,000	\$36,000	Depths ranging from 30 - 40 ft bgs
Install LFG Monitoring Probes	6	Each	\$6,000	\$36,000	Depths ranging from 10 - 60 ft bgs
EW System Decommissioning	1	LS	\$25,000	\$25,000	
Connect GPs for Perimeter Gas Collection	6	Each	\$2,000	\$12,000	Conducted by KCSWD Operations.
Predesign & Selection of Extraction Wells for LFG Collection	3	Each	\$5,000	\$15,000	Includes well rehab and influence testing.
Retrofit Extraction Wells for Gas Collection	3	Each	\$2,500	\$7,500	
Install Precision Control Valves	8	Each	\$1,500	\$12,000	Installed by KCSWD Operations.
Implement Optimized LFG Operations on East Main Hill	1	LS	\$20,000	\$20,000	Conducted by KCSWD Operations.
Total Direct Installation Cost (DI):				\$227,350	
TOTAL DIRECT COST (DC) [PEC + DI]:				\$235,696	
Indirect Costs	Quantity	Units	Unit Cost	Extension	Description
Cleanup Action Plan	1	LS	\$20,000	\$20,000	
Engineering Design Report	1	LS	\$20,000	\$20,000	
Compliance Monitoring Plan	1	LS	\$12,000	\$12,000	
Institutional Controls - Legal Fees	1	LS	\$15,000	\$15,000	
Institutional Controls - Technical and Administrative Support	1	LS	\$7,500	\$7,500	
Total Indirect Cost (IC):				\$74,500.00	
Total Capital Investment (Subtotal):				\$310,000	
Contingency (20% Subtotal):				\$62,000	
TOTAL CAPITAL INVESTMENT (TCI) [DC + IC+ Contingency]:				\$608,000	
Annual Monitoring (years 1-5)	Quantity	Units	Unit Cost	Extension	Description
Perimeter Gas/Groundwater Collection O&M	1	LS	\$12,000	\$12,000	Performed by Consultant.
LFG Optimization Operations	120	Hours	\$95	\$11,400	Conducted by KCSWD Operations.
LFG Operations - Engineering Support	80	Hours	\$160	\$12,800	
Groundwater Monitoring Labor	200	Hours	\$95	\$19,000	
Gas Monitoring Event	1	LS	\$7,500	\$7,500	
Field Supplies	4	Event	\$1,000	\$4,000	
Data Management, Evaluation, and Reporting	1	Report	\$20,000	\$25,000	
Laboratory Analytical	4	Event	\$19,500	\$78,000	
Subtotal:				\$170,000	
Project Management (15%):				\$25,500	
Annual Monitoring (years 1-5)				\$195,500	
Annual Monitoring (Semi-Annual; years >5)	Quantity	Units	Unit Cost	Extension	Description
Perimeter Gas Collection O&M	1	LS	\$12,000	\$12,000	Performed by Consultant.
LFG Optimization Operations	120	Hours	\$95	\$11,400	Conducted by KCSWD Operations.
LFG Operations - Engineering Support	80	Hours	\$160	\$12,800	
Groundwater Monitoring Labor	100	Hours	\$95	\$9,500	
Field Supplies	2	Event	\$1,000	\$2,000	
Data Management, Evaluation, and Reporting	1	Report	\$20,000	\$20,000	
Laboratory Analytical	2	Event	\$19,500	\$39,000	
Subtotal:				\$107,000	
Project Management (15%):				\$16,050	
Annual Monitoring (Semi-Annual; years >5)				\$123,050	
TOTAL ALTERNATIVE COST (Actual Dollars, 30 years):				\$4,662,000	
TOTAL ALTERNATIVE COST (NPV, 30 years):				\$3,994,000	

Notes:

- The costs presented are preliminary, Feasibility Study-level estimates based on existing information, and are estimated to be within +50/-30% of actual costs.
- Net Present Value (NPV) calculated using a real discount rate of 1.2% according to the Federal Office of Management and Budget (https://www.whitehouse.gov/omb/circulars_a094/a94_appx-c).

Aspect Consulting

December 2016

V:\130088 KC CHRLF Env Control System Mods-E00286E12\Deliverables\RI_FS Report Agency Draft\Appendices\Appendix G\Appendix G - Detailed Cost Estimates_111416.xlsx

Table G-3

Remedial Investigation/Feasibility Study

1 of 1

Table G-4 - Alternative 4 Detailed Cost Estimate

Project No. 130088, Cedar Hills Regional Landfill
King County, Washington

Alternative 4 - Perimeter Gas Collection, Expanded LFG Control, and MNA of Groundwater Engineer's Estimate of Alternative Probable Cost

Revision Date: September 19, 2016

Purchased Equipment Costs	Quantity	Units	Unit Cost	Extension	Description
Wellhead Completion for Retrofitted Extraction Wells	3	Each	\$1,000	\$3,000	Includes pad, shed, and other mechanical and instrumentation.
QED Precision Control Valve (3")	8	Each	\$600	\$4,800	
				Equipment Subtotal (EQ):	\$7,800
Taxes (5% of EQ)	1	Lump	\$390	\$390	
Freight (2% of EQ)	1	Lump	\$156	\$156	
				Total Purchased Equipment Cost (PEC):	\$8,346
Direct Installation Costs	Quantity	Units	Unit Cost	Extension	Description
DOE NOI/Decom Log	25	Each	\$54	\$1,350	
Overdrill and Decommission EWs	25	Each	\$2,500	\$62,500	Average depth of 40
Install Replacement Monitoring Wells	6	Each	\$6,000	\$36,000	Depths ranging from 30 - 40 ft bgs
Install LFG Monitoring Probes	6	Each	\$6,000	\$36,000	Depths ranging from 10 - 60 ft bgs
EW System Decommissioning	1	LS	\$25,000	\$25,000	
Drill and Construct new LFG Collection Wells	4	Each	\$50,000	\$200,000	
Connect new LFG Wells	4	Each	\$2,000	\$8,000	Conducted by KCSWD Operations.
Connect GPs for Perimeter Gas Collection	6	Each	\$2,000	\$12,000	Conducted by KCSWD Operations.
Pre-design & Selection of Extraction Wells for LFG Collection	3	Each	\$5,000	\$15,000	Includes well rehab and influence testing.
Retrofit Extraction Wells for Gas Collection	3	Each	\$2,500	\$7,500	
Install Precision Control Valves	8	Each	\$1,500	\$12,000	Installed by KCSWD Operations.
Implement Optimized LFG Operations on East Main Hill	1	LS	\$20,000	\$20,000	Conducted by KCSWD Operations.
				Total Direct Installation Cost (DI):	\$435,350
				TOTAL DIRECT COST (DC) [PEC + DI]:	\$443,696
Indirect Costs	Quantity	Units	Unit Cost	Extension	Description
Cleanup Action Plan	1	LS	\$20,000	\$20,000	
Engineering Design Report	1	LS	\$2,000	\$2,000	
Compliance Monitoring Plan	1	LS	\$12,000	\$12,000	
Institutional Controls - Legal Fees	1	LS	\$15,000	\$15,000	
Institutional Controls - Technical and Administrative Support	1	LS	\$7,500	\$7,500	
				Total Indirect Cost (IC):	\$56,500
				Total Capital Investment (Subtotal):	\$500,000
				Contingency (20% Subtotal):	\$100,000
				TOTAL CAPITAL INVESTMENT (TCI) [DC + IC + Contingency]:	\$1,044,000
Annual Monitoring (years 1-5)	Quantity	Units	Unit Cost	Extension	Description
Perimeter Gas/Groundwater Collection O&M	1	LS	\$12,000	\$12,000	Performed by Consultant.
LFG Optimization Operations	120	Hours	\$95	\$11,400	Conducted by KCSWD Operations.
LFG Operations - Engineering Support	80	Hours	\$160	\$12,800	
Groundwater Monitoring Labor	200	Hours	\$95	\$19,000	
Gas Monitoring Event	1	LS	\$7,500	\$7,500	
Field Supplies	4	Event	\$1,000	\$4,000	
Data Management, Evaluation, and Reporting	1	Report	\$20,000	\$20,000	
Laboratory Analytical	4	Event	\$19,500	\$78,000	
				Subtotal:	\$165,000
				Project Management (15%):	\$24,750
				Annual Monitoring (years 1-5):	\$189,750
Annual Monitoring (Semi-Annual; years >5)	Quantity	Units	Unit Cost	Extension	Description
Perimeter Gas Collection O&M	1	LS	\$12,000	\$12,000	Performed by Consultant.
LFG Optimization Operations	120	Hours	\$95	\$11,400	Conducted by KCSWD Operations.
LFG Operations - Engineering Support	80	Hours	\$160	\$12,800	
Groundwater Monitoring Labor	100	Hours	\$95	\$9,500	
Field Supplies	2	Event	\$1,000	\$2,000	
Data Management, Evaluation, and Reporting	1	Report	\$20,000	\$20,000	
Laboratory Analytical	2	Event	\$19,500	\$39,000	
				Subtotal:	\$107,000
				Project Management (15%):	\$16,050
				Annual Monitoring (Semi-Annual; years >5):	\$123,050
				TOTAL ALTERNATIVE COST (Actual Dollars, 30 years):	\$5,069,000
				TOTAL ALTERNATIVE COST (NPV, 30 years):	\$4,398,000

Notes:

- The costs presented are preliminary, Feasibility Study-level estimates based on existing information, and are estimated to be within +50/-30% of actual costs.
- Net Present Value (NPV) calculated using a real discount rate of 1.2% according to the Federal Office of Management and Budget (https://www.whitehouse.gov/omb/circulars_a094/a94_appx-c).