King County Department of Natural Resources and Parks

Solid Waste Division

Phase 1 – Cedar Hills Regional Landfill
CONTRACT NO. E00286E12
Task No. 810

Cedar Hills Regional Landfill - EPZ Extraction Well Decommissioning Technical Memorandum

Prepared by
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King County
Department of
Natural Resources and Parks
Solid Waste Division

Waste **Prevention** | *Resource* **Recovery** | *Waste* **Disposal**

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July 26, 2018

CEDAR HILLS REGIONAL LANDFILL – EPZ EXTRACTION WELL DECOMMISSIONING TECHNICAL MEMORANDUM

Contract No. E00286E12

Prepared for: King County Solid Waste Division
Project No. 130088 Task 810 • July 26, 2018

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1.0 INTRODUCTION

This Technical Memorandum (Tech Memo) summarizes the decommissioning of 29 extraction wells at the Cedar Hills Regional Landfill (CHRLF; the Site: see Figure 1). The decommissioning described in this Tech Memo is a component of the Phase I Interim Actions focused on environmental monitoring infrastructure upgrades, recommended in the draft East Perched Zone (EPZ) Remedial Investigation and Feasibility Study (EPZ RI/FS; Aspect, 2016) and as agreed upon during discussions between the Washington State Department of Ecology and King County Solid Waste Division (KCSWD). The intent of the decommissioning work described in this Tech Memo was to reduce the potential migration pathway for movement of groundwater and landfill gas (LFG) through the EPZ. The work was completed in accordance with the *Final Work Plan – Cedar Hills Regional Landfill – EPZ Infrastructure Upgrades Workplan* (Aspect, 2018) of Contract No. E00286E12 with Aspect Consulting, LLC (Aspect) and consisted of the following:

- Predrilling activities including initial Site visit, siting extraction wells, utility locates, and removal of dedicated pumps and wiring at all extraction well locations.
- Decommissioning of 29 extraction wells (Figure 2) by overdrilling and backfilling with bentonite grout, as part of the preferred remedy implementation.
- Managing investigative-derived waste created during decommissioning and drilling activities.

2.0 PREDRILLING ACTIVITIES

Decommissioning locations were observed prior to field work with project representatives from KCSWD, Aspect, and the drilling contractor, Holt Services, Inc (Holt). In addition, public and private utility locates were conducted prior to drilling.

3.0 EXTRACTION WELL DECOMMISSIONING

The existing extraction wells (EWs), EW-1 through EW-29 (Figure 3) were decommissioned, in accordance with Washington Administrative Code (WAC)173-160, by overdrilling using rotosonic methods. The decommissioning drilling methods included setting 12-inch-diameter casing and cleaning out each run with 8-inch-diameter core barrel. Once the total depth of the EW was drilled, and well construction materials were removed, the borings were backfilled with a 20-percent (by weight) high solids bentonite grout slurry by tremie pipe and/or by placement of ¾-inch unhydrated sodium bentonite chips, depending upon the depth of the former EW. The existing aboveground surface monuments were removed and left on-site for reuse by KCSWD. Bollards were temporarily removed, as needed, to access the extraction well locations and were replaced after decommissioning activities. Aspect's field staff oversaw and documented the decommissioning activities.

Holt provided the water necessary for drilling activities from both an off-site source, and an approved location on-site. The off-site source of water was analyzed on January 12, 2016, and results provided to

KCSWD in May 2018. The on-site potable water was sourced from a hydrant located near Pump Station 4 located at CHRLF, as per authorization from KCSWD.

Field screening instruments used during the decommissioning included a MiniRae 3000 photoionization detector (PID) and a LandTec GEM 5000 LFG meter (GEM meter). Soil cuttings were field screened for the presence of volatile organic compound (VOC) vapors using the PID, which is designed to detect and measure VOC vapors in air, but it does not detect methane. The VOC concentrations were used to monitor worker health and safety during drilling and to monitor VOCs present in the soil encountered during drilling. The GEM meter was used to monitor methane, carbon dioxide, oxygen, and hydrogen sulfide (H_2S) concentrations during drilling. LFG and H_2S measurements were taken from the top of the drill casing prior to removal of the well construction materials, and periodic ambient air measurements were recorded as part of the health and safety monitoring. The threshold used for H_2S screening during drilling was defined by the permissible exposure limit (PEL) of 10 parts per million (ppm) and the short-term PEL of 15 ppm. The methane action level is set at 10 percent of the lower explosive limit (LEL), which is 5 percent. Per the WAC 173-351, the criterion is set to 25 percent of the LEL for on-site structures, therefore 1.25 percent of methane was the action level during drilling. Measurements of methane and H_2S during drilling did not exceed the thresholds defined above.

Wells EW-1 through EW-29 were decommissioned between May 7, 2018 and June 6, 2018 by Holt in accordance with WAC 173-160 and the methods and design parameters described in the Final Phase I Interim Action Work Plan (Aspect, 2018). Original EW construction details and materials used in the decommissioning process are presented in Table 1.

The EWs were generally constructed with extended filter packs above the screen and, in some cases, long sumps below the screen. Well depths and geologic conditions in the well screen intervals varied across the EPZ. Wells EW-2 and EW-11 through EW-27 were screened between 20–40 feet below ground surface (bgs) within glacial till/glacio-lacustrine deposits; EW-1 and EW-3 through EW-10 were screened between 30–60 feet bgs within the uppermost stratified drift deposits; and EW-28 and EW-29 were screened less than 20 feet bgs within the glacial till/glacio-lacustrine.

During overdrilling at EW-5 and EW-8, native soils and filter pack were identified in soil cuttings below 45 feet bgs and 43 feet bgs, respectively; however, the soil cuttings below these depths did not include original well construction materials, other than the filter pack. Above these depths, native soils, screen, blank PVC and centralizers were encountered in the soil cuttings from these wells. Several attempts were made to regain the borehole by retracting and advancing outer casing and inner core barrel near the depth of the observed deviation without success. Subsequently, each well was overdrilled to the total depth depicted on the original well logs and backfilled with bentonite grout. In both cases, the well construction materials below the deviation are contained completely within the stratified drift; thus, there is no interconnection of hydrostratigraphic units. In both wells, the section of the well below the deviation included about 5 feet of screen and a 4-foot sump.

EW-28 and 29 were constructed at the relatively shallow depths of 20 feet bgs and 24.5 feet bgs, respectively. Based on the shallow depths minimizing the standing water column, unhydrated ¾-inch sodium bentonite chips were used to backfill these wells to ground surface and hydrated with potable water.

No elevated methane levels were detected during overdrilling activities. No elevated PID levels were detected during overdrilling activities. Documentation of the VOCs and LFG field screening recorded during decommissioning activities are provided in Table 2.

EW as-builts were prepared for each EW location to document the total depth overdrilled and sealing methods utilized at each EW location. Documentation includes a log of cuttings returned during overdrilling, total depth overdrilled, tally of materials used (i.e., grout, bentonite chips), and placement method. Original well construction logs and the decommissioning logs for the EWs are presented in Appendix A.

4.0 SITE RESTORATION

Following drilling, areas disturbed during well decommissioning were re-graded by the driller using the surrounding soil and restored to its original condition to the extent feasible.

5.0 DECONTAMINATION PROCEDURES

Equipment used for drilling or making measurements in wells was decontaminated prior to use on-site and decontaminated again between EW locations. Drilling equipment was decontaminated by Holt using appropriate decontamination procedures, including a mobile, hot-water high-pressure washer, buckets, and brushes.

Any sampling equipment used in wells, such as water level indicators, was decontaminated after use at each well location. The decontamination procedure consisted of spraying Alconox® or other non-phosphate detergent on the equipment, scrubbing the equipment with a brush, rinsing it thoroughly with potable water, and then rinsing it thoroughly with distilled water. All decontamination water was containerized as investigation-derived waste and properly disposed, as discussed in the following section.

6.0 INVESTIGATION-DERIVED WASTE

All soil cuttings and former well construction materials from the decommissioning activities were contained in a lined roll-off container designed for hauling to an approved facility following designation sampling. The investigation-derived waste was approved for disposal at the CHRLF as per King County Solid Waste Division Waste Clearance Decision Number N0116 (Appendix B). During the course of the decommissioning activities, the roll-off container was periodically disposed of at the active cell at CHRLF in accordance with KCSWD waste clearance requirements.

All water generated during the decommissioning activities was temporarily contained in WSDOT-approved 55-gallon drums. The water generated during decommissioning was sampled for laboratory analysis prior

to disposal and compared to KCSWD leachate/wastewater discharge permit conditions. Analytical results are provided in Appendix B. The results indicated the water met KCSWD leachate/wastewater discharge permit limits, and was discharged into the leachate lagoons on-site, per KCSWD approval.

7.0 LIMITATIONS

Work for this project was performed for King County Solid Waste Division (KCSWD) (Client), and this report was prepared in accordance with generally accepted professional practices for the nature and conditions of work completed in the same or similar localities, at the time the work was performed. This report does not represent a legal opinion. No other warranty, expressed or implied, is made.

All reports prepared by Aspect Consulting for the Client apply only to the services described in the Agreement(s) with the Client. Any use or reuse by any party other than the Client is at the sole risk of that party, and without liability to Aspect Consulting. Aspect Consulting's original files/reports shall govern in the event of any dispute regarding the content of electronic documents furnished to others.

Please refer to Appendix C titled "Report Limitations and Guidelines for Use" for additional information governing the use of this report.

8.0 REFERENCES

Aspect Consulting, LLC (Aspect), 2016, East Perched Zones Remedial Investigation and Feasibility Study – Cedar Hills Regional Landfill, December 2016, Agency Review Draft.

Aspect Consulting, 2018, Cedar Hills Regional Landfill—EPZ Interim Action Infrastructure Upgrades Work Plan, Contract No. E00286E12, Prepared for King County Solid Waste Division, May 2018.

TABLES

Table 1 - Summary of Decommissioned Extraction Well Details

Project No. 130088, Cedar Hills Regional Landfill, Maple Valley, WA

Well ID	Well Completion Depth (ft bgs)	Boring Diameter (in)	Actual Depth Over Drilled (ft bgs)	Estimated Grout/ Chip Volume (gallons)	Actual Grout/Chip Volume (gallons/pounds)
EW-1	47.67	12	46.0	270	175
EW-2	34.80	12	35.0	205	125
EW-3	59.70	12	52.0	305	250
EW-4	69.68	12	68.0	399	300
EW-5	46.25	12	55.0	323	275
EW-6	59.20	12	59.0	346	225
EW-7	45.80	12	45.0	264	190
EW-8	54.50	12	54.0	317	320
EW-9	46.20	12	45.0	264	250
EW-10	43.80	12	45.0	264	300
EW-11	43.50	12	42.0	247	300
EW-12	39.80	12	35.0	205	180
EW-13	39.90	12	66.0	387	320
EW-14	47.90	12	45.0	264	145
EW-15	47.80	12	45.0	264	195
EW-16	43.70	12	45.0	264	150
EW-17	43.50	12	46.0	270	150
EW-18	43.10	12	40.0	235	150
EW-19	44.00	12	38.0	223	180
EW-20	43.20	12	38.0	223	140
EW-21	39.50	12	38.0	223	165
EW-22	44.10	12	41.0	241	195
EW-23	44.50	12	41.0	241	200
EW-24	39.00	12	37.7	221	155
EW-25	38.30	12	36.0	211	150
EW-26	36.00	12	36.5	214	165
EW-27	36.90	12	36.0	211	150
EW-28*	22.80	12	20.0	117	850
EW-29*	23.60	12	24.5	144	1000

Notes:

ft = feet, ft bgs = feet below ground surface, in = inches

Estimated grout and chip volume is calculated using multiplier 5.87 gallons/foot.

* = 3/8" bentonite chips used for backfilling (measured in pounds)

Table 2 - Summary of LFG Monitoring Results

Project No. 130088, Cedar Hills Regional Landfill, Maple Valley, WA

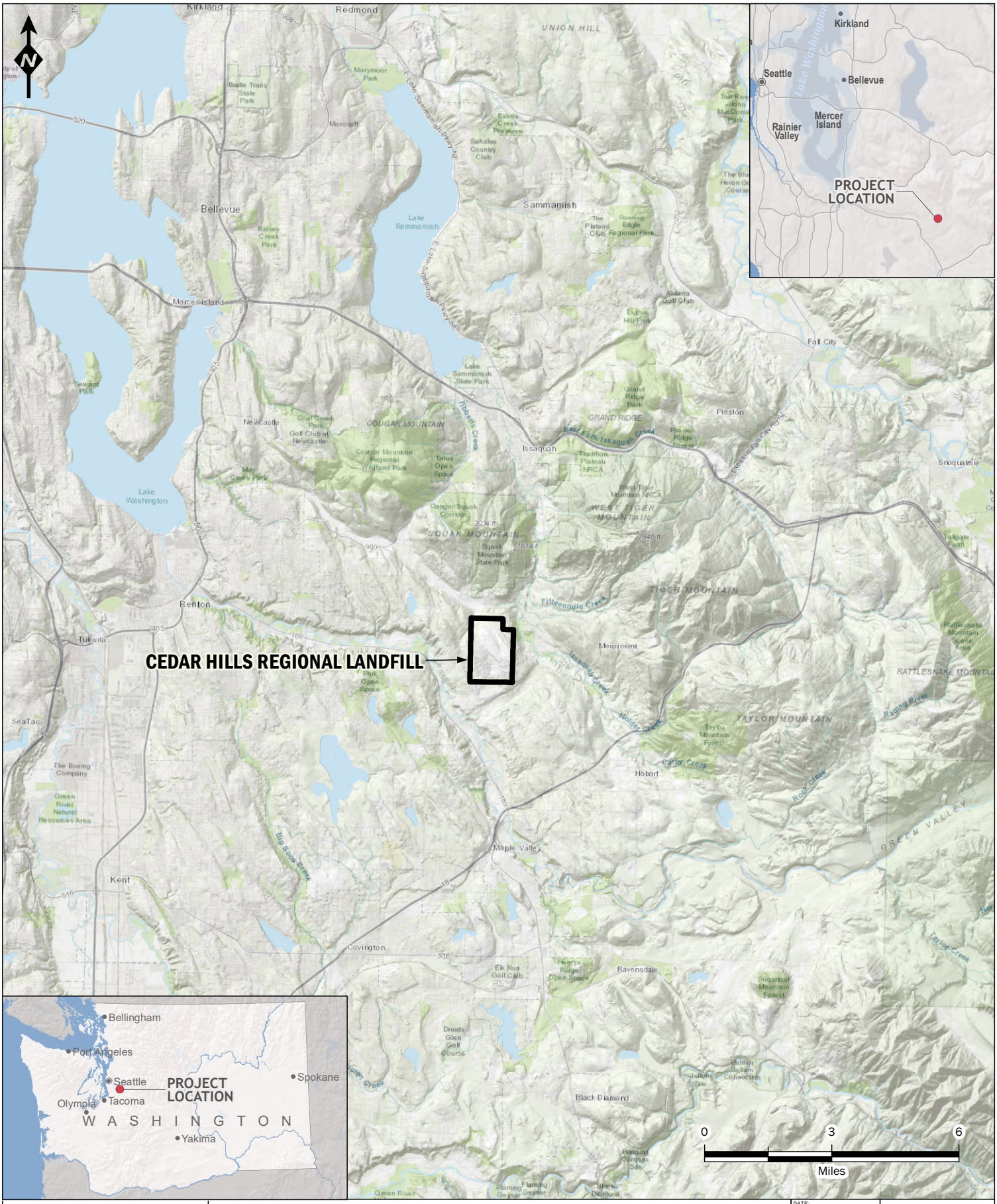
Extraction Well ID	Depth of Measurment	PID (ppm)	CH_4 (%)	CO_2 (%)	O_2 (%)	H_2S (ppm)	CO (ppm)
	0	0.1	0	0.1	20.9	0	0
EW-01	40	0.1	0	0.2	21.2	0	1
	0	0	0	0	20.1	1	1
EW-02	30	0.1	0	0.2	21.8	0	1
	0	0.1	0	0.1	20.8	0	1
EW-03	60	0.2	0	0.3	20.7	0	1
	0	0.1	0	0.3	20.7	0	0
EW-04	60	0.2	0	0.2	21.3	0	1
	0	0.1	0	0.1	21	1	0
EW-05	40	0.1	0	0.2	20.7	1	1
	0	0.1	0	0.1	20	1	1
EW-06	60	0.2	0	0.2	20.3	0	0
	0	0.2	0	0.2	20.3	0	0
EW-07	20	0.5	0	0.2	19.7	1	1
	0	0.1	0	0.1	20.5	0	0
EW-08	20	0.2	0	0.1	21.7	0	0
EW-09	0	0	0.1	1.6	-	-	-
EW-10	0	0	0	1.8	-	-	-
EW-11	0	0	0	0.2	-	-	-
	0	0.1	0.1	0.4	19	1	1
EW-12	40	1.4	0	0.1	21.2	0	4
	0	0.1	0	0.1	20.9	0	1
EW-13	40	2.5	0.3	0.2	21	0	1
EW-14	0	0	0.1	1.2	-	-	-
	0	0.1	0.1	2.8	-	-	-
EW-15	40	0	0	0.1	-	-	-
EW-16	0	0	0.1	2.5	-	-	-
EW-17	0	0	0	2.7	-	-	-
	0	0	0	0.1	21.2	-	-
EW-18	40	0	0	0.1	21.2	-	-
	0	0.1	0.1	0.2	21.2	0	0
EW-19	40	0.1	0	0.1	19.1	0	1
	0	0.1	0	0.1	20.4	1	0
EW-20	40	0.2	0	0.1	21	0	1
	0	0	0.2	0.7	19.7	1	0
EW-21	40	0.4	0	0.1	20.7	1	1
	0	0.4	0	0.1	20.8	0	1
EW-22	40	0.5	0	0.1	20.9	0	0
	0	0.1	0	0.2	20.9	0	0
EW-23	30	0.3	0	0.2	21	0	1
	0	0	0	0.1	21.1	0	0
EW-24	30	0.4	0	0.1	21.5	0	1
	0	0.2	0	0.1	19.3	1	1
EW-25	30	0.3	1	0.1	20.3	1	2
	0	0.1	0.2	0.4	20.5	0	0
	20	0.1	3.6	3.3	16.1	0	0
EW-26	40	0.2	1.2	1.8	18.7	0	1
	0	0	0.3	0.5	20.5	0	0
	20	0.1	1.2	1.7	18.7	0	1
EW-27	30	0.1	0	0.1	20.9	0	1
	0	0	0	0.1	20.8	0	1
EW-28	20	0.1	0	0.1	20.8	0	1
EW-29*	20	0.1	15.6	10.7	5.4	0	0

Notes:

"-" = not recorded

*LandGEM 5000 was not purged after calibrating with 15% methane and before sampling downhole

FIGURES



King County

Aspect CONSULTING

Project Location Map

Cedar Hills Regional Landfill

King County, Washington

DATE: Apr-2018	PROJECT NO. 130088
DESIGNED BY: KSL/RAP	
DRAWN BY: KSL/RAP	FIGURE NO. 1
REVISED BY: AO / RAP	

King County

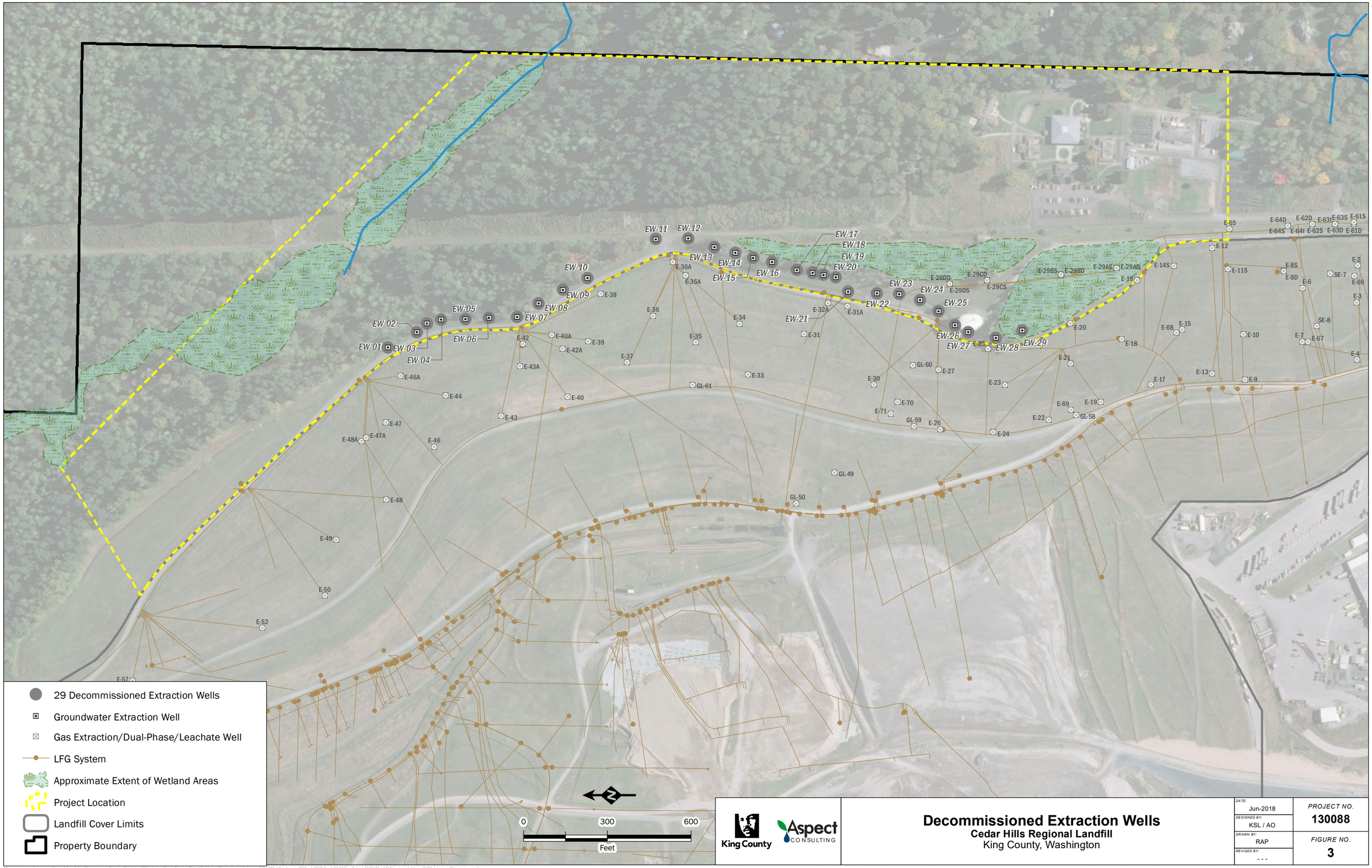
Aspect CONSULTING

Cedar Hills Regional Landfill Property Features

Cedar Hills Regional Landfill

King County, Washington

DATE: Apr-2018	PROJECT NO. 130088
DESIGNED BY: KSL/RAP	
DRAWN BY: KSL/RAP	FIGURE NO. 2
REVISED BY: AO / RAP	



29 Decommissioned Extraction Wells

Groundwater Extraction Well

Gas Extraction/Dual-Phase/Leachate Well

LFG System

Approximate Extent of Wetland Areas

Project Location

Landfill Cover Limits

Property Boundary

King County

Aspect CONSULTING

Decommissioned Extraction Wells

Cedar Hills Regional Landfill

King County, Washington

DATE: Jun-2018	PROJECT NO. 130088
DESIGNED BY: KSL / AO	
DRAWN BY: RAP	FIGURE NO. 3
REVISED BY: - - -	

APPENDIX A

Original Extraction Well Logs and Decommissioned Logs

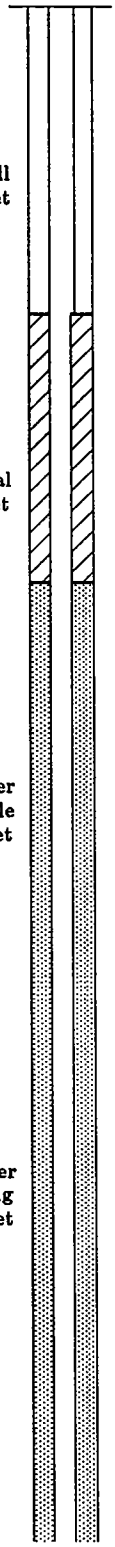
11101/D:

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

0

Gravel Borrow Import Pit Run-D (FILL)

SILT with sand and gravel (ML); moderate yellowish brown; nonplastic; little medium to coarse sand; trace fine gravel (WEATHERED TILL)

cobbles @ 9.5 to 10 feet

10

GRAVEL with sand (GW); light brown, fine to coarse; little fine to medium sand; dry (WEATHERED TILL)

SAND with silt (SP-SM); moderate yellowish brown, fine grained; few fine gravel; dry (WEATHERED TILL)

SAND with gravel (SW); moderate brown, some fine to coarse gravel; dry (WEATHERED TILL)

20

Harding Lawson Associates
Engineering and Environmental Services

Log of Boring and Well Completion

PLATE

EW-17A

(sheet 1 of 3)

Cedar Hills Landfill

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

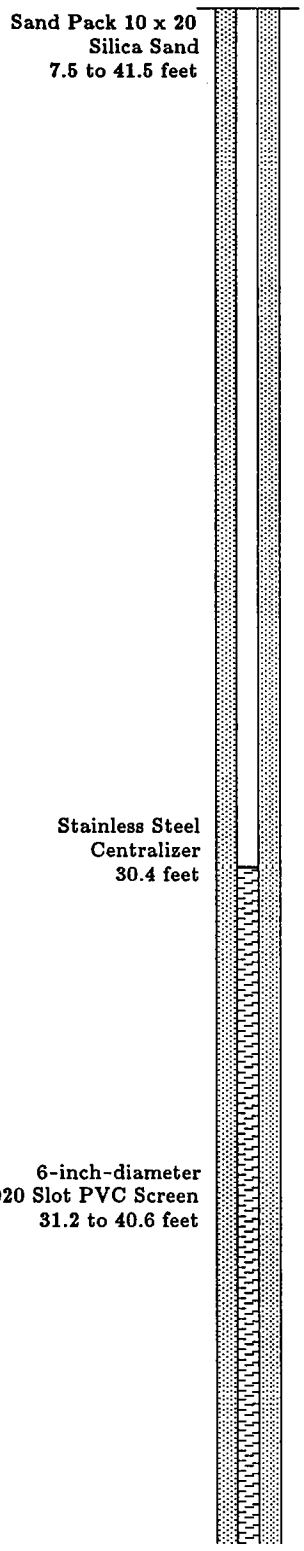
11101/D:

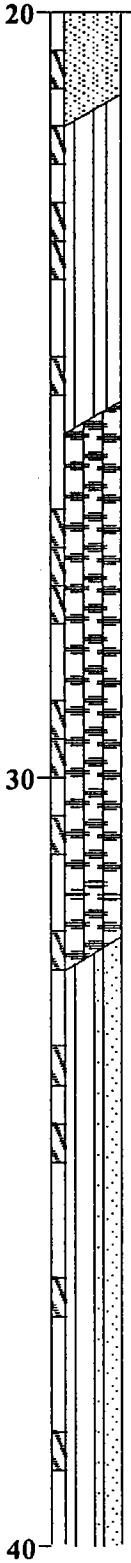
Stickup 3.20 ft

Drill Method Air Rotary

Boring No. EW-17A EW-1

TOC Elevation 554.05 ft Date 8/10/92





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)

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

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Engineering and Environmental Services

Log of Boring and Well Completion

PLATE

EW-17A

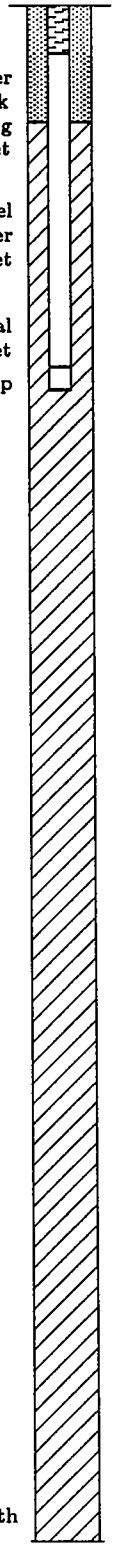
(sheet 2 of 3)

Cedar Hills Landfill

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

11101/D:

Stickup 3.20 ft



6-inch-diameter Schedule 40 PVC Blank Casing 40.6 to 45.0 feet

Stainless Steel Centralizer 41.5 feet

Bentonite Pellet Seal 41.5 to 60.0 feet

End Cap

Total Depth

Depth ft / Sample

Drill Method: Air Rotary

Boring No.: EW-17A EW-1

TOC Elevation: 554.05 ft Date: 8/10/92

40

SILTY GRAVEL with sand (GM); light olive gray; mostly fine to medium; occasional coarse gravel beds; some fine to coarse sand; little to some fines; water added (STRATIFIED DRIFT)

coarse gravels

50

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

GRAVEL with silt and sand (GW-GM); light olive gray to brownish gray; some fine to coarse sand; trace fines; water added (ADVANCE OUTWASH)

60

Total depth drilled = 60 feet

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Engineering and Environmental Services

Log of Boring and Well Completion

PLATE

EW-17A (sheet 3 of 3)

Cedar Hills Landfill

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

Aspect CONSULTING	Cedar Hills Regional Landfill - 130088		Well Decommissioning Log	
	Project Address & Site Specific Location 16645 228th AVE SE, Maple Valley, WA 98038, North of EW-2		*Coordinates (SPN NAD83 ft)* E:172517 N:1341660	*Exploration Number* **EW-01**
Contractor Holt Services	*Equipment* Rotosonic drill rig	*Sampling Method* Rotary core	*Ground Surface (GS) Elev.* 550.443'	
Operator Brian Owens	*Exploration Method(s)* Sonic	*Work Start/Completion Dates* 6/6/2018	*Top of Casing Elev.* 552.77'	*Depth to Water (Below GS)* 40.79' (Static)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	550	Hydrated bentonite chips					**Decommissioning Details** Extraction well decommissioned by overdrilling using rotosonic drilling methods: 12-inch OD barrel and 8-inch ID to 46 ft bgs. 12-inch diameter above-ground stainless steel monument removed 0 to 2 feet: Hydrated bentonite chips 2 to 46 feet: Bentonite grout (20% weight by solids) **Original Well Construction** 12-inch diameter above-ground stainless steel monument +3.2 to 31.2 feet: 6-inch, blank PVC Casing 30.4 feet: Stainless steel centralizer 31.2 to 40.6 feet: 6-inch, 0.020 slot PVC screen 40.6 to 45.0 feet: 6-inch, SCH 40 PVC blank casing 41.5 feet: Stainless steel centralizer 0 to 4 feet: Gravel backfill 4 to 7.5 feet: Bentonite surface seal 7.5 to 41.5 feet: 10 x 20 Silica Sand 41.5 to 60 feet: Bentonite pellet seal Bottom of overdrilling for decommissioning at 46 feet bgs.	
5	545	Bentonite grout						5
10	540							10
15	535							15
20	530							20
25	525							25
30	520							30
35	515							35
40	510	▼ 5/31/2018						40
45	505							45

Legend

Sample Method

Water Level ▼ Static Water Level

See Exploration Log Key for explanation of symbols

Logged by: ACO
Approved by: KSL

Exploration Log EW-01
Sheet 1 of 1

NEW STANDARD LOG FORM P:\GINTW\PROJECTS\2018_130088_CHRLF_DECOMLOGS.GPJ June 24, 2018

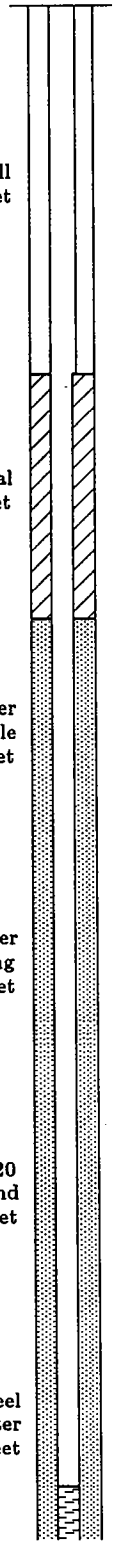
11101/Di

Stickup 2.20 ft

Drill Method Air Rotary

Boring No. EW-12A EW-2

TOC Elevation 561.56 ft Date 7/21/92



Depth ft
Sample

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

Harding Lawson Associates
Engineering and Environmental Services

Log of Boring and Well Completion

PLATE

EW-12A

(sheet 1 of 4)

Cedar Hills Landfill

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

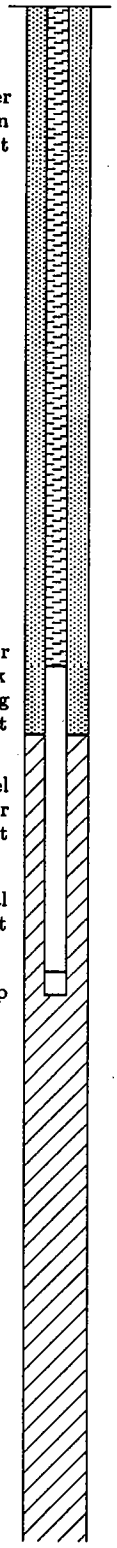
11101/D:

Stickup 2.20 ft

Drill Method Air Rotary

Boring No. EW-12A EW-2

TOC Elevation 561.56 ft Date 7/21/92



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

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

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Log of Boring and Well Completion

PLATE

EW-12A

(sheet 2 of 4)

Cedar Hills Landfill

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

11101/D:

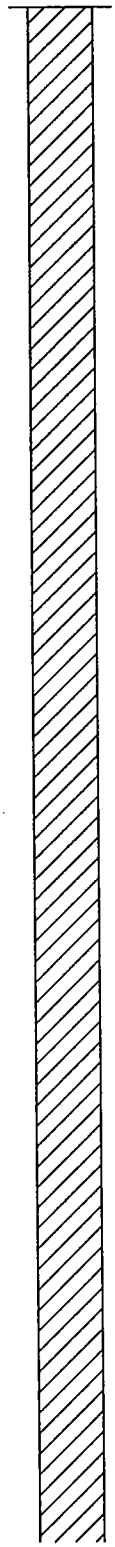
Stickup 2.20 ft

Depth ft
Sample

Drill Method Air Rotary

Boring No. EW-12A EW-2

TOC Elevation 561.56 ft Date 7/21/92



40

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)

60

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Log of Boring and Well Completion

PLATE

EW-12A (sheet 3 of 4)

Cedar Hills Landfill

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

11101/D:

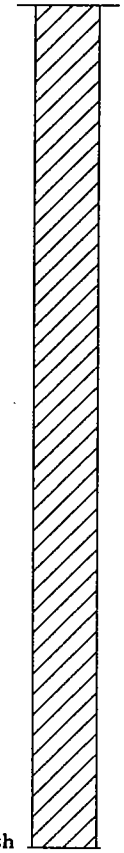
Stickup 2.20 ft

Depth ft
Sample

Drill Method Air Rotary

Boring No. EW-12A EW-2

TOC Elevation 561.56 ft Date 7/21/92



Total Depth

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)

Cedar Hills Landfill

PLATE

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

Aspect CONSULTING	Cedar Hills Regional Landfill - 130088		Well Decommissioning Log	
	Project Address & Site Specific Location 16645 228th AVE SE, Maple Valley, WA 98038, North of EW-3 and South of EW-2		*Coordinates (SPN NAD83 ft)* E:172413 N:1341710	*Exploration Number* **EW-02**
Contractor Holt Services	*Equipment* Rotosonic drill rig	*Sampling Method* Rotary core	*Ground Surface (GS) Elev.* 559.555'	
Operator Brian Owens	*Exploration Method(s)* Sonic	*Work Start/Completion Dates* 6/5/2018 to 6/6/2018	*Top of Casing Elev.* 561.02'	*Depth to Water (Below GS)* No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	560	Hydrated bentonite chips					**Decommissioning Details** Extraction well decommissioned by overdrilling using rotosonic drilling methods: 12-inch OD barrel and 8-inch ID barrel to 35 feet bgs. 12-inch diameter above-ground stainless steel monument removed 0 to 3 feet: Hydrated bentonite chips 3 to 35 feet: Bentonite grout (20% weight by solids) **Original Well Construction** 12-inch diameter above-ground stainless steel monument +2.2 to 19.3 feet: 6-inch PVC blank casing 18.1 feet: Stainless steel centralizer 19.3 to 28.6 feet: 6-inch 0.020 Slot PVC screen 28.6 to 32.9 feet: 6-inch SCH 40 PVC blank casing 29.3 feet: Stainless steel centralizer 0 to 4.8 feet: Gravel backfill 4.8 to 8 feet: Bentonite surface seal 8 to 29.5 feet: 10 x 20 Silica sand 29.5 to 71 feet: Bentonite pellet seal	0
5	555	Bentonite grout						5
10	550							10
15	545							15
20	540							20
25	535							25
30	530							30
35	525						Bottom of overdrilling for decommissioning at 35 feet bgs.	35
	520							

Legend

Sample Method

Water Level — No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: ACO
Approved by: KSL

Exploration Log EW-02
Sheet 1 of 1

NEW STANDARD LOG FORM P:\GINTW\PROJECTS\2018_130088_CHRLF_DECOMLOGS.GPJ June 24, 2018

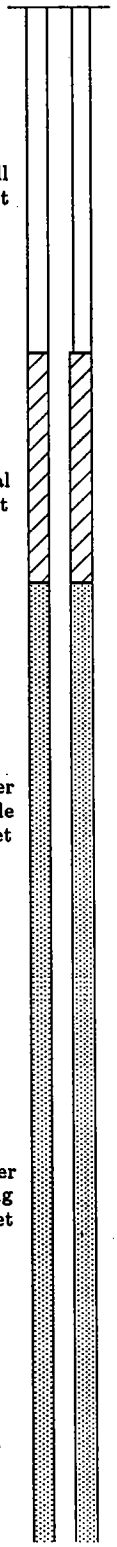
11101/Di

Stickup 3.20 ft

Drill Method Air Rotary

Boring No. EW-16A EW-3

TOC Elevation 560.15 ft Date 8/5/92



Depth ft	Sample	
0		SILT (ML); dark brown; few organics - roots (FILL)
		GRAVELLY SILT with sand (ML); dark yellowish brown; some fine to coarse grvel; little medium to coarse sand; damp (WEATHERED TILL)
		SILTY SAND with gravel and SILT with sand (SM/ML); moderate brown, fine to coarse sand; trace to little fine to medium gravel; dry (WEATHERED TILL)
10		GRAVEL with sand and silt (GW-GM); moderate brown, fine to coarse sand; dry (WEATHERED TILL)
		SAND with silt and gravel (SW-SM); moderate brown; some fine to coarse gravel; dry (WEATHERED TILL)
		SILTY GRAVEL with sand (GM); olive gray, fine to coarse; little fine to coarse sand; some fines; moist; water added below 14 feet (TILL)
20		

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Engineering and Environmental Services

Log of Boring and Well Completion

PLATE

EW-16A

(sheet 1 of 4)

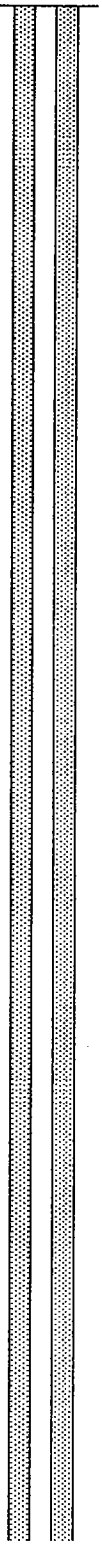
Cedar Hills Landfill

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

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

20

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)

30

coarse gravels @ 31 to 31.5 feet

SILTY GRAVEL with sand (GM); olive gray; mostly fine to medium gravel; with occassional lenses of coarse gravel; some fine to coarse sand; little fines; water added (STRATIFIED DRIFT)

40

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Log of Boring and Well Completion
EW-16A

PLATE

(sheet 2 of 4)

Cedar Hills Landfill

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

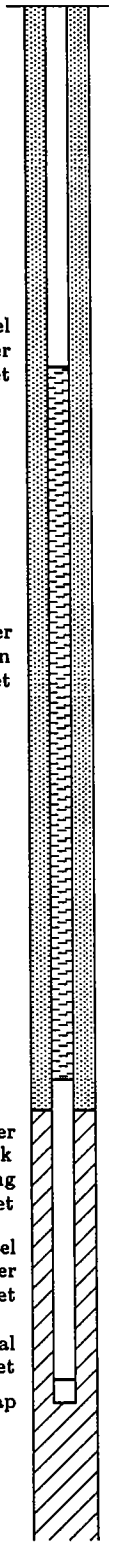
11101/D:

Stickup 3.20 ft

Drill Method Air Rotary

Boring No. EW-16A EW-3

TOC Elevation 560.15 ft Date 8/5/92



Depth ft
Sample

40

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)

50

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)

60

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Log of Boring and Well Completion

PLATE

EW-16A

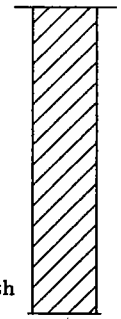
(sheet 3 of 4)

Cedar Hills Landfill

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

11101/D:

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

60

Total depth drilled = 64 feet

70

80

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Log of Boring and Well Completion

PLATE

EW-16A

(sheet 4 of 4)

Cedar Hills Landfill

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

Aspect CONSULTING	Cedar Hills Regional Landfill - 130088		Well Decommissioning Log	
	Project Address & Site Specific Location 16645 228th AVE SE, Maple Valley, WA 98038, North of EW-4 and South of EW-2		*Coordinates (SPN NAD83 ft)* E:172377 N:1341740	*Exploration Number* **EW-03**
Contractor Holt Services	*Equipment* Rotosonic drill rig	*Sampling Method* Rotary core	*Ground Surface (GS) Elev.* 559.239'	
Operator Brian Owens	*Exploration Method(s)* Sonic	*Work Start/Completion Dates* 6/5/2018	*Top of Casing Elev.* 559.88'	*Depth to Water (Below GS)* No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
5	555	Hydrated bentonite chips Bentonite grout					**Decommissioning Details** Extraction well decommissioned by overdrilling using rotosonic drilling methods: 12-inch OD barrel and 8-inch ID barrel to 52 ft bgs. 12-inch diameter above-ground stainless steel monument removed 0 to 3 feet: Hydrated bentonite chips 3 to 52 feet: Bentonite grout (20% weight by solids) **Original Well Construction** 12-inch diameter above-ground stainless steel monument +3.2 to 44.7 feet: 6-inch PVC blank casing 43.9 feet: Stainless steel centralizer 44.7 to 54 feet: 6-inch 0.020 slot PVC screen 54 to 58.2 feet: 6-inch SCH 40 PVC blank casing 54.8 feet: Stainless steel centralizer 0 to 4.5 feet: Gravel backfill 4.5 to 7.5 feet: Bentonite surface seal 7.5 to 54.4 feet: 10 x 20 silica sand 54.4 to 64 feet: Bentonite pellet seal Bottom of overdrilling for decommissioning at 52 feet bgs.	5
10	550							10
15	545							15
20	540							20
25	535							25
30	530							30
35	525							35
40	520							40
45	515							45
50	510							50
	505							

Legend

Sample Method

Water Level — No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: ACO
Approved by: KSL

Exploration Log EW-03
Sheet 1 of 1

NEW STANDARD LOG FORM P:\GINTW\PROJECTS\2018_130088_CHRLF_DECOMLOGS.GPJ June 24, 2018

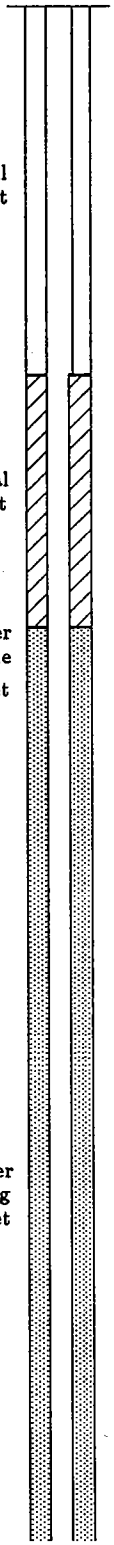
11101/D:

Stickup 1.50 ft

Drill Method Air Rotary

Boring No. EW- 1A EW-4

TOC Elevation 556.67 ft Date 5/26/92



Depth ft	Sample	
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

PLATE

EW- 1A

(sheet 1 of 4)

Cedar Hills Landfill

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

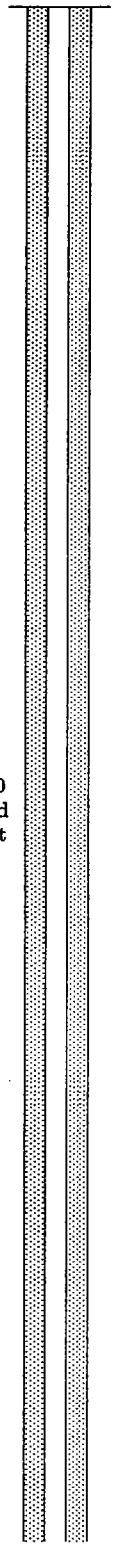
11101/D:

Stickup 1.50 ft

Drill Method Air Rotary

Boring No. EW- 1A EW-4

TOC Elevation 556.67 ft Date 5/26/92



Sand Pack 10 x 20
Silica Sand
8.1 to 63.1 feet

Depth ft
Sample

20

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)

30

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)

40

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Log of Boring and Well Completion

PLATE

EW- 1A

(sheet 2 of 4)

Cedar Hills Landfill

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

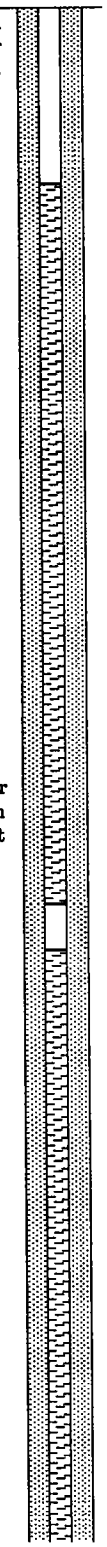
11101/D:

Stickup 1.50 ft

Drill Method Air Rotary

Boring No. EW- 1A EW-4

TOC Elevation 556.67 ft Date 5/26/92



Depth ft
Sample

40

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

50

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

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Log of Boring and Well Completion

PLATE

EW- 1A

(sheet 3 of 4)

Cedar Hills Landfill

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

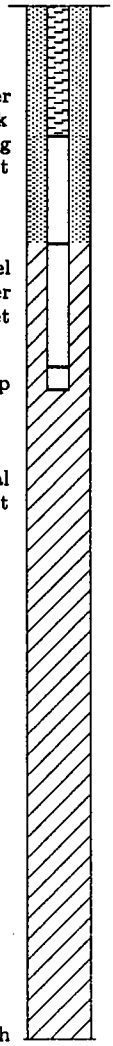
11101/D:

Stickup 1.50 ft

Drill Method Air Rotary

Boring No. EW- 1A EW-4

TOC Elevation 556.67 ft Date 5/26/92



Depth ft	Sample	
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)
70		SAND with silt and gravel (SW-SM); yellowish brown, fine to coarse; some fine to medium gravel; few fines; adding water (ADVANCE OUTWASH)
		GRAVEL to GRAVEL with silt and sand (GW/GW-GM); yellowish brown, fine to coarse; few coarse sand; trace to few fines (ADVANCE OUTWASH)
80		Total depth drilled = 73.5 feet

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Log of Boring and Well Completion

PLATE

EW- 1A

(sheet 4 of 4)

Cedar Hills Landfill

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

Aspect CONSULTING	Cedar Hills Regional Landfill - 130088		Well Decommissioning Log	
	Project Address & Site Specific Location 16645 228th AVE SE, Maple Valley, WA 98038, North of EW-5 and South of EW-3		*Coordinates (SPN NAD83 ft)* E:172326 N:1341760	*Exploration Number* **EW-04**
Contractor Holt Services	*Equipment* Rotosonic drill rig	*Sampling Method* Rotary core	*Ground Surface (GS) Elev.* 565.286'	
Operator Brian Owens	*Exploration Method(s)* Sonic	*Work Start/Completion Dates* 6/4/2018	*Top of Casing Elev.* 566.36'	*Depth to Water (Below GS)* 52.03' (Static)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	565	Hydrated bentonite chips					**Decommissioning Details** Extraction well decommissioned by overdrilling using rotosonic drilling methods: 12-inch OD barrel and 8-inch ID barrel. 12-inch diameter above-ground stainless steel monument removed 0 to 3 feet: Hydrated bentonite chips 3 to 68 feet: Bentonite grout (20% weight by solids) **Original Well Construction** 12-inch diameter above-ground stainless steel monument +1.5 to 42.3 feet: 6-inch PVC blank casing 41.7 feet: Stainless steel centralizer 42.3 to 61.7 feet: 6-inch 0.020 slot PVC screen 61.7 to 65 feet: 6-inch SCH 40 PVC blank casing 63.6 feet: Stainless steel centralizer 0 to 4.8 feet: Gravel backfill 4.8 to 8.1 feet: Bentonite surface seal 8.1 to 63.1 feet: 10 x 20 Silica sand 63.1 to 73.5 feet: Bentonite pellet seal	0
5	560	Bentonite grout						5
10	555							10
15	550							15
20	545							20
25	540							25
30	535							30
35	530							35
40	525							40
45	520							45
50	515	▼ 5/31/2018						50
55	510							55
60	505							60
65	500						Bottom of overdrilling for decommissioning at 68 feet bgs.	65

Legend

Sample Method

Water Level ▼ Static Water Level

See Exploration Log Key for explanation of symbols

Logged by: ACO
Approved by: KSL

Exploration Log EW-04
Sheet 1 of 1

NEW STANDARD LOG FORM P:\GINTW\PROJECTS\2018_130088_CHRLF_DECOMLOGS.GPJ June 24, 2018

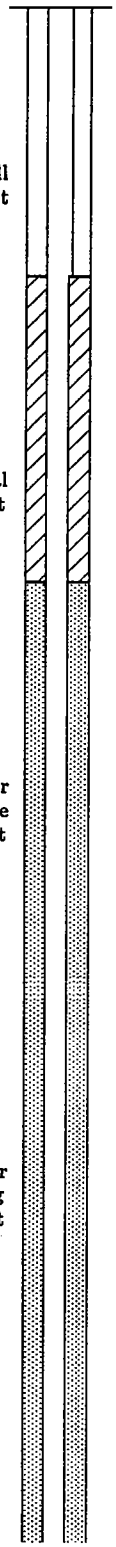
11101/D:

Stickup 1.10 ft

Drill Method Air Rotary

Boring No. EW- 9A EW-5

TOC Elevation 574.52 ft Date 7/14/92



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

Depth ft
Sample

0

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)

10

SAND with silt, cobbles, and gravel (SW-SM); light olive gray; some fine to coarse grvel; 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

PLATE

EW- 9A

(sheet 1 of 4)

Cedar Hills Landfill

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

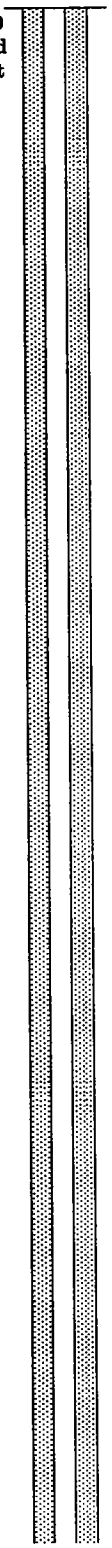
11101/D:

Stickup 1.10 ft

Drill Method Air Rotary

Boring No. EW- 9A EW-5

TOC Elevation 574.52 ft Date 7/14/92



Depth ft
Sample

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

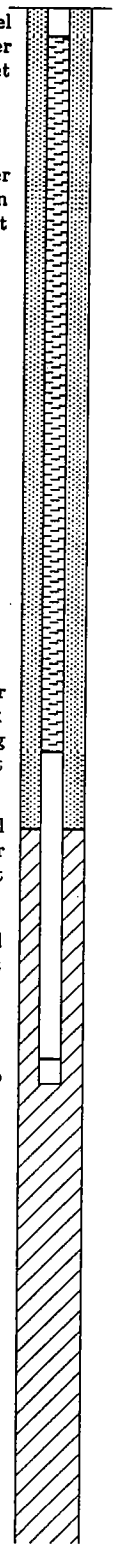
11101/D:

Stickup 1.10 ft

Drill Method Air Rotary

Boring No. EW- 9A EW-5

TOC Elevation 574.52 ft Date 7/14/92



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

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

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)

60

Harding Lawson Associates
Engineering and Environmental Services

Log of Boring and Well Completion

PLATE

EW- 9A

(sheet 3 of 4)

Cedar Hills Landfill

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

11101/Di

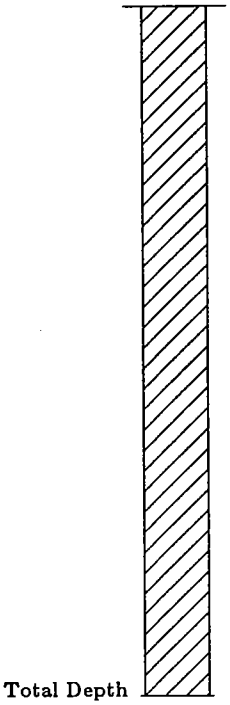
Stickup 1.10 ft

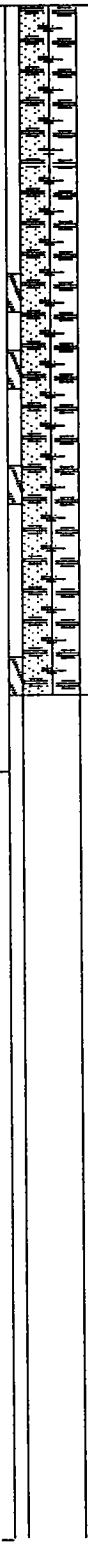
Depth ft
Sample

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

PLATE

EW- 9A

(sheet 4 of 4)

Cedar Hills Landfill

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

Aspect CONSULTING	Cedar Hills Regional Landfill - 130088		Well Decommissioning Log	
	Project Address & Site Specific Location 16645 228th AVE SE, Maple Valley, WA 98038, North of EW-6 and South of EW-4		*Coordinates (SPN NAD83 ft)* E:172239 N:1341760	*Exploration Number* **EW-05**
Contractor Holt Services	*Equipment* Rotosonic drill rig	*Sampling Method* Rotary core	*Ground Surface (GS) Elev.* 573.355'	
Operator Brian Owens	*Exploration Method(s)* Sonic	*Work Start/Completion Dates* 6/1/2018	*Top of Casing Elev.* 574.21'	*Depth to Water (Below GS)* 49.99' (Static)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	570	Hydrated bentonite chips					**Decommissioning Details** Extraction well decomissioned by overdrilling using rotosonic drilling methods: 12-inch OD barrel, 8-inch ID barrel. 12-inch diameter above-ground stainless steel monument removed 0 to 3 feet: Hydrated bentonite chips 3 to 55 feet: Bentonite grout (20% weight by solids) Additional notes: -Well casing deviates from plumb at 45 feet bgs (observed) -Well casing below the deviation not extracted -Remaining well casing below deviation at 45 feet bgs backfilled with bentonite grout **Original Well Construction** 12-inch diameter above-ground stainless steel monument +1.1 to 40.35 feet: 6-inch PVC blank casing 39.9 feet: Stainless steel centralizer 40.35 to 49.7 feet: 6-inch 0.020 slot PVC screen 49.7 to 54.2 feet: 6-inch SCH 40 PVC blank casing 0 to 3.5 feet: Gravel backfill 3.5 to 7.5 feet: Bentonite surface seal 7.5 to 50.7 feet: 10 x 20 Silica sand 50.7 to 69 feet: Bentonite pellet seal	0
5	565	Bentonite grout						5
10	560							10
15	555							15
20	550							20
25	545							25
30	540							30
35	535							35
40	530							40
45	525							45
50	520	▼ 5/31/2018						50
55							Bottom of overdrilling for decommissioning at 55 feet bgs.	55

Legend

Sample Method

Water Level ▼ Static Water Level

See Exploration Log Key for explanation of symbols

Logged by: ACO
Approved by: KSL

Exploration Log EW-05
Sheet 1 of 1

NEW STANDARD LOG FORM P:\GINTW\PROJECTS\2018_130088_CHRLF_DECOMLOGS.GPJ June 24, 2018

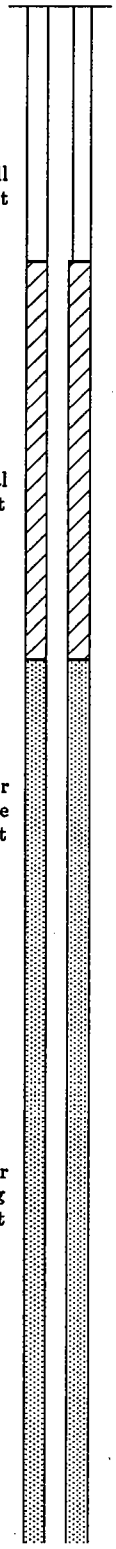
11101/D:

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	
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)
10		SANDY GRAVEL with cobbles (GW); gray brown to olive gray; trace rounded cobbles; moist (TILL)
20		

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Log of Boring and Well Completion

PLATE

EW-10A

(sheet 1 of 4)

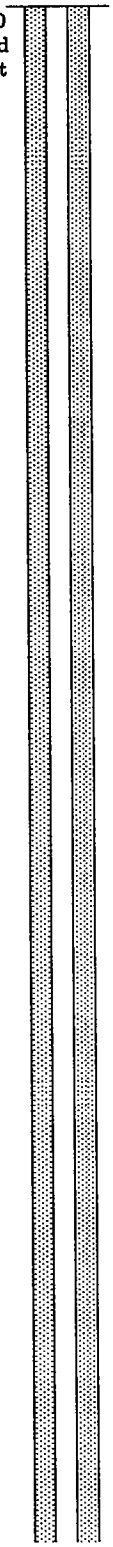
Cedar Hills Landfill

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

11101/D:

Stickup 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)

SANDY GRAVEL (GW); brown; little silt; adding water (STRATIFIED DRIFT)

30

SILTY GRAVEL (GM); olive gray (STRATIFIED DRIFT)

40

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Log of Boring and Well Completion

PLATE

EW-10A

(sheet 2 of 4)

Cedar Hills Landfill

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

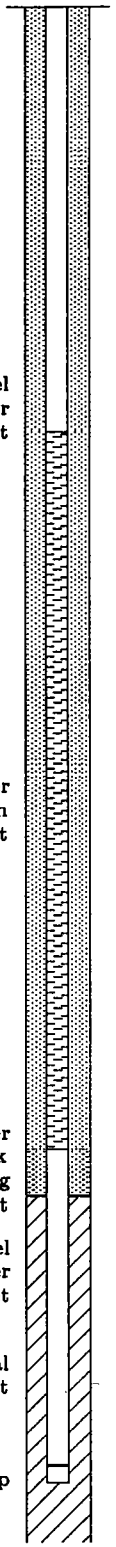
11101/D:

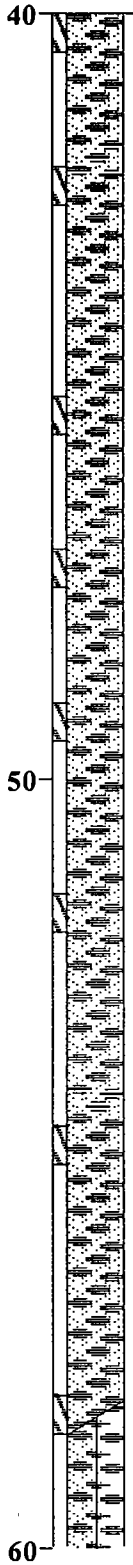
Stickup 0.90 ft

Drill Method Air Rotary

Boring No. EW-10A EW-6

TOC Elevation 582.87 ft Date 7/15/92





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

PLATE

EW-10A

(sheet 3 of 4)

Cedar Hills Landfill

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

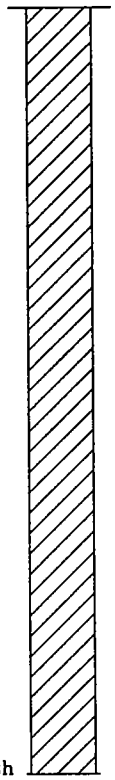
11101/D:

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

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

PLATE

EW-10A

(sheet 4 of 4)

Cedar Hills Landfill

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

Cedar Hills Regional Landfill - 130088

Well Decommissioning Log

Project Address & Site Specific Location	Coordinates (SPN NAD83 ft)	Exploration Number
16645 228th AVE SE, Maple Valley, WA 98038, North of EW-7 and South of EW-5	E:172154 N:1341760	**EW-06**

Contractor	Equipment	Sampling Method	Ground Surface (GS) Elev.
Holt Services	Rotosonic drill rig	Rotary core	582.095'

Operator	Exploration Method(s)	Work Start/Completion Dates	Top of Casing Elev.	Depth to Water (Below GS)
Brian Owens	Sonic	5/31/2018 to 6/1/2018	582.63'	47.08' (Static)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	580	Hydrated bentonite chips					**Decommissioning Details** Extraction well decommissioned by overdrilling using rotosonic drilling methods: 12-inch OD barrel, and 8-inch ID barrel. 12-inch diameter above-ground stainless steel monument removed 0 to 3 feet: Hydrated bentonite chips 3 to 59 feet: Bentonite grout (20% weight by solids) **Original Well Contstruction** 12-inch diameter above-ground stainless steel monument +0.9 to 45.54 feet: 6-inch PVC blank casing 44.9 feet: Stainless steel centralizer 45.54 to 54.89 feet: 6-inch 0.020 slot PVC screen 54.89 to 59.2 feet: 6-inch SCH 40 PVC blank casing 55.5 feet: Stainless steel centralizer 0 to 3.3 feet: Gravel backfill 3.3 to 8.5 feet: Bentonite surface seal 8.5 to 55.5 feet: 10 x 20 Silica sand 55.5 to 70 feet: Bentonite pellet seal	0
5	575	Bentonite grout						5
10	570							10
15	565							15
20	560							20
25	555							25
30	550							30
35	545							35
40	540							40
45	535	▼ 5/30/2018						45
50	530							50
55	525						Bottom of overdrilling for decommissioning at 59 feet bgs.	55

Legend

Sample Method

Water Level ▼ Static Water Level

See Exploration Log Key for explanation of symbols

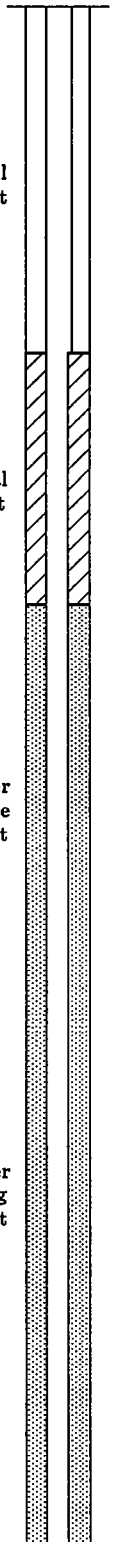
Logged by: ACO
Approved by: KSL

Exploration Log EW-06
Sheet 1 of 1

NEW STANDARD LOG FORM P:\GINTW\PROJECTS\2018_130088_CHRLF_DECOMLOGS.GPJ June 24, 2018

11101/D:

Stickup 2.10 ft



Depth ft | Sample

Drill Method: Air Rotary

Boring No.: EW-11A (EW-7)

TOC Elevation: 593.47 ft Date: 7/17/92

0 — 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)

10

becoming olive brown

moist below 18 feet

20

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Log of Boring and Well Completion

PLATE

EW-11A

(sheet 1 of 3)

Cedar Hills Landfill

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

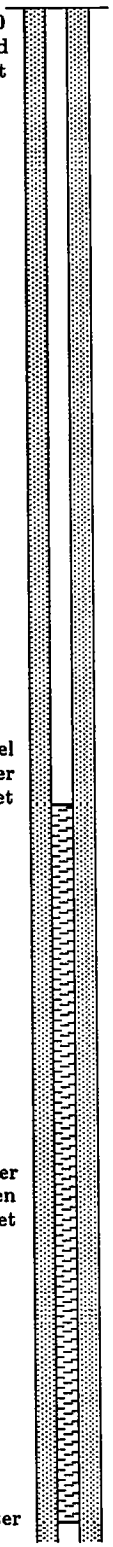
11101/D:

Stickup 2.10 ft

Drill Method Air Rotary

Boring No. EW-11A EW-7

TOC Elevation 593.47 ft Date 7/17/92



Depth ft
Sample

20

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)

30

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

40

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Log of Boring and Well Completion

PLATE

EW-11A

(sheet 2 of 3)

Cedar Hills Landfill

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

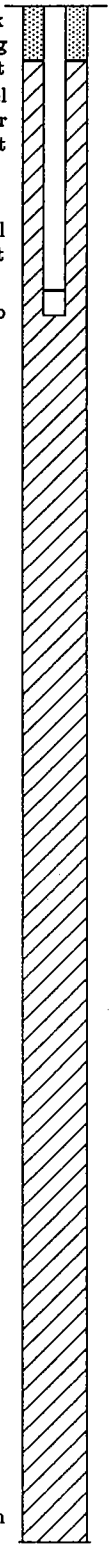
11101/D:

Stickup 2.10 ft

Drill Method Air Rotary

Boring No. EW-11A EW-7

TOC Elevation 593.47 ft Date 7/17/92



Schedule 40 PVC Blank Casing
39.73 to 44.0 feet

Stainless Steel Centralizer
40.4 feet

Bentonite Pellet Seal
40.7 to 60.0 feet

End Cap

Total Depth

Depth ft
Sample

40

start adding drilling water @ 42.5 feet

SILTY GRAVEL with sand and cobbles (GM); light olive grayish brown, fine to coarse; little fine to coarse sand; little fines; water added (STRATIFIED DRIFT)

50

SILTY SAND with gravel (SM); fine to medium; little fine to medium gravel; little fines, water added (STRATIFIED DRIFT)

GRAVEL with silt and sand (GW-GM); dark yellowish brown; little fine to coarse sand; few fines (ADVANCE OUTWASH)

fewer fines (GW)

60

Total depth drilled = 60 feet

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Log of Boring and Well Completion

PLATE

EW-11A

(sheet 3 of 3)

Cedar Hills Landfill

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

Aspect CONSULTING	Cedar Hills Regional Landfill - 130088		Well Decommissioning Log	
	Project Address & Site Specific Location 16645 228th AVE SE, Maple Valley, WA 98038, North of EW-8 and South of EW-6		*Coordinates (SPN NAD83 ft)* E:172054 N:1341770	*Exploration Number* **EW-07**
Contractor Holt Services	*Equipment* Rotosonic drill rig	*Sampling Method* Rotary core	*Ground Surface (GS) Elev.* 591.36'	
Operator Pete Rosenberg	*Exploration Method(s)* Sonic	*Work Start/Completion Dates* 5/30/2018 to 5/30/187	*Top of Casing Elev.* 593.27'	*Depth to Water (Below GS)* 31.07' (Static)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	590	Hydrated bentonite chips					**Decommissioning Details** Extraction well decomissioned by overdrilling using rotosonic drilling methods: 12-inch OD barrel, 8-inch ID barrel. 12-inch diameter above-ground stainless steel monument removed 0 to 2 feet: Hydrated bentonite chips 2 to 45 feet: Bentonite grout (20% weight by solids) **Original Well Construction** 12-inch diameter above-ground stainless steel monument +2.1 to 30.4 feet: 6-inch PVC blank casing 29.7 feet: Stainless steel centralizer 30.4 to 39.73 feet: 6-inch 0.020 slot PVC screen 39.73 to 44 feet: 6-inch SCH 40 PVC blank casing 40.4 feet: Stainless steel centralizer 0 to 4.5 feet: Gravel backfill 4.5 to 7.8 feet: Bentonite surface seal 7.8 to 40.7 feet: 10 x 20 Silica sand 40.7 to 60 feet: Bentonite pellet seal	0
5	585	Bentonite grout						5
10	580							10
15	575							15
20	570							20
25	565							25
30	560	▼ 5/30/2018						30
35	555							35
40	550							40
45	545						Bottom of overdrilling for decommissioning at 45 feet bgs.	45

Legend

Sample Method

Water Level ▼ Static Water Level

See Exploration Log Key for explanation of symbols

Logged by: ACO
Approved by: KSL

Exploration Log EW-07
Sheet 1 of 1

NEW STANDARD LOG FORM P:\GINTW\PROJECTS\2018_130088_CHRLF_DECOMLOGS.GPJ June 24, 2018

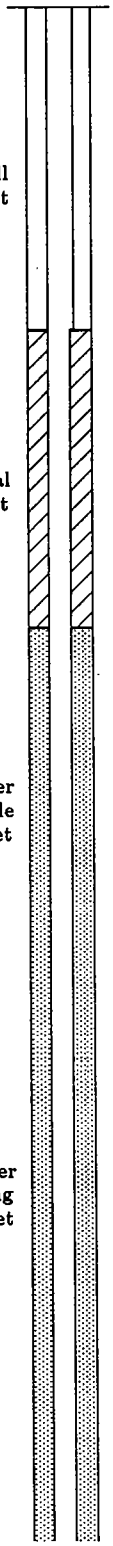
11101/D:

Stickup 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

0

SILT with gravel (ML); dark grayish brown; little fine to coarse gravel; trace plastic; dry to damp (FILL)

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

SILT with cobbles and gravel (ML); moderate yellowish brown; few medium to coarse sand and few fine to medium gravel; (WEATHERED TILL)

10

trace cobbles

SILTY GRAVEL with cobbles and boulder (GM); moderate yellowish brown, fine to coarse; few medium to coarse sand; trace cobbles, boulders at 21 feet; some fines; adding water below 21 feet to remove cuttings (STRATIFIED DRIFT)

20

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Engineering and Environmental Services

Log of Boring and Well Completion

PLATE

EW-13A

(sheet 1 of 3)

Cedar Hills Landfill

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

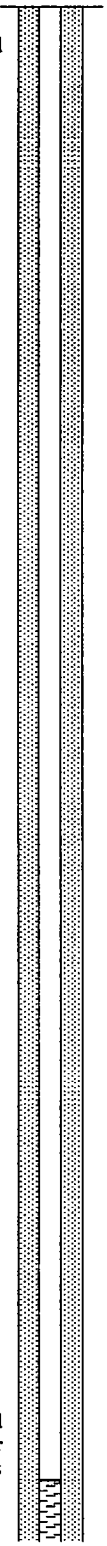
11101/D:

Stickup 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

20

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)

30

large cobbles/boulders

GRAVEL with cobble (GW); olive gray with slight brownish color; trace fines; varied lithologies; water added (STRATIFIED DRIFT)

40

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Log of Boring and Well Completion

PLATE

EW-13A

(sheet 2 of 3)

Cedar Hills Landfill

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

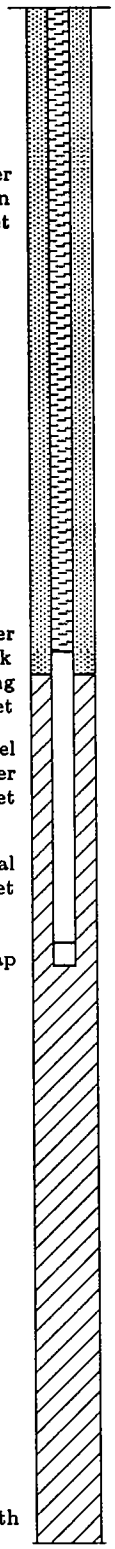
11101/D:

Stickup 2.40 ft

Drill Method Air Rotary

Boring No. EW-13A EW-8

TOC Elevation 600.38 ft Date 7/24/92



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

Depth ft
Sample

40

50

60

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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Engineering and Environmental Services

Log of Boring and Well Completion

PLATE

EW-13A

(sheet 3 of 3)

Cedar Hills Landfill

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

Aspect CONSULTING	Cedar Hills Regional Landfill - 130088		Well Decommissioning Log	
	Project Address & Site Specific Location 16645 228th AVE SE, Maple Valley, WA 98038, North of EW-9 and South of EW-7		*Coordinates (SPN NAD83 ft)* E:171976 N:1341810	*Exploration Number* **EW-08**
Contractor Holt Services	*Equipment* Rotosonic drill rig	*Sampling Method* Rotary core	*Ground Surface (GS) Elev.* 598.133'	
Operator Pete Rosenberg	*Exploration Method(s)* Sonic	*Work Start/Completion Dates* 5/29/2018 to 5/30/2018	*Top of Casing Elev.* 600.2'	*Depth to Water (Below GS)* 35.84' (Static)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	595	Hydrated bentonite chips					**Decommissioning Details** Extraction well decomissioned by overdrilling using rotosonic drilling methods: 12-inch OD barrel, 8-inch ID barrel. 12-inch diameter above-ground stainless steel monument removed 0 to 2 feet: Hydrated bentonite chips 2 to 54 feet: Bentonite grout (20% weight by solids) Additional notes: -Well casing deviates from plumb at 43 feet bgs (observed) -Well casing below the deviation not extracted -Remaining well casing below deviation at 43 feet bgs backfilled with bentonite grout **Original Well Construction** 12-inch diameter above-ground stainless steel monument +2.4 to 39.2 feet: 6-inch PVC blank casing 38.3 feet: Stainless steel centralizer 39.2 to 48.4 feet: 6-inch 0.020 slot PVC screen 48.4 to 52.5 feet: 6-inch SCH 40 PVC blank casing 49.2 feet: Stainless steel centralizer 0 to 4.2 feet: Gravel backfill 4.2 to 8.1 feet: Bentonite surface seal 8.1 to 48.7 feet: 10 x 20 Silica sand 48.7 to 60 feet: Bentonite pellet seal	0
5	590	Bentonite grout						5
10	585							10
15	580							15
20	575							20
25	570							25
30	565							30
35	560	▼ 5/22/2018						35
40	555							40
45	550							45
50	545						Bottom of overdrilling for decommissioning at 54 feet bgs.	50

Legend

Sample Method

Water Level ▼ Static Water Level

See Exploration Log Key for explanation of symbols

Logged by: ACO
Approved by: KSL

Exploration Log EW-08
Sheet 1 of 1

NEW STANDARD LOG FORM P:\GINTW\PROJECTS\2018_130088_CHRLF_DECOMLOGS.GPJ June 24, 2018

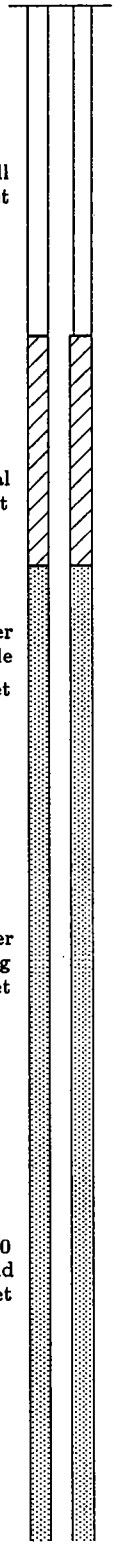
11101/D:

Stickup 1.90 ft

Drill Method Air Rotary

Boring No. EW- 3A EW-9

TOC Elevation 602.92 ft Date 6/18/92



Depth ft	Sample	
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

PLATE

EW- 3A

(sheet 1 of 3)

Cedar Hills Landfill

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

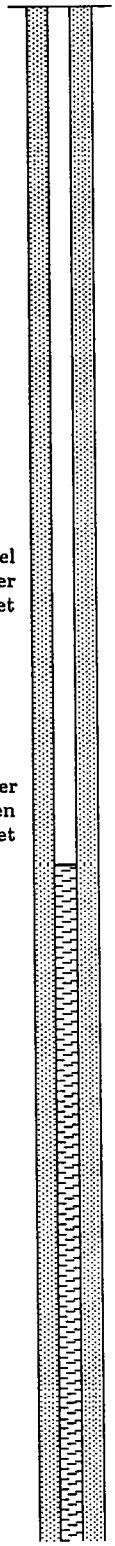
11101/Di

Stickup 1.90 ft

Drill Method Air Rotary

Boring No. EW- 3A EW-9

TOC Elevation 602.92 ft Date 6/18/92



Depth ft
Sample

20

water added (TRANSITIONAL)

Drilled with 10-5/8 inch tricone button bit

GRAVEL with sand and cobbles (GW-GM); light olive gray to light olive brown; little to fine coarse sand; few fines; water added (STRATIFIED DRIFT)

SAND with silt and gravel (SP-SW); medium yellowish brown, medium to coarse; some fine to medium gravel; few to little fines; water added (STRATIFIED DRIFT)

30

GRAVEL with sand and cobbles (GW); yellowish brown; some medium to coarse sand; trace fines; water added (STRATIFIED DRIFT)

GRAVEL with sand, silt, and cobbles (GM); medium yellowish brown, fine to coarse; some fine to coarse sand; little fines, water added (STRATIFIED DRIFT)

Drilled with 12-inch tricone rock BIT

GRAVEL with sand (GW); light olive gray to medium yellowish brown; some medium to coarse sand; trace fines; with cobbles; water added (STRATIFIED DRIFT)

cobbles - metamorphic

SAND with gravel (SW); medium yellowish brown; some fine to medium gravel; trace fines; water added (STRATIFIED DRIFT)

40

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Log of Boring and Well Completion

PLATE

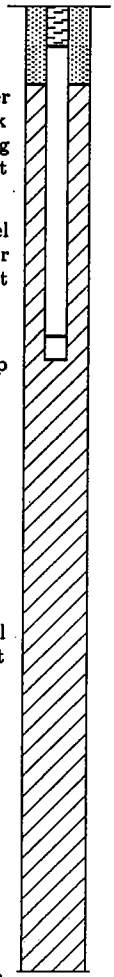
EW- 3A (sheet 2 of 3)

Cedar Hills Landfill

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

11101/D:

Stickup 1.90 ft



Depth ft
Sample

Drill Method Air Rotary

Boring No. EW- 3A EW-9

TOC Elevation 602.92 ft Date 6/18/92

40

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)

50

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

60

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Log of Boring and Well Completion

PLATE

EW- 3A

(sheet 3 of 3)

Cedar Hills Landfill

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

Aspect CONSULTING	Cedar Hills Regional Landfill - 130088		Well Decommissioning Log	
	Project Address & Site Specific Location 16645 228th AVE SE, Maple Valley, WA 98038, North of EW-10 and South of EW-8		*Coordinates (SPN NAD83 ft)* E:171890 N:1341860	*Exploration Number* **EW-09**
Contractor Holt Services	*Equipment* Rotosonic drill rig	*Sampling Method* Rotary core	*Ground Surface (GS) Elev.* 601.228'	
Operator Pete Rosenberg	*Exploration Method(s)* Sonic	*Work Start/Completion Dates* 5/25/2018 to 5/29/2018	*Top of Casing Elev.* 602.89'	*Depth to Water (Below GS)* 36.87' (Static)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	600	Hydrated bentonite chips					**Decommissioning Details** Extraction well decomissioned by overdrilling using rotosonic drilling methods: 12-inch OD barrel, 8-inch ID barrel. 12-inch diameter above-ground stainless steel monument removed 0 to 8 feet: Hydrated bentonite chips 8 to 45 feet: Bentonite grout (20% weight by solids) **Original Well Construction** 12-inch diameter above-ground stainless steel monument +1.9 to 31.2 feet: 6-inch PVC blank casing 29 feet: Stainless steel centralizer 31.2 to 40.5 feet: 6-inch 0.020 slot PVC screen 40.5 to 44.6 feet: 6-inch SCH 40 PVC blank casing 42.1 feet: Stainless steel centralizer 0 to 4.3 feet: Gravel backfill 4.3 to 7.3 feet: Bentonite surface seal 7.3 to 41 feet: 10 x 20 Silica sand 41 to 52.6 feet: Bentonite pellet seal	0
5	595							5
10	590	Bentonite grout						10
15	585							15
20	580							20
25	575							25
30	570							30
35	565	▼ 5/22/2018						35
40	560							40
45	555						Bottom of overdrilling for decommissioning at 45 feet bgs.	45

Legend

Sample Method

Water Level ▼ Static Water Level

See Exploration Log Key for explanation of symbols

Logged by: ACO
Approved by: KSL

Exploration Log EW-09
Sheet 1 of 1

NEW STANDARD LOG FORM P:\GINTW\PROJECTS\2018_130088_CHRLF_DECOMLOGS.GPJ June 24, 2018

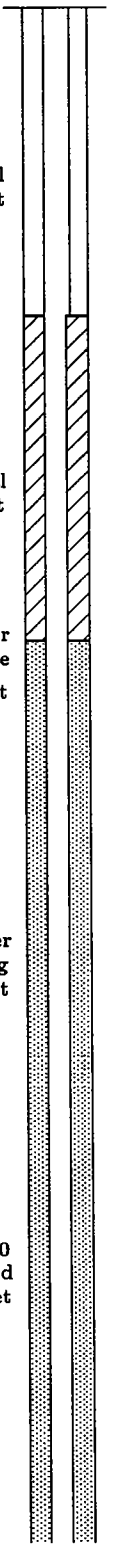
11101/D:

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

0

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)

10

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)

20

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Log of Boring and Well Completion
EW- 8A

(sheet 1 of 3)

PLATE

Cedar Hills Landfill

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

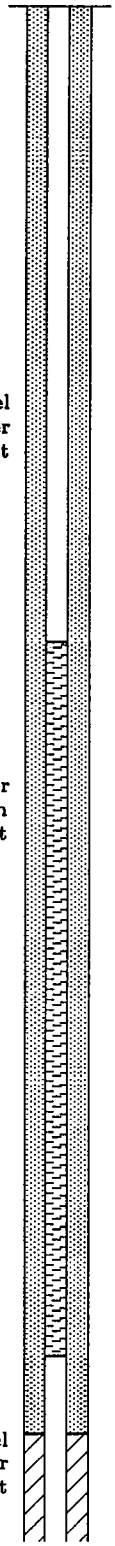
11101/D:

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

20

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)

30

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

40

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Log of Boring and Well Completion
EW- 8A (sheet 2 of 3)
Cedar Hills Landfill

PLATE

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

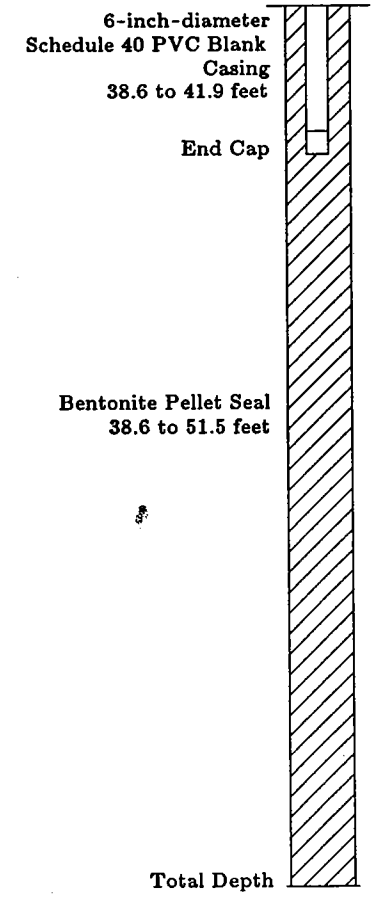
11101/D:

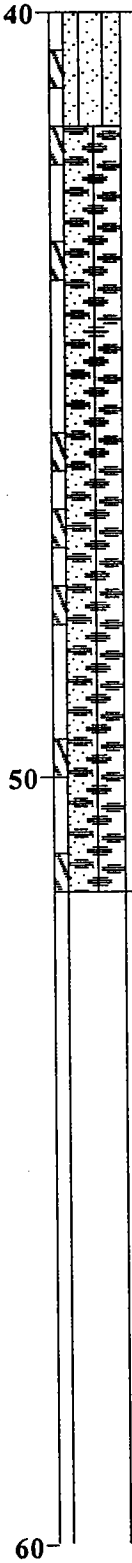
Stickup 2.20 ft

Drill Method Air Rotary

Boring No. EW- 8A EW-10

TOC Elevation 609.03 ft Date 7/10/92





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

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Log of Boring and Well Completion

PLATE

EW- 8A (sheet 3 of 3)

Cedar Hills Landfill

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

Cedar Hills Regional Landfill - 130088

Well Decommissioning Log

Aspect CONSULTING	*Project Address & Site Specific Location* 16645 228th AVE SE, Maple Valley, WA 98038, North of EW-11 and South of EW-9		*Coordinates (SPN NAD83 ft)* E:171802 N:1341910	*Exploration Number* **EW-10**
Contractor Holt Services	*Equipment* Rotosonic drill rig	*Sampling Method* Rotary core	*Ground Surface (GS) Elev.* 606.895'	
Operator Pete Rosenberg	*Exploration Method(s)* Sonic	*Work Start/Completion Dates* 5/24/2018 to 5/25/2018	*Top of Casing Elev.* 608.71'	*Depth to Water (Below GS)* 38.27' (Static)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	605	Hydrated bentonite chips					**Decommissioning Details** Extraction well decomissioned by overdrilling using rotosonic drilling methods: 12-inch OD barrel, 8-inch ID barrel. 12-inch diameter above-ground stainless steel monument removed 0 to 3 feet: Hydrated bentonite chips 3 to 45 feet: Bentonite grout (20% weight by solids) **Original Well Construction** 12-inch diameter above-ground stainless steel monument +2.2 to 28.28 feet: 6-inch PVC blank casing 27.3 feet: Stainless steel centralizer 28.28 to 37.6 feet: 6-inch 0.020 Slot PVC screen 38.5 feet: Stainless steel centralizer 38.6 to 41.9 feet: 6-inch SCH 40 PVC blank casing 0 to 4 feet: Gravel backfill 4 to 8.25 feet: Bentonite surface seal 8.25 to 38.6 feet: 10 x 20 Silica sand 38.6 to 51.5 feet: Bentonite pellet seal	0
5	600	Bentonite grout						5
10	595							10
15	590							15
20	585							20
25	580							25
30	575							30
35	570	▼ 5/22/2018						35
40	565						Bottom of overdrilling for decommissioning at 42 feet bgs.	40

Legend

Sample Method

Water Level ▼ Static Water Level

See Exploration Log Key for explanation of symbols

Logged by: MVA
Approved by: KSL

Exploration Log EW-10
Sheet 1 of 1

NEW STANDARD LOG FORM P:\GINTW\PROJECTS\2018_130088_CHRLF_DECOMLOGS.GPJ June 24, 2018

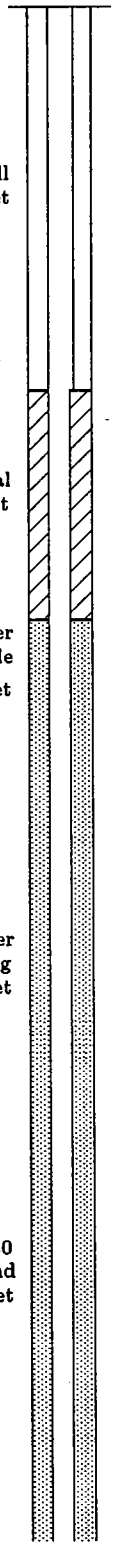
11101/D:

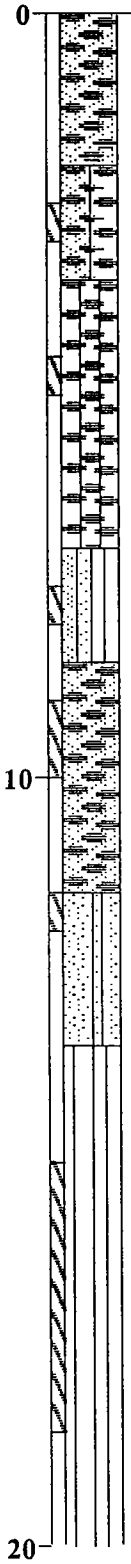
Stickup 2.40 ft

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)

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Log of Boring and Well Completion

PLATE

EW- 2A

(sheet 1 of 3)

Cedar Hills Landfill

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

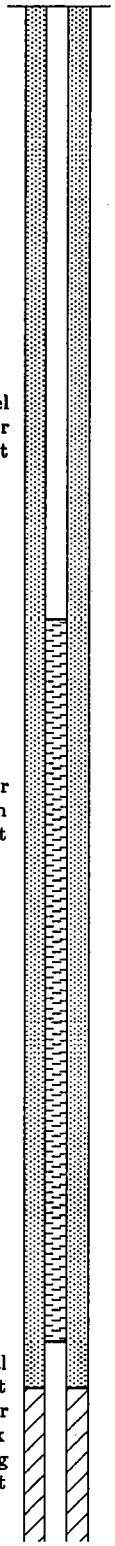
11101/D:

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

20

becoming less gravelly and sandy with depth

30

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)

40

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Log of Boring and Well Completion

PLATE

EW- 2A

(sheet 2 of 3)

Cedar Hills Landfill

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

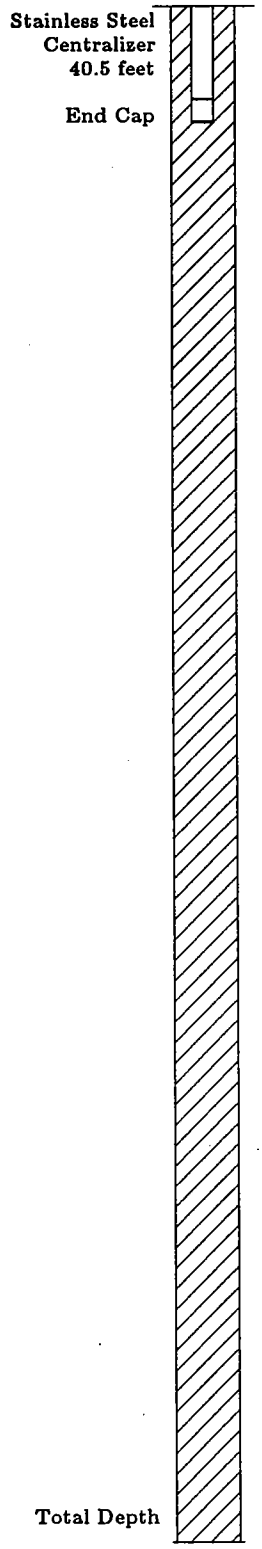
11101/D:

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

40

some fine to coarse sand

50

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.

60

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Log of Boring and Well Completion

PLATE

EW- 2A

(sheet 3 of 3)

Cedar Hills Landfill

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

Aspect CONSULTING	Cedar Hills Regional Landfill - 130088		Well Decommissioning Log	
	Project Address & Site Specific Location: 16645 228th AVE SE, Maple Valley, WA 98038, North of EW-12 and South of EW-10		Coordinates (SPN NAD83 ft): E:171556 N:1342040	Exploration Number: **EW-11**
Contractor: Holt Services	Equipment: Rotosonic drill rig	Sampling Method: Rotary core	Ground Surface (GS) Elev.: 615.126'	
Operator: Pete Rosenberg	Exploration Method(s): Sonic	Work Start/Completion Dates: 5/22/2018 to 5/23/2018	Top of Casing Elev.: 617.44'	Depth to Water (Below GS): 38.64' (Static)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
5	610	Hydrated bentonite chips; Bentonite grout					**Decommissioning Details** Extraction well decommissioned by overdrilling using rotosonic drilling methods: 8-inch ID barrel and 12-inch OD barrel. 12-inch diameter above-ground stainless steel monument removed 0 to 2 feet: Hydrated bentonite chips 2 to 40 feet: Bentonite grout (20% weight by solids) **Original Well Construction** 12-inch diameter above-ground stainless steel monument +2.4 to 28 feet: 6-inch PVC blank casing 27 feet: Stainless steel centralizer 28 to 37.4 feet: 6-inch 0.020 slot PVC screen 40.5 feet: Stainless steel centralizer 37.4 to 41.5 feet: 6-inch SCH 40 PVC blank casing 0 to 5 feet: Gravel backfill 5 to 8 feet: Bentonite surface seal 8 to 38 feet: Sand pack 10 x 20 silica sand 38 to 60 feet: Bentonite pellet seal	5
10	605							10
15	600							15
20	595							20
25	590							25
30	585							30
35	580							35
40	575	▼ 5/22/2018					Bottom of overdrilling for decommissioning at 40 feet bgs.	40

Legend

Sample Method

Water Level: ▼ Static Water Level

See Exploration Log Key for explanation of symbols

Logged by: MVA
Approved by: KSL

Exploration Log EW-11
Sheet 1 of 1

NEW STANDARD LOG FORM P:\GINTW\PROJECTS\2018_130088_CHRLF_DECOMLOGS.GPJ June 24, 2018

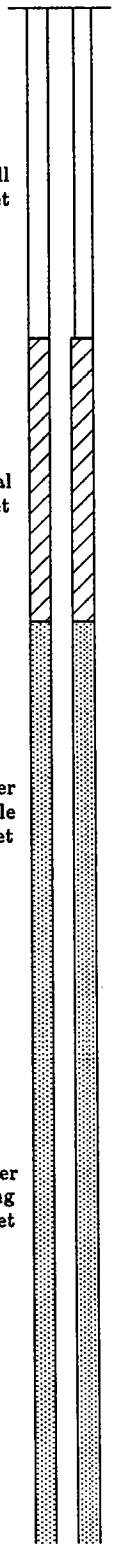
11101/Di

Stickup 2.53 ft

Drill Method Air Rotary

Boring No. EW-21A EW-12

TOC Elevation 623.25 ft Date 9/1/92



Depth ft | Sample

0

SILT (ML); moderate brown; nonplastic; dry (WEATHERED TILL)

with sand

GRAVELLY SILT with sand (ML); moderate brown; little fine to coarse gravel; little medium to coarse sand; nonplastic; dry (WEATHERED TILL)

SILTY GRAVEL with sand (GM); moderate brown, fine to coarse; little fine to coarse sand; some fines; dry (WEATHERED TILL)

10

SILTY GRAVEL with sand (GM); moderate brown, fine to coarse; little fine to coarse sand; little fines; coated clasts; slightly moist (TILL)

lenses of sand, silt, and boulders

SILT with gravel (ML); medium dark gray; trace clay; few fine to medium gravel; damp to dry (LACUSTRINE)

SILT with clay (ML/CL); medium dark gray; little clay; moderate plasticity; damp (LACUSTRINE)

20

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Log of Boring and Well Completion

PLATE

EW-21A

(sheet 1 of 3)

Cedar Hills Landfill

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

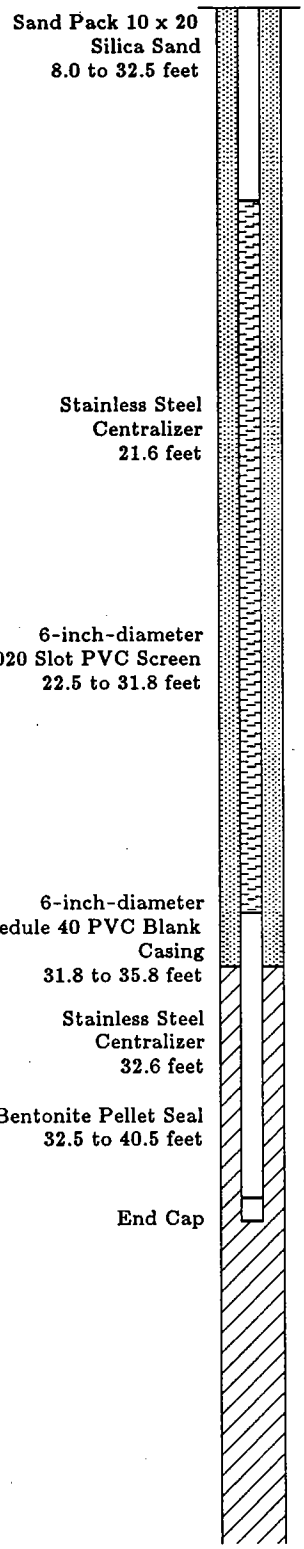
11101/Di

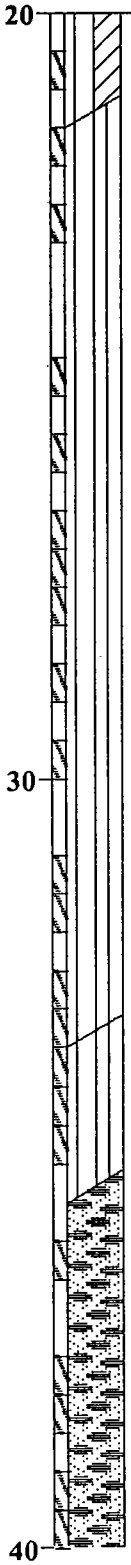
Stickup 2.53 ft

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

PLATE

EW-21A

(sheet 2 of 3)

Cedar Hills Landfill

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

11101/D:

Stickup 2.53 ft

Total Depth

Depth ft
Sample

Drill Method Air Rotary

Boring No. EW-21A EW-12

TOC Elevation 623.25 ft Date 9/1/92

40

Total depth drilled = 40.5 feet

50

60

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Log of Boring and Well Completion

PLATE

EW-21A

(sheet 3 of 3)

Cedar Hills Landfill

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

Aspect CONSULTING	Cedar Hills Regional Landfill - 130088		Well Decommissioning Log	
	Project Address & Site Specific Location 16645 228th AVE SE, Maple Valley, WA 98038, North of EW-13 and South of EW-11		*Coordinates (SPN NAD83 ft)* E:171441 N:1342050	*Exploration Number* **EW-12**
Contractor Holt Services	*Equipment* Rotosonic drill rig	*Sampling Method* Rotary core	*Ground Surface (GS) Elev.* 620.888'	
Operator Pete Rosenberg	*Exploration Method(s)* Sonic	*Work Start/Completion Dates* 5/22/2018	*Top of Casing Elev.* 623.02'	*Depth to Water (Below GS)* 19.88' (Static)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	620	Hydrated bentonite chips					**Decommissioning Details** Extraction well decommissioned by overdrilling using rotosonic drilling methods: 8-inch ID barrel and 12-inch OD barrel. 12-inch diameter above-ground stainless steel monument removed 0 to 2 feet: Hydrated bentonite chips 2 to 37 feet: Bentonite grout (20% weight by solids) **Original Well Construction** 12-inch diameter above-ground stainless steel monument +2.53 to 22.5 feet: 6-inch PVC blank casing 21.6 feet: Stainless steel centralizer 22.5 to 31.8 feet: 6-inch 0.020 slot PVC screen 31.8 to 35.8 feet: 6-inch SCH 40 PVC blank casing 32.6 feet: Stainless steel centralizer 0 to 4.3 feet: Gravel backfill 4.3 to 8 feet: Bentonite surface seal 8 to 32.5 feet: Sand pack 10 x 20 silica sand 32.5 to 40.5 feet: Bentonite pellet seal Bottom of overdrilling for decommissioning at 37 feet bgs.	0
5	615	Bentonite grout						5
10	610							10
15	605							15
20	600	▼ 5/21/2018						20
25	595							25
30	590							30
35	585							35

Legend

Sample Method

Water Level ▼ Static Water Level

See Exploration Log Key for explanation of symbols

Logged by: ACO
Approved by: KSL

Exploration Log EW-12
Sheet 1 of 1

NEW STANDARD LOG FORM P:\GINTW\PROJECTS\2018_130088_CHRLF_DECOMLOGS.GPJ June 24, 2018

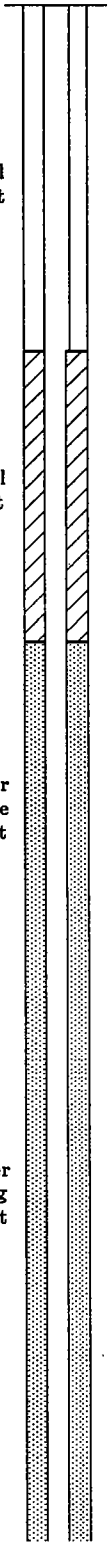
11101/D:

Stickup 1.90 ft

Drill Method Air Rotary

Boring No. EW-18A EW-13

TOC Elevation 633.77 ft Date 8/18/92



Gravel Backfill
0 to 4.5 feet

Bentonite Surface Seal
from 4.5 to 8.3 feet

12-inch-diameter
Borehole
0 to 66.0 feet

6-inch-diameter
PVC Blank Casing
+1.9 to 24.4 feet

Depth ft
Sample

0

SILT (ML); mottled brownish gray; few fine to medium gravel; few coarse sand; damp (FILL)

SANDY SILT with gravel (ML); moderate yellowish brown; little fine to coarse sand; few fine gravel; dry (WEATHERED TILL)

10

GRAVELLY SILT with sand (ML); moderate yellowish brown; some fine to mediium; trace coarse gravel; little fine to coarse; dry to damp (WEATHERED TILL)

GRAVEL with silt, sand, and cobbles (GW-GM); moderate brown; some fine to coarse sand; few fines; damp (WEATHERED TILL)

GRAVELLY SILT with sand (ML); moderate yellowish brown; little fine to medium gravel; little fine to coarse sand; dry to damp (WEATHERED TILL)

20

Harding Lawson Associates
Engineering and Environmental Services

Log of Boring and Well Completion

PLATE

EW-18A

(sheet 1 of 4)

Cedar Hills Landfill

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

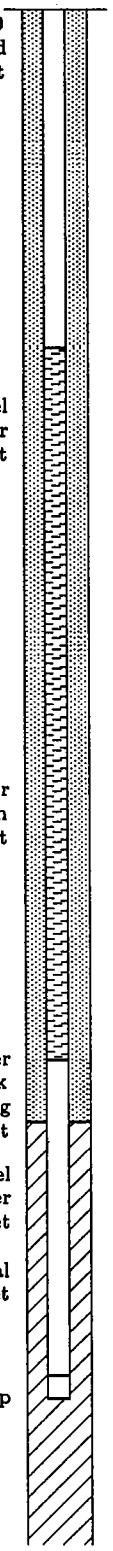
11101/D:

Stickup 1.90 ft

Drill Method Air Rotary

Boring No. EW-18A EW-13

TOC Elevation 633.77 ft Date 8/18/92



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

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

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Engineering and Environmental Services

Log of Boring and Well Completion

PLATE

EW-18A

(sheet 2 of 4)

Cedar Hills Landfill

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

11101/Di

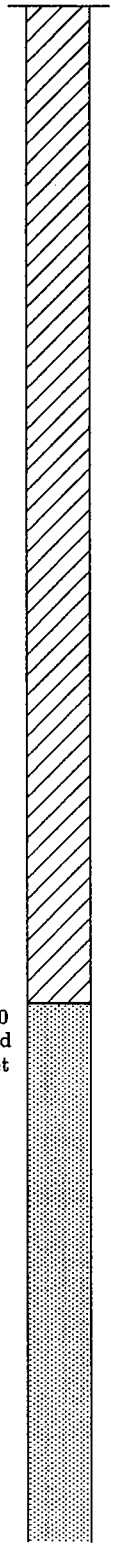
Stickup 1.90 ft

Depth ft
Sample

Drill Method Air Rotary

Boring No. EW-18A EW-13

TOC Elevation 633.77 ft Date 8/18/92



40

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)

50

Sand Pack 10 x 20
Silica Sand
53.0 to 63.5 feet

GRAVEL with sand (GW); slightly yellowish light olive gray; some fine to coarse sand; trace fines; water added (ADVANCE OUTWASH)

sandy lense

60

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Log of Boring and Well Completion

PLATE

EW-18A

(sheet 3 of 4)

Cedar Hills Landfill

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

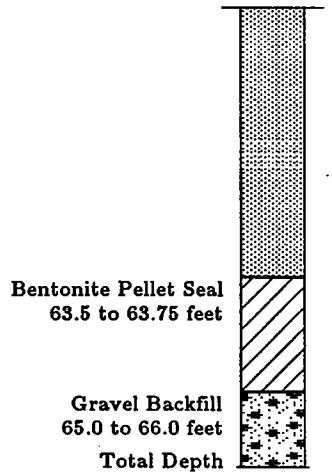
11101/D:

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

60

coarse gravels, with cobbles/boulders

sand lense

Total depth drilled = 66 feet

70

80

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Engineering and Environmental Services

Log of Boring and Well Completion

PLATE

EW-18A

(sheet 4 of 4)

Cedar Hills Landfill

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

Cedar Hills Regional Landfill - 130088

Well Decommissioning Log

Project Address & Site Specific Location	Coordinates (SPN NAD83 ft)	Exploration Number
16645 228th AVE SE, Maple Valley, WA 98038, North of EW-14 and South of EW-12	E:171347 N:1342020	**EW-13**

Contractor	Equipment	Sampling Method	Ground Surface (GS) Elev.
Holt Services	Rotosonic drill rig	Rotary core	631.276'

Operator	Exploration Method(s)	Work Start/Completion Dates	Top of Casing Elev.	Depth to Water (Below GS)
Pete Rosenberg	Sonic	5/21/2018 to 5/22/2018	633.76'	16.64' (Static)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	630	Hydrated bentonite chips					**Decommissioning Details** Extraction well decommissioned by overdrilling using rotosonic drilling methods: 8-inch ID barrel and 12-inch OD barrel. 12-inch diameter above-ground stainless steel monument removed 0 to 2 feet: Hydrated bentonite grout 2 to 66 feet: Bentonite grout (20% weight by solids) Additional Notes: - 2-inch PVC blank casing nested inside 6-inch PVC from 40 to 65 feet, not recorded on original well log. **Original Well Construction** 12-inch diameter above-ground stainless steel monument +1.9 to 24.4 feet: 6-inch PVC blank casing 23.4 feet: Stainless steel centralizer 24.4 to 33.7 feet: 6-inch 0.020 slot PVC screen 33.7 to 38.1 feet: 6-inch SCH 40 PVC blank casing 34.5 feet: Stainless steel centralizer 0 to 4.5 feet: Gravel backfill 4.5 to 8.3 feet: Bentonite surface seal 8.3 to 34.3 feet: Sand pack 10 x 20 silica sand 34.3 to 53 feet: Bentonite pellet seal 53 to 63.5 feet: Sand pack 10 x 20 silica sand 63.5 to 63.75 feet: Bentonite pellet seal 65 to 66 feet: Gravel backfill	0
		Bentonite grout						
5	625							5
10	620							10
15	615	▼ 5/21/2018						15
20	610							20
25	605							25
30	600							30
35	595							35
40	590							40
45	585							45
50	580							50
55	575							55
60	570							60
65	565						Bottom of overdrilling for decommissioning at 66 feet bgs.	65

Legend

Sample Method

Water Level ▼ Static Water Level

See Exploration Log Key for explanation of symbols

Logged by: ACO
Approved by: KSL

Exploration Log EW-13
Sheet 1 of 1

NEW STANDARD LOG FORM P:\GINTW\PROJECTS\2018_130088_CHRLF_DECOMLOGS.GPJ June 24, 2018

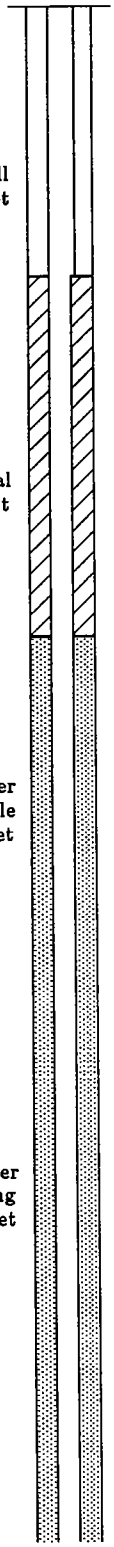
11101/D:

Stickup 2.20 ft

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

Depth ft
Sample

0

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)

10

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 grvel; 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)

20

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Engineering and Environmental Services

Log of Boring and Well Completion

PLATE

EW- 4A

(sheet 1 of 3)

Cedar Hills Landfill

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

11101/D:

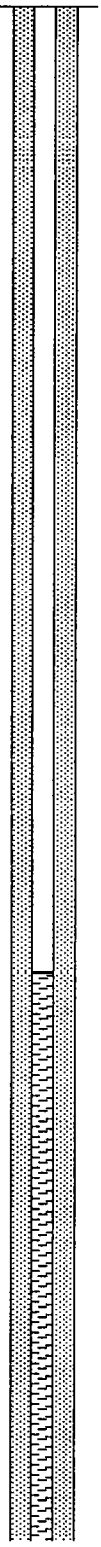
Stickup 2.20 ft

Depth ft
Sample

Drill Method Air Rotary

Boring No. EW- 4A EW-14

TOC Elevation 633.66 ft Date 6/25/92



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

20

trace fine gravel

increase in moisture content
(moist) below 23 feet

few fine grained gravels

30

cobbles at 32.5 feet

trace fine gravel and fine sand, moist from 35 to
40.5 feet

40

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Log of Boring and Well Completion

PLATE

EW- 4A

(sheet 2 of 3)

Cedar Hills Landfill

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

11101/D:

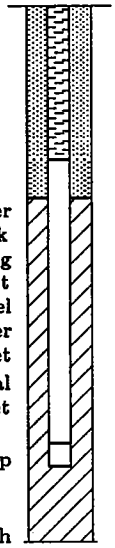
Stickup 2.20 ft

Depth ft
Sample

Drill Method Air Rotary

Boring No. EW- 4A EW-14

TOC Elevation 633.66 ft Date 6/25/92



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

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

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Log of Boring and Well Completion

PLATE

EW- 4A

(sheet 3 of 3)

Cedar Hills Landfill

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

Cedar Hills Regional Landfill - 130088

Well Decommissioning Log

Project Address & Site Specific Location	Coordinates (SPN NAD83 ft)	Exploration Number
16645 228th AVE SE, Maple Valley, WA 98038, North of EW-15 and South of EW-13	E:171272 N:1342000	**EW-14**

Contractor	Equipment	Sampling Method	Ground Surface (GS) Elev.
Holt Services	Rotosonic drill rig	Rotary core	631.694'

Operator	Exploration Method(s)	Work Start/Completion Dates	Top of Casing Elev.	Depth to Water (Below GS)
Pete Rosenberg	Sonic	5/18/2018 to 5/21/2018	633.42'	11.11' (Static)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	630	Hydrated bentonite chips					**Decommissioning Details** Extraction well decommissioned by overdrilling using rotosonic drilling methods: 8-inch ID barrel, and 12-inch OD barrel.	0
5	625	Bentonite grout					12-inch diameter above-ground stainless steel monument removed 0 to 2 feet: Hydrated bentonite chips 2 to 47 feet: Bentonite grout (20% weight by solids)	5
10	620	▼ 5/18/2018					**Original Well Construction** 12-inch diameter above-ground stainless steel monument +2.2 to 32.6 feet: 6-inch PVC blank casing 31.5 feet: Stainless steel centralizer 32.6 to 42 feet: 6-inch 0.020 slot PVC screen 42 to 46 feet: 6-inch SCH 40 PVC blank casing 44 feet: Stainless steel centralizer	10
15	615						0 to 3.5 feet: Gravel backfill 3.5 to 8.2 feet: Bentonite surface seal 8.2 to 42.5 feet: Sand pack 10 x 20 silica sand 42.5 to 47 feet: Bentonite pellet seal	15
20	610							20
25	605							25
30	600							30
35	595							35
40	590							40
45	585						Bottom of overdrilling for decommissioning at 47 feet bgs.	45

Legend

Sample Method

Water Level ▼ Static Water Level

See Exploration Log Key for explanation of symbols

Logged by: ACO
Approved by: KSL

Exploration Log EW-14

Sheet 1 of 1

NEW STANDARD LOG FORM P:\GINTW\PROJECTS\2018_130088_CHRLF_DECOMLOGS.GPJ June 24, 2018

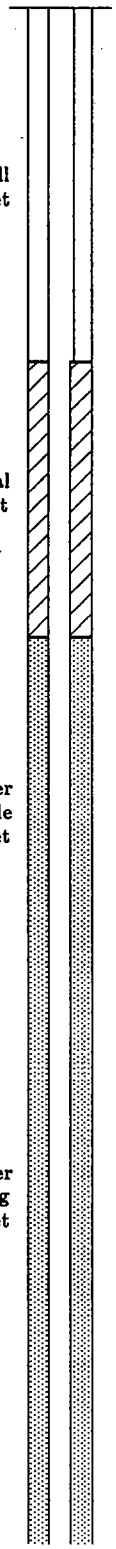
11101/D:

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	
0		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)
10		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)
20		

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Engineering and Environmental Services

Log of Boring and Well Completion

PLATE

EW-15A

(sheet 1 of 3)

Cedar Hills Landfill

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

11101/D:

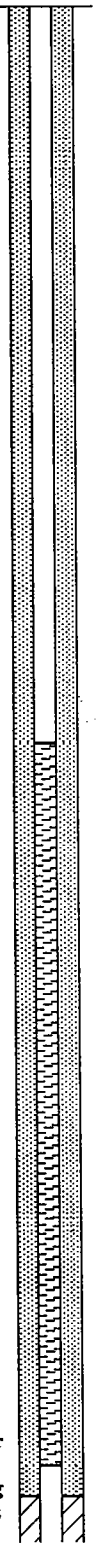
Stickup 2.10 ft

Drill Method Air Rotary

Boring No. EW-15A EW-15

TOC Elevation 635.30 ft Date 7/29/92

Depth ft
Sample



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

20

30

40

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)

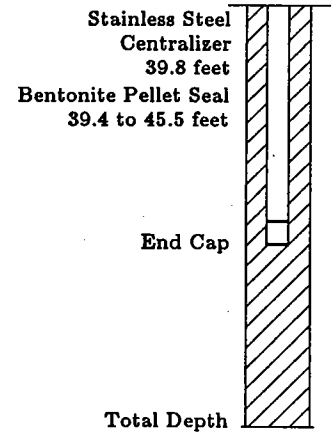
PLATE

Cedar Hills Landfill

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

11101/D:

Stickup 2.10 ft



Depth ft
Sample

Drill Method: Air Rotary

Boring No.: EW-15A EW-15

TOC Elevation: 635.30 ft Date: 7/29/92

40

Total depth drilled = 45.5 feet

50

60

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Engineering and Environmental Services

Log of Boring and Well Completion

PLATE

EW-15A

(sheet 3 of 3)

Cedar Hills Landfill

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

Aspect CONSULTING	Cedar Hills Regional Landfill - 130088		Well Decommissioning Log	
	Project Address & Site Specific Location 16645 228th AVE SE, Maple Valley, WA 98038, North of EW-16 and South of EW-14		*Coordinates (SPN NAD83 ft)* E:171207 N:1341980	*Exploration Number* **EW-15**
Contractor Holt Services	*Equipment* Rotosonic drill rig	*Sampling Method* Rotary core	*Ground Surface (GS) Elev.* 633.071'	
Operator Pete Rosenberg	*Exploration Method(s)* Sonic	*Work Start/Completion Dates* 5/17/2018 to 5/18/2018	*Top of Casing Elev.* 635.09'	*Depth to Water (Below GS)* 9.01' (Static)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	633	Hydrated bentonite chips					**Decommissioning Details** Extraction well decommissioned by overdrilling using rotosonic drilling methods: 8-inch ID barrel and 12-inch OD barrel.	0
5	630	Bentonite grout					12-inch diameter above-ground stainless steel monument removed 0 to 2 feet: Hydrated bentonite chips 2 to 43 feet: Bentonite grout (20% weight by solids)	5
10	625	▼ 5/17/2018					**Original Well Construction** 12-inch diameter above-ground stainless steel monument +2.1 to 29.6 feet: 6-inch PVC blank casing 29.6 to 39 feet: 6-inch 0.020 slot PVC screen 28.8 feet: Stainless steel centralizer 39 to 43.1 feet: 6-inch SCH 40 PVC blank casing 39.8 feet: Stainless steel centralizer	10
15	620						0 to 4.6 feet: Gravel backfill 4.6 feet to 8.2 feet: Bentonite surface seal 4.6 to 39.4 feet: Sand pack 10 x 20 silica sand 39.4 to 45.5 feet: Bentonite pellet seal	15
20	615							20
25	610							25
30	605							30
35	600							35
40	595							40
	590						Bottom of overdrilling for decommissioning at 43 feet bgs.	

Legend

Sample Method

Water Level ▼ Static Water Level

See Exploration Log Key for explanation of symbols

Logged by: MVA
Approved by: KSL

Exploration Log EW-15
Sheet 1 of 1

NEW STANDARD LOG FORM P:\GINTW\PROJECTS\2018_130088_CHRLF_DECOMLOGS.GPJ June 24, 2018

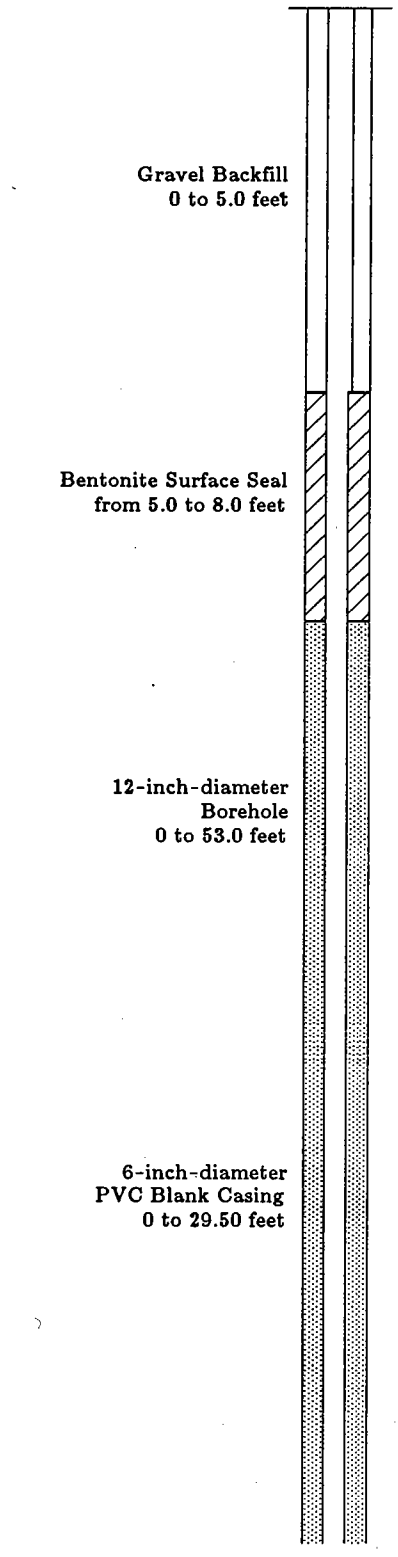
11101/Di

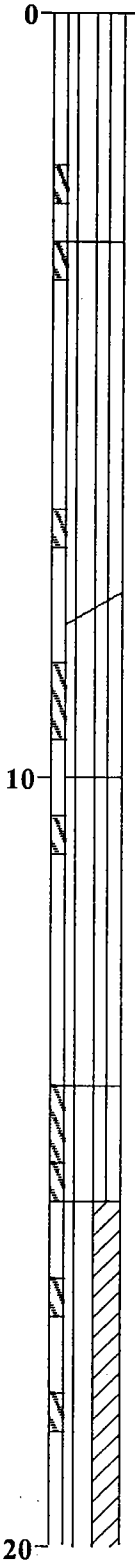
Stickup 1.40 ft

Drill Method Air Rotary

Boring No. EW- 7A EW-16

TOC Elevation 636.88 ft Date 7/2/92





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

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Log of Boring and Well Completion
EW- 7A

(sheet 1 of 3)

PLATE

Cedar Hills Landfill

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

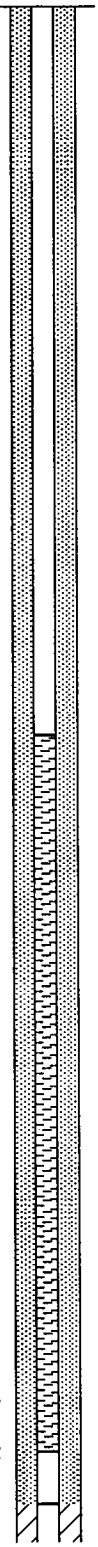
11101/D:

Stickup 1.40 ft

Drill Method Air Rotary

Boring No. EW- 7A EW-16

TOC Elevation 636.88 ft Date 7/2/92



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

20

slight to non-plasticity silt

SILT (ML); medium dark gray; non-plastic; moist
(LACUSTRINE)

30

wet to moist

little fine to medium gravel

40

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Engineering and Environmental Services

Log of Boring and Well Completion

PLATE

EW- 7A

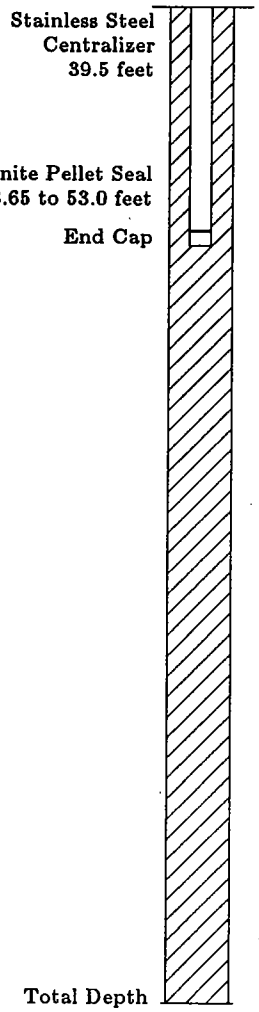
(sheet 2 of 3)

Cedar Hills Landfill

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

11101/D:

Stickup 1.40 ft



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)

GRAVEL with silt and sand (GW-GM); moderate yellowish brown; some medium to coarse sand; water added to remove cuttings (ADVANCE OUTWASH)

50

Total depth drilled = 53.0 feet

60

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Engineering and Environmental Services

Log of Boring and Well Completion

PLATE

EW- 7A

(sheet 3 of 3)

Cedar Hills Landfill

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

Aspect CONSULTING	Cedar Hills Regional Landfill - 130088		Well Decommissioning Log	
	Project Address & Site Specific Location 16645 228th AVE SE, Maple Valley, WA 98038, North of EW-17 and South of EW-15		*Coordinates (SPN NAD83 ft)* E:171140 N:1341960	*Exploration Number* **EW-16**
Contractor Holt Services	*Equipment* Rotosonic drill rig	*Sampling Method* Rotary core	*Ground Surface (GS) Elev.* 635.64'	
Operator Pete Rosenberg	*Exploration Method(s)* Sonic	*Work Start/Completion Dates* 5/17/2018	*Top of Casing Elev.* 636.71'	*Depth to Water (Below GS)* No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	635	Hydrated bentonite chips					**Decommissioning Details** Extraction well decommissioned by overdrilling using rotosonic drilling methods: 12-inch OD barrel and 8-inch ID barrel. 12-inch diameter above-ground stainless steel monument removed 0 to 3 feet: Hydrated bentonite chips 3 to 45 feet: Bentonite grout (20% weight by solids) **Original Well Construction** 12-inch diameter above-ground stainless steel monument 0 to 29.50 feet: 6-inch PVC blank casing 28.9 feet: Stainless steel centralizer 29.50 to 38.81 feet: 6-inch 0.020 slot PVC screen 38.81 to 43.09 feet: 6-inch SCH 40 PVC blank casing 39.5 feet: Stainless steel centralizer 0 to 5 feet: Gravel backfill 5 to 8 feet: Bentonite surface seal 8 to 38.65 feet: Sand pack 10 x 20 silica sand 38.65 to 53 feet: Bentonite pellet seal Bottom of overdrilling for decommissioning at 45 feet bgs.	
5	630	Bentonite grout						5
10	625							10
15	620							15
20	615							20
25	610							25
30	605							30
35	600							35
40	595							40
45	590							45

Legend

Sample Method

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MVA
Approved by: KSL

Exploration Log EW-16
Sheet 1 of 1

NEW STANDARD LOG FORM P:\GINTW\PROJECTS\2018_130088_CHRLF_DECOMLOGS.GPJ June 24, 2018

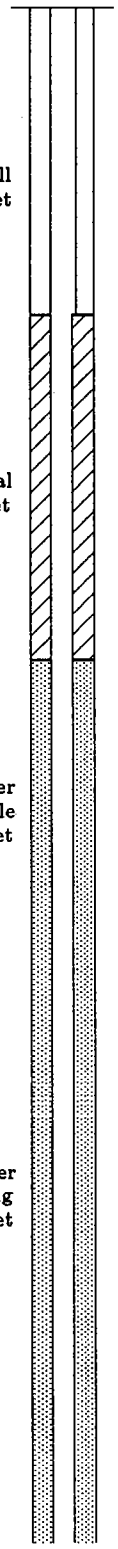
11101/D:

Stickup 0.90 ft

Drill Method Air Rotary

Boring No. EW- 5A EW-17

TOC Elevation 637.27 ft Date 6/25/92



Depth ft	Sample	
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)
		SANDY SILT (ML); pale brown; some very fine-grained sand
10		GRAVELLY SILT with sand (ML); moderate yellowish brown; non-plastic; some fine to coarse gravel; little fine to medium sand; dry (GLACIAL TILL)
		CLAYEY SILT with gravel (ML/CL); dark gray; slight plasticity; trace fine to medium gravel; damp to moist (LACUSTRINE)
20		

Harding Lawson Associates
Engineering and Environmental Services

Log of Boring and Well Completion

PLATE

EW- 5A

(sheet 1 of 3)

Cedar Hills Landfill

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

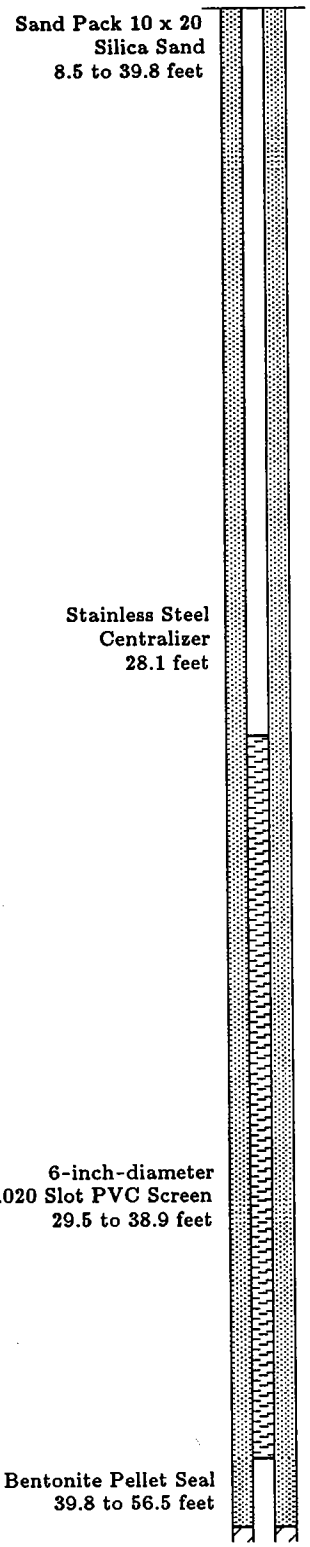
11101/D:

Stickup 0.90 ft

Drill Method Air Rotary

Boring No. EW- 5A EW-17

TOC Elevation 637.27 ft Date 6/25/92



Depth ft	Sample	
20		SILT (ML); dark gray; non-plastic; moist; becoming wet below 27 feet (LACUSTRINE)
30		Formation water blew out up outside of casing
		SILT (ML); dark gray; non-plastic; wet, damp below 37 feet (LACUSTRINE)
		damp
40		trace fine to medium gravel; no samples available

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Log of Boring and Well Completion

PLATE

EW- 5A (sheet 2 of 3)

Cedar Hills Landfill

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

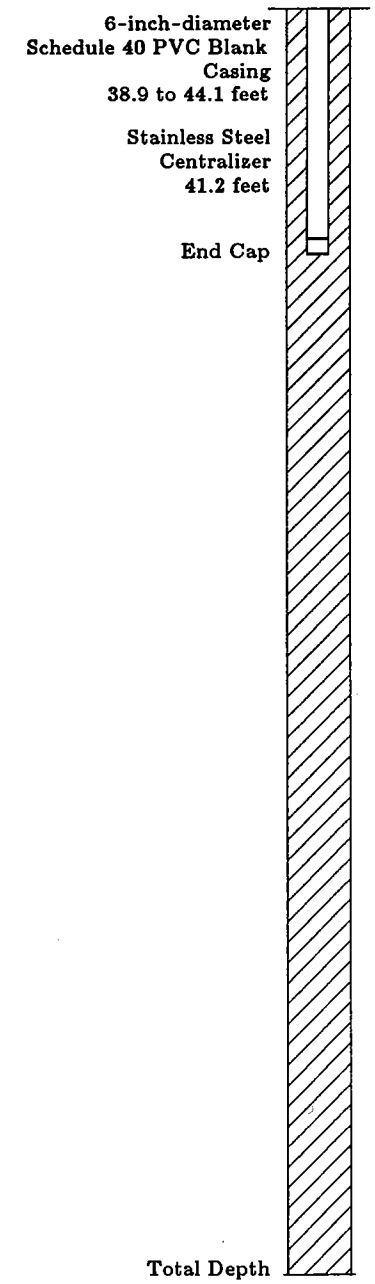
11101/D:

Stickup 0.90 ft

Drill Method Air Rotary

Boring No. EW- 5A EW-17

TOC Elevation 637.27 ft Date 6/25/92



Depth ft / Sample

40

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

PLATE

EW- 5A

(sheet 3 of 3)

Cedar Hills Landfill

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

Cedar Hills Regional Landfill - 130088

Well Decommissioning Log

Aspect CONSULTING	Project Address & Site Specific Location: 16645 228th AVE SE, Maple Valley, WA 98038, North of EW-18 and South of EW-16		Coordinates (SPN NAD83 ft): E:171052 N:1341930	Exploration Number: **EW-17**
Contractor: Holt Services	Equipment: Rotosonic drill rig	Sampling Method: Rotary core	Ground Surface (GS) Elev.: 636.722'	
Operator: Pete Rosenberg	Exploration Method(s): Sonic	Work Start/Completion Dates: 5/16/2018	Top of Casing Elev.: 637.08'	Depth to Water (Below GS): 4.17' (Static)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	635	5/16/2018					**Decommissioning Details** Extraction well decommissioned by overdrilling using rotosonic drilling methods: 12-inch OD barrel and 8-inch ID barrel. 12-inch diameter above-ground stainless steel monument removed 0 to 2 feet: Hydrated bentonite chips 2 to 46 feet: Bentonite grout (20% weight by solids) **Original Construction** 12-inch diameter above-ground stainless steel monument +0.9 to 29.5 feet: 6-inch PVC blank casing 28.1 feet: Stainless steel centralizer 29.5 to 38.9 feet: 6-inch 0.020 slot PVC screen 38.9 to 44.1 feet: 6-inch SCH 40 PVC blank casing 41.2 feet: Stainless steel centralizer 0 to 4 feet: Gravel backfill 4 to 8.5 feet: Bentonite surface seal 8.5 to 39.8 feet: Sand pack 10 x 20 silica sand 39.8 to 56.5 feet: Bentonite pellet seal Bottom of overdrilling for decommissioning at 46 feet bgs.	0
5	630							5
10	625							10
15	620							15
20	615							20
25	610							25
30	605							30
35	600							35
40	595							40
45	590							45

Legend

Sample Method

Water Level: ▼ Static Water Level

See Exploration Log Key for explanation of symbols

Logged by: MVA
Approved by: KSL

Exploration Log EW-17
Sheet 1 of 1

NEW STANDARD LOG FORM P:\GINTW\PROJECTS\2018_130088_CHRLF_DECOMLOGS.GPJ June 24, 2018

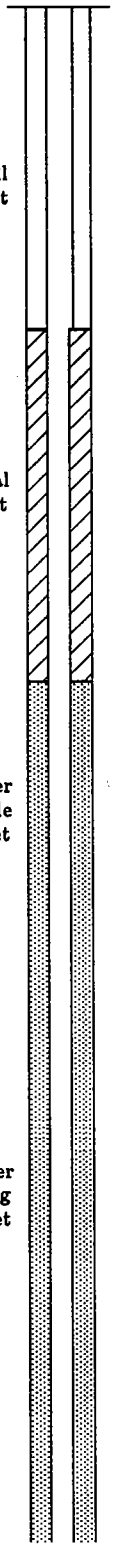
11101/D:

Stickup 2.60 ft

Drill Method Air Rotary

Boring No. EW-23A EW-18

TOC Elevation 639.88 ft Date 9/4/92



Gravel Backfill
0 to 4.2 feet

Bentonite Surface Seal
from 4.2 to 8.8 feet

12-inch-diameter
Borehole
0 to 43.5.0 feet

6-inch-diameter
PVC Blank Casing
+2.6 to 27.4 feet

Depth ft
Sample

0

SILT (ML); reddish brown; few fery fine sand; trace roots - organics; dry (FILL)

SILT (ML); dark brown; few very fine sand; trace roots - organics; dry (FILL)

SILT with gravel (ML); dark brown; trace to few fine gravel and coarse sand; few wood; roots - organics; trace plastic; moist (FILL)

SAND with silt and gravel (SP-SM); light olive gray; fine to medium; little fine to coarse gravel; damp (WEATHERED TILL)

SAND with silt and gravel (SW-SM); light olive gray; little fine to coarse gravel; dry (WEATHERED TILL)

10

SILTY GRAVEL with sand and cobbles (GM); moderate yellowish brown, fine to coarse; little fine to medium little fines; trace cobbles; dry (WEATHERED TILL)

SILTY SAND with gravel (SM); olive brown, fine grained; few to little fine to medium gravel; little fines; wet to moist (WEATHERED TILL)

20

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Engineering and Environmental Services

Log of Boring and Well Completion

PLATE

EW-23A

(sheet 1 of 3)

Cedar Hills Landfill

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

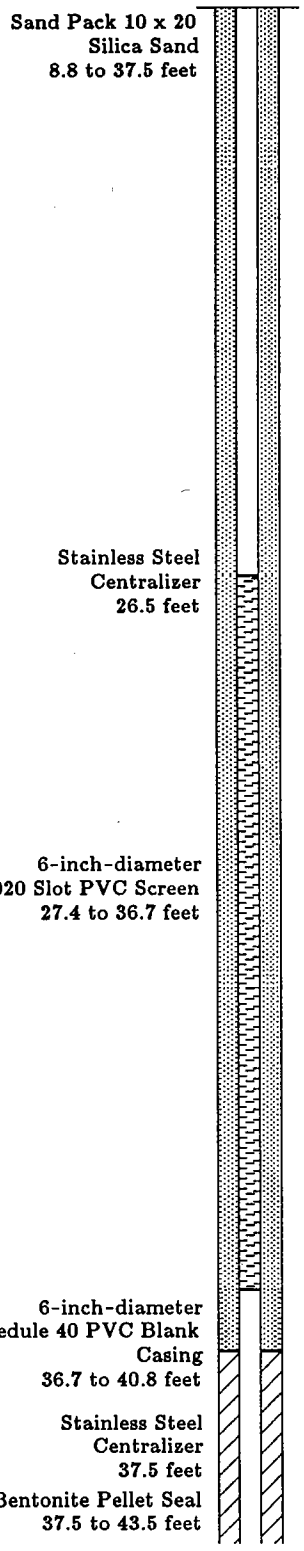
11101/D:

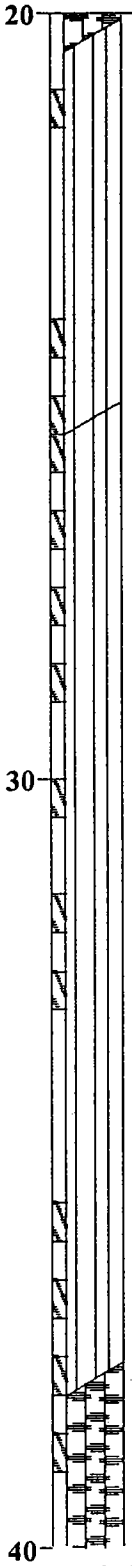
Stickup 2.60 ft

Drill Method Air Rotary

Boring No. EW-23A EW-18

TOC Elevation 639.88 ft Date 9/4/92





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

PLATE

EW-23A

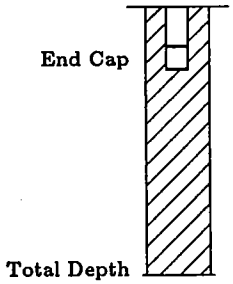
(sheet 2 of 3)

Cedar Hills Landfill

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

11101/D:

Stickup 2.60 ft



Depth ft
Sample

Drill Method Air Rotary

Boring No. EW-23A EW-18

TOC Elevation 639.88 ft Date 9/4/92

40

Total depth drilled = 43.5 feet

50

60

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Engineering and Environmental Services

Log of Boring and Well Completion

PLATE

EW-23A (sheet 3 of 3)

Cedar Hills Landfill

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

Aspect CONSULTING	Cedar Hills Regional Landfill - 130088		Well Decommissioning Log	
	Project Address & Site Specific Location 16645 228th AVE SE, Maple Valley, WA 98038, North of EW-19 and South of EW-17		*Coordinates (SPN NAD83 ft)* E:170994 N:1341920	*Exploration Number* **EW-18**
Contractor Holt Services	*Equipment* Rotosonic drill rig	*Sampling Method* Rotary core	*Ground Surface (GS) Elev.* 637.23'	
Operator Pete Rosenberg	*Exploration Method(s)* Sonic	*Work Start/Completion Dates* 5/16/2018	*Top of Casing Elev.* 639.59'	*Depth to Water (Below GS)* 8.69' (Static)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	635	Hydrated bentonite chips					**Decommissioning Details** Extraction well decommissioned by overdrilling using rotosonic drilling methods: 12-inch OD barrel and 8-inch ID barrel.	0
5	630	Bentonite grout ▼ 5/14/2018					12-inch diameter above-ground stainless steel monument removed 0 to 2 feet: Hydrated bentonite chips 2 to 40 feet: Bentonite grout (20% weight by solids)	5
10	625						**Original Well Construction** 12-inch diameter above-ground stainless steel monument +2.6 to 27.4 feet: 6-inch PVC blank casing 26.5 feet: Stainless steel centralizer 27.4 to 36.7 feet: 6-inch 0.020 slot PVC screen 36.7 to 40.8 feet: 6-inch SCH 40 PVC blank casing 37.5 feet: Stainless steel centralizer	10
15	620						0 to 4.2 feet: Gravel backfill 4.2 to 8.8 feet: Bentonite surface seal 8.8 to 37.5 feet: Sand pack 10x 20 silica sand 37.5 to 43.5 Bentonite pellet seal	15
20	615							20
25	610							25
30	605							30
35	600							35
40	595						Bottom of overdrilling for decommissioning at 40 feet bgs.	40

Legend

Sample Method

Water Level ▼ Static Water Level

See Exploration Log Key for explanation of symbols

Logged by: MVA
Approved by: KSL

Exploration Log EW-18
Sheet 1 of 1

NEW STANDARD LOG FORM P:\GINTW\PROJECTS\2018_130088_CHRLF_DECOMLOGS.GPJ June 24, 2018

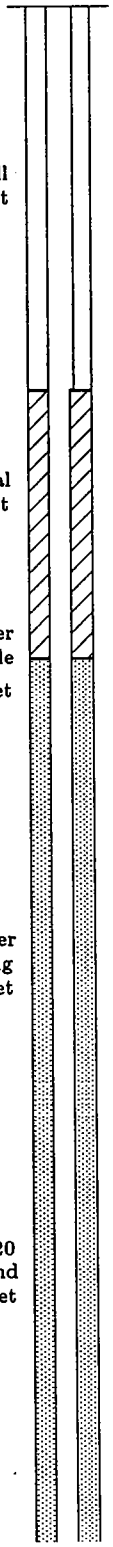
11101/Di

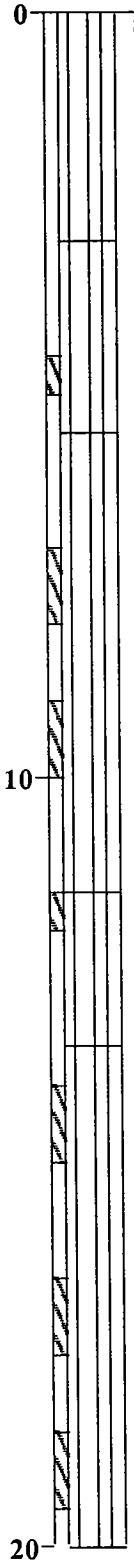
Stickup 2.35 ft

Drill Method Air Rotary

Boring No. EW- 6A EW-19

TOC Elevation 640.00 ft Date 7/8/92





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

PLATE

EW- 6A

(sheet 1 of 3)

Cedar Hills Landfill

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

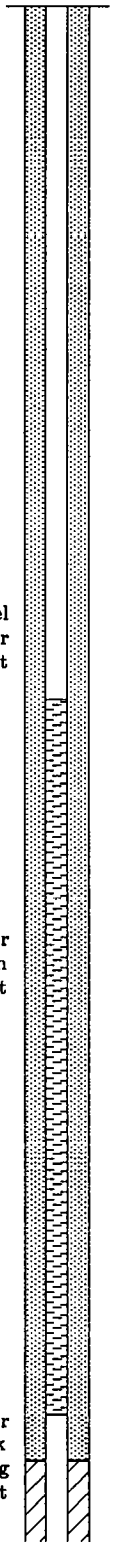
11101/D:

Stickup 2.35 ft

Drill Method Air Rotary

Boring No. EW- 6A EW-19

TOC Elevation 640.00 ft Date 7/8/92



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

Depth ft
Sample

20

CLAYEY SILT (ML/CL); dark bluish gray; moderate plasticity; damp (LACUSTRINE)

SILT (ML); medium dark gray; non-plastic; wet (LACUSTRINE)

30

trace coarse gravel; trace coarse sand

40

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Log of Boring and Well Completion

PLATE

EW- 6A

(sheet 2 of 3)

Cedar Hills Landfill

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

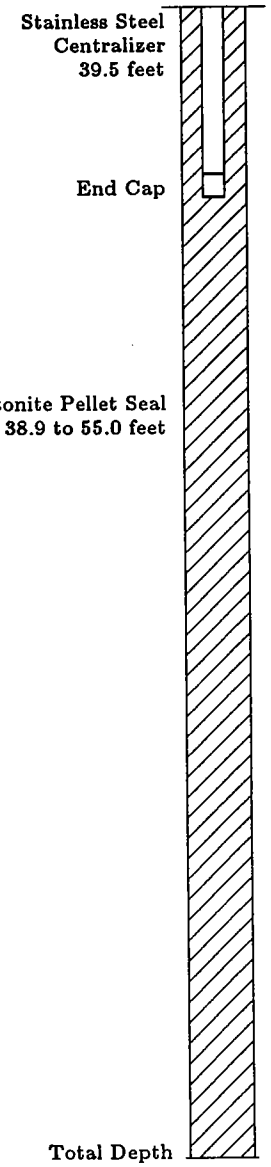
11101/D:

Stickup 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

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)

Total depth drilled = 55.0 feet

60

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Log of Boring and Well Completion

PLATE

EW- 6A (sheet 3 of 3)

Cedar Hills Landfill

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

Aspect CONSULTING	Cedar Hills Regional Landfill - 130088		Well Decommissioning Log	
	Project Address & Site Specific Location 16645 228th AVE SE, Maple Valley, WA 98038, North of EW-20 and South of EW-18		*Coordinates (SPN NAD83 ft)* E:170956 N:1341920	*Exploration Number* **EW-19**
Contractor Holt Services	*Equipment* Rotosonic drill rig	*Sampling Method* Rotary core	*Ground Surface (GS) Elev.* 638.201'	
Operator Pete Rosenberg	*Exploration Method(s)* Sonic	*Work Start/Completion Dates* 5/15/2018	*Top of Casing Elev.* 639.98'	*Depth to Water (Below GS)* 6.78' (Static)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	640						**Decommissioning Details** Extraction well decommissioned by overdrilling using rotosonic drilling methods: 12-inch OD barrel and 8-inch ID barrel. 12-inch diameter above-ground stainless steel monument removed 0 to 2 feet: Hydrated bentonite chips 2 to 44 feet: Bentonite grout (20% weigt by solids)	0
5	635	Hydrated bentonite chips Bentonite grout ▼ 5/14/2018					**Original Well Construction** 12-inch diameter above-ground stainless steel monument +2.3 to 29.04 feet: 6-inch PVC blank casing 28.1 feet: Stainless steel centralizer 29 to 38.4 feet: 6-inch 0.020 slot PVC screen 38.4 to 42.5 feet: 6-inch SCH 40 PVC blank casing 39.5 feet: Stainless steel centralizer	5
10	630						0 to 5 feet: Gravel backfill 5 to 8.5 feet: Bentonite surface seal 8.5 to 38.95 feet: Sand pack 10 x 20 silica sand 38.9 to 55 feet: Bentonite pellet seal	10
15	625							15
20	620							20
25	615							25
30	610							30
35	605							35
40	600						Bottom of overdrilling for decommissioning at 44 feet bgs.	40
	595							

Legend

Sample Method

Water Level ▼ Static Water Level

See Exploration Log Key for explanation of symbols

Logged by: ACO
Approved by: KSL

Exploration Log EW-19
Sheet 1 of 1

NEW STANDARD LOG FORM P:\GINTW\PROJECTS\2018_130088_CHRLF_DECOMLOGS.GPJ June 24, 2018

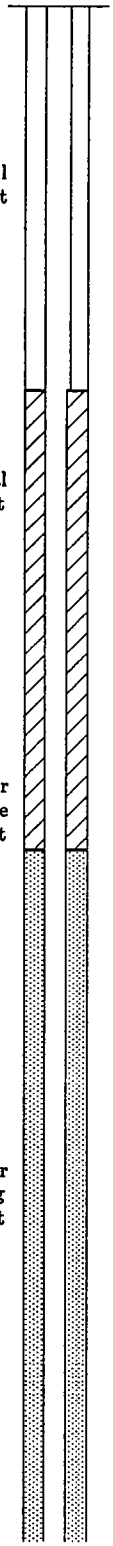
11101/D:

Stickup 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		

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Log of Boring and Well Completion

PLATE

EW-22A

(sheet 1 of 3)

Cedar Hills Landfill

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

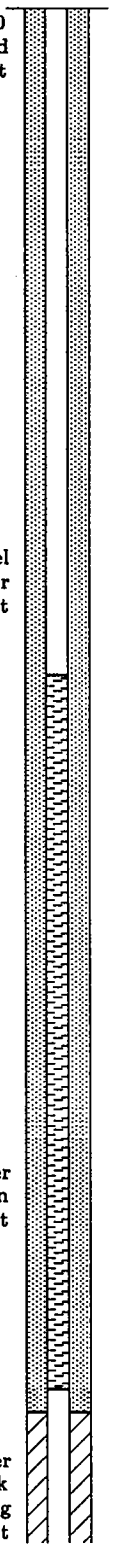
11101/D:

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

20

30

40

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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Engineering and Environmental Services

Log of Boring and Well Completion

PLATE

EW-22A

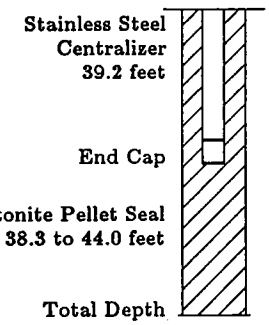
(sheet 2 of 3)

Cedar Hills Landfill

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

11101/Di

Stickup 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)

Total depth drilled = 44.0 feet

50

60

Harding Lawson Associates
Engineering and Environmental Services

Log of Boring and Well Completion

PLATE

EW-22A (sheet 3 of 3)

Cedar Hills Landfill

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

Aspect CONSULTING	Cedar Hills Regional Landfill - 130088		Well Decommissioning Log	
	Project Address & Site Specific Location 16645 228th AVE SE, Maple Valley, WA 98038, North of EW-21 and South of EW-19		*Coordinates (SPN NAD83 ft)* E:170911 N:1341910	*Exploration Number* **EW-20**
Contractor Holt Services	*Equipment* Rotosonic drill rig	*Sampling Method* Rotary core	*Ground Surface (GS) Elev.* 637.665'	
Operator Pete Rosenberg	*Exploration Method(s)* Sonic	*Work Start/Completion Dates* 5/14/2018 to 5/15/2018	*Top of Casing Elev.* 638.68'	*Depth to Water (Below GS)* 3.81' (Static)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	635	Hydrated bentonite chips ▼ 5/10/2018 Bentonite grout					**Decommissioning Details** Extraction well decommissioned by overdrilling using rotosonic drilling methods: 12-inch OD barrel and 8-inch ID barrel. 12-inch diameter above-ground stainless steel monument removed 0 to 2 feet: Hydrated bentonite chips 2 to 38 feet: Bentonite grout (20% weight by solids) **Original Well Construction** 12-inch diameter above-ground stainless steel monument +1.5 to 28.7 feet: 6-inch PVC blank casing 27.9 feet: Stainless steel centralizer 28.7 to 38 feet: 6-inch 0.020 slot PVC screen 38 to 39.2 feet: 6-inch SCH 40 PVC blank casing 39.2 feet: Stainless steel centralizer 0 to 5 feet: Gravel backfill 5 to 11 feet: Bentonite surface seal 11 to 38.3 feet: Sand pack 10 x 20 silica sand 38.3 to 44 feet: Bentonite pellet seal	0
5	630							5
10	625							10
15	620							15
20	615							20
25	610							25
30	605							30
35	600						Bottom of overdrilling for decommissioning at 38 feet bgs.	35

Legend

Sample Method

Water Level ▼ Static Water Level

See Exploration Log Key for explanation of symbols

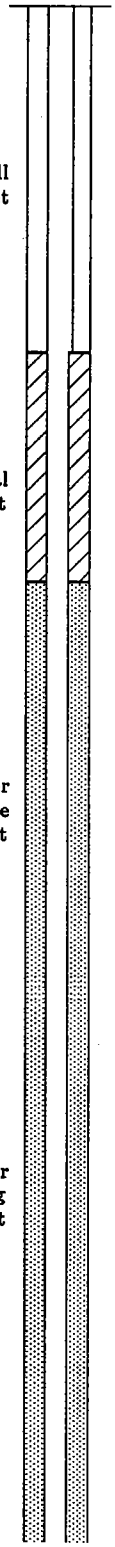
Logged by: ACO
Approved by: KSL

Exploration Log EW-20
Sheet 1 of 1

NEW STANDARD LOG FORM P:\GINTW\PROJECTS\2018_130088_CHRLF_DECOMLOGS.GPJ June 24, 2018

11101/Di

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

0

SANDY SILT with gravel (ML); light to dark brown; little fine to medium sand; little fine to coarse gravel; dry; trace plywood chips; plastic (FILL)

GRAVELLY SILT with sand (ML); pale brown; some fine to medium gravel; little fine to coarse sand; dry (WEATHERED TILL)

SANDY SILT with gravel (ML); pale brown; little medium to coarse sand; little fine gravel; dry (WEATHERED TILL)

SILTY GRAVEL with sand (GM); moderate brown, fine to medium; little fine to coarse sand; little fines; damp (WEATHERED TILL)

10

trace olive gray silt

SILT with gravel and cobbles (ML); moderate yellow brown; little fine to coarse gravel; few coarse sand; nonplastic; moist (TILL)

SILT AND SILT with gravel (ML); medium gray; few to little fine to coarse gravel; nonplastic; damp (LACUSTRINE)

20

Harding Lawson Associates
Engineering and Environmental Services

Log of Boring and Well Completion

PLATE

EW-14A

(sheet 1 of 4)

Cedar Hills Landfill

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

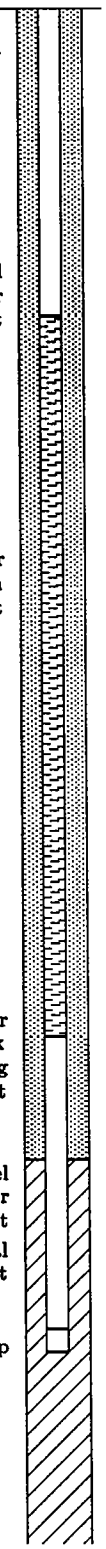
11101/Di

Stickup 2.40 ft

Drill Method Air Rotary

Boring No. EW-14A EW-21

TOC Elevation 641.04 ft Date 9/15/92



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

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

PLATE

EW-14A

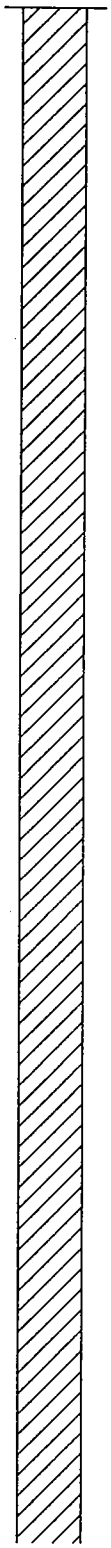
(sheet 2 of 4)

Cedar Hills Landfill

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

11101/D:

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

40

Total depth of replacement well = 41 feet

Original well drilled using water below 34 feet

50

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

60

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Log of Boring and Well Completion

PLATE

EW-14A

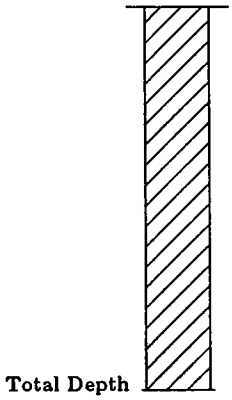
(sheet 3 of 4)

Cedar Hills Landfill

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

11101/D:

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

60

70

80

Total depth drilled = 65 feet

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Engineering and Environmental Services

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		

Cedar Hills Regional Landfill - 130088

Well Decommissioning Log

Project Address & Site Specific Location	Coordinates (SPN NAD83 ft)	Exploration Number
16645 228th AVE SE, Maple Valley, WA 98038, North of EW-22 and South of EW-20	E:170867 N:1341860	**EW-21**

Contractor	Equipment	Sampling Method	Ground Surface (GS) Elev.
Holt Services	Rotosonic drill rig	Rotary core	638.591'

Operator	Exploration Method(s)	Work Start/Completion Dates	Top of Casing Elev.	Depth to Water (Below GS)
Pete Rosenberg	Sonic	5/14/2018	640.84'	4.65' (Static)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	640	Hydrated bentonite chips					**Decommissioning Details** Extraction well decommissioned by overdrilling using rotosonic drilling methods: 12-inch OD barrel and 8-inch ID barrel.	0
5	635	Bentonite grout ▼ 5/10/2018					12-inch diameter above-ground stainless steel monument removed 0 to 2 feet: Hydrated bentonite chips 2 to 38 feet: Bentonite grout (20% weight by solids)	5
10	630						**Original Well Construction** 12-inch diameter above-ground stainless steel monument +2.4 to 24 feet: 6-inch PVC blank casing 23.1 feet: Stainless steel centralizer 24 to 33.4 feet: 6-inch 0.020 slot PVC screen 33.4 to 37.5 feet: 6-inch SCH 40 PVC blank casing 34.2 feet: Stainless steel centralizer	10
15	625						0 to 4.5 feet: Gravel backfill 4.5 to 7.5 feet: Bentonite surface seal 7.5 to 35 feet: Sand pack 10 x 20 silica sand 35 to 65 feet: Bentonite pellet seal	15
20	620							20
25	615							25
30	610							30
35	605							35
	600						Bottom of overdrilling for decommissioning at 38 feet bgs.	

Legend

Sample Method

Water Level ▼ Static Water Level

See Exploration Log Key for explanation of symbols

Logged by: ACO
Approved by: KSL

Exploration Log EW-21
Sheet 1 of 1

NEW STANDARD LOG FORM P:\GINTW\PROJECTS\2018_130088_CHRLF_DECOMLOGS.GPJ June 24, 2018

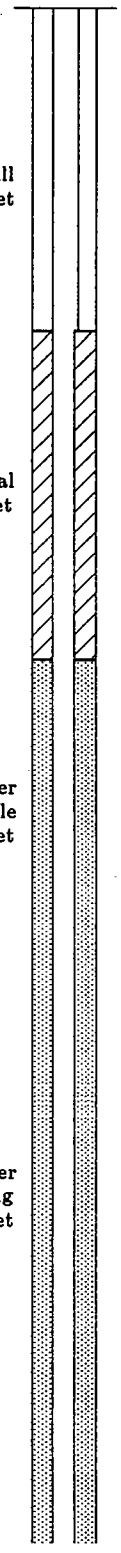
11101/Di

Stickup 0.60 ft

Drill Method Air Rotary

Boring No. EW-19A EW-22

TOC Elevation 639.71 ft Date 9/15/92



Depth ft	Sample	
0		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

PLATE

EW-19A

(sheet 1 of 4)

Cedar Hills Landfill

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

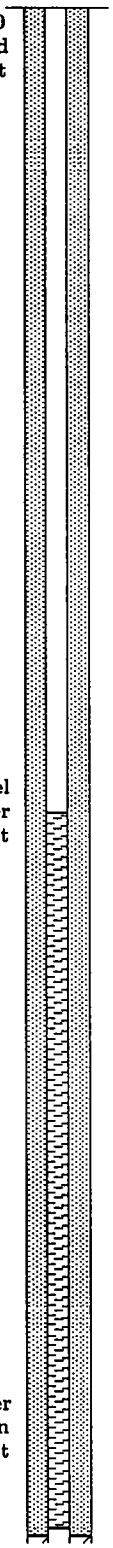
11101/D:

Stickup 0.60 ft

Drill Method Air Rotary

Boring No. EW-19A EW-22

TOC Elevation 639.71 ft Date 9/15/92



Depth ft
Sample

20

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)

30

SANDY SILT (ML); medium dark gray; some very fine sand; nonplastic; moist to wet (LACUSTRINE)

40

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Log of Boring and Well Completion

PLATE

EW-19A

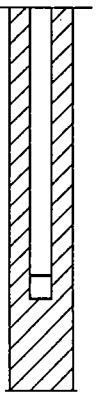
(sheet 2 of 4)

Cedar Hills Landfill

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

11101/D:

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

40

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

50

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)

60

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Log of Boring and Well Completion

PLATE

EW-19A

(sheet 3 of 4)

Cedar Hills Landfill

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

11101/Di

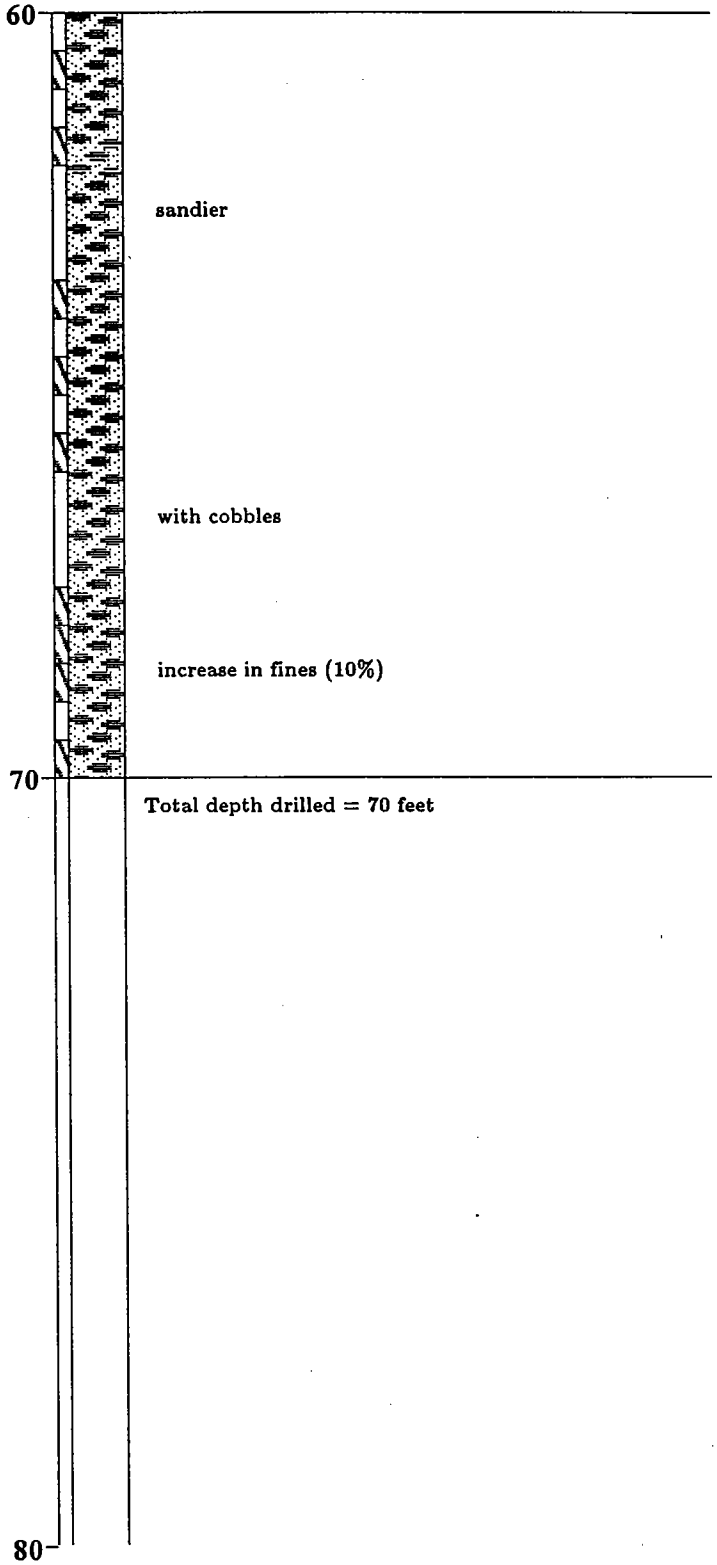
Stickup 0.60 ft

Depth ft
Sample

Drill Method Air Rotary

Boring No. EW-19A EW-22

TOC Elevation 639.71 ft Date 9/15/92



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Log of Boring and Well Completion

PLATE

EW-19A

(sheet 4 of 4)

Cedar Hills Landfill

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

Aspect CONSULTING	Cedar Hills Regional Landfill - 130088		Well Decommissioning Log	
	Project Address & Site Specific Location 16645 228th AVE SE, Maple Valley, WA 98038, North of EW-23 and South of EW-21		*Coordinates (SPN NAD83 ft)* E:170764 N:1341850	*Exploration Number* **EW-22**
Contractor Holt Services	*Equipment* Rotosonic drill rig	*Sampling Method* Rotary core	*Ground Surface (GS) Elev.* 638.836'	
Operator Pete Rosenberg	*Exploration Method(s)* Sonic	*Work Start/Completion Dates* 5/10/2018 to 5/11/2018	*Top of Casing Elev.* 639.48'	*Depth to Water (Below GS)* 3.56' (Static)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0		Hydrated bentonite chips					**Decommissioning Details** Extraction well decommissioned by overdrilling using rotosonic drilling methods: 12-inch OD barrel, 8-inch ID barrel.	0
		▼ 5/10/2018					12-inch diameter above-ground stainless steel monument removed 0 to 2 feet: Hydrated bentonite chips 2 to 40 feet: Bentonite grout (20% weight by solids)	
5	635	Bentonite grout						5
							Original Well Construction 12-inch diameter above-ground stainless steel monument +0.60 to 30.5 feet: 6-inch PVC blank casing 28.9 feet: Stainless steel centralizer 30.5 to 39.8 feet: 6-inch 0.020 slot PVC screen 39.8 to 43.8 feet: 6-inch SCH 40 PVC blank casing 40.7 feet: Stainless steel centralizer	
10	630							10
							0 to 4.2 feet: Gravel backfill 4.2 to 8.5 feet: Bentonite surface seal 8.5 to 39.9 feet: Sand pack 10 x 20 silica sand 39.9 to 45 feet: Bentonite pellet seal	
15	625							15
20	620							20
25	615							25
30	610							30
35	605							35
40	600						Bottom of overdrilling for decommissioning at 40 ft. bgs.	40

Legend

Sample Method

Water Level ▼ Static Water Level

See Exploration Log Key for explanation of symbols

Logged by: ACO
Approved by: KSL

Exploration Log EW-22
Sheet 1 of 1

NEW STANDARD LOG FORM P:\GINTW\PROJECTS\2018_130088_CHRLF_DECOMLOGS.GPJ June 24, 2018

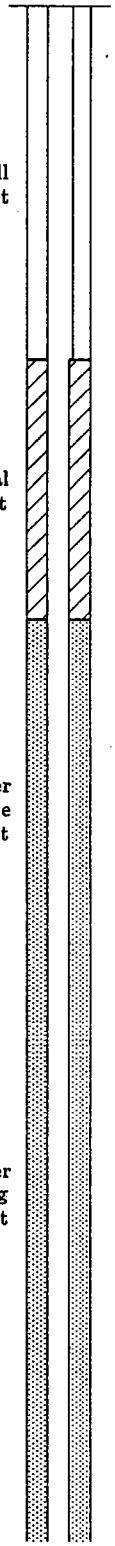
11101/D:

Stickup 0.70 ft

Drill Method Air Rotary

Boring No. EW-20A EW-23

TOC Elevation 640.65 ft Date 8/28/92



Depth ft	Sample	
0		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)
10		
		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)
20		

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Engineering and Environmental Services

Log of Boring and Well Completion

PLATE

EW-20A

(sheet 1 of 3)

Cedar Hills Landfill

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

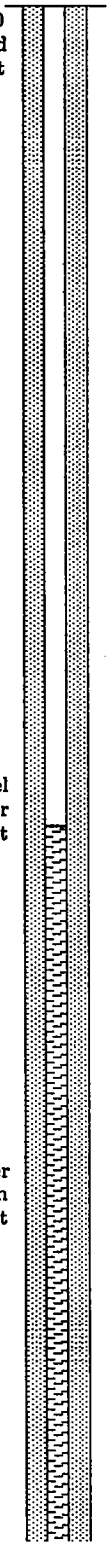
11101/D:

Stickup 0.70 ft

Drill Method Air Rotary

Boring No. EW-20A EW-23

TOC Elevation 640.65 ft Date 8/28/92



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

20

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)

30

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

40

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Log of Boring and Well Completion

PLATE

EW-20A

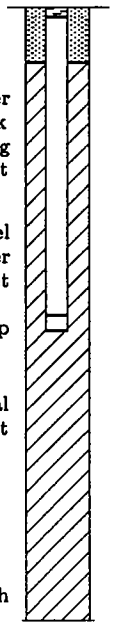
(sheet 2 of 3)

Cedar Hills Landfill

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

11101/Di

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

PLATE

EW-20A (sheet 3 of 3)

Cedar Hills Landfill

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

Aspect CONSULTING	Cedar Hills Regional Landfill - 130088		Well Decommissioning Log	
	Project Address & Site Specific Location 16645 228th AVE SE, Maple Valley, WA 98038, North of EW-24 and South of EW-22		*Coordinates (SPN NAD83 ft)* E:170684 N:1341850	*Exploration Number* **EW-23**
Contractor Holt Services	*Equipment* Rotosonic drill rig	*Sampling Method* Rotary core	*Ground Surface (GS) Elev.* 639.792'	
Operator Pete Rosenberg	*Exploration Method(s)* Sonic	*Work Start/Completion Dates* 5/10/2018	*Top of Casing Elev.* 640.15'	*Depth to Water (Below GS)* 3.17' (Static)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	640	Hydrated bentonite chips					**Decommissioning Details** Extraction well decommissioned by overdrilling using rotosonic drilling methods: 12-inch OD barrel, 8-inch ID barrel.	0
		▼ 5/10/2018						
		Bentonite grout						
5	635						12-inch diameter above-ground stainless steel monument removed 0 to 2 feet: Hydrated bentonite chips 2 to 41 feet: Bentonite grout (20% weight by solids)	5
10	630						**Original Well Construction** 12-inch diameter above-ground stainless steel monument +0.7 to 30.7 feet: 6-inch PVC blank casing 29.8 feet: Stainless steel centralizer 30.7 to 40.1 feet: 6-inch 0.020 Slot PVC screen 40.1 to 44.2 feet: 6-inch SCH 40 PVC blank casing 40.9 feet: Stainless steel centralizer	10
15	625						0 to 4.6 feet: Gravel backfill 4.6 to 8 feet: Bentonite surface seal 8 to 40.7 feet: Sand pack 10 x 20 silica sand 40.7 to 48 feet: Bentonite pellet seal	15
20	620							20
25	615							25
30	610							30
35	605							35
40	600						Bottom of overdrilling for decommissioning at 41 feet bgs.	40
	595							

Legend

Sample Method

Water Level ▼ Static Water Level

See Exploration Log Key for explanation of symbols

Logged by: ACO
Approved by: KSL

Exploration Log EW-23
Sheet 1 of 1

NEW STANDARD LOG FORM P:\GINTW\PROJECTS\2018_130088_CHRLF_DECOMLOGS.GPJ June 24, 2018

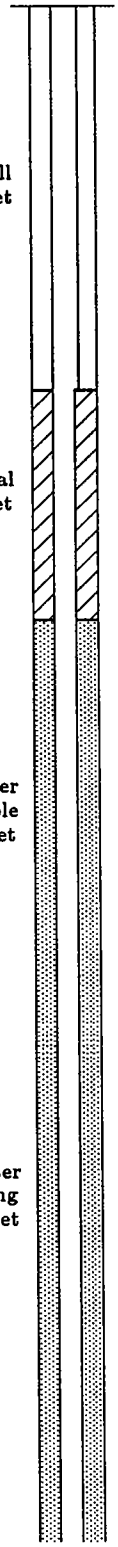
11101/D:

Stickup 2.40 ft

Drill Method Air Rotary

Boring No. EW-27A EW-24

TOC Elevation 643.11 ft Date 9/16/92



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

0

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)

10

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)

20

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Engineering and Environmental Services

Log of Boring and Well Completion

PLATE

EW-27A

(sheet 1 of 3)

Cedar Hills Landfill

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

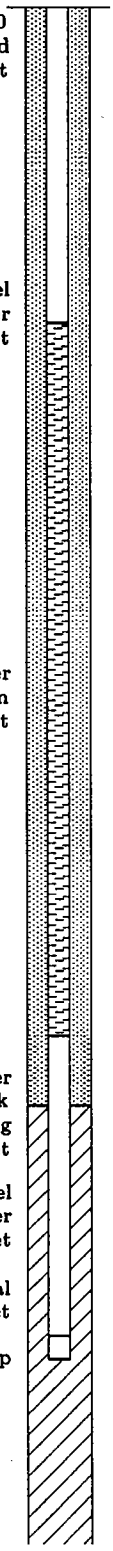
11101/D:

Stickup 2.40 ft

Drill Method Air Rotary

Boring No. EW-27A EW-24

TOC Elevation 643.11 ft Date 9/16/92



Sand Pack 10 x 20 Silica Sand 8.0 to 34.3 feet

Stainless Steel Centralizer 23.2 feet

6-inch-diameter 0.020 Slot PVC Screen 24.1 to 33.4 feet

6-inch-diameter Schedule 40 PVC Blank Casing 33.4 to 37.6 feet

Stainless Steel Centralizer 34.2 feet

Bentonite Pellet Seal 34.3 to 41.0 feet

End Cap

Depth ft
Sample

20

few fine to medium gravel

trace coarse sand and fine gravel

SANDY SILT (ML); some very fine sand; soft; damp to wet (LACUSTRINE)

30

moist

wet

SILT with gravel (ML); medium gray; very dense; trace fine gravels; nonplastic; damp (LACUSTRINE)

40

Harding Lawson Associates
Engineering and Environmental Services

Log of Boring and Well Completion

PLATE

EW-27A

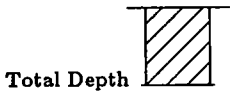
(sheet 2 of 3)

Cedar Hills Landfill

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

11101/D:

Stickup 2.40 ft



Depth ft
Sample

Drill Method Air Rotary

Boring No. EW-27A EW-24

TOC Elevation 643.11 ft Date 9/16/92

40

Total depth drilled = 41.0 feet

50

60

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Log of Boring and Well Completion

PLATE

EW-27A (sheet 3 of 3)

Cedar Hills Landfill

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

Cedar Hills Regional Landfill - 130088

Well Decommissioning Log

Project Address & Site Specific Location	Coordinates (SPN NAD83 ft)	Exploration Number
16645 228th AVE SE, Maple Valley, WA 98038, North of EW-25 and South of EW-23	E:170609 N:1341830	**EW-24**

Contractor	Equipment	Sampling Method	Ground Surface (GS) Elev.
Holt Services	Rotosonic drill rig	Rotary core	640.512'

Operator	Exploration Method(s)	Work Start/Completion Dates	Top of Casing Elev.	Depth to Water (Below GS)
Pete Rosenberg	Sonic	5/9/2018	642.84'	5.68' (Static)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	640	Hydrated bentonite chips					**Decommissioning Details** Extraction well decommissioned by overdrilling using rotosonic drilling methods: 12-inch OD barrel, and 8-inch ID barrel.	0
5	635	Bentonite grout ▼ 5/9/2018					12-inch diameter above-ground stainless steel monument removed 0 to 2 feet: Hydrated bentonite chips 2 to 38 feet: Bentonite grout	5
10	630						**Original Well Construction** 12-inch diameter above-ground stainless steel monument 0 to 24.1 feet: 6-inch PVC blank casing 23.2 feet: Stainless steel centralizer 24.1 to 33.4 feet: 6-inch 0.020 Slot PVC screen 33.4 to 37.6 feet: 6-inch SCH 40 PVC blank casing 34.2 feet: Stainless steel centralizer	10
15	625						0 to 5 feet: Gravel backfill 5 to 8 feet: Bentonite surface seal 8 to 34.3 feet: Sand pack 10 x 20 silica sand 34.3 to 41 feet: Bentonite pellet seal	15
20	620							20
25	615							25
30	610							30
35	605						Bottom of overdrilling for decommissioning at 38 feet bgs.	35

Legend

Sample Method

Water Level ▼ Static Water Level

See Exploration Log Key for explanation of symbols

Logged by: ACO
Approved by: KSL

Exploration Log EW-24
Sheet 1 of 1

NEW STANDARD LOG FORM P:\GINTW\PROJECTS\2018_130088_CHRLF_DECOMLOGS.GPJ June 24, 2018

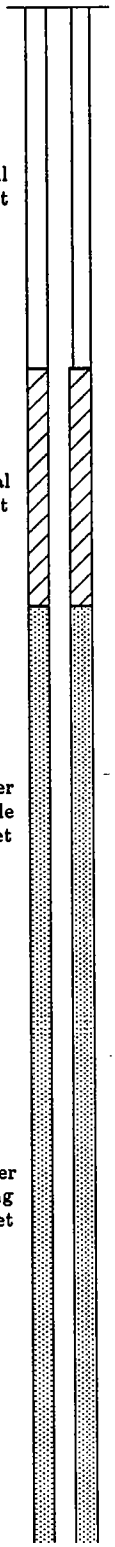
11101/D:

Stickup 2.40 ft

Drill Method Air Rotary

Boring No. EW-29A EW-25

TOC Elevation 643.61 ft Date 10/6/92



Gravel Backfill
0 to 4.7 feet

Bentonite Surface Seal
from 4.7 to 7.8 feet

12-inch-diameter
Borehole
0 to 39.5 feet

6-inch-diameter
PVC Blank Casing
+2.4 to 22.8 feet

Depth ft
Sample

0

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)

10

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)

20

Harding Lawson Associates
Engineering and Environmental Services

Log of Boring and Well Completion

PLATE

EW-29A

(sheet 1 of 2)

Cedar Hills Landfill

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

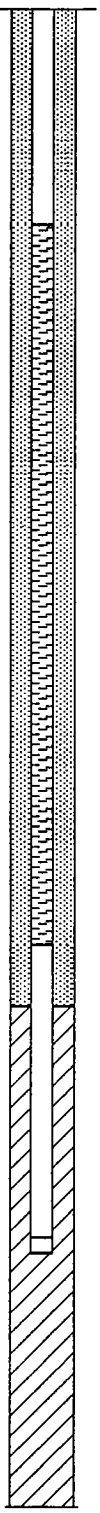
11101/D:

Stickup 2.40 ft

Drill Method Air Rotary

Boring No. EW-29A EW-25

TOC Elevation 643.61 ft Date 10/6/92



Sand Pack 10 x 20 Silica Sand
7.8 to 33.0 feet

Stainless Steel Centralizer
21.9 feet

6-inch-diameter 0.020 Slot PVC Screen
22.8 to 32.0 feet

6-inch-diameter Schedule 40 PVC Blank Casing
32.2 to 36.2 feet

Stainless Steel Centralizer
33.0 feet

Bentonite Pellet Seal
33.0 to 39.5 feet

End Cap

Total Depth

Depth ft
Sample

20

SANDY SILT with gravel (ML); medium dark gray; some very fine sand; trace fine gravel and coarse sand; wet (LACUSTRINE)

30

SILT with gravel (ML); medium dark gray; trace to few fine gravel; non to slight plasticity; dense (LACUSTRINE)

Total depth drilled = 39.5 feet

40

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Engineering and Environmental Services

Log of Boring and Well Completion

PLATE

EW-29A

(sheet 2 of 2)

Cedar Hills Landfill

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

Aspect CONSULTING	Cedar Hills Regional Landfill - 130088		Well Decommissioning Log	
	Project Address & Site Specific Location: 16645 228th AVE SE, Maple Valley, WA 98038, North of EW-26 and South of EW-24		Coordinates (SPN NAD83 ft): E:170544 N:1341790	Exploration Number: **EW-25**
Contractor: Holt Services	Equipment: Rotosonic drill rig	Sampling Method: Rotary core	Ground Surface (GS) Elev.: 641.442'	
Operator: Pete Rosenberg	Exploration Method(s): Sonic	Work Start/Completion Dates: 5/11/2018	Top of Casing Elev.: 643.39'	Depth to Water (Below GS): 7.45' (Static)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	640	Hydrated bentonite chips					**Decommissioning Details** Extraction well decommissioned by overdrilling using rotosonic drilling methods: 12-inch OD barrel, 8-inch ID barrel.	0
5	635	Bentonite grout ▼ 5/11/2018					12-inch diameter above-ground stainless steel monument removed 0 to 2 feet: Hydrated bentonite chips 2 to 36 feet: Bentonite grout (20% weight by solids)	5
10	630						**Original Well Construction** 12-inch diameter above-ground stainless steel monument +2.4 to 22.8 feet: 6-inch PVC blank casing 21.9 feet: Stainless steel centralizer 22.8 to 32 feet: 6-inch 0.020 Slot PVC screen 32.2 to 36.2 feet: 6-inch SCH 40 PVC blank casing 33 feet: Stainless steel centralizer	10
15	625						0 to 4.7 feet: Gravel backfill 4.7 to 7.8 feet: Bentonite surface seal 7.8 to 33 feet: Sand pack 10 x 20 silica sand 33 to 39.5 feet: Bentonite pellet seal	15
20	620							20
25	615							25
30	610							30
35	605						Bottom of overdrilling for decommissioning at 36 feet bgs.	35

Legend

Sample Method

Water Level: ▼ Static Water Level

See Exploration Log Key for explanation of symbols

Logged by: ACO
Approved by: KSL

Exploration Log EW-25
Sheet 1 of 1

NEW STANDARD LOG FORM P:\GINTW\PROJECTS\2018_130088_CHRLF_DECOMLOGS.GPJ June 24, 2018

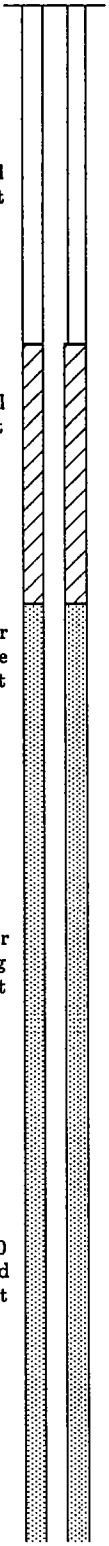
11101/D:

Stickup 2.40 ft

Drill Method Air Rotary

Boring No. EW-24A EW-26

TOC Elevation 642.16 ft Date 9/9/92



Gravel Backfill
0 to 4.4 feet

Bentonite Surface Seal
from 4.4 to 7.8 feet

12-inch-diameter
Borehole
0 to 59.0 feet

6-inch-diameter
PVC Blank Casing
+2.4 to 21.1 feet

Sand Pack 10 x 20
Silica Sand
7.8 to 32.2 feet

Depth ft
Sample

0

SILT with gravel and cobbles / GRAVELLY SILT (ML); moderate to dark brown; few to little fine to coarse gravel; trace plastic; dry (FILL)

SILT (ML); mottled orange brown; nonplastic; moist (WEATHERED TILL)

10

SANDY SILT (ML); mottled orange brown; some very fine sand; trace coarse sand; moist to wet (WEATHERED TILL)

SILT TO GRAVELLY SILT (ML); medium gray; trace to some fine to medium gravel; nonplastic to slight plasticity at base; damp (TILL / LACUSTRINE)

SANDY SILT (ML); medium gray; some very fine sand; damp; moist below 22 feet (LACUSTRINE)

20

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Engineering and Environmental Services

Log of Boring and Well Completion

PLATE

EW-24A

(sheet 1 of 3)

Cedar Hills Landfill

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

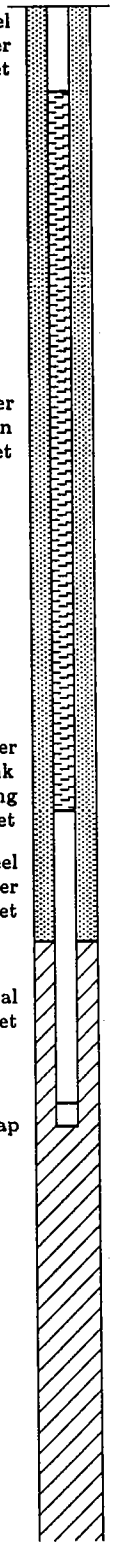
11101/D:

Stickup 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

20

30

40

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

PLATE

EW-24A

(sheet 2 of 3)

Cedar Hills Landfill

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

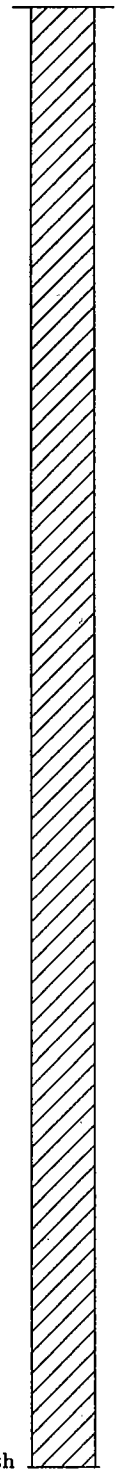
11101/D:

Stickup 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

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 drilled = 59.0 feet

60

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Log of Boring and Well Completion

PLATE

EW-24A

(sheet 3 of 3)

Cedar Hills Landfill

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

Aspect CONSULTING	Cedar Hills Regional Landfill - 130088		Well Decommissioning Log	
	Project Address & Site Specific Location: 16645 228th AVE SE, Maple Valley, WA 98038, North of EW-27 and South of EW-25		Coordinates (SPN NAD83 ft): E:170485 N:1341740	Exploration Number: **EW-26**
Contractor: Holt Services	Equipment: Rotosonic drill rig	Sampling Method: Rotary core	Ground Surface (GS) Elev.: 640.293'	
Operator: Pete Rosenberg	Exploration Method(s): Sonic	Work Start/Completion Dates: 5/9/2018	Top of Casing Elev.: 641.99'	Depth to Water (Below GS): 6.23' (Static)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	640	Hydrated bentonite chips					**Decommissioning Details** Extraction well decommissioned by overdrilling using rotosonic drilling methods: 12-inch OD barrel, and 8-inch ID barrel.	0
5	635	Bentonite grout ▼ 5/8/2018					12-inch diameter above-ground stainless steel monument removed 0 to 2 feet: Hydrated bentonite chips 2 to 36.5 feet: Bentonite grout (20% weight by solids)	5
10	630						**Original Well Construction** 12-inch diameter above-ground stainless steel monument +2.4 to 21.1 feet: 6-inch PVC blank casing 20.1 feet: Stainless steel centralizer 21.1 to 30.5 feet: 6-inch 0.020 slot PVC screen 30.5 to 34.6 feet: 6-inch SCH 40 PVC blank casing 30.5 feet: Stainless steel centralizer	10
15	625						0 to 4.4 feet: Gravel backfill 4.4 to 7.8 feet: Bentonite surface seal 7.8 to 32.2 feet: Sand pack 10 x 20 silica sand 32.2 to 59 feet: Bentonite pellet seal	15
20	620							20
25	615							25
30	610							30
35	605						Bottom of overdrilling for decommissioning at 36.5 feet bgs.	35

Legend

Sample Method

Water Level: ▼ Static Water Level

See Exploration Log Key for explanation of symbols

Logged by: ACO
Approved by: KSL

Exploration Log EW-26
Sheet 1 of 1

NEW STANDARD LOG FORM P:\GINTW\PROJECTS\2018_130088_CHRLF_DECOMLOGS.GPJ June 24, 2018

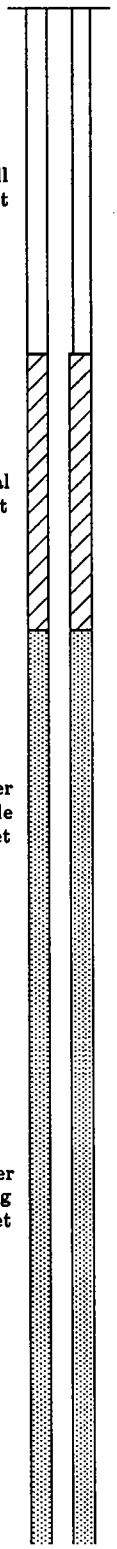
11101/D:

Stickup 2.20 ft

Drill Method Air Rotary

Boring No. EW-30A EW-27

TOC Elevation 640.63 ft Date 10/6/92



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

Depth ft
Sample

0

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

10

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)

20

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Log of Boring and Well Completion

PLATE

EW-30A

(sheet 1 of 2)

Cedar Hills Landfill

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

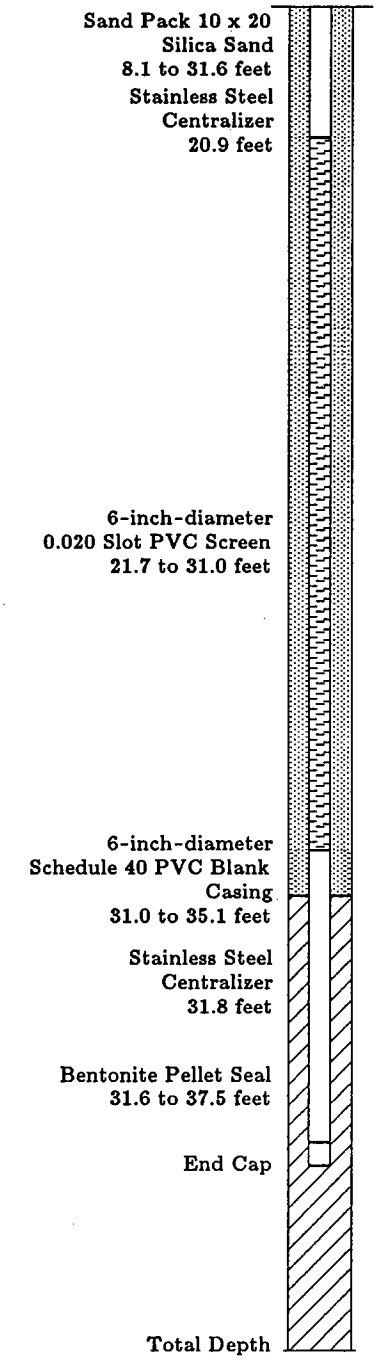
11101/D:

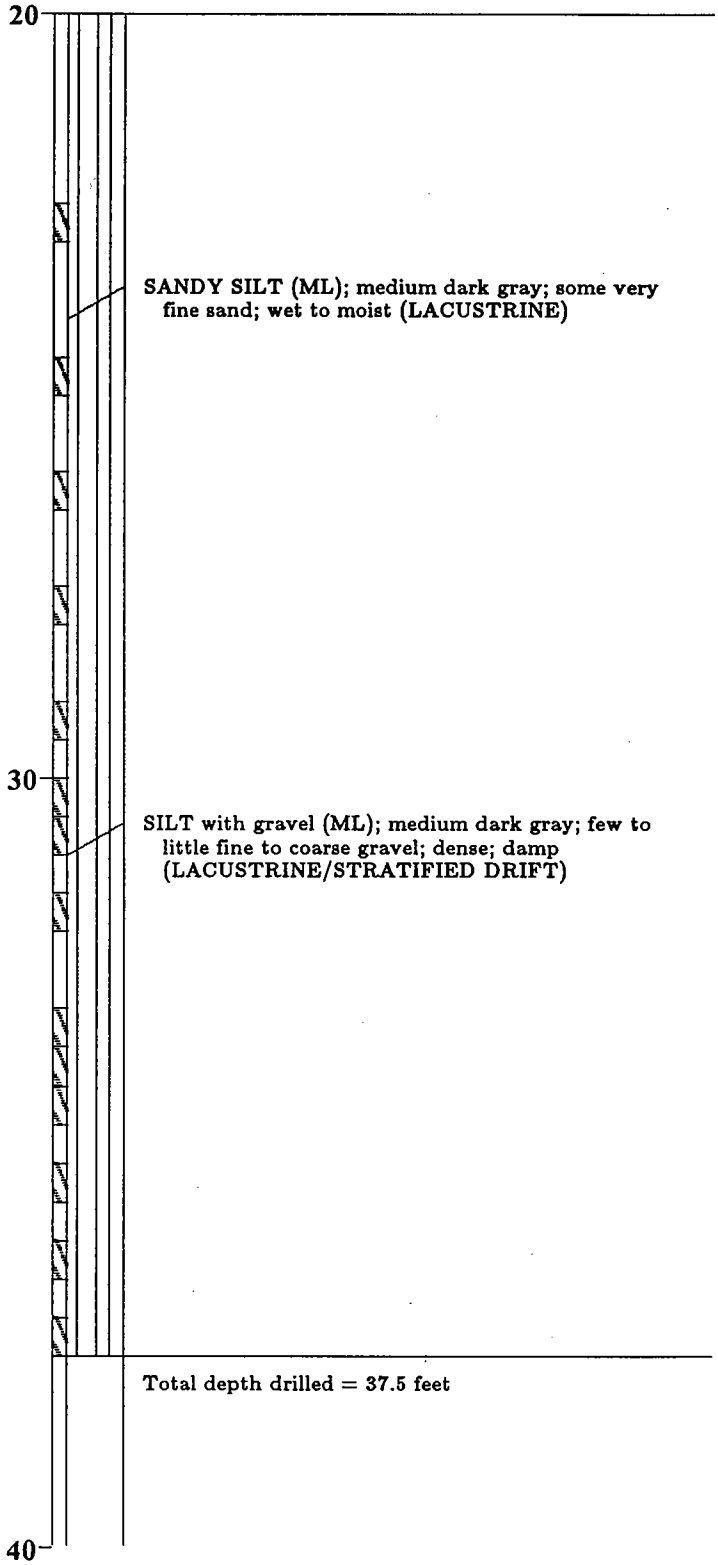
Stickup 2.20 ft

Drill Method Air Rotary

Boring No. EW-30A EW-27

TOC Elevation 640.63 ft Date 10/6/92





Harding Lawson Associates
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Log of Boring and Well Completion

PLATE

EW-30A

(sheet 2 of 2)

Cedar Hills Landfill

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

Aspect CONSULTING	Cedar Hills Regional Landfill - 130088		Well Decommissioning Log	
	Project Address & Site Specific Location: 16645 228th AVE SE, Maple Valley, WA 98038, North of EW-28 and South of EW-26		Coordinates (SPN NAD83 ft): E:170438 N:1341710	Exploration Number: **EW-27**
Contractor: Holt Services	Equipment: Rotosonic drill rig	Sampling Method: Rotary core	Ground Surface (GS) Elev.: 639.329'	
Operator: Pete Rosenberg	Exploration Method(s): Sonic	Work Start/Completion Dates: 5/8/2018	Top of Casing Elev.: 640.53'	Depth to Water (Below GS): 4.09' (Static)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	640	Hydrated bentonite chips					**Decommissioning Details** Extraction well decommissioned by overdrilling using rotosonic drilling methods: 12-inch OD barrel, and 8-inch ID barrel.	0
5	635	▼ 5/8/2018 Bentonite grout					12-inch diameter above-ground stainless steel monument removed 0 to 2 feet: Hydrated bentonite chips 2 to 36 feet: Bentonite grout (20% weight by solids)	5
10	630						**Original Well Construction** 12-inch diameter above-ground stainless steel monument +2.4 to 21.1 feet: 6-inch PVC blank casing 20.1 feet: Stainless steel centralizer 21.1 to 30.5 feet: 6-inch 0.020 Slot PVC screen 30.5 to 34.6 feet: 6-inch SCH 40 PVC blank casing 30.5 feet: Stainless steel centralizer	10
15	625						0 to 4.4 feet: Gravel backfill 4.4 to 7.8 feet: Bentonite surface seal 7.8 to 32.2 feet: Sand pack 10 x 20 silica sand 32.2 to 59 feet: Bentonite pellet seal	15
20	620							20
25	615							25
30	610							30
35	605						Bottom of overdrilling for decommissioning at 36 feet bgs.	35
	600							

Legend

Sample Method

Water Level: ▼ Static Water Level

See Exploration Log Key for explanation of symbols

Logged by: ACO
Approved by: KSL

Exploration Log EW-27
Sheet 1 of 1

NEW STANDARD LOG FORM P:\GINTW\PROJECTS\2018_130088_CHRLF_DECOMLOGS.GPJ June 24, 2018

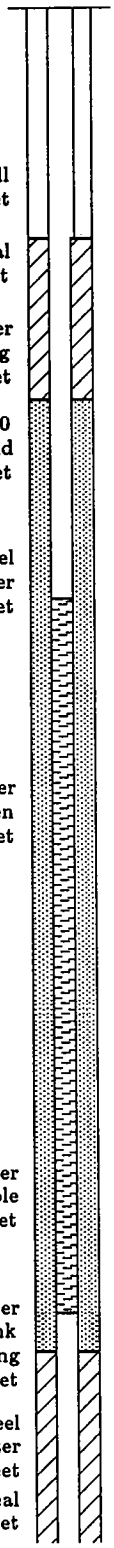
11101/D:

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	
0		SILT/SILT with sand and cobbles (ML); mottled dark and light brown; little fine to coarse sand below 2.5 feet; trace organics; plastic; damp (FILL)
		SILT with gravel (ML); olive yellowish brown; few fine to medium gravel; trace medium to coarse sand; slight plasticity; moist (WEATHERED TILL)
		SILT with sand and gravel (ML); olive yellowish brown; few to little very fine sand; trace fine gravel; slight plasticity (WEATHERED TILL)
10		SILTY SAND with gravel (SM); olive yellowish brown, fine to medium; trace fine gravel and coarse sand; some fines; moist (WEATHERED TILL)
		GRAVELLY SILT with sand (ML); mottled yellowish to orange brown; little fine to medium gravel and fine to coarse sand; moist (WEATHERED TILL)
		SANDY SILT with gravel (ML); medium gray, fine; trace fine to coarse gravel; moist (LACUSTRINE)
		SILT with gravel (ML); medium dark gray; trace fine gravel and coarse sand; slight plasticity; damp (LACUSTRINE)
20		

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Engineering and Environmental Services

Log of Boring and Well Completion

PLATE

EW-31A

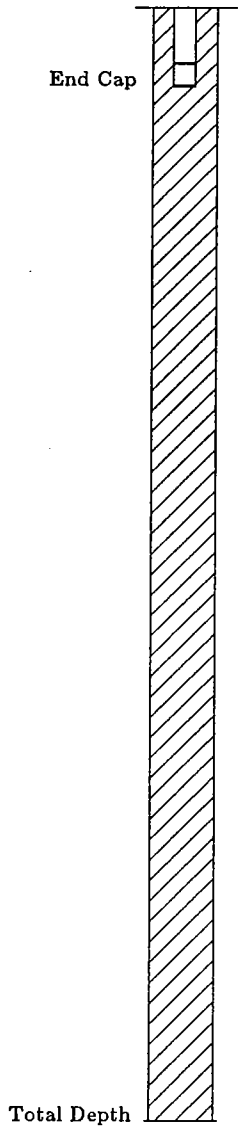
(sheet 1 of 2)

Cedar Hills Landfill

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

11101/D:

Stickup 2.10 ft



Depth ft
Sample

Drill Method Air Rotary

Boring No. EW-31A EW-28

TOC Elevation 640.86 ft Date 10/7/92

20

SILT (ML); medium dark gray; moderate plasticity; denser; damp (LACUSTRINE)

30

Total depth drilled = 34.5 feet

40

Harding Lawson Associates
Engineering and Environmental Services

Log of Boring and Well Completion

PLATE

EW-31A

(sheet 2 of 2)

Cedar Hills Landfill

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

Aspect CONSULTING	Cedar Hills Regional Landfill - 130088		Well Decommissioning Log	
	Project Address & Site Specific Location: 16645 228th AVE SE, Maple Valley, WA 98038, North of EW-29 and South of EW-27		Coordinates (SPN NAD83 ft): E:170338 N:1341690	Exploration Number: **EW-28**
Contractor: Holt Services	Equipment: Rotosonic drill rig	Sampling Method: Rotary core	Ground Surface (GS) Elev.: 638.323'	
Operator: Pete Rosenberg	Exploration Method(s): Sonic	Work Start/Completion Dates: 5/7/2018	Top of Casing Elev.: 640.49'	Depth to Water (Below GS): 7.07' (Static)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0		Native fill soil					**Decommissioning Details** Extraction well decommissioined by overdrilling using rotosonic drilling methods: 12-inch OD barrel, 8-inch ID barrel.	0
	635						12-inch diameter above-ground stainless steel monument removed 0 to 2 feet: Top soil 2 to 20 feet: Hydrated bentonite chips	
5		Hydrated bentonite chips ▼ 5/7/2018					**Original Well Construction** 12-inch diameter above-ground stainless steel monument 0 to 7.7 feet: 6-inch PVC blank casing 6.9 feet: Stainless steel centralizer 7.7 to 17 feet: 6-inch 0.020 slot PVC screen 17 to 21 feet: 6-inch SCH 40 PVC blank casing 17.8 feet: Stainless steel centralizer	5
	630						0 to 3 feet: Gravel backfill 3 to 5.1 feet: Bentonite surface seal 5.1 to 17.5 feet: Sand pack 10 x 20 silica sand 17.5 to 34.5 feet: Bentonite pellet seal	
10								10
	625							
15								15
	620							
20							Bottom of overdrilling for decommissioning at 20 feet bgs.	20

Legend

Sample Method

Water Level: ▼ Static Water Level

See Exploration Log Key for explanation of symbols

Logged by: ACO
Approved by: KSL

Exploration Log EW-28
Sheet 1 of 1

NEW STANDARD LOG FORM P:\GINTW\PROJECTS\2018_130088_CHRLF_DECOMLOGS.GPJ June 24, 2018

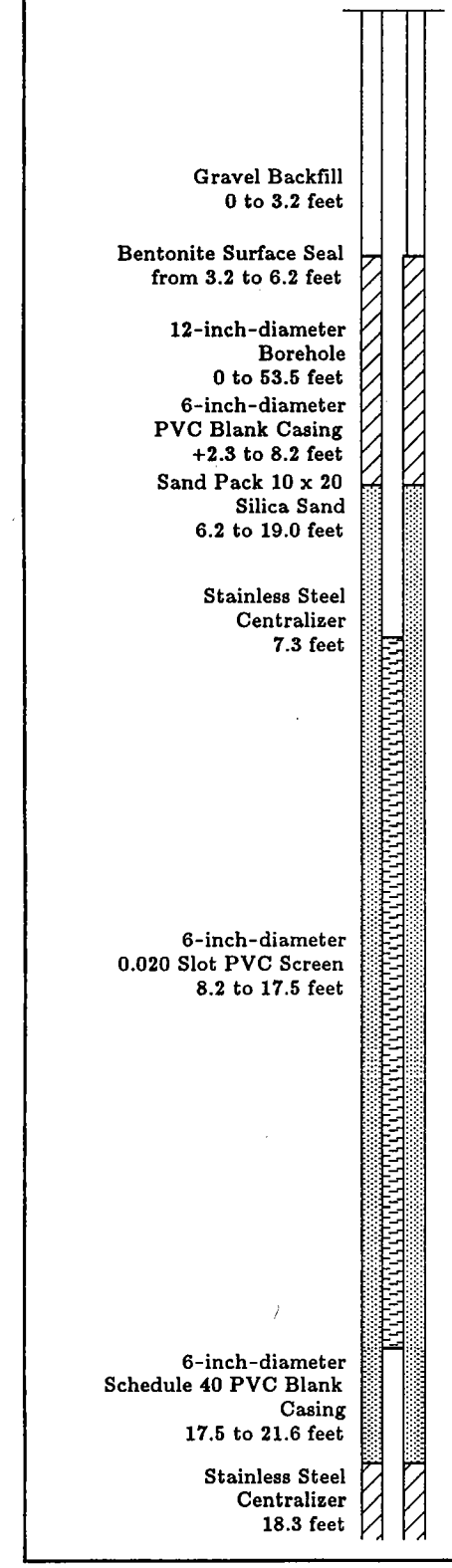
11101/D:

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	
0		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)
10		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)
20		

Harding Lawson Associates
Engineering and Environmental Services

Log of Boring and Well Completion

PLATE

EW-28A

(sheet 1 of 3)

Cedar Hills Landfill

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

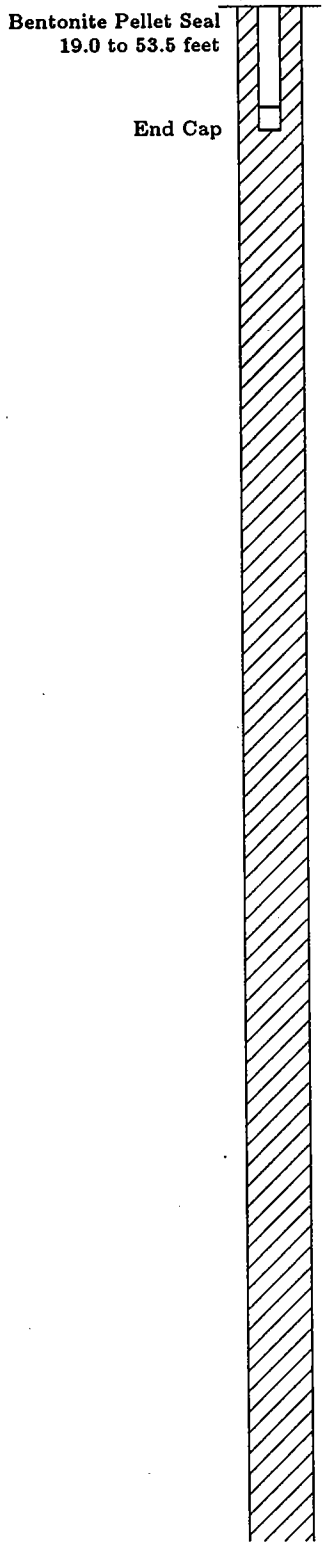
11101/D:

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

20

SILT (ML); medium gray; slight plasticity; trace clay; damp (LACUSTRINE)

few fine gravel

30

few fine gravel; trace coarse sand; damp

SILT (ML); medium gray; moderate plasticity; few clay; damp to moist (LACUSTRINE)

40

Harding Lawson Associates
Engineering and Environmental Services

Log of Boring and Well Completion

PLATE

EW-28A

(sheet 2 of 3)

Cedar Hills Landfill

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

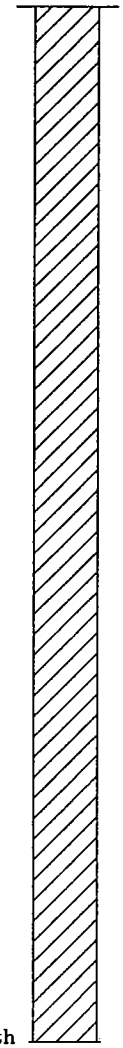
11101/D:

Stickup 2.30 ft

Drill Method Air Rotary

Boring No. EW-28A EW-29

TOC Elevation 638.93 ft Date 9/21/92



Total Depth

Depth ft
Sample

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

Harding Lawson Associates
Engineering and Environmental Services

Log of Boring and Well Completion

PLATE

EW-28A

(sheet 3 of 3)

Cedar Hills Landfill

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

Aspect CONSULTING	Cedar Hills Regional Landfill - 130088		Well Decommissioning Log	
	Project Address & Site Specific Location 16645 228th AVE SE, Maple Valley, WA 98038, South of EW-28		*Coordinates (SPN NAD83 ft)* E:170244 N:1341720	*Exploration Number* **EW-29**
Contractor Holt Services	*Equipment* Rotosonic drill rig	*Sampling Method* Rotary core	*Ground Surface (GS) Elev.* 636.976'	
Operator Pete Rosenberg	*Exploration Method(s)* Sonic	*Work Start/Completion Dates* 5/7/2018	*Top of Casing Elev.* 638.56'	*Depth to Water (Below GS)* 5.35' (Static)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	635	Native fill soils					**Decommissioining Details** Extraction well decommissioined by overdrilling using rotosonic drilling methods: 12-inch OD barrel, 8-inch ID barrel. 12-inch diameter above-ground stainless steel monument removed 0 to 2 feet: Native fill 2 to 24.5 feet: Hydrated bentonite chips	0
5	630	Hydrated bentonite chips ▼ 5/7/2018					**Original Well Construction** 12-inch diameter above-ground stainless steel monument +2.3 to 8.2 feet: 6-inch PVC blank casing 7.3 feet: Stainless steel centralizer 8.2 to 17.5 feet: 6-inch 0.020 slot PVC Screen 17.5 to 21.6 feet: 6-inch SCH 40 PVC blank casing 18.3 feet: Stainless steel centralizer 0 to 3.2 feet: Gravel backfill 3.2 to 6.2 feet: Bentonite surface seal 6.2 to 19 feet: Sand pack 10 x 20 silica sand 19 to 53.5 feet: Bentonite pellet seal	5
10	625							10
15	620							15
20	615						Bottom of overdrilling for decommissioning at 24.5 feet bgs.	20

Legend

Sample Method

Water Level ▼ Static Water Level

See Exploration Log Key for explanation of symbols

Logged by: ACO
Approved by: KSL

Exploration Log EW-29
Sheet 1 of 1

NEW STANDARD LOG FORM P:\GINTW\PROJECTS\2018_130088_CHRLF_DECOMLOGS.GPJ June 24, 2018

APPENDIX B

Investigation-Derived Waste Results

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

May 16, 2018

Kirsi Longley, Project Manager
Aspect Consulting, LLC
401 2nd Ave S, Suite 201
Seattle, WA 98104

Dear Ms Longley:

Included are the results from the testing of material submitted on May 10, 2018 from the CHRLF-130088, F&BI 805187 project. There are 8 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
c: data@aspectconsulting.com
ASP0516R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on May 10, 2018 by Friedman & Bruya, Inc. from the Aspect Consulting, LLC CHRLF-130088, F&BI 805187 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Aspect Consulting, LLC
805187 -01	D1-051018

The samples were sent to Fremont Analytical for sulfide and cyanide analyses. The report is enclosed.

A 6020B internal standard failed the acceptance criteria for sample D1-051018 due to matrix interferences. The data were flagged accordingly. The sample was diluted and reanalyzed.

All other quality control requirements were acceptable.

Date of Report: 05/16/18
Date Received: 05/10/18
Project: CHRLF-130088, F&BI 805187
Date Extracted: NA
Date Analyzed: 05/10/18

RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR pH USING EPA METHOD 9040C

Sample ID Laboratory ID	pH	Date Analyzed	Time Analyzed
D1-051018 805187-01	7.4	05/10/18	17:04

Analysis For Total Metals By EPA Method 6020B

Client ID:	D1-051018	Client:	Aspect Consulting, LLC
Date Received:	05/10/18	Project:	CHRLF-130088, F&BI 805187
Date Extracted:	05/11/18	Lab ID:	805187-01
Date Analyzed:	05/11/18	Data File:	805187-01.054
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	11.8
Cadmium	<1
Chromium	38.5 J
Copper	45.9 J
Lead	22.7
Mercury	<1
Nickel	30.1 J
Silver	<1
Zinc	2,140 J ve

Analysis For Total Metals By EPA Method 6020B

Client ID:	D1-051018	Client:	Aspect Consulting, LLC
Date Received:	05/10/18	Project:	CHRLF-130088, F&BI 805187
Date Extracted:	05/11/18	Lab ID:	805187-01 x10
Date Analyzed:	05/11/18	Data File:	805187-01 x10.083
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Chromium	50.4
Copper	71.4
Nickel	44.7
Zinc	3,270

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	Not Applicable	Project:	CHRLF-130088, F&BI 805187
Date Extracted:	05/11/18	Lab ID:	I8-304 mb
Date Analyzed:	05/11/18	Data File:	I8-304 mb.100
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<1
Cadmium	<1
Chromium	<1
Copper	<5
Lead	<1
Mercury	<1
Nickel	<1
Silver	<1
Zinc	<5

Date of Report: 05/16/18
Date Received: 05/10/18
Project: CHRLF-130088, F&BI 805187

QUALITY ASSURANCE RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR pH BY METHOD 9040C

Laboratory Code: 805187-01 (Duplicate)

Analyte	Sample Result	Duplicate Result	Relative Percent Difference	Acceptance Criteria
pH	8.4	8.4	0	0-20

Date of Report: 05/16/18
Date Received: 05/10/18
Project: CHRLF-130088, F&BI 805187

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR TOTAL METALS USING EPA METHOD 6020B

Laboratory Code: 805180-06 x10 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	ug/L (ppb)	10	<10	105	108	75-125	3
Cadmium	ug/L (ppb)	5	<10	105	106	75-125	1
Chromium	ug/L (ppb)	20	<10	99	104	75-125	5
Copper	ug/L (ppb)	20	<50	100	103	75-125	3
Lead	ug/L (ppb)	10	<10	93	96	75-125	3
Mercury	ug/L (ppb)	5	<10	88	92	75-125	4
Nickel	ug/L (ppb)	20	<10	94	97	75-125	3
Silver	ug/L (ppb)	5	<10	85	85	75-125	0
Zinc	ug/L (ppb)	50	<50	96	102	75-125	6

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	ug/L (ppb)	10	99	80-120
Cadmium	ug/L (ppb)	5	99	80-120
Chromium	ug/L (ppb)	20	93	80-120
Copper	ug/L (ppb)	20	99	80-120
Lead	ug/L (ppb)	10	93	80-120
Mercury	ug/L (ppb)	5	90	80-120
Nickel	ug/L (ppb)	20	99	80-120
Silver	ug/L (ppb)	5	95	80-120
Zinc	ug/L (ppb)	50	97	80-120

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The compound is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht – The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits. Compounds in the sample matrix interfered with the quantitation of the analyte.

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Friedman & Bruya
Michael Erdahl
3012 16th Ave. W.
Seattle, WA 98119

RE: 805187
Work Order Number: 1805129

May 11, 2018

Attention Michael Erdahl:

Fremont Analytical, Inc. received 1 sample(s) on 5/10/2018 for the analyses presented in the following report.

Cyanide by SM 4500-CN C, E
Sulfide by SM 4500-S2-F

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

Mike Ridgeway
Laboratory Director

Date: *05/11/2018*

CLIENT: Friedman & Bruya
Project: 805187
Work Order: 1805129

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1805129-001	D1-051018	05/10/2018 8:00 AM	05/10/2018 2:25 PM

Case Narrative

WO#: **1805129**
Date: **5/11/2018**

CLIENT: Friedman & Bruya
Project: 805187

I. SAMPLE RECEIPT:
Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:
Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:
Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Qualifiers:

* - Flagged value is not within established control limits
B - Analyte detected in the associated Method Blank
D - Dilution was required
E - Value above quantitation range
H - Holding times for preparation or analysis exceeded
I - Analyte with an internal standard that does not meet established acceptance criteria
J - Analyte detected below Reporting Limit
N - Tentatively Identified Compound (TIC)
Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20% Drift or minimum RRF)
S - Spike recovery outside accepted recovery limits
ND - Not detected at the Reporting Limit
R - High relative percent difference observed

Acronyms:

%Rec - Percent Recovery
CCB - Continued Calibration Blank
CCV - Continued Calibration Verification
DF - Dilution Factor
HEM - Hexane Extractable Material
ICV - Initial Calibration Verification
LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
MB or MBLANK - Method Blank
MDL - Method Detection Limit
MS/MSD - Matrix Spike / Matrix Spike Duplicate
PDS - Post Digestion Spike
Ref Val - Reference Value
RL - Reporting Limit
RPD - Relative Percent Difference
SD - Serial Dilution
SGT - Silica Gel Treatment
SPK - Spike
Surr - Surrogate

Analytical Report

Work Order: **1805129**
Date Reported: **5/11/2018**

Client: Friedman & Bruya
Collection Date: 5/10/2018 8:00:00 AM
Project: 805187
Lab ID: 1805129-001
Matrix: Water
Client Sample ID: **D1-051018**

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Cyanide by SM 4500-CN C, E				Batch ID: 20622		Analyst: WF
Cyanide, Amenable to Chlorination	ND	0.0500		mg/L	1	5/11/2018 12:07:00 PM
Cyanide, Total	ND	0.0500		mg/L	1	5/11/2018 12:07:00 PM
Sulfide by SM 4500-S2-F				Batch ID: R43431		Analyst: KT
Sulfide	ND	0.500		mg/L	1	5/11/2018 9:50:00 AM

Work Order: 1805129
CLIENT: Friedman & Bruya
Project: 805187

QC SUMMARY REPORT

Cyanide by SM 4500-CN C, E

Sample ID	**MB-20653**	SampType:	**MBLK**			Units:	**mg/L**	Prep Date:	**5/11/2018**	RunNo:	**43430**
Client ID:	**MBLKW**	Batch ID:	**20622**					Analysis Date:	**5/11/2018**	SeqNo:	**839607**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cyanide, Total	ND	0.0500									

Sample ID	**LCS-20653**	SampType:	**LCS**			Units:	**mg/L**	Prep Date:	**5/11/2018**	RunNo:	**43430**
Client ID:	**LCSW**	Batch ID:	**20622**					Analysis Date:	**5/11/2018**	SeqNo:	**839608**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cyanide, Total	0.266	0.0500	0.2500	0	107	80	120				

Sample ID	**1805129-001ADUP**	SampType:	**DUP**			Units:	**mg/L**	Prep Date:	**5/11/2018**	RunNo:	**43430**
Client ID:	**D1-051018**	Batch ID:	**20622**					Analysis Date:	**5/11/2018**	SeqNo:	**839610**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cyanide, Amenable to Chlorination	ND	0.0500						0		20	
Cyanide, Total	ND	0.0500						0		20	

Sample ID	**1805129-001AMS**	SampType:	**MS**			Units:	**mg/L**	Prep Date:	**5/11/2018**	RunNo:	**43430**
Client ID:	**D1-051018**	Batch ID:	**20622**					Analysis Date:	**5/11/2018**	SeqNo:	**839611**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cyanide, Total	0.266	0.0500	0.2500	0	106	80	120				

Sample ID	**1805129-001AMSD**	SampType:	**MSD**			Units:	**mg/L**	Prep Date:	**5/11/2018**	RunNo:	**43430**
Client ID:	**D1-051018**	Batch ID:	**20622**					Analysis Date:	**5/11/2018**	SeqNo:	**839612**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cyanide, Total	0.264	0.0500	0.2500	0	105	80	120	0.2660	0.944	30	

Work Order: 1805129
CLIENT: Friedman & Bruya
Project: 805187

QC SUMMARY REPORT

Sulfide by SM 4500-S2-F

Sample ID	MB-R43431	SampType:	MBLK			Units:	mg/L	Prep Date:	5/11/2018	RunNo:	43431	
Client ID:	MBLKW	Batch ID:	R43431					Analysis Date:	5/11/2018	SeqNo:	839633	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfide		ND	0.500									

Sample ID	LCS-R43431	SampType:	LCS			Units:	mg/L	Prep Date:	5/11/2018	RunNo:	43431	
Client ID:	LCSW	Batch ID:	R43431					Analysis Date:	5/11/2018	SeqNo:	839634	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfide		2.00	0.500	2.000	0	100	65	135				

Sample ID	1805098-001CDUP	SampType:	DUP			Units:	mg/L	Prep Date:	5/11/2018	RunNo:	43431	
Client ID:	BATCH	Batch ID:	R43431					Analysis Date:	5/11/2018	SeqNo:	839639	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfide		ND	0.500						0		30	

Sample ID	1805098-002CMS	SampType:	MS			Units:	mg/L	Prep Date:	5/11/2018	RunNo:	43431	
Client ID:	BATCH	Batch ID:	R43431					Analysis Date:	5/11/2018	SeqNo:	839641	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfide		1.80	0.500	2.000	0	90.0	65	135				

Sample Log-In Check List

Client Name:	**FB**	Work Order Number:	**1805129**
Logged by:	**Brianna Barnes**	Date Received:	**5/10/2018 2:25:00 PM**

Chain of Custody

1.	Is Chain of Custody complete?	Yes ☑	No ☐	Not Present ☐
2.	How was the sample delivered?	FedEx		

Log In

3.	Coolers are present?	Yes ☐	No ☑	NA ☐
	Samples received at appropriate temperature.			
4.	Shipping container/cooler in good condition?	Yes ☑	No ☐	
5.	Custody Seals present on shipping container/cooler? (Refer to comments for Custody Seals not intact)	Yes ☐	No ☑	Not Required ☐
6.	Was an attempt made to cool the samples?	Yes ☑	No ☐	NA ☐
7.	Were all items received at a temperature of >0°C to 10.0°C*	Yes ☑	No ☐	NA ☐
8.	Sample(s) in proper container(s)?	Yes ☑	No ☐	
9.	Sufficient sample volume for indicated test(s)?	Yes ☑	No ☐	
10.	Are samples properly preserved?	Yes ☑	No ☐	
11.	Was preservative added to bottles?	Yes ☑	No ☐	NA ☐
				NaOH added to 001A.
12.	Is there headspace in the VOA vials?	Yes ☐	No ☐	NA ☑
13.	Did all samples containers arrive in good condition(unbroken)?	Yes ☑	No ☐	
14.	Does paperwork match bottle labels?	Yes ☑	No ☐	
15.	Are matrices correctly identified on Chain of Custody?	Yes ☑	No ☐	
16.	Is it clear what analyses were requested?	Yes ☑	No ☐	
17.	Were all holding times able to be met?	Yes ☑	No ☐	

Special Handling (if applicable)

18.	Was client notified of all discrepancies with this order?	Yes ☐	No ☐	NA ☑

Person Notified: _____ Date _____

By Whom: _____ Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person

Regarding: _____

Client Instructions: _____

19. Additional remarks:

Item Information

Item #	Temp ºC
Sample	3.8

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C

SUBCONTRACT SAMPLE CHAIN OF CUSTODY 1805129

Page # 1 of 1

Send Report To Michael Erdahl

Company Friedman and Bruya, Inc.

Address 3012 16th Ave W

City, State, ZIP Seattle, WA 98119

Phone # (206) 285-8282 Fax # (206) 283-5044

SUBCONTRACTER Fremont.

PROJECT NAME/NO.	PO #
605187	A-358

REMARKS

Please Email Results Aspect EDD

TURNAROUND TIME

~~Standard (2 Weeks)~~ Hold.

☐ RUSH

Rush charges authorized by:

SAMPLE DISPOSAL

☐ Dispose after 30 days

☐ Return samples

☐ Will call with instructions

Sample ID	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	Dioxins/Furans	EPH	VPH	Nitrate	Sulfate	Alkalinity	TOC-9060M				Notes
						ANALYSES REQUESTED										
D1 - 051018		5/10/18	0800	water	2											Hold for Now.

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282
Fax (206) 283-5044

	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
~~Relinquished by:~~		Michael Erdahl	Friedman and Bruya	5/10/18	12:24
Received by:		B Barnes	FAI	5/10/18	1425
Relinquished by:					
Received by:					

SUBCONTRACT SAMPLE CHAIN OF CUSTODY 1805129

Page # 1 of 1

Send Report To Michael Erdahl
Company Friedman and Bruya, Inc.
Address 3012 16th Ave W
City, State, ZIP Seattle, WA 98119
Phone # (206) 285-8282 Fax # (206) 283-5044

SUBCONTRACTER Fremont.

PROJECT NAME/NO.	PO #
805187	A-358

REMARKS
Please Email Results
edit per M.E. 5/10/18 BB Aspect EDD

TURNAROUND TIME
~~Standard (2 Weeks)~~
☑ RUSH 24hr Hold.
Rush charges authorized by:

SAMPLE DISPOSAL
☐ Dispose after 30 days
☐ Return samples
☐ Will call with instructions

Sample ID	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	Dioxins/Furans	EPH	VPH	Nitrate	Sulfate	Alkalinity	TOC-9060M	Amenable Cyanide	Sulfide		Notes
D1 - 051018		5/10/18	0800	water	2								X	X		Hold for Now.

ANALYSES REQUESTED

	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:		Michael Erdahl	Friedman and Bruya	5/10/18	12:24
Received by:		BBarnes	FAI	5/10/18	1425
Relinquished by:					
Received by:					

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282
Fax (206) 283-5044

805187

SAMPLE CHAIN OF CUSTODY

ME 05-10-18

Page # 1 of AI24

Report To Kirsi Longley
Company Aspect Consulting
Address 401 2nd AVE S #201
City, State, ZIP Seattle WA 98104
Phone 206-328-7443 Email Klongley@aspectconsulting.com

SAMPLERS (*signature*) Amelia C. Oates

PROJECT NAME: CHRLF - 130088

PO #:

REMARKS: METALS: As, Cd, Cr, Cu, Pb, Hg, Ni, Ag, Zn

INVOICE TO:

TURNAROUND TIME
- ☐ Standard Turnaround
- ☑ RUSH 24-HR
- Rush charges authorized by:

SAMPLE DISPOSAL
- ☐ Dispose after 30 days
- ☐ Archive Samples
- ☐ Other

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	TPH-HCID	TPH-Diesel	TPH-Gasoline	BTEX by 8021B	VOCs by 8260C	SVOCs by 8270D	PAHs 8270D SIM	Amenable Cyanide	pH	Total Metals	Sulfide Sulfides	Notes
						ANALYSES REQUESTED											
DI-051018	01A-D	5/10/18	0800	H2O	4								X	X	X	X	~~Hold for Analysis~~ ~~per direction from KL (Aspect)~~ X per KL 5/10/18 ME
													Samples received at 4 °C				

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: Amelia C. Oates	AMELIA C. OATES	Aspect	5/10/18	0830
Received by:	Nhan Phan	FEBI	5/10/18	1130
Relinquished by:				
Received by:				

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282

King County
Department of
Natural Resources and Parks
Solid Waste Division

KING COUNTY SOLID WASTE DIVISION
WASTE CLEARANCE DECISION

Waste Clearance Number: N0116
No Charge

GENERATOR

Name and address:

King County Solid Waste Division
16645 - 228th Ave. SE
Maple Valley, WA 98038

Toraj Ghofrani
206-477-5221
Toraj.Ghofrani@kingcounty.gov

Source:

Cedar Hills Landfill

WASTE APPROVED FOR DISPOSAL

Waste type: Drill Cuttings from CHRLF
DRILL CUTTINGS - SOIL AND SOLID WASTE

Quantity approved for disposal: Approx. 10 tons

CONDITIONS OF DISPOSAL

- Material must be disposed directly at the CEDAR HILLS LANDFILL.
- CALL SPECIAL WASTE UNIT AT 206-263-1091 TO SCHEDULE AN APPOINTMENT PRIOR TO DELIVERY.
- Appointments made Monday - Friday, 8:00 a.m. - 3:00 p.m. (Closed on federal holidays and the Friday after Thanksgiving.)
- Must be able to unload without assistance from landfill personnel.
- Not for use as daily cover due to garbage.
- The Scale House will need a no-charge code, which Ken Wong supplies. Please follow up with Ken.

CLEARANCE SCHEDULE

Clearance is valid from: 5/15/2018 through **8/31/2018**

Clearance issued by: Delivery frequency: Twice monthly through July 2018

Peggy Wolf, Environmental Scientist

A copy of this Waste Clearance Decision and payment by cash, check, credit/debit using VISA/Mastercard or Solid Waste charge account MUST accompany each vehicle at the time of disposal. Payment by Comchek will NOT be accepted.

Health Department Approval # / Expiration Date: **N/A** / 5/15/2018

Safety First! What You Should Know Before You Go To the Landfill

Because your safety comes first, the following items are recommended while you or your employees are out of your vehicle in the active dumping area:

- -- ***High visibility clothing, such as a safety vest***
  - ~ ***To enhance your visibility when on the ground***
- -- ***Work boots with puncture-resistant soles***
  - ~ ***To prevent puncture-type injuries and slips, trips and falls***
- -- ***Fall protection is suggetsed when dumping next to tippers directly in refuse pit or into the special waste pit***
  - ~ ***Fall protection consists of a safety belt and lanyard***
- -- ***Eye protection: safety glasses are strongly recommended***

COPY DISTRIBUTION LIST FOR WASTE CLEARANCE NUMBER N0116

King County Distribution

Eyasu Ayalew, Environmental Health Specialist, Health Department

Scott Barden, Assistant Operations Manager

Mark Hammer, Assistant Operations Manager

Kris Beatty, Special Waste Supervisor

Special Waste Technicians

Generator, hauler and other distribution

Toraj Ghofrani

King County Solid Waste Division

16645 - 228th Ave. SE
Maple Valley, WA 98038

Ross Fricke

Alder Tank Rentals

For more information or to request
this material in alternate formats contact:
King County Solid Waste Division
206-477-4466; 1-800-325-6165, ext. 7-4466
TTY Relay: 711

APPENDIX C

Report Limitations and Use Guidelines

REPORT LIMITATIONS AND USE GUIDELINES

Reliance Conditions for Third Parties

This report was prepared for the exclusive use of the Client. No other party may rely on this report or the product of our services without the express written consent of Aspect Consulting, LLC (Aspect). This limitation is to provide our firm with reasonable protection against liability claims by third parties with whom there would otherwise be no contractual conditions or limitations and guidelines governing their use of the report. Within the limitations of scope, schedule and budget, our services have been executed in accordance with Contract No. E00102E08 (Agreement) and recognized standards of professionals in the same locality and involving similar conditions.

Services for Specific Purposes, Persons and Projects

Aspect has performed the services in general accordance with the scope and limitations of our Agreement. This report has been prepared for the exclusive use of the Client and their authorized third parties, approved in writing by Aspect. This report is not intended for use by others, and the information contained herein is not applicable to other properties.

This report is not, and should not, be construed as a warranty or guarantee regarding the presence or absence of hazardous substances or petroleum products that may affect the Site. The report is not intended to make any representation concerning title or ownership to the Site. If real property records were reviewed, they were reviewed for the sole purpose of determining the Site's historical uses. All findings, conclusions, and recommendations stated in this report are based on the data and information provided to Aspect, current use of the Site, and observations and conditions that existed on the date and time of the report.

Aspect structures its services to meet the specific needs of our clients. Because each environmental study is unique, each environmental report is unique, prepared solely for the specific client and Site. This report should not be applied for any purpose or project except the purpose described in the Agreement.

This Report Is Project-Specific

Aspect considered a number of unique, project-specific factors when establishing the Scope of Work for this project and report. You should not rely on this report if it was:

- Not prepared for you
- Not prepared for the specific purpose identified in the Agreement
- Not prepared for the specific real property assessed
- Completed before important changes occurred concerning the Site, project or governmental regulatory actions

If changes are made to the project or Site after the date of this report, Aspect should be retained to assess the impact of the changes with respect to the conclusions contained in the report.

Geoscience Interpretations

The geoscience practices (geotechnical engineering, geology, and environmental science) require interpretation of spatial information that can make them less exact than other engineering and natural science disciplines. It is important to recognize this limitation in evaluating the content of the report. If you are unclear how these "Report Limitations and Use Guidelines" apply to your project or site, you should contact Aspect.

Discipline-Specific Reports Are Not Interchangeable

The equipment, techniques and personnel used to perform an environmental study differ significantly from those used to perform a geotechnical or geologic study and vice versa. For that reason, a geotechnical engineering or geologic report does not usually address any environmental findings, conclusions or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. Similarly, environmental reports are not used to address geotechnical or geologic concerns regarding the Site.

Environmental Regulations Are Not Static

Some hazardous substances or petroleum products may be present near the Site in quantities or under conditions that may have led, or may lead, to contamination of the Site, but are not included in current local, state or federal regulatory definitions of hazardous substances or petroleum products or do not otherwise present potential liability. Changes may occur in the standards for appropriate inquiry or regulatory definitions of hazardous substance and petroleum products; therefore, this report has a limited useful life.

Property Conditions Change Over Time

This report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time =, by events such as a change in property use or occupancy, or by natural events, such as floods, earthquakes, slope failure or groundwater fluctuations. If more than six months have passed since issuance of our report, or if any of the described events may have occurred following the issuance of the report, you should contact Aspect so that we may evaluate whether changed conditions affect the continued reliability or applicability of our conclusions and recommendations.

Historical Information Provided by Others

Aspect has relied upon information provided by others in our description of historical conditions and in our review of regulatory databases and files. The available data does not provide definitive information with regard to all past uses, operations or incidents affecting the Site or adjacent properties. Aspect makes no warranties or guarantees regarding the accuracy or completeness of information provided or compiled by others.