

May 19, 2021
File No. 04221030.05

Mr. Mohsen Kourehdar, P.E.
Washington State Department of Ecology
Southwest Regional Office
Toxics Cleanup Program
300 Desmond Drive
Lacey, Washington 98503

Subject: Work Plan for Groundwater and Landfill Gas Monitoring Network Modifications,
Closed Lechner Landfill, Clark County, Washington

Dear Mr. Kourehdar:

This letter presents a work plan to modify the groundwater and landfill gas (LFG) monitoring networks at the closed Lechner Landfill to accommodate the planned N.E. 99th Street extension project that will cross the northern portion of the site, including the North Detection Basin (Figure 1). The work will include (1) decommissioning and replacing (i.e., new well installations) of groundwater monitoring wells LB-9SR and LB-22S, (2) decommissioning of compliance landfill gas (LFG) monitoring probes GP-14R, GP-18S, GP-18D, GP-19S, GP-19D, and GP-31 and (3) installing two new LFG probes (GP-40 and GP-41) between the northern edge of the landfill and new road. SCS Engineers (SCS) in Portland, Oregon, prepared this work plan on behalf of and with approval from Clark County (County).

The rationale for decommissioning the above list of LFG probes and two monitoring wells are as follows:

- The street extension will include substantial changes in the ground surface in and around monitoring well LB-22S. Rather than risk damaging the well and the costly extension of the well during construction, it will be decommissioned just prior to construction and then a new well installed after road construction activities are completed in this area.
- Monitoring well LB-9SR will be in the way for the changes planned for the intersection of NE 99th and NE 94th Avenue so this well will be decommissioned and replaced after road construction activities are completed in this area.
- LFG probes GP-14R, GP-18S, GP-18D, GP-19S, GP-19D and GP-31 are within the cut and fill zone and/or the work zone next to the street extension so will necessitate decommissioning. Methane has not been detected in any of these six LFG probes throughout their monitoring histories. Two new LFG monitoring probes will be installed and incorporated into the compliance LFG monitoring network after road construction activities are completed in the North Detention Pond area.

The location of the existing groundwater monitoring wells and LFG probes to be decommissioned, along with the proposed locations of the replacement monitoring wells (LB-9RS2 and LB-22R) and two new LFG probes are shown in Figure 1.



FIELDWORK ACTIVITIES

Decommissioning and replacement activities will be performed in accordance with Washington Administrative Code (WAC) regulation 173-160, Part 2 (General Requirements for Resource Protection Well Construction and Geotechnical Soil Borings). A licensed drilling contractor will decommission the wells. A hollow-stem auger drill rig will be used to do this work, with all augers and drilling equipment that goes into the boring decontaminated between borings. The following sections describe the proposed fieldwork methods and procedures.

UTILITY CLEARANCE

Before field activities are performed, SCS will arrange for public utility notification using the Washington utility notification center, as well as a private utility locating contractor, to provide utility clearance in the vicinity of the monitoring wells and LFG probes.

TASK 1 -- MONITORING WELLS LB-22S AND LB-9SR DECOMMISSIONING AND REPLACEMENT

Monitoring well LB22S is a shallow, upgradient well that is not routinely sampled during semiannual monitoring events at the landfill.¹ The monitoring well was installed in 1990 and the total depth of the well is 40 feet below ground surface (bgs). Monitoring well LB-9SR is used for water level measurements only and is a shallow alluvial well installed originally in 1987 and replaced in 2001. The well was drilled to a total depth of 50 feet bgs. As indicated in the boring log/well construction details (provided in Attachment 1), the monitoring wells were constructed in accordance with WAC regulations.

Decommissioning

The details of the well construction for LB-22S are not included in the well log, including boring diameter. The well casing diameter noted in the field is a 2-inch diameter schedule 40 PVC. The well construction log for LB-9SR, indicates a 2-inch schedule 40 PVC well installed in an 8.75- inch diameter boring. Both wells will be over-drilled using a minimum of 8.75 inch outside diameter hollow stem augers.

Prior to the decommissioning, the wells will be measured to verify the total depth and depth to water in the well. The well will be decommissioned by first removing the above-ground well head materials (i.e., concrete surface pad, and any above-ground protective monuments or protective posts). An attempt will be made to pull out as much of the PVC well casing as possible before over-drilling the borehole to the total depth of backfill materials (estimated to be 40 or 50 feet). After reaching total depth, the borehole will be backfilled from the bottom up as the drill string is removed from the hole. The material used for backfilling will be hydrated bentonite chips. The surface will be covered with soil.

¹ It should be noted that groundwater samples were collected from monitoring well LB-22 in March 2021 to establish baseline groundwater quality conditions prior to the well being decommissioned.

Installation of Replacement Wells

Once phased road construction activities are complete in the area of the two monitoring wells, the County will install replacement wells as close to their original locations as feasible (Figure 1). Replacement well LB-22R will be installed with the screen set at the same elevations as the current well (176.8' to 166.8' above mean sea level). LB-9SR will be replaced with another well located just to the north of its current location, approximately 100 to 200 feet, depending on final construction elevations and site access (Figure 1). The well will be installed with a 15-foot well screen at approximately the same elevations as the current well (184.2' to 169.2' above mean sea level).

Replacement monitoring wells LB-22SR and LB-9SR2 will be constructed with 2-inch-diameter, Schedule 40, polyvinyl chloride (PVC), flush threaded solid and slotted (screened) casing; the casing sections will be connected with O ring fitted joints. The 10-foot-long or 15-foot long, screened casing will have 0.010-inch machine-cut slots and be installed at the bottom of the boring. The filter sand pack and bentonite chip seal will be constructed inside the hollow stem augers which will be incrementally withdrawn as the materials are placed in the annular space between the well casing and augers. The filter sand pack will be placed approximately 1 foot below and 2 feet above the top of the well screen. The driller will use a decontaminated surge block to surge the well to facilitate compaction of the sand pack. Additional sand will be added if needed to achieve the required depth. Bentonite chips, hydrated with water, will be placed above the filter pack material. An above-ground, lockable, steel protective monument will be secured with concrete over the well casing, and three steel protective posts will be installed around the monument.

Well Development

The wells will be allowed to stabilize for a minimum of 24 hours before they are developed. The monitoring wells will be developed using a decontaminated, polyethylene, submersible pump to alternately purge and surge each well. Field water-quality parameters (specific conductance, pH, temperature, and turbidity) will be measured and recorded on a well development field form after each casing volume is removed. The wells will be considered developed when (1) at least ten casing volumes of water have been removed, (2) the field parameters have stabilized to within 5 percent of the previous measurement for at least three successive measurements, and (3) the purged water is at or near sediment free conditions.

TASK 2 - COMPLIANCE LFG PROBES DECOMMISSIONING AND INSTALLATION

LFG probes to be decommissioned are listed in Table 1. Available information regarding the depth and screen interval are also listed with boring logs included as Attachment 2. Boring logs were not available for two of the six probe points so screen intervals for GP18D and GP-31 are not known. The LFG probes are all 3/4 inch PVC so they will be over-drilled with 4.25-inch augers. As indicated in the available boring logs (provided in Attachment 2), a bentonite seal was constructed on the four LFG probe points, and assumed on the other two, in accordance with WAC regulations.

Decommissioning

LFG probes are typically 3/4-inch PVC, backfilled and sealed in borings that are 6 to 25 feet deep (Table 1). Each probe will be checked with a tape to verify total depth of the hole before they are decommissioned. As with the monitoring well, the LFG probes will be decommissioned by removing

all above ground well head materials, removing the PVC well casing material, and then over-drilling to the total depth of the borehole. Each boring will be backfilled with the appropriate bentonite chips (hydrated with clean tap water) as the drill string is withdrawn from the boring. The surface will be covered with soil.

Installation of New LFG Probes

The County is proposing to install two new LFG probes (GP-40 and GP-41) in approximate locations as shown on the attached Figure 1. The probes will be installed following road construction in the general vicinity of the North Detention Pond. The final locations will be determined and submitted to Ecology following completion of road construction activities in this area.

The probes will be constructed with 1-inch diameter, Schedule 40, PVC, flush thread solid and slotted (screened) casing connected with O-ring fitted joints. The screen casing will have 0.020-inch machine-cut slots and be installed from approximately 5 to 15 feet bgs. Solid casings will extend from 5 feet bgs to approximately 3 feet above ground surface. The annular gravel pack will be placed from the bottom of the screen to one-foot above the top of the screen through the hollow stem augers or Geoprobe rods used to advance the borehole, as the drilling equipment is incrementally withdrawn from the borehole. The annular space above the pea gravel (from 2 to 4 feet bgs) will be sealed with bentonite chips hydrated with clean tap water. The probes will be capped at the top with a ½ inch ball valve. An above ground lockable steel protective casing will be secured with concrete over the probe casings, and three steel protective posts (bollards) will be installed around each of the protective steel casings.

Final depths for the LFG screened intervals will be determined after construction is complete and final ground elevations are known. Screened intervals and LFG locations will be submitted to Ecology prior to installation for approval.

Monitoring Point Surveying

The two replacement monitoring wells and two new LFG probes will be surveyed by a Washington-registered professional land surveyor. Horizontal coordinates and elevations will be surveyed relative to and consistent with other survey data for the site. The ground surface and top of casing elevations will be surveyed to an accuracy of 0.01 foot.

SCHEDULE AND REPORTING

The well decommissioning work will be scheduled following approval of this work plan by the Washington Department of Ecology (Ecology) and before road construction is scheduled to begin, minimizing the time when LFG and groundwater measurements are not collected in this area. Currently construction is scheduled to start in the first quarter of 2022. As such, the decommissioning will likely occur before the end of 2021.

Monitoring well and LFG probe replacements will not be completed until after phased road construction activities are completed in each area. The County will notify Ecology of the well and LFG probe decommissioning and installation schedules and submit final location and well specifications based on the final grades at the site, if modified.

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Within 45 days after the monitoring wells and LFG probes are decommissioning and new wells and probes are installed, a report will be submitted to Ecology documenting the work. The report will describe the field methods and procedures, a site map showing monitoring locations, boring logs and well/probes construction details, and copies of the driller's reports submitted to Ecology.

Sincerely,

SCS ENGINEERS



Barbara E. Lary, LG
Project Manager

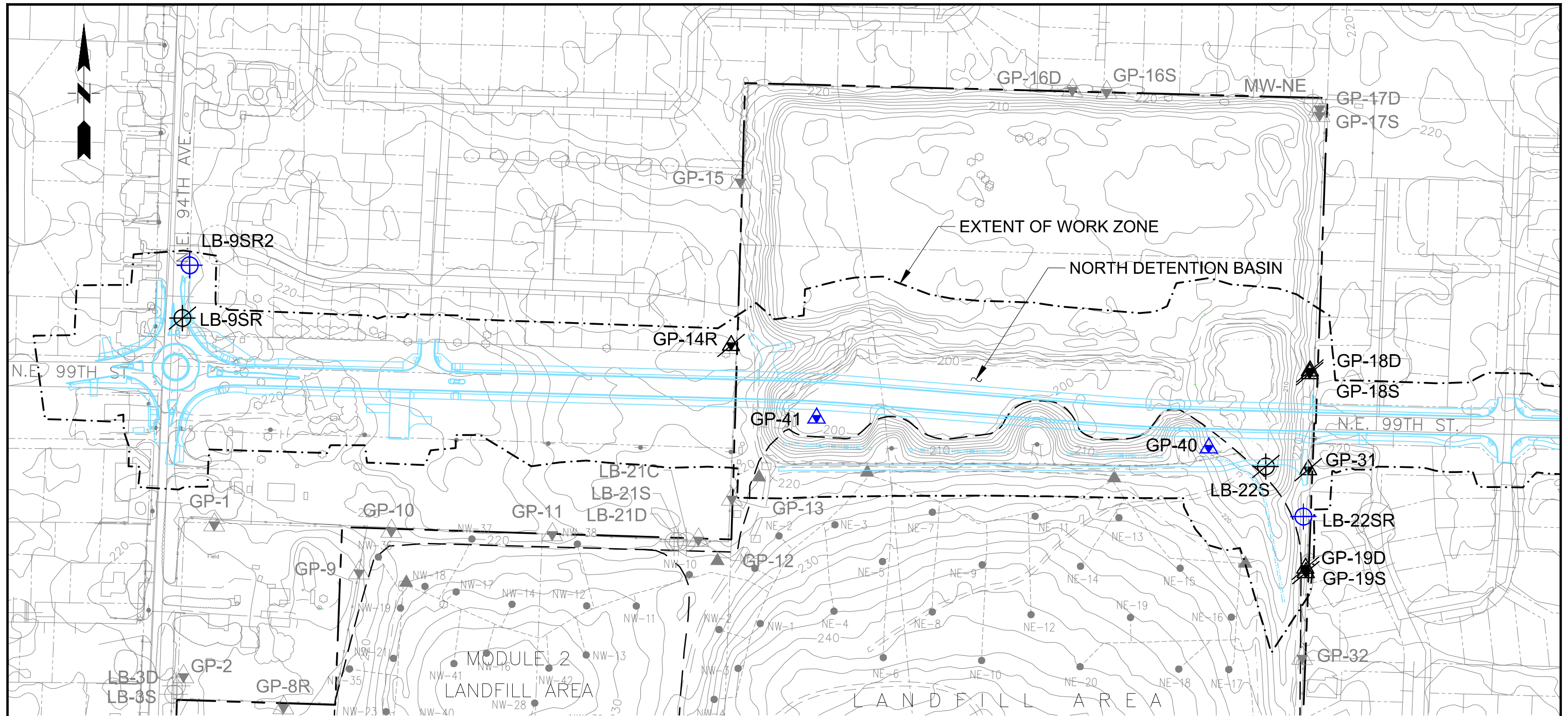


Louis Caruso, LG, LHG
Project Director

BEL/JC

cc: Mike Davis, CCPH
Alan Melnick, Travis Dutton, Melissa Sutton, CCPH
Brian Carlson, City of Vancouver
Scott Fakler, Clark County Public Works
Jennifer Belknap-Williamson, City of Vancouver

Attachments: Figure 1 - Site Plan NE 99th Street Extension
Table 1 - Landfill Gas Probe Construction Information
Attachment 1 - Monitoring Well and LFG Probe Boring Logs/Construction Details



LEGEND			
LB-22S	Proposed for Decommissioning Groundwater Monitoring Well Location		Property Boundary
GP-31	Proposed for Decommissioning Landfill Gas Monitoring Probe Location		Limit of Landfill Cover and Approximate Edge of Waste
LB-22S	Proposed Replacement Groundwater Monitoring Well Location		Extent of Work Zone
GP-31	Proposed Replacement Landfill Gas Monitoring Probe Location		

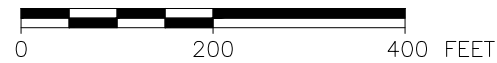
SCS ENGINEERS

Environmental Consultants and Contractors
 15940 S.W. 72nd Avenue
 Portland, Oregon 97224
 (503) 639-9201 FAX: (503) 684-6948

NOTES:

1. Topography taken from Clark County GIS, December 2008.

SCALE



PROJECT NO.	04221030.05	DES BY	B.L.
SCALE	AS SHOWN	CHK BY	D.L.
CAD FILE	FIGURE 2	APP BY	L.C.

SITE PLAN
99TH STREET EXTENSION
 LEICHER LANDFILL
 VANCOUVER, WASHINGTON

DATE
MAY 2021

FIGURE
1

Table 1
LFG Probe Construction Information
Leichner Landfill

LFG ID	Year Installed	Total Depth (feet bgs)	Well Casing Diameter (inches)	Boring Diameter (inches)	Screen Interval (feet bgs)	Seal	Notes
GP-14R	2001	25	0.75	8.75	9.9-24.9	1 to 8 feet bgs (bentonite grout over 3 feet of chips)	
GP18S	2000	12	0.75	7	5-10	Bentonite chips from 1 to 4 feet	
GP-18D	1992?	13	0.75	unknown	unknown	unknown	No log available
GP-19S	2000	17	0.75	7	5-15	Bentonite chips from 1 to 4 feet	
GP-19D	1992	20	0.75	unknown	17-18	Sealed with bentonite 6 to 10 feet bgs and soil surface to 6 feet.	Boring diameter not indicated on log.
GP-31	unknown	6.3	0.75	unknown	unknown	unknown	No log available.

*All LFG probes installed with above ground monuments

ATTACHMENT 1

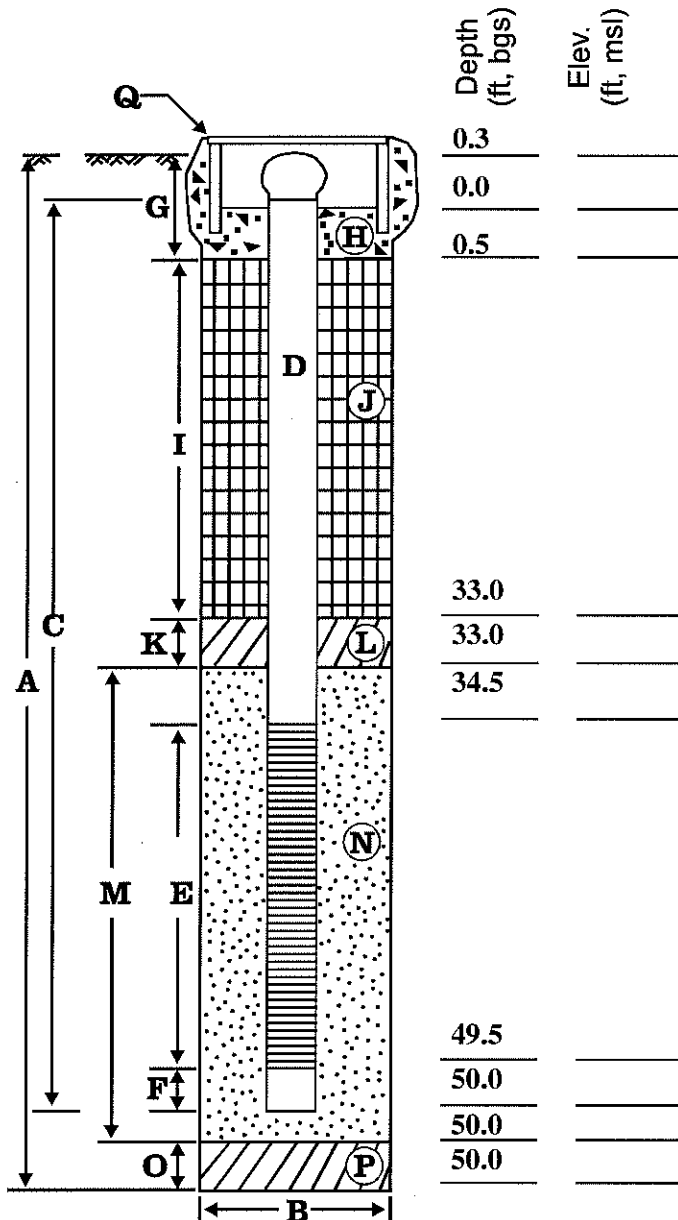
**MONITORING WELL AND LFG PROBE BORING LOGS WITH
CONSTRUCTION DETAILS**



WELL DETAILS

Project Number: 822353
 Client Name: Leichner Brothers Land Reclamation Corp.
 Project Name: Leichner Landfill
 Location: Vanvouver
 Driller: Cascade Drilling

Boring/Well No.: LB-9SR
 Top of Casing Elev.: Not Surveyed
 Ground Surface Elev.: _____
 Installation Date: 9/6/01
 Permit/Start Card No.: _____



EXPLORATORY BORING

A. Total depth: 50 ft.
 B. Diameter: 8.75 in.
 Drilling method: Hollow Stem Auger

WELL CONSTRUCTION

C. Well casing length: 50 ft.
 Well casing material: Sched 40 PVC
 D. Well casing diameter: 2 in.
 E. Well screen length: 15 ft.
 Well screen type: machine slot
 Well screen slot size: 0.010 in.
 F. Well sump/end cap length: 0.5 ft.
 G. Surface seal thickness: 0.5 ft.
 H. Surface seal material: concrete
 I. Annular seal thickness: 32.5 ft.
 J. Annular seal material: bentonite chips
 K. Filter pack seal thickness: NA ft.
 L. Filter pack seal material: NA
 M. Sand pack thickness: 17 ft.
 N. Sand pack material: 10x20 Silica Sand
 O. Bottom material thickness: NA ft.
 P. Bottom material: NA
 Q. Vault box type: 8 inch flush
 Well centralizer depths: NA ft.

NOTES:

LB-9S(R) was installed as a replacement to LB-9S.
 LB-9S was decommissioned on 9/5/01.

Installed by: J. Renda
 Reviewed by: [Signature]
 Date: 11/7/01

LOG OF EXPLORATORY BORING

PROJECT NAME Lechner Brothers Landfill
 LOCATION Vancouver, WA
 DRILLED BY Hokkaido Drilling
 DRILL METHOD H.S. Auger
 LOGGED BY R. Fredricksen

BORING NO. LB-22S
 PAGE 1 OF 2
 REFERENCE ELEV. 206.80'
 TOTAL DEPTH 40.00'
 DATE COMPLETED 9/24/90

SAMPLE NUMBER	RECOVERY PERCENT	BLOW COUNTS (N COMP)	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
S-1 (S)	67	3-19-23 (35)		5	1			0-7.5' GRAVELLY SAND (SW-SM), brown, medium to coarse grained, some silt and gravel (subrounded to 0.75-inch, medium dense, dry, some iron stained grains, roots present. (ALLUVIUM)
S-2 (S)	67	5-7-15 (22)		10	2			7.5-23.7 SAND (SP), gray brown, coarse to medium grained, trace silt, loose to medium dense, moist-wet @ 10 ft., massive. (ALLUVIUM)
S-3 (S)	100	7-15-15 (30)	10.4 11/8/90	15	3			@ 7.5' Interbed of greenish-gray SILTY SAND (SP), fine to medium grained, soft, moist. @ 12.5' Interbed of brown SILTY SAND (SP), medium grained, firm, wet.
S-4 (S)	100	4-3-4 (7)		20	4			
S-5 (S)	33	8-5-6 (11)		25	5			
S-6 (S)	100	6-24-37 (61)		30	6			23.7-40' GRAVELLY SAND (SW-SM), brown, medium to coarse grained, some gravels (subrounded to 1.25-inch, various lithologies), medium dense, wet, interbedded lenses of fine silty sand. (ALLUVIUM)

REMARKS

(S) = Split Spoon sampler; samples were driven with 140 lb. hammer utilizing a 30" stroke. Added approximately 100 gallons of water; vegetable oil used as thread lube for auger. Total well assembly 42' with 2' above ground.



LOG OF EXPLORATORY BORING

PROJECT NAME Lechner Brothers Landfill
LOCATION Vancouver, WA
DRILLED BY Hokkaido Drilling
DRILL METHOD H.S. Auger
LOGGED BY R. Fredricksen

BORING NO. LB-22S
PAGE 2 OF 2
REFERENCE ELEV. 206.80'
TOTAL DEPTH 40.00'
DATE COMPLETED 9/24/90

SAMPLE NUMBER	RECOVERY PERCENT	BLOW COUNTS (N COMP)	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
S-7 (S)	100	2-3-3 (6)		35	1			23.7-40' GRAVELLY SAND (SW-SM), continued from previous page.
S-8 (S)	100	5-5-7 (12)		40	1			
				45				Bottom of hole and total depth at 40 feet.
				50				
				55				
				60				

REMARKS

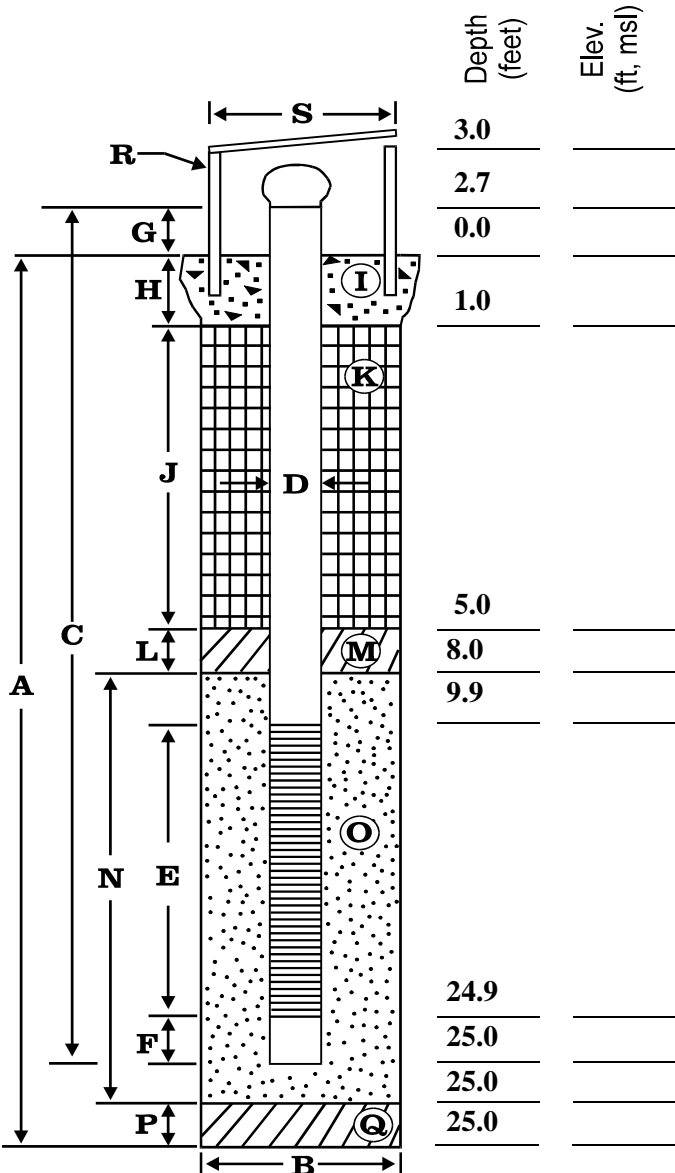
(S) = Split Spoon sampler; samples were driven with 140 lb. hammer utilizing a 30" stroke. Added approximately 100 gallons of water; vegetable oil used as thread lube for auger. Total well assembly 42' with 2' above ground.



WELL DETAILS

Project Number: 822353
 Client Name: Leichner Brothers Land Reclamation Corp.
 Project Name: Leichner Landfill
 Location: Vancouver
 Driller: Cascade Drilling

Boring/Well No.: GP-14R
 Top of Casing Elev.: _____
 Ground Surface Elev.: _____
 Installation Date: 9/6/01
 Permit/Start Card No.: _____



EXPLORATORY BORING

A. Total depth: 25 ft.
 B. Diameter: 8.75 in.
 Drilling method: Hollow Stem Auger

WELL CONSTRUCTION

C. Well casing length: 27.7 ft.
 Well casing material: Schedule 40 PVC
 D. Well casing diameter: 0.75 in.
 E. Well screen length: 15 ft.
 Well screen type: machine slot
 Well screen slot size: 0.010 in.
 F. Well sump/end cap length: 0.1 ft.
 G. Well casing height (stickup): 2.7 ft.
 H. Surface seal thickness: 1.0 ft.
 I. Surface seal material: Concrete
 J. Annular seal thickness: 4.0 ft.
 K. Annular seal material: benonite grout
 L. Filter pack seal thickness: 3.0 ft.
 M. Filter pack seal material: benonite chips
 N. Sand pack thickness: 17.0 ft.
 O. Sand pack material: 6x9 Silica Sand
 P. Bottom material thickness: NA ft.
 Q. Bottom material: NA
 R. Protective casing material: Steel
 S. Protective casing diameter: 6.0 in.

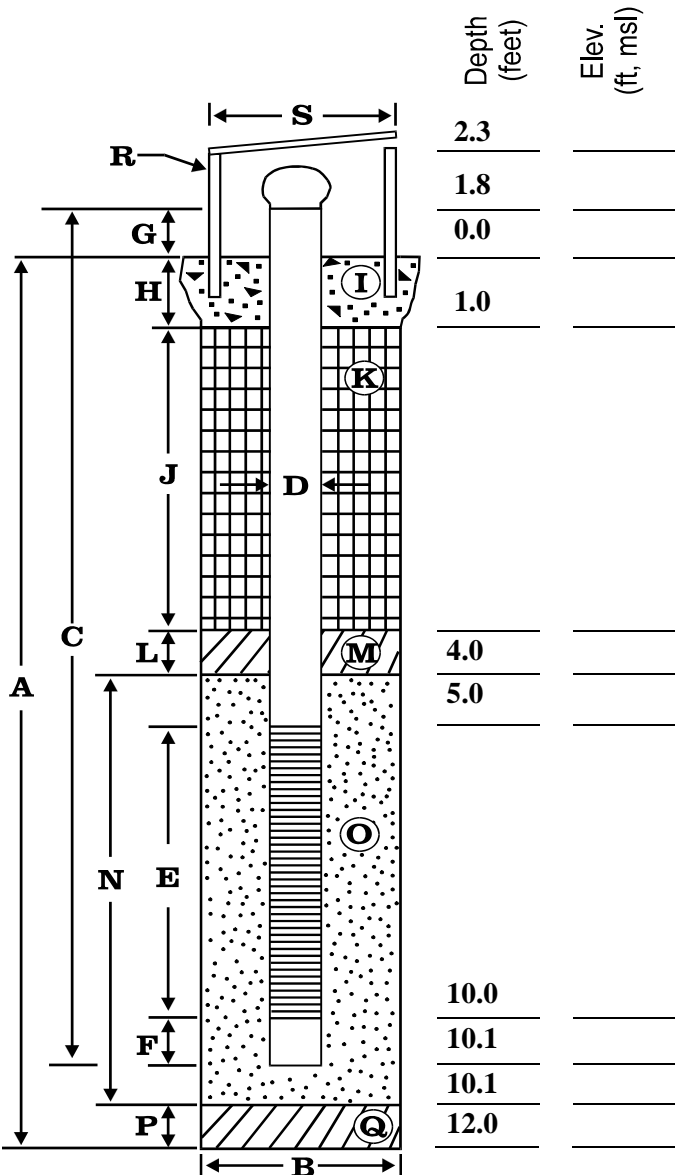
NOTES:

Installed by: J. Renda
 Reviewed by: _____
 Date: _____

WELL DETAILS

Project Number: 807349
 Client Name: Leichner Bros Land Reclamation
 Project Name: Leichner Landfill
 Location: Vancouver, Washington
 Driller: Cascade Drilling

Boring/Well No.: GP-18S
 Top of Casing Elev.: _____
 Ground Surface Elev.: _____
 Installation Date: 4/20/00
 Permit/Start Card No.: R48367



EXPLORATORY BORING

A. Total depth: 12 ft.
 B. Diameter 7 in.
 Drilling method: HSA

WELL CONSTRUCTION

C. Well casing length: 11.9 ft.
 Well casing material: PVC
 D. Well casing diameter: 3/4 in.
 E. Well screen length: 5 ft.
 Well screen type: machine slot
 Well screen slot size: 0.010 in.
 F. Well sump/end cap length: 0.1 ft.
 G. Well casing height (stickup): 1.5 ft.
 H. Surface seal thickness: 1.0 ft.
 I. Surface seal material: Concrete
 J. Annular seal thickness: 3.0 ft.
 K. Annular seal material: Bentonite Chips
 L. Filter pack seal thickness: NA ft.
 M. Filter pack seal material: NA
 N. Sand pack thickness: 6.1 ft.
 O. Sand pack material: 6x9 Silica Sand
 P. Bottom material thickness: 1.9 ft.
 Q. Bottom material: 6x9 Silica Sand
 R. Protective casing material: Steel
 S. Protective casing diameter: 4.0 in.

NOTES:

0 to 1 feet: Grass, roots, topsoil
1 to 4 feet: Silty Sand (SM); brown; 70% fine to medium sand, subangular to subrounded; 30% nonplastic fines; moist. (Alluvium)
4 to 12 feet: Sand (SP); brown; fine to medium sand, subangular to subrounded, moist. (Alluvium).
GP-18 renamed GP-18D. GP-18S installed 5.5 feet south of GP-18D.

Installed by: J. Renda

Reviewed by: _____

Date: _____



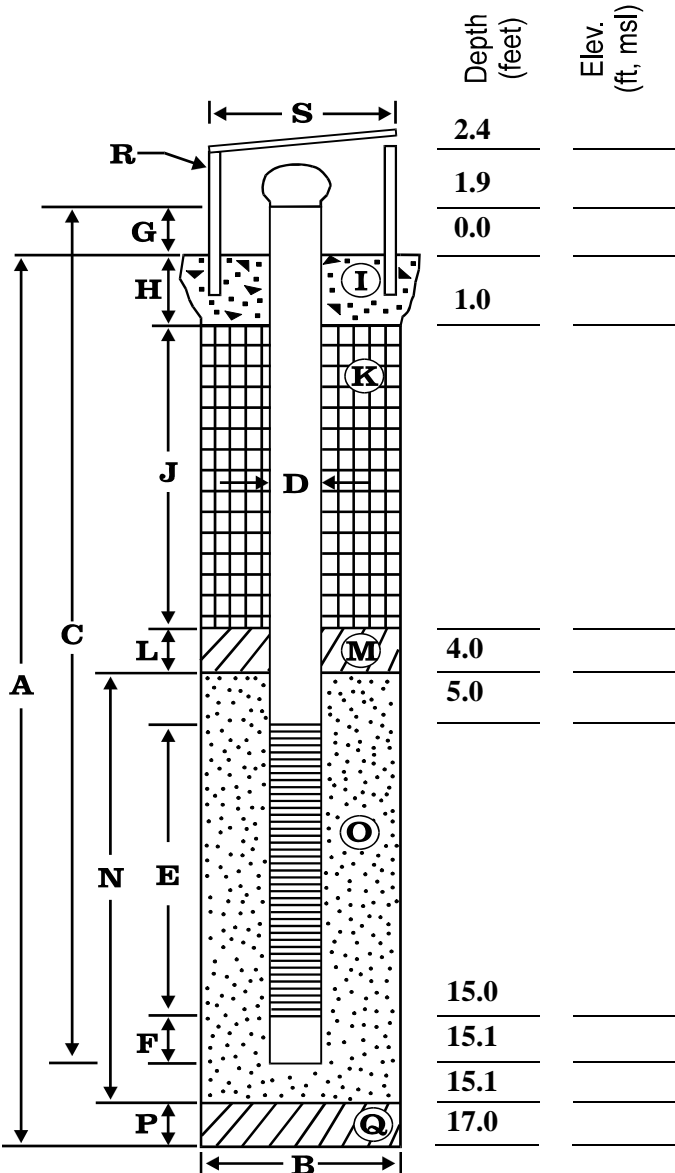
PROJECT NAME LEICHTNER SOUTH LFG SYSTEM CONSTRUCTION
 PROJECT NUMBER S 82-01.43 BORING NUMBER GP-19
 DATE OF BORING 7-27-92
 GROUND ELEVATION AT BORING WHEN DRILLED 225

DEPTH, FEET	SAMPLE DATA			▲ STANDARD PENETRATION RESISTANCE, N. BLOWS/FOOT ● WATER CONTENT, %	WATER TABLE	SOIL AND ROCK DESCRIPTION AND COMMENTS
	NUMBER	LOCATION	CLASS SYMBOL			
0				0		GAS PROBE CONSTRUCTION
5						SOIL BACKFILL, 0'-6'
10						BENTONITE, 6'-10'
15						GRAVEL, 10'-20'
20						PROBE TIP AT 18'
25						
30						

WELL DETAILS

Project Number: 807349
 Client Name: Leichner Bros Land Reclamation
 Project Name: Leichner Landfill
 Location: Vancouver, Washington
 Driller: Cascade Drilling

Boring/Well No.: GP-19S
 Top of Casing Elev.: _____
 Ground Surface Elev.: _____
 Installation Date: 4/20/00
 Permit/Start Card No.: R48367



EXPLORATORY BORING

A. Total depth: 17 ft.
 B. Diameter 7 in.
 Drilling method: HSA

WELL CONSTRUCTION

C. Well casing length: 17.0 ft.
 Well casing material: PVC
 D. Well casing diameter: 3/4 in.
 E. Well screen length: 5 ft.
 Well screen type: machine slot
 Well screen slot size: 0.010 in.
 F. Well sump/end cap length: 0.1 ft.
 G. Well casing height (stickup): 1.5 ft.
 H. Surface seal thickness: 1.0 ft.
 I. Surface seal material: Concrete
 J. Annular seal thickness: 3.0 ft.
 K. Annular seal material: Bentonite Chips
 L. Filter pack seal thickness: NA ft.
 M. Filter pack seal material: NA
 N. Sand pack thickness: 11.1 ft.
 O. Sand pack material: 6x9 Silica Sand
 P. Bottom material thickness: 1.9 ft.
 Q. Bottom material: 6x9 Silica Sand
 R. Protective casing material: Steel
 S. Protective casing diameter: 4.0 in.

NOTES:

0 to 1 feet: Grass, roots, topsoil
1 to 5 feet: Silty Sand (SM); brown; 70% fine to medium sand, subangular to subrounded; 30% nonplastic fines; moist. (Alluvium)
5 to 17 feet: Sand (SP); brown; fine to medium sand, subangular to subrounded, trace gravel, moist. (Alluvium).
GP-19 renamed GP-19D. GP-19S installed 7.5 feet south of GP-19D.

Installed by: J. Renda

Reviewed by: _____

Date: _____