

# King County Department of Natural Resources and Parks Solid Waste Division

ENVIRONMENTAL INVESTIGATIONS, MONITORING, AND  
REMEDIAL SERVICES FOR CLOSED LANDFILLS

CONTRACT No. E00102E08

TASK No. 310.1.7.5

## **TECHNICAL MEMORANDUM PERIMETER PROBE INVESTIGATION AND MONITORING— VASHON LANDFILL**

**Prepared by**

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**King County**

Department of  
Natural Resources and Parks  
**Solid Waste Division**

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February 2, 2016

**Note:**

Some pages in this document have been purposely skipped or blank pages inserted so that this document will copy correctly when duplexed.

# TECHNICAL MEMORANDUM PERIMETER PROBE INVESTIGATION AND MONITORING

## VASHON LANDFILL

Prepared for



**King County**

Department of Natural Resources and Parks  
Solid Waste Division  
201 South Jackson Street, Room 701  
Seattle, Washington 98104

by

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February 2, 2016





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## TABLE OF CONTENTS

List of Figures .....	i
List of Tables .....	i
1.0 Introduction.....	1
2.0 Background .....	1
3.0 Field Investigation.....	2
4.0 Results.....	2
5.0 Recommendations.....	3

## LIST OF FIGURES

Figure 1. Gas Clam Data Plot. ....	11
Figure 2. Barometric Pressure Plot. ....	12
Figure 3. Perimeter LFG Probe Location Map. ....	13
Figure 4. Proposed Temporary Probe Location Map. ....	15

## LIST OF TABLES

Table 1. Summary of Probe and Monitoring Well Water Level Measurements and Construction Details. .	5
Table 2. Summary of Landfill Gas Monitoring Results. ....	7

## LIST OF APPENDICES

Appendix A	Daily Field Reports
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## 1.0 INTRODUCTION

Herrera Environmental Consultants (Herrera) has prepared this Technical Memorandum for King County Solid Waste Division (KCSWD) under Contract Number: E00102E08 for Environmental Investigations Monitoring, and Remediation Services for Closed Landfills. The Technical Memorandum addresses Perimeter Probe Investigation and Monitoring at Vashon Landfill under Task 310.1.7.5, based on the Work Plan completed by Herrera on November 19, 2015.

## 2.0 BACKGROUND

A review of recent landfill gas (LFG) system monitoring results at Vashon Landfill indicated:

- No methane detected in lateral EF-1 during 9 of 12 monthly monitoring events (June 2014 to June 2015), with concentrations of 6.5, 10.1, and 1.2 percent methane detected November 2014, December 2014, and January 2015, respectively.
- Methane concentrations ranged from 0 to 3.1 percent and from 0 to 0.9 percent in laterals EF-2 and EF-3, respectively, in the same period (June 2014 through June 2015)
- The valve at lateral T-2 remained closed during this past year and no methane was detected when monitored
- Methane concentrations greater than 50 percent have been measured in south slope probe VTP2D, periodically from September 18 to October 5, 2015 (Figure 1).

In addition, no methane was detected in T-2 during March and April 2013, when Herrera and King County monitored the extraction system with the valves fully closed, partially opened, and fully opened.

Blockages within laterals EF-1, EF-2, EF-3, and T-2 were originally thought to have resulted in this low to no LFG found over the last couple of years of monitoring. A camera survey, conducted in June 2015, indicated no blockages in any of the laterals; however, some fine-grained material was identified both within a small portion of the EF-1 lateral pipe itself, which was removed during cleaning as well as in bedding material exposed during pipe excavation. Based on limited observations, it appears that this fine-grain material may exist along the entire lateral lengths, limiting LFG flow into the pipes. It was also determined that laterals EF-1, EF-2, and EF-3 are all connected to each other.

The present configuration of the LFG collection system at the south end of the landfill, including lateral EF-1 is not able to collect methane from the vicinity of VTP2D. Additional infrastructure is needed south of EF-1 to effectively collect LFG that is contributing to groundwater contamination.

Herrera's scope of work for Task 310.1.6.4 currently includes influence testing to determine lateral effectiveness in drawing LFG from surrounding formations and to evaluate potential LFG migration/interconnection within the gravel blanket.

### 3.0 FIELD INVESTIGATION

Herrera conducted a field investigation of existing perimeter probes on December 1, 2, and 3, 2015, during a downward trending period of barometric pressure (Figure 2). Daily field reports are provided in Appendix A. In general, the barometric pressure trend was downward, although pressure stagnated during the first 2 days, then decreased the third day of monitoring. Figure 2 provides locations of NP-1 through NP-8 (NP probes each include three nested probes); GP-1; GP-2; and three temporary probes VTP1S, VTP2S, and VTP2D. LFG measurements also were taken from monitoring wells MW-21 and MW-35.

The field investigation included:

- Measured total depth (and water levels, if present) in 28 perimeter probes and three temporary probes and compared to conditions identified in probe construction logs to determine whether screens were blocked blockages exist and compare to conditions identified in probe construction logs
- Measured water levels in monitoring wells MW-21 and MW-35 to compare with well construction logs to verify that there is an unsaturated screen section
- Monitored LFG concentrations at all probe and monitoring well locations using purge times evacuating a minimum of one probe/well volume at each location while recording gas measurements.

The LFG monitoring procedures provided in the November 2015 Work Plan – Perimeter Probe Investigation and Monitoring – Vashon Landfill were followed during this investigation.

### 4.0 RESULTS

Table 1 provides a summary of water level measurements and construction details for the probes and monitoring wells. Standing water was detected in many of the shallow probes, but the water level extended above the screened zone only at VTP1S. Approximately 0.5 to 1.5 gallons of water were purged from probes NP1S, NP2S, NP3S, NP6S, NP8S, VTP1S, VTP2S, and VTP2D2 prior to monitoring. Despite purging water from VTP1S on December 1, prior to monitoring, the water level extended above the screen when re-monitored on December 3 and purging was required again prior to monitoring.

The total measured well depth was greater than the total depth reported on construction logs in 14 probes. The discrepancy ranged from 0.2 to 5.4 feet; however, it appears that probes 8S, 8I, and 8D were altered from aboveground to belowground completions. The discrepancy in those probes ranged from 4.5 to 5.4 feet. The discrepancy in the remaining 11 probes ranged from 0.2 to 1.6 feet, which could be attributed to the sump installed at the bottom of each probe.

At MW-35, a transducer and submersible pump are installed with cable and tubing to a depth of over 100 feet, preventing water level measurement. Holes in the well cap are used to suspend the cable



prevented a good seal for LFG monitoring. Note: the well is 4 inches in diameter, not 2 inches, as reported, which would affect the purge time needed if one full volume is required prior to monitoring.

Table 2 provides a summary of LFG monitoring results. Methane was detected only at probe VTP2D, with a concentration of 10.1 percent by volume on December 1 and 29.5 percent on December 3. Hydrogen sulfide was only detected at VTP2D, with a concentration of 10 parts per million (ppm) on December 3 (it was not detected December 1). Probe VTP2D is located approximately 150 feet south of the southern limit of the lined refuse area (Figure 3). Figure 4 defines an area where refuse is potentially in direct contact with a transmissive upper sand unit, situated beneath less permeable glacial till. Refuse reportedly extends approximately 360 feet beyond the southern limit of lined refuse, provided in the March 2006 Vashon Island Closed Landfill Environmental Evaluation. Approximately 5.5 feet of refuse was observed in probe VTP2D at depths ranging from 19.5 to 25 feet below ground surface (bgs), the probe did not extend to the bottom of the refuse. Approximately 70 feet west-southwest, refuse was encountered in well MW-33 at a depth of 12 to 28 feet bgs and thickness of 16 feet.

An attempt was made to measure LFG at MW-35, but holes in the well cap could not be sealed. With a well diameter of 4 inches, it would take approximately 1 hour to purge one pore volume. The well was purged for approximately 3 minutes at a rate of approximately 5,000 milliliters per minute, but no methane was detected.

## 5.0 RECOMMENDATIONS

Herrera offers the following recommendations:

- Based on the presence of methane concentrations ranging from 0 to 55.1, percent by volume in probe VTP2D, installation of one extraction well located between EF-1 and VTP2D, and four temporary gas probes is recommended. The temporary gas probes will be paired at the two locations shown on Figure 4; a shallow probe will be screened in the refuse; and a deeper probe will be screened in the soil beneath the refuse. The well and probes will be used to characterize the extent and thickness of refuse, the presence of methane and to conduct influence testing (Figure 4).
- Temporary probe VTP1S should be abandoned. Methane has never been detected in the probe, it is screened in glacial till, offering limited radial influence, and it usually requires purging to remove water that extends above the screened zone. A deeper replacement probe should be installed to determine if LFG has migrated beyond the landfill boundary caused by refuse in direct contact with Unit B (Qva) soils beneath the landfill.
- Well MW-35 should be monitored for LFG. Monitoring would be performed by installing a drop tube to the screen zone. This well is screened in the Cc2 permeable sand unit, located below the screened zones of the deep perimeter probes. The presence of LFG at this depth could contribute to groundwater contamination.

- 
- Influence testing will be conducted by inducing a low vacuum in the proposed extraction well and monitoring the two existing temporary probes, VTP2S, VTP2D, the condensate trap, and the four proposed probes to the east and west of the extraction well.

**Table 1. Summary of Probe and Monitoring Well Water Level Measurements and Construction Details.**

Monitoring Location	Measurement Date	Static Water Level (feet below TOC)	Measured Total Depth (feet below TOC)	Construction Log Well Depth (feet below TOC)	Screen Setting (feet below TOC) <sup>a</sup>	Screen Length (feet)	Unsaturated Screen	Well Stickup (feet) <sup>b</sup>
NP1S	12/1/2015	20.52	24.6 <sup>c</sup>	24.1	14.1–24.1	10	6.4 <sup>d</sup>	2.1
NP1I	12/1/2015	Dry	45.8	49.8	39.8–49.8	10	6.0	1.8
NP1D	12/1/2015	Dry	106.9 <sup>c</sup>	106.0	91.5–106.0	14.5	14.5	1.5
NP2S	12/1/2015	21.37	23.7	24.0	14.0–24.0	10	7.4 <sup>d</sup>	2.0
NP2I	12/1/2015	58.72	58.9 <sup>c</sup>	58.6	48.6–58.6	10	10	1.6
NP2D	12/1/2015	Dry	95.8	96.2	81.2–96.2	15	14.6	1.2
NP3S	12/1/2015	14.78	21.7	23.9	13.9–23.9	10	0.9 <sup>d</sup>	1.9
NP3I	12/1/2015	Dry	45.2	45.6	35.6–45.6	10	9.6	1.6
NP3D	12/1/2015	NA	NA	93.2	83.2–93.2	10	NA	1.2
NP4S	12/2/2015	24.05	24.3 <sup>c</sup>	24.0	14.0–24.0	10	10	2.0
NP4I	12/2/2015	Dry	44.2 <sup>c</sup>	43.6	33.6–43.6	10	10	1.6
NP4D	12/2/2015	NA	NA	91.3	76.3–91.3	15	NA	1.3
NP5S	12/2/2015	22.14	22.3 <sup>c</sup>	22.1	12.1–22.1	10	10	2.1
NP5I	12/2/2015	Dry	42.6 <sup>c</sup>	41.7	31.7–41.7	10	10	1.7
NP5D	12/2/2015	NA	NA	81.4	66.4–81.4	15	NA	1.4
NP6S	12/1/2015	14.95	23.7 <sup>c</sup>	23.4	13.4–23.4	10	1.6 <sup>d</sup>	1.4
NP6I	12/1/2015	Dry	46.0	46.0	36.0–46.0	10	10	1.0
NP6D	12/1/2015	NA	NA	105.7	90.7–105.7	15	NA	0.7
NP7S	12/2/2015	23.30	23.9 <sup>c</sup>	23.5	13.5–23.5	10	9.8	1.5
NP7I	12/2/2015	50.95	51.2 <sup>c</sup>	51.8	40.8–50.8	10	10	1.8
NP7D	12/2/2015	Dry	102.8 <sup>c</sup>	102.2	88.2–101.2	13	13	2.2

**Table 1 (continued). Summary of Probe and Monitoring Well Water Level Measurements and Construction Details.**

Monitoring Location	Measurement Date	Static Water Level (feet below TOC)	Measured Total Depth (feet below TOC)	Construction Log Well Depth (feet below TOC)	Screen Setting (feet below TOC) <sup>a</sup>	Screen Length (feet)	Unsaturated Screen	Well Stickup (feet) <sup>b</sup>
NP8S	12/2/2015	18.48	25.5 <sup>c</sup>	21.0	11.0–21.0	10	7.5 <sup>d</sup>	-1.0
NP8I	12/2/2015	Dry	62.7 <sup>c</sup>	58.2	48.2–58.2	10	10	-0.8
NP8D	12/2/2015	Dry	113.4 <sup>c</sup>	108.8	93.8–108.8	15	15	-1.2
GP-1	12/2/2015	Dry	31.2	31.6	21.6–31.6	10	9.6	1.6
GP-2	12/2/2015	Dry	31.4	31.7	26.7–31.7	5	4.7	1.7
VTP1S	12/1/2015	13.88	17.4	17.7	15.2–17.7	2.5	-1.3 <sup>d</sup>	2.7
VTP2S	12/1/2015	8.60	9.9	10.0	7.5–10.0	2.5	1.1 <sup>d</sup>	3.0
VTP2D	12/1/2015	26.33	27.40	27.5	25.0–27.5	2.5	1.3	3.5
MW-21	12/2/2015	106.85	NM	111.9	93.4–111.9	18.5	13.5	1.9
MW-35 <sup>e</sup>	12/3/15	NM	NM	124.8	114.5–124.5	10	NM	NM

<sup>a</sup> Screen settings based on construction logs.

<sup>b</sup> Well stickup relative to ground surface.

<sup>c</sup> Measured total well depth greater than total depth reported on construction log.

<sup>d</sup> Perched groundwater pumped from probe prior to monitoring.

<sup>e</sup> 4-inch-diameter well. Unable to remove dedicated submersible pump and transducer.

NA – not accessible.

NM – not measured.

**Table 2. Summary of Landfill Gas Monitoring Results.**

Monitoring Location	Date	Time	Barometric Pressure (inches Hg)	Well Head Pressure (inches H <sub>2</sub> O)	Methane (percent volume)	Carbon Dioxide (percent volume)	Oxygen (percent volume)	Hydrogen Sulfide (ppm)
NP1S	12/1/2015	12:20	29.65	0.50	0.0	2.8	17.0	0
NP1S	12/3/2015	7:59	29.07	0.03	0.0	2.7	17.0	0
NP1I	12/1/2015	12:35	29.65	0.10	0.0	0.3	20.6	0
NP1I	12/3/2015	8:12	29.07	0.00	0.0	0.4	18.5	0
NP1D	12/1/2015	12:50	29.65	0.00	0.0	0.3	18.4	0
NP1D	12/3/2015	8:12	29.07	0.00	0.0	0.4	18.5	0
NP2S	12/1/2015	13:45	29.61	0.00	0.0	1.7	19.3	0
NP2S	12/3/2015	8:46	29.07	0.00	0.0	1.7	19.5	0
NP2I	12/1/2015	14:00	29.61	0.00	0.0	0.4	18.6	0
NP2I	12/3/2015	9:00	29.07	0.00	0.0	0.4	19.1	0
NP2D	12/1/2015	14:20	29.61	0.00	0.0	0.5	19.2	0
NP2D	12/3/2015	9:12	29.07	0.00	0.0	0.6	19.3	0
NP3S	12/1/2015	15:05	29.62	0.08	0.0	2.1	17.9	0
NP3S	12/3/2015	9:44	29.07	0.08	0.0	2.2	17.7	0
NP3I	12/1/2015	15:10	29.62	0.00	0.0	2.7	17.9	0
NP3I	12/3/2015	9:55	29.07	0.00	0.0	2.7	17.9	0
NP3D	12/1/2015	15:15	29.62	0.00	0.0	1.8	18.1	0
NP3D	12/3/2015	10:00	29.07	1.94	0.0	1.8	18.1	0
NP4S	12/2/2015	8:50	29.65	0.18	0.0	3.4	18.7	0
NP4I	12/2/2015	9:04	29.65	0.01	0.0	2.8	18.4	0
NP4D	12/2/2015	9:10	29.65	0.05	0.0	1.8	16.8	0
NP5S	12/2/2015	10:55	29.66	0.02	0.0	4.7	16.7	0
NP5I	12/2/2015	11:10	29.66	0.03	0.0	3.9	17.9	0
NP5D	12/2/2015	11:18	29.66	0.01	0.0	3.0	16.3	0
NP6S	12/1/2015	16:17	29.63	0.00	0.0	4.2	17.4	0
NP6S	12/3/2015	10:30	29.04	0.00	0.0	4.9	16.6	0
NP6I	12/1/2015	16:25	29.63	0.00	0.0	3.3	19.4	0
NP6I	12/3/2015	10:38	29.04	0.00	0.0	3.1	19.5	0
NP6D	12/1/2015	16:38	29.63	0.00	0.0	1.8	19.9	0
NP6D	12/3/2015	10:49	29.04	0.02	0.0	1.8	19.6	0
NP7S	12/2/2015	13:36	29.58	0.18	0.0	3.5	17.6	0
NP7I	12/2/2015	13:50	29.58	0.00	0.0	1.2	20.4	0
NP7D	12/2/2015	14:04	29.58	0.00	0.0	0.9	19.3	0
NP8S	12/2/2015	15:54	29.50	0.00	0.0	7.2	12.3	0
NP8I	12/2/2015	16:04	29.50	0.00	0.0	3.1	15.1	0
NP8D	12/2/2015	16:12	29.50	0.00	0.0	0.7	15.5	0
GP-1	12/2/2015	9:32	29.65	0.00	0.0	2.2	19.4	0
GP-2	12/2/2015	12:46	29.64	0.21	0.0	2.7	18.0	0

Table 2 (continued). Summary of Landfill Gas Monitoring Results.

Monitoring Location	Date	Time	Barometric Pressure (inches Hg)	Well Head Pressure (inches H <sub>2</sub> O)	Methane (percent volume)	Carbon Dioxide (percent volume)	Oxygen (percent volume)	Hydrogen Sulfide (ppm)
VTP1S	12/1/2015	11:10	29.71	0.03	0.0	0.1	20.7	0
VTP1S	12/3/2015	11:20	29.03	NA	0.0	0.1	21.4	0
VTP2S	12/1/2015	8:30	29.80	-0.41	0.0	5.5	13.5	0
VTP2S	12/1/2015	9:48	29.81	0.00	0.0	3.8	16.7	0
VTP2S	12/3/2015	12:00	29.06	0.00	0.0	0.1	21.4	0
VTP2D	12/1/2015	8:59	29.80	0.00	<b>10.1</b>	9.9	13	0
VTP2D	12/3/2015	12:12	29.06	0.00	<b>29.5</b>	20.5	6.7	<b>10</b>
MW-21	12/2/2015	11:52	29.68	0.00	0.0	0.1	21.6	0
MW-35*	12/3/2015	12:20	29.06	NA	0	0.9	17.5	0

\*4-inch-diameter well. Unable to get a good seal for LFG monitoring.

**Bold** indicates detection of methane and hydrogen sulfide.

## Figures

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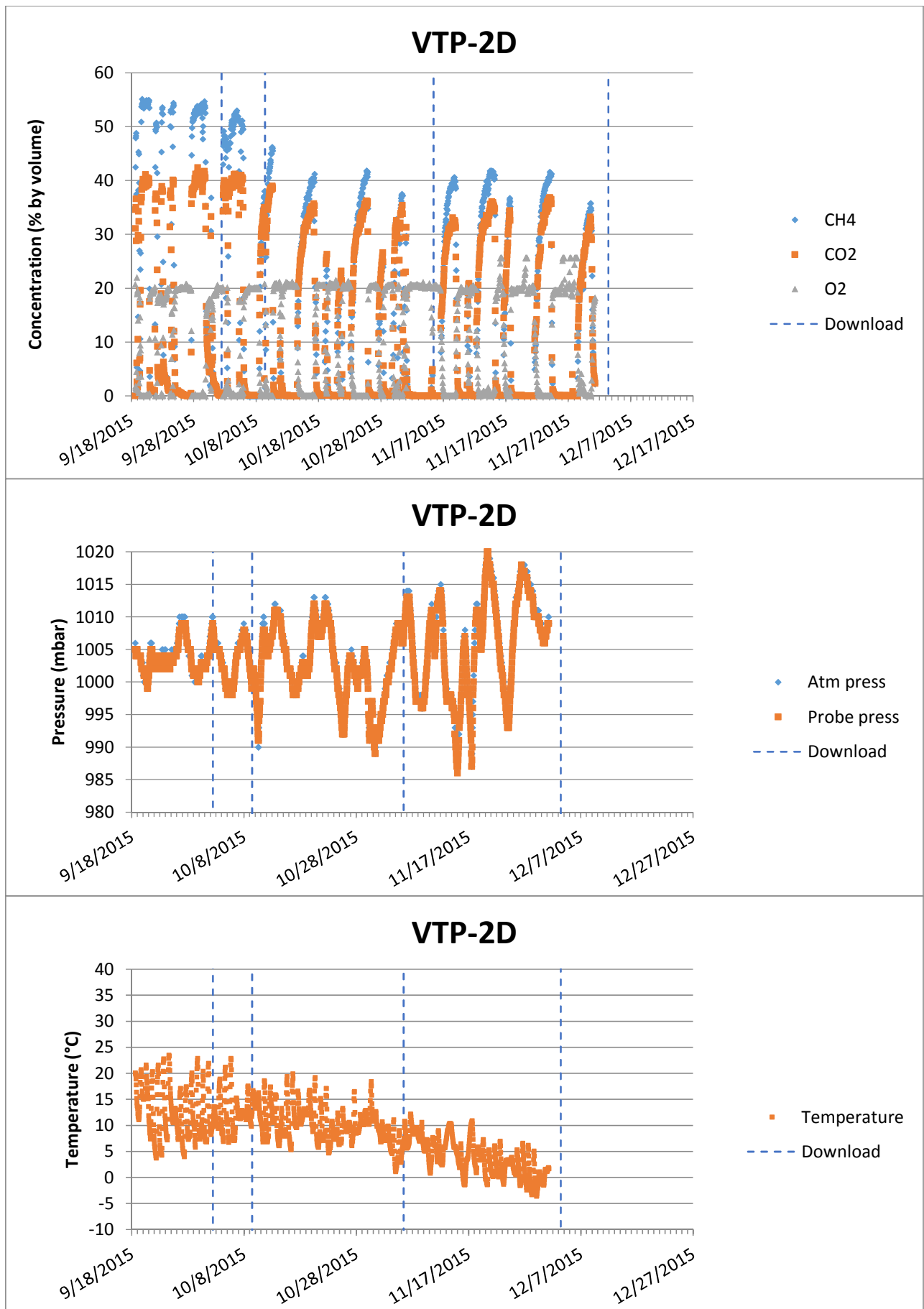
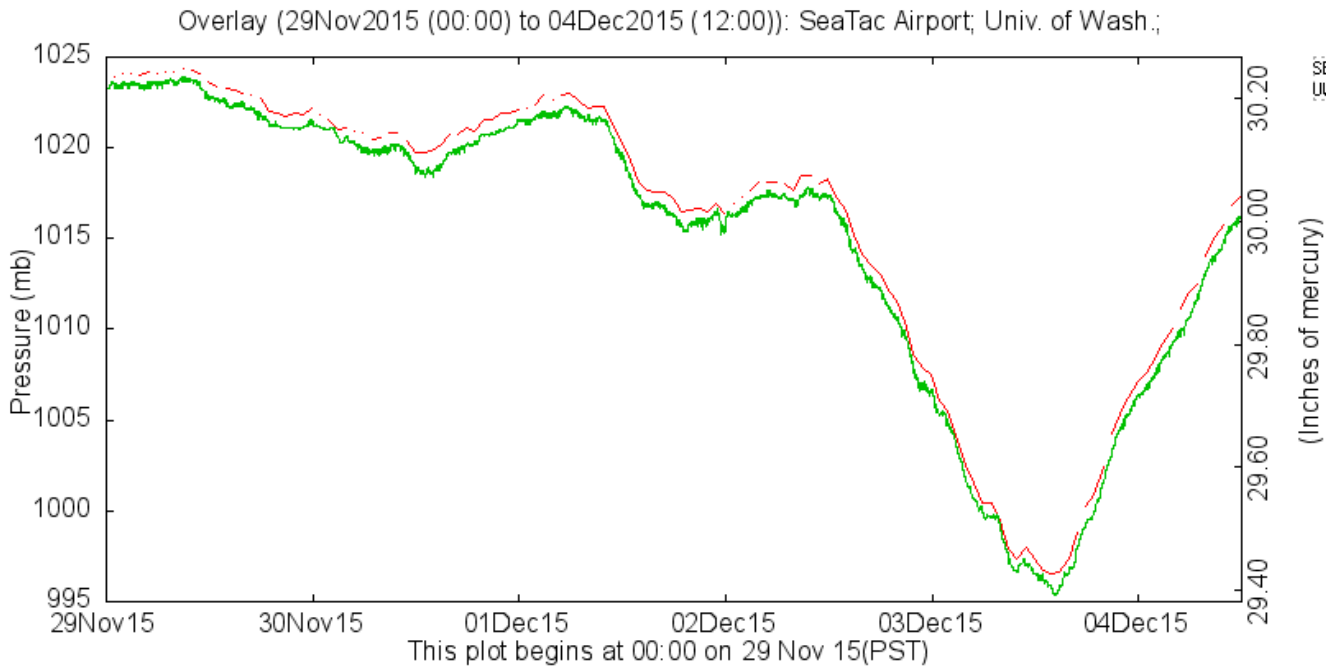


Figure 1. Gas Clam Data Plot.



Pressure (millibars)



Created by:

*Rich Edgerton  
 Harry Edmon  
 Neal Johnson  
 Jim Tillman  
 David Warren  
 Fred Weller*

*University of Washington  
 Seattle, Washington  
 USA*

Clicking on a plot brings up the data file that was used to create that plot and available station information.

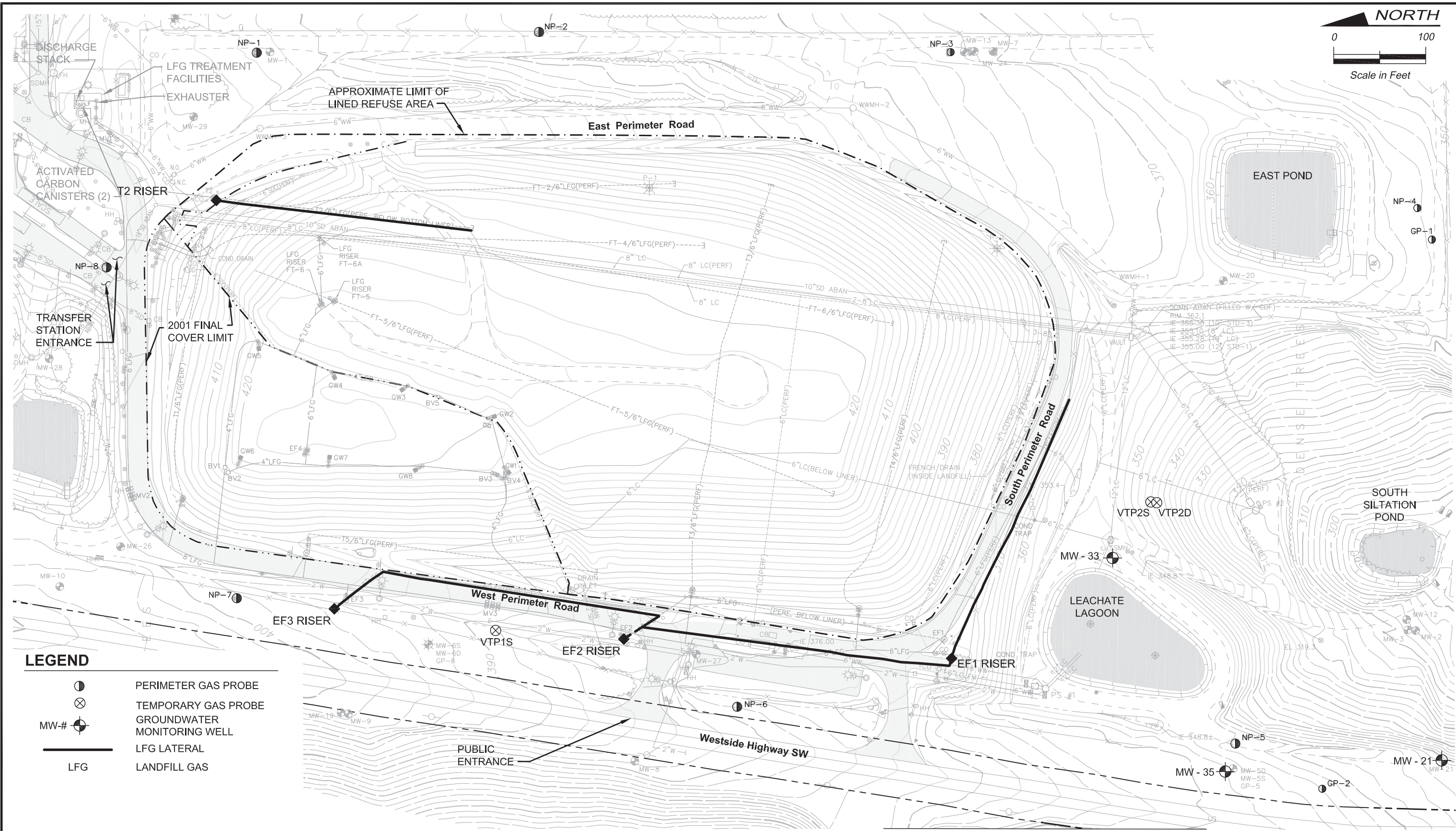
Current time GMT/UTC **Thu Dec 17 16:44:48 2015**

Local (Pacific Standard Time) **Thu Dec 17 08:44:48 2015**



Figure 2. Barometric Pressure Plot.

Path: C:\p\proj\2009\09-04\304-000\CAD\DWG\3-LFG Probe Location Plot.dwg File Name: Figure 3-LFG Probe Location Plot.dwg Plot date: Jan 06, 2016 09:48:05am CAD User: emarshall  
 .Xref File Name: | X21104004b.mxd | X21104004.mxd | X21104004.mxd



**King County**  
 Department of Natural Resources & Parks  
 Solid Waste Division

**PERIMETER LFG PROBE  
 LOCATION MAP**

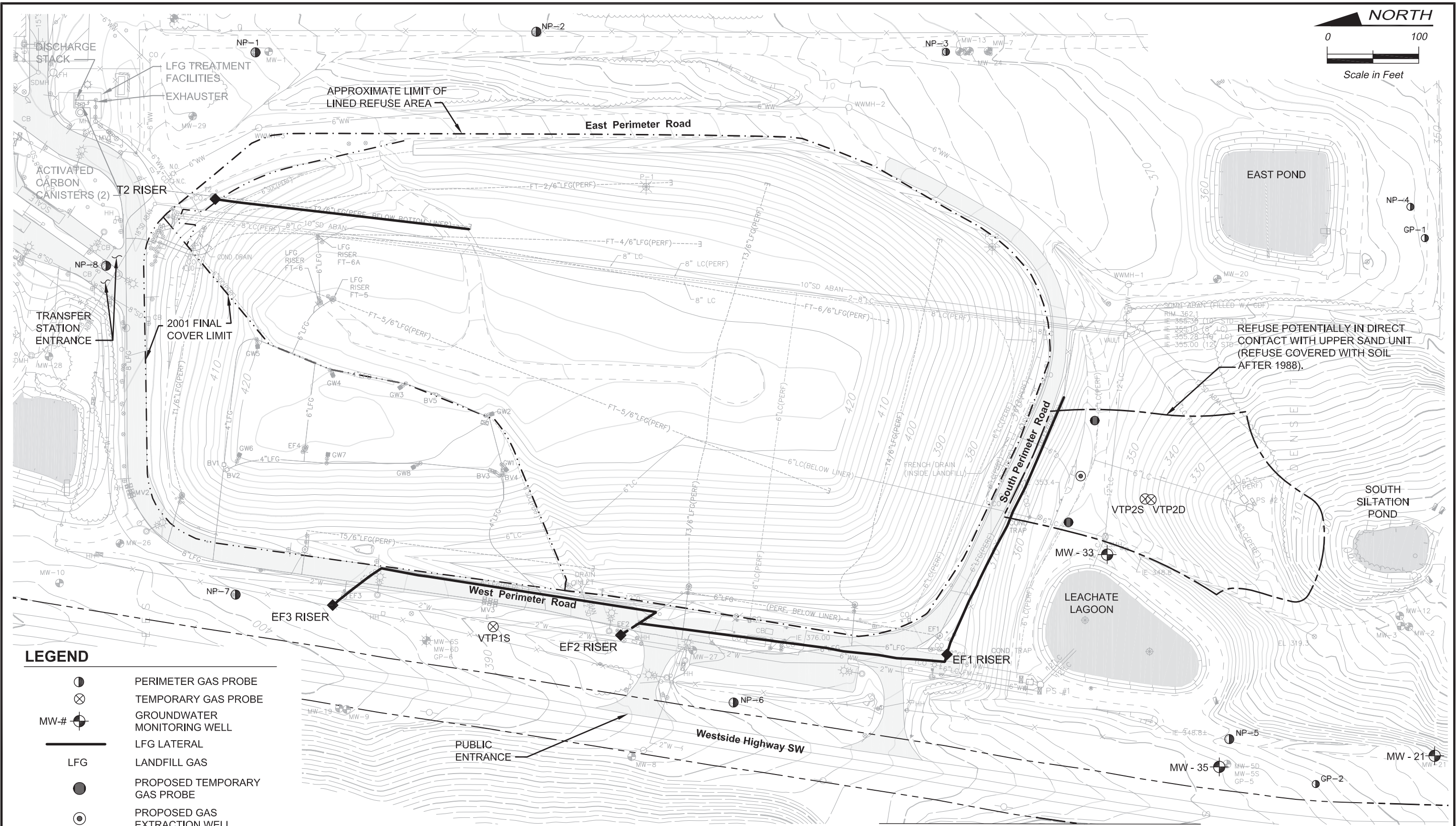
Vashon Island Landfill  
 King County, Washington

Sheet  
**3**  
 Date  
 January  
 2016

REFERENCE: PHOTOGRAMMETRY BY: (3DJ) TECHNOLOGIES, INC. 04-26-04



Path: C:\p\proj\2009\09-04\304-000\CAD\Drawings\Vashon\LFM File Name: Figure 4-Prop Temp Probe Location Plot date: Jan 06, 2016-09:46:28am CAD User: emarshall.  
 .Xref Filename: | X21104004bm0404 | X21104004m1 | X21104004m1



**LEGEND**

- PERIMETER GAS PROBE
- TEMPORARY GAS PROBE
- GROUNDWATER MONITORING WELL
- LFG LATERAL
- LFG LANDFILL GAS
- PROPOSED TEMPORARY GAS PROBE
- PROPOSED GAS EXTRACTION WELL



**King County**  
 Department of Natural Resources & Parks  
 Solid Waste Division

**PROPOSED TEMPORARY PROBE LOCATION MAP**

Vashon Island Landfill  
 King County, Washington

Sheet  
**4**  
 Date  
 January  
 2016

REFERENCE: PHOTOGRAMMETRY BY: (SDJ) TECHNOLOGIES, INC. 04-26-04



## Appendix A

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### *Daily Field Reports*







# DAILY FIELD REPORT

PROJECT NO. 09-04304-000

# HERRERA

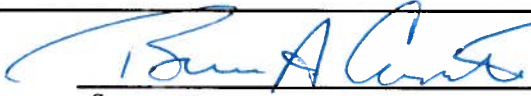
(1) DAY TUESDAY DATE: 1 | 2 | 0 | 1 | 1 | 5 WORK PERIOD 7:30 AM TO 16:45 PM REPORT NO. 1  
WEATHER Sunny, calm TEMP. \_\_\_\_\_ 40s °F PRECIPITATION None

(2) PERSONNEL ONSITE  
Simon Butler - Aspect  
Bruce Carpenter - Herrera

(3) EQUIPMENT ON PROJECT	
DESCRIPTION	
Herrera - GEM 2000 Plus, SKC pump, water level indicator	

(4) WORK ACCOMPLISHED TODAY Simon Butler removed Gas Clam tubing to access VTP2D for LFG monitoring. Monitored 15 probes today, including VTP1S, VTP2S, VTP2D, NP1 (S,I,D), NP2 (S,I,D), NP3 (S,I,D), and NP6 (S,I,D). Groundwater was present and purged from probes VTP1S, VTP2S, VTP2D, NP1S, NP2S, NP3S, and NP6S. Groundwater was above the top of the screen at one location VTP1S, prior to purging. Water levels and total depths were not able to be measured at locations NP3D and NP6D, because the pvc stopcock was not able to be removed. All of the probes functioned well, none appeared to be clogged during purging. Methane was detected at only one location, VTP2D at a concentration of 10.1 percent by volume.

(5) **Action Items:** Aspect requested re-monitoring the 15 probes tested today on either Wednesday or Thursday. The barometric pressure is projected to continue to drop over the next few days.

(6)  12/7/15  
SIGNATURE DATE



# DAILY FIELD REPORT

PROJECT NO. 09-04304-000

# HERRERA

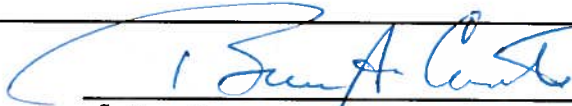
(1) DAY WEDNESDAY DATE 12/02/15 WORK PERIOD 7:45 AM TO 16:30 PM REPORT NO. 2  
WEATHER Sunny, calm TEMP. 40s °F PRECIPITATION None

(2) PERSONNEL ONSITE  
Bruce Carpenter – Herrera  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

EQUIPMENT ON PROJECT	
DESCRIPTION	
Herrera – GEM 2000 Plus, SKC pump, water level indicator	

(4) WORK ACCOMPLISHED TODAY Monitored 15 probes today, including NP4 (S,I,D), NP5 (S,I,D), NP7 (S,I,D), NP8 (S,I,D), GP-1, GP-2, and MW-21. Groundwater was present at probes NP4S, NP5S, NP7S, and NP8S, but purged only from probe NP8S due to the presence of 7 feet of groundwater. Less than 0.5-inches of groundwater were detected at the other three locations, not enough to purge, the screen extends 10 feet at each of the NP probes. Water levels and total depths were not able to be measured at locations NP4D and NP5D, because the pvc stopcock was not able to be removed. All of the probes functioned well, none appeared to be clogged during purging. Methane was not detected at any of the 15 monitored locations.

(5) **Action Items:** Per Aspect's request the 15 probes tested on Tuesday will be re-monitored on Thursday during a period of lower barometric pressure. Monitoring well MW-35 is constructed with 4-inch diameter pvc, not 2-inch as noted in the work plan. The well cap is perforated to suspend a transducer, pressure tubing, and a submersible pump to approximately 119 feet below ground surface. It is unlikely this well cap can be effectively sealed to test for methane.

(6)  SIGNATURE 12/7/15 DATE



# DAILY FIELD REPORT

PROJECT NO. 09-04304-000

# HERRERA

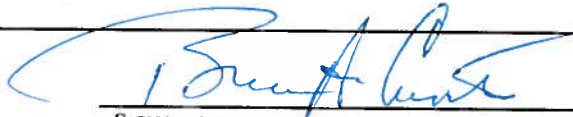
(1) DAY THURSDAY DATE 1 | 2 | 0 | 3 | 1 | 5 WORK PERIOD 7:20 AM TO 12:50 PM REPORT NO. 3  
WEATHER Cloudy, calm TEMP. 40s °F PRECIPITATION Occasional light rain

(2) PERSONNEL ONSITE  
Bruce Carpenter - Herrera  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

EQUIPMENT ON PROJECT	
	DESCRIPTION
	Herrera - GEM 2000 Plus, SKC pump, water level indicator

(4) WORK ACCOMPLISHED TODAY Re-monitored 15 probes today, including VTP1S, VTP2S, VTP2D, NP1 (S,I,D), NP2 (S,I,D), NP3 (S,I,D), and NP6 (S,I,D). Groundwater was present at probes VTP1S, VTP2S, VTP2D, NP1S, NP2S, NP3S, and NP6S, but only present above the top of the screen at one location, VTP1S. Groundwater was purged from VTP1S and VTP2S. Methane was detected at only one location, VTP2D at a concentration of 29.5 percent by volume. Approximately, 15,000 cubic centimeters (cc) were purged from well MW-35, but due to the perforated well cap, it was not possible to achieve an effective seal, no methane was detected. One casing volume in well MW-35 is approximately 294,000 cc.

(5) **Action Items:** Well MW-35 may be monitored for methane at a later date, when the downhole equipment in the well can be removed and a cap with a stopcock installed to achieve an effective seal.

(6)  12/7/15  
SIGNATURE DATE

