August 30, 2019

Ms. Sunny Becker
Washington State Department of Ecology
3190 160th Avenue SE
Bellevue, WA 98008-5452

Subject: Second Quarter 2019 Progress Report, Southwest Harbor Project Remediation Areas 1, 2, 3, and 5
Ecology Facility/Site Numbers 2384, 2385, 2127, and 2383

Dear Sunny:

This letter contains the combined quarterly progress report for the Ecology-lead portions of the Southwest Harbor Project (SWHP) for remediation areas (RAs) 1, 2, 3, and 5 and covers April, May, and June 2019. This report satisfies the reporting requirement stipulated in the consent decrees for these sites as modified by the Port's November 15, 2016 letter to Ecology and subsequent communication from Ecology to the Port on December 2, 2016, and June 30, 2017 (see previous Progress Reports for additional details).

A. List of on-site activities that have taken place during the quarter.

Biweekly Landfill Monitoring:

No detections of methane occurred in the SG sampling points located along Harbor Avenue SW during the reporting period.

Methane concentrations measured soil vapor probes VP-1 to VP-4 were below the LEL of five percent or non-detect. The SG sampling results and these vapor probe results indicate that methane concentrations remain below the action level of 5 percent beyond the former landfill boundary.

A vicinity map showing the landfill relative to nearby structures is included as Figure 1; a site map showing the extent of the consolidated landfill, extent of the former landfill area, sampling probe/port locations, and the extent of the landfill cap is included as Figure 2; a representative schematic cross section of typical landfill cap construction is included as Figure 3; and a map showing methane concentrations this quarter is included as Figure 4.

The second quarter monitoring results are discussed further in Attachment 1, and monitoring results are presented in Attachment 2.

We will reevaluate the monitoring results and make recommendations as necessary in the next quarterly monitoring report.

Semiannual Inspection: The semiannual inspection of site pavement caps, drainage, ballast cover areas, fencing, and warning signs was conducted on June 25, 2019 (Attachment 3).

The next semiannual inspection is scheduled for the fourth quarter of 2019.

B. Detailed description of any deviations from the required tasks not otherwise documented in project plans or amendment requests.

There have been no deviations during the past quarter.

C. Description of all deviations from the schedule during the current quarter and any planned deviations in the upcoming quarter.

There have been no deviations during the past quarter. No deviations are planned in the upcoming quarter.

D. For any deviations in schedule, a plan for recovering lost time and maintaining compliance with the schedule.

No deviations are anticipated.

E. All raw data (including laboratory reports) received by the Port during the past quarter and an identification of the source of the sample.

No raw laboratory data were received during this quarter.

F. A list of deliverables and activities for the upcoming quarter.

The next routine deliverable will be a letter summarizing the monitoring performed during the third quarter of 2019 and will be titled *Third Quarter 2019 Progress Report, Remediation Areas 1, 2, 3, and 5*. This progress report will summarize our updated monitoring plan per Ecology's request. Biweekly monitoring will continue until monitoring results indicate stable methane concentrations.

The next semiannual inspection of site pavement caps, drainage, ballast cover areas, fencing, and warning signs is scheduled for the fourth quarter of 2019.

Please contact me at (206) 787-3193 if you have any questions or comments about our activities at the SWHP site.

Sincerely,

Brick Spangler
Sr. Environmental Program Manager

Attachments:
Figure 1 – Vicinity Map Showing Nearby Structures
Figure 2 – Site Plan
Figure 3 – Cap Schematic Cross Section
Figure 4 – Methane Monitoring Results
Attachment 1 – Terminal 5 Landfill Gas Collection and Treatment System Monitoring Results Memorandum – Second Quarter 2019
Attachment 2 – Terminal 5 Landfill Gas Collection and Treatment System Monthly Monitoring Results Tables – Second Quarter 2019
Attachment 3 – Semiannual Inspection of T-5 Ecology-Lead Sites 2019 Mid-Year Inspection – Second Quarter 2019

cc: Warren Hansen – Windward Environmental, LLC
Mark Dagel – Hart Crowser, Inc.

Legend

Approximate Geomembrane Limits

0 250 500 1,000 Feet

N

Port of Seattle, Southwest Harbor Terminal 5
Seattle, Washington

Vicinity Map Showing Nearby Structures

17627-06 1/19

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Figure
1

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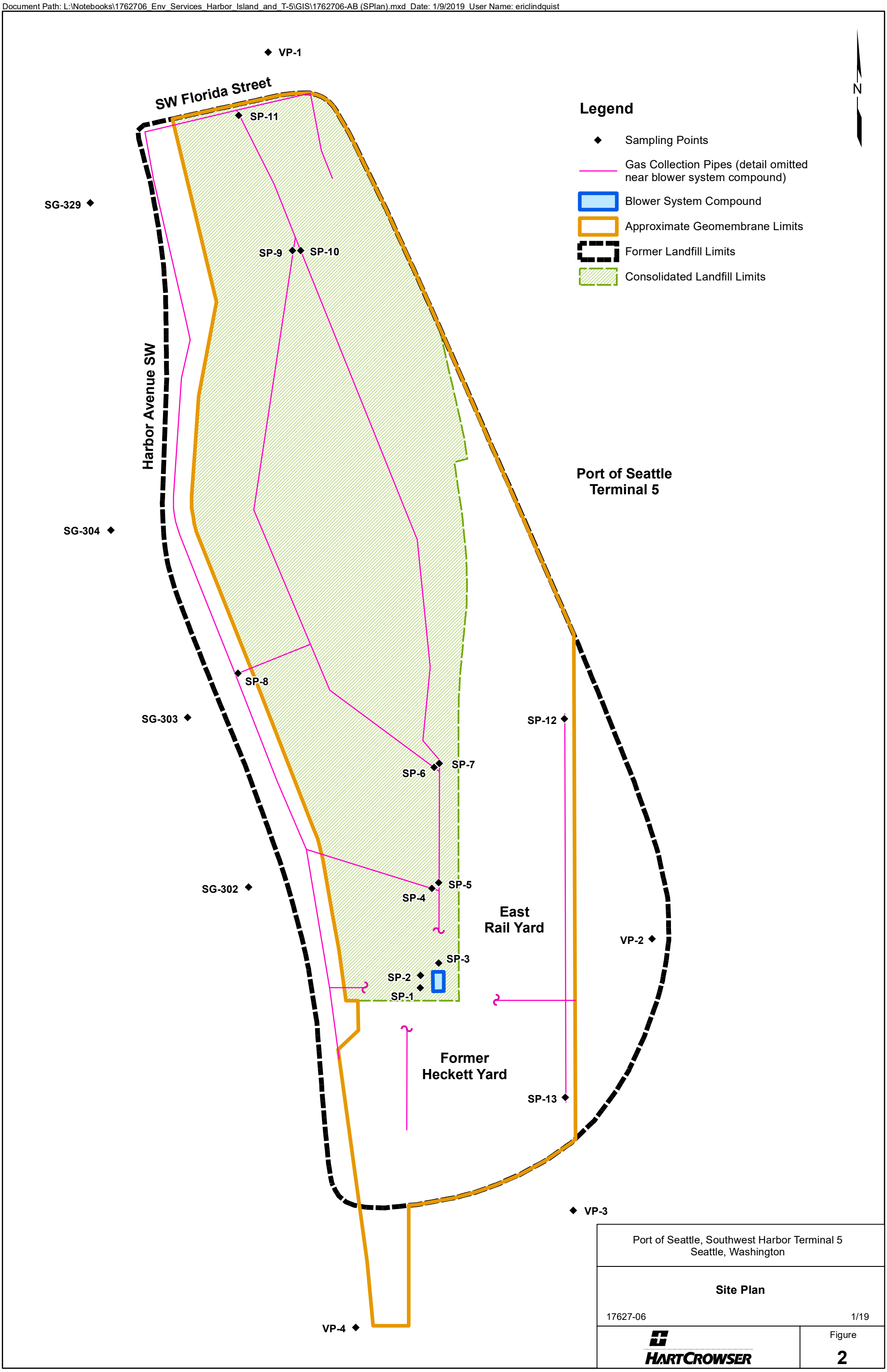

Port of Seattle, Southwest Harbor Terminal 5
Seattle, Washington

Site Plan

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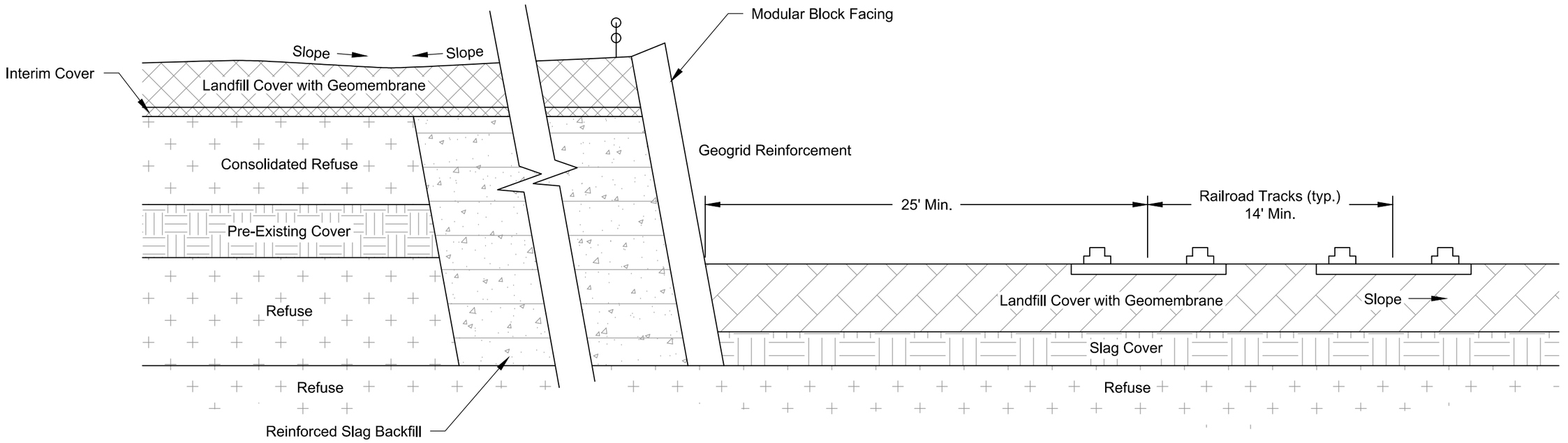
Figure
2

West

East



0 6 12

Approximate Scale in Feet

Sources: Figure prepared from PDF "Cross Section - Final Landfill Cover System," created by Woodward-Clyde Consultants, dated 2/21/95.

Port of Seattle, Southwest Harbor Terminal 5
Seattle, Washington

Cap Schematic Cross Section

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Figure
3

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N

SW Florida Street

Harbor Avenue SW

VP-1	
Date	Methane
6/19/19	0.0
6/5/19	0.0
5/23/19	0.0
5/7/19	0.0
4/23/19	0.0
4/10/19	--

SP-11	
Date	Methane
6/19/19	39.5
6/5/19	36.3
5/23/19	57.0
5/7/19	4.4
4/23/19	33.5
4/10/19	--

SG-329	
Date	Methane
6/19/19	0
6/5/19	0
5/23/19	0
5/7/19	0
4/23/19	0
4/10/19	0

SP-09	
Date	Methane
6/19/19	66.0
6/5/19	60.5
5/23/19	67.0
5/7/19	64.0
4/23/19	64.0
4/10/19	--

SP-10	
Date	Methane
6/19/19	68.0
6/5/19	63.1
5/23/19	68.0
5/7/19	67.0
4/23/19	67.0
4/10/19	--

SG-304	
Date	Methane
6/19/19	0
6/5/19	0
5/23/19	0
5/7/19	0
4/23/19	0
4/10/19	0

SP-08	
Date	Methane
6/19/19	15.5
6/5/19	30.7
5/23/19	24.0
5/7/19	4.9
4/23/19	--
4/10/19	33.5

SP-06	
Date	Methane
6/19/19	76.0
6/5/19	67.1
5/23/19	73.0
5/7/19	56.0
4/23/19	69.0
4/10/19	--

SP-07	
Date	Methane
6/19/19	65.0
6/5/19	59.3
5/23/19	62.0
5/7/19	54.0
4/23/19	68.0
4/10/19	--

SP-12	
Date	Methane
6/19/19	--
6/5/19	9.0
5/23/19	2.0
5/7/19	1.5
4/23/19	4.6
4/10/19	0.0

SG-303	
Date	Methane
6/19/19	0
6/5/19	0
5/23/19	0
5/7/19	0
4/23/19	0
4/10/19	0

SP-04	
Date	Methane
6/19/19	1.8
6/5/19	67.3
5/23/19	70.0
5/7/19	38.5
4/23/19	58.0
4/10/19	--

SP-05	
Date	Methane
6/19/19	74.0
6/5/19	68.5
5/23/19	71.0
5/7/19	44.5
4/23/19	50.0
4/10/19	--

SG-302	
Date	Methane
6/19/19	0
6/5/19	0
5/23/19	0
5/7/19	0
4/23/19	0
4/10/19	0

East Rail Yard

VP-2	
Date	Methane
6/19/19	4.0
6/5/19	--
5/23/19	4.0
5/7/19	2.9
4/23/19	1.6
4/10/19	2.6

SP-02	
Date	Methane
6/19/19	51.0
6/5/19	55.0
5/23/19	48.0
5/7/19	13.5
4/23/19	51.0
4/10/19	--

SP-03	
Date	Methane
6/19/19	66.0
6/5/19	65.6
5/23/19	67.0
5/7/19	23.5
4/23/19	45.0
4/10/19	--

Former Heckett Yard

SP-01	
Date	Methane
6/19/19	8.40
6/5/19	51.00
5/23/19	49.00
5/7/19	0.40
4/23/19	22.00
4/10/19	--

SP-13	
Date	Methane
6/19/19	--
6/5/19	9.0
5/23/19	13.0
5/7/19	10.5
4/23/19	9.7
4/10/19	10.0

VP-4	
Date	Methane
6/19/19	4.2
6/5/19	2.9
5/23/19	2.4
5/7/19	1.1
4/23/19	2.9
4/10/19	0.5

VP-3	
Date	Methane
6/19/19	0.0
6/5/19	--
5/23/19	0.0
5/7/19	0.0
4/23/19	0.0
4/10/19	0.4

Legend

- Sampling Points
- Gas Collection Pipes (detail omitted near blower system compound)
- Blower System Compound
- Approximate Geomembrane Limits
- Former Landfill Limits
- Consolidated Landfill Limits

Notes:
Methane concentration in percent by volume measured with LMS-40 or Landtec GEM 2000 gas analyzer.
Sampling point locations are based on as-built drawings and GPS coordinates measured in the field.

Port of Seattle Terminal 5

Port of Seattle, Southwest Harbor Terminal 5
Seattle, Washington

Methane Monitoring Results

17627-06 7/19

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Figure 4

ATTACHMENT 1

Terminal 5 Landfill Gas Collection and Treatment System

Monitoring Results Memorandum

Second Quarter 2019

MEMORANDUM

DATE: August 30, 2019

TO: Brick Spangler, Port of Seattle

FROM: Jamalyn Green and Mark Dagel, Hart Crowser

RE: **Terminal 5 Landfill Gas Collection System Monitoring Results**
Second Quarter 2019
17627-06

This memorandum presents the results of the second quarter of 2019 monitoring at the Terminal 5 (T-5) Remediation Area 3 landfill gas collection system.

Second Quarter Monitoring Summary

This quarter's report includes biweekly monitoring from April through June 2019. Gas concentrations were measured in the field using an LMS-40 or Landtec GEM 2000 gas analyzer. The landfill gas collection system was converted to a passive system in December 2016, by replumbing the system discharge piping to bypass the blower and shutting the blower off.

Monitoring was performed at the following locations:

- System effluent sampling port BV-1;
- System sampling ports SP-01 through SP-13;
- Off-site soil gas probes SG-302, SG-303, SG-304, and SG-329; and
- Former landfill boundary soil vapor probes VP-1, VP-2, VP-3, and VP-4.

Monitoring locations are shown on Figure 2. Results are presented in Attachment 2 and summarized below.

Effluent Sampling Port Results

Effluent sample port BV-1 is located within the system manifold and represents the vapor concentrations that are exiting the system via the discharge stack. Methane concentrations during this quarter ranged from 0.6 to 57.5 percent by volume. Carbon dioxide concentrations ranged from 0.3 to 8.1 percent by volume. Oxygen concentrations ranged from 1.0 to 19.6 percent by volume.

Additional parameters measured within the system manifold were vapor temperature and flow rate. Temperature was measured at in-line temperature gage T-1 and averaged 54°F; consistent with normal ambient subsurface conditions for this time of year. Flow rate was monitored at flow meter F1, located between BV-1 and the condensate drum. The meter indicated a flow rate of 0.07 cubic feet per minute.

Collection System Sampling Port Results

Sampling ports SP-01 though SP-13 allow vapor samples to be collected from various locations within the underground gas collection piping system (Figure 2). Sampling ports SP-12 and SP-13 are located in the easternmost arm of the collection system.

During this quarter, methane concentrations ranged from non-detect to 76.0 percent, carbon dioxide concentrations ranged from 0.1 to 17.0 percent, and oxygen concentrations ranged from non-detect to 19.8 percent.

Temperature within the each of the sampling ports was measured with an infrared thermometer and values ranged from 52° to 78°F.

Off-Site Soil Gas Probe Results

Off-site soil gas probes SG-302, SG-303, SG-304, and SG-329 are located to the west of the landfill along Harbor Avenue. There were no methane detections in the gas probes during this sampling period. Carbon dioxide concentrations ranged from 0.4 to 2.7 percent, and oxygen concentrations ranged from 15.1 to 19.6 percent.

Former Landfill Boundary Soil Vapor Probes

Former landfill boundary soil vapor probes VP-1, VP-2, VP-3, VP-4 are located to the north, east, and south of the former landfill boundary. The vapor probes were installed in November 2018. Methane concentrations ranged from non-detect to 4.2 percent, carbon dioxide concentrations ranged from non-detect to 5.9 percent, and oxygen concentrations ranged from non-detect to 12.6 percent.

System Maintenance and Other Notes

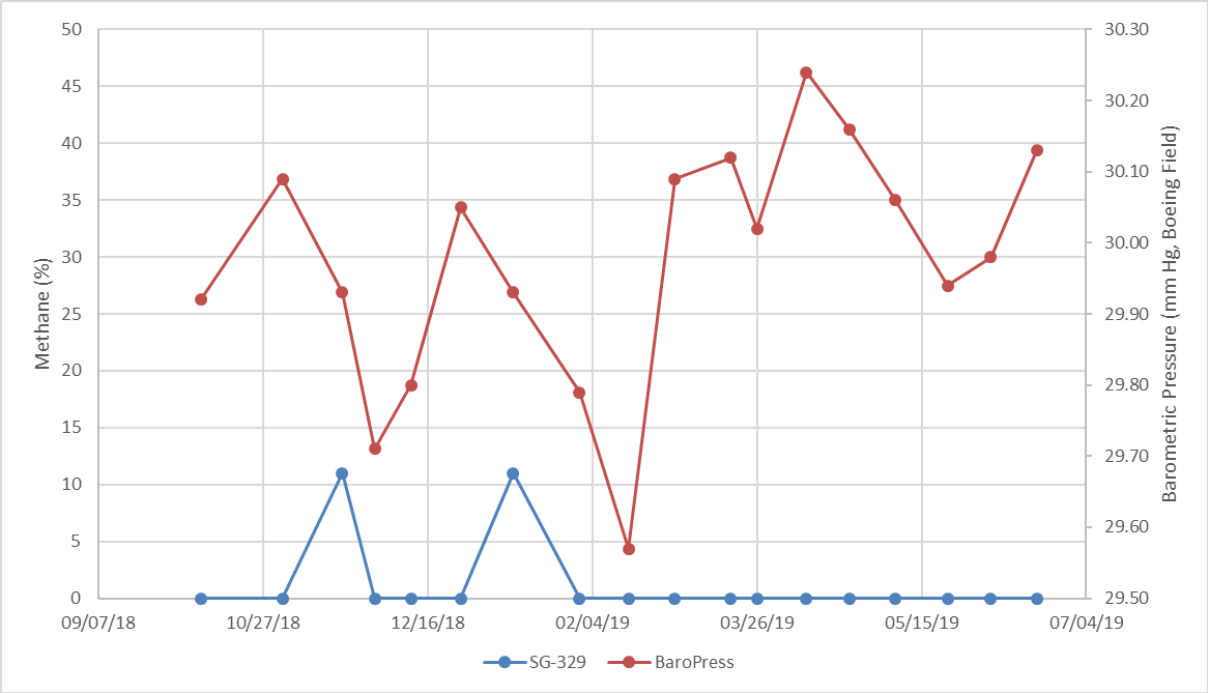
None.

Off-Site Methane Barometric Trend Analysis

Since the landfill gas collection system was converted to a passive system in December 2016 there have been two methane detections of in one of the off-site gas probes, SG-329, that exceeded the lower explosive limit (LEL) threshold of five percent. Both readings were 11 percent; one detection occurred

on November 20, 2018 and the other on January 11, 2019. Methane has not been detected during any of the subsequent monitoring rounds.

In order to evaluate a potential relationship between barometric pressure and methane detections in soil gas, we compared time-series methane concentrations in SG-329 and barometric pressure records from Boeing Field. Inspection of the graphs (see below) indicates that the two detections did not occur during periods of particularly low (or high) barometric pressure and does not indicate any clear relationship.



We believe that the two methane detections in SG-329 may have been the result a carryover effect from monitoring SG-329 shortly after monitoring high-methane-level sampling ports within the gas collection system. We have modified our field sampling protocol so as to monitor the off-site soil vapor probes first before monitoring the high-level ports in the gas collection system and to make sure the instrument is adequately flushed and zeroed before each location.

We plan to continue bi-weekly monitoring of the system and off-site probes. Our next report will cover the third quarter of 2019. Please feel free to contact us with any questions or concerns.

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ATTACHMENT 2

Terminal 5 Landfill Gas Collection and Treatment System

Monthly Monitoring Results Tables

Second Quarter 2019

Terminal 5 / RA-3 Landfill Gas Treatment System

Monitoring Results January 2018 - June 2019

Parameter: PRESSURE (negative)
(Gauge - inches of water.)

	Monitoring Location																				
Date	*SG-302*	*SG-303*	*SG-304*	*SG-329*	*SP-01*	*SP-02*	*SP-03*	*SP-04*	*SP-05*	*SP-06*	*SP-07*	*SP-08*	*SP-09*	*SP-10*	*SP-11*	*SP-12*	*SP-13*	*VP-1*	*VP-2*	*VP-3*	*VP-4*
19-Jun-19	**0**	**0**	**0**	**0**	**0.06**	**0**	**0**	**0.06**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**--**	**--**	**0**	**0**	**0**	**0**
05-Jun-19	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0.08**	**0**	**0**	**0**	**--**	**--**	**0**
23-May-19	**0**	**0**	**0**	**0**	**0.08**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0.06**	**0.06**	**0**	**0**	**0**	**0**	**0**
07-May-19	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0.08**	**0**	**0**	**0.8**	**0**	**0**	**0**	**0**	**0**	**0**
23-Apr-19	**0**	**0**	**0**	**0**	**0.01**	**0**	**0**	**0**	**0**	**0**	**0**	**--**	**0**	**0**	**0.06**	**0**	**0**	**0**	**0**	**0**	**0**
10-Apr-19	**0**	**0**	**0.02**	**0**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**0**	**--**	**--**	**--**	**0.02**	**0**	**--**	**0**	**0**	**0**
26-Mar-19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18-Mar-19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	--	--	0	0	0	0
01-Mar-19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15-Feb-19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	>1	0	0	0	0	0	0
31-Jan-19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11-Jan-19	0	0	0	0	0	0	0	0	0	0	0	0	0.10	0	0.6	0	0	0	0	0	0
26-Dec-18	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0	0	0	0	0	0	0	0
11-Dec-18	0	0	0	0	0	0	0	0	0	0	0	0	0.24	0	0.1	0	0	0	0	0	0
30-Nov-18	0	0	0	0	0	0	0	0	0	0	0	0	0.03	0	0.52	0	0	0	0	0	0
20-Nov-18	0	0	0	0	0	0	0.01	0	0	0	0	0	0.1	0	0	0	0	--	--	--	--
02-Nov-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	--	--	--	--
08-Oct-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	--	--	--	--
21-Sep-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	--	--	--	--
07-Sep-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	--	--	--	--
30-Jul-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	--	--	--	--
13-Jul-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	--	--	--	--
29-Jun-18	0	0	0	0	0	0	0	0	0	0	0	0	0.06	0	0	0	0	--	--	--	--
15-Jun-18	0	0	0	0	0	0	0	0	0	0	0	0.05	0	0	0	0	0	--	--	--	--
01-Jun-18	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0.001	--	--	--	--
11-May-18	0	0	0	0	0	1.41	0.43	0	0	0	0	0	0	0	0	0	0	--	--	--	--
26-Apr-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	--	--	--	--
06-Apr-18	0	0	0	0	0	0	0	0	0	0	0	0	--	0	0	0	0	--	--	--	--
07-Mar-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	--	--	--	--
21-Feb-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	--	--	--	--
05-Feb-18	0	0	1.0	0	0	0	0.08	0	0	0	0	0	0	0	0	0	0	--	--	--	--
24-Jan-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	--	--	--	--
# Readings	*32*	*32*	*32*	*32*	*31*	*31*	*31*	*31*	*31*	*31*	*31*	*31*	*30*	*31*	*30*	*30*	*30*	*14*	*14*	*14*	*15*
Min. value	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Max. value	*0*	*0*	*1*	*0*	*0.08*	*1.41*	*0.43*	*0.06*	*0.00*	*0.00*	*0.30*	*0.30*	*0.24*	*0.00*	*0.80*	*0*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
AVERAGE	***0***	***0***	***0***	***0***	***0.00***	***0.05***	***0.02***	***0.00***	***0.00***	***0.00***	***0.01***	***0.02***	***0.02***	***0.00***	***0***	***0***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***
Location	*SG-302*	*SG-303*	*SG-304*	*SG-329*	*SP-01*	*SP-02*	*SP-03*	*SP-04*	*SP-05*	*SP-06*	*SP-07*	*SP-08*	*SP-09*	*SP-10*	*SP-11*	*SP-12*	*SP-13*	*VP-1*	*VP-2*	*VP-3*	*VP-4*

Terminal 5 / RA-3 Landfill Gas Treatment System

Monitoring Results January 2019 - June 2019

Parameter: METHANE
(LMS-40 or GEM 2000 instrument field measurement - percent by volume.)

	Monitoring Location																				
Date	*SG-302*	*SG-303*	*SG-304*	*SG-329*	*SP-01*	*SP-02*	*SP-03*	*SP-04*	*SP-05*	*SP-06*	*SP-07*	*SP-08*	*SP-09*	*SP-10*	*SP-11*	*SP-12*	*SP-13*	*VP-1*	*VP-2*	*VP-3*	*VP-4*
19-Jun-19	**0**	**0**	**0**	**0**	**8.4**	**51.0**	**66.0**	**1.8**	**74.0**	**76.0**	**65.0**	**15.5**	**66.0**	**68.0**	**39.5**	**--**	**--**	**0**	**4.0**	**0**	**4.2**
05-Jun-19	**0**	**0**	**0**	**0**	**51.0**	**55.0**	**65.6**	**67.3**	**68.5**	**67.1**	**59.3**	**30.7**	**60.5**	**63.1**	**36.3**	**9.0**	**9.0**	**0**	**--**	**--**	**2.9**
23-May-19	**0**	**0**	**0**	**0**	**49.0**	**48.0**	**67.0**	**70.0**	**71.0**	**73.0**	**62.0**	**24.0**	**67.0**	**68.0**	**57.0**	**2.0**	**13.0**	**0**	**4.0**	**0**	**2.4**
07-May-19	**0**	**0**	**0**	**0**	**0.4**	**13.5**	**23.5**	**38.5**	**44.5**	**56.0**	**54.0**	**4.9**	**64.0**	**67.0**	**4.4**	**1.5**	**10.5**	**0**	**2.9**	**0**	**1.1**
23-Apr-19	**0**	**0**	**0**	**0**	**22.0**	**51.0**	**45.0**	**58.0**	**50.0**	**69.0**	**68.0**	**--**	**64.0**	**67.0**	**33.5**	**4.6**	**9.7**	**0**	**1.6**	**0**	**2.9**
10-Apr-19	**0**	**0**	**0**	**0**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**33.5**	**--**	**--**	**--**	**0**	**10.0**	**--**	**2.6**	**0.4**	**0.5**
26-Mar-19	0	0	0	0	11.0	11.5	47.0	65.0	67.0	70.0	60.0	7	64.0	69.0	56.0	7.5	9.5	0	2.2	0	3
18-Mar-19	0	0	0	0	32.0	49.0	69.0	72.0	70.0	71.0	61.0	20	59.0	70.0	4.3	--	--	0	0.9	0	0
01-Mar-19	0	0	0	0	26.5	38.0	66.0	71.0	68.0	70.0	60.0	18	64.0	69.0	42.0	0.7	9.6	0	0.7	0	0
15-Feb-19	0	0	0	0	10.7	12.1	27.1	36.0	38.7	57.9	53.3	0	63.6	51.5	0.0	0.0	10.2	0	0.1	0	3
31-Jan-19	0.1	0	0	0	42.6	43.4	74.2	73.4	74.9	74.4	64.5	42	64.7	73.9	45.7	18.8	9.8	0	1.7	0	1
11-Jan-19	--	--	--	11	43.0	18.5	64.0	66.0	64.0	65.0	59.0	--	66.0	67.0	39.0	15.5	14.5	2	2.3	0	3
26-Dec-18	0	0	0	0	22.5	40.0	57.0	64.0	65.0	65.0	59.0	0	5.7	67.0	35.0	9.7	12.5	0	2.2	0	0
11-Dec-18	0	0.3	0	0	60.0	49.0	68.0	69.0	60.0	68.0	59.0	52.0	65.0	65.0	57.0	37.0	18.0	0	3.0	0	0.7
30-Nov-18	0	0	0	0	33.0	48.0	66.0	68.0	66.0	66.0	57.0	33.0	50.0	65.0	45.0	44.0	20.0	0	2.9	0	2.1
20-Nov-18	0	0	0	11	43.0	52.0	68.0	69.0	69.0	69.0	59.0	46.0	66.0	68.0	53.0	15.0	20.0	--	--	--	--
02-Nov-18	0	0	0	0	10.5	24.5	48.0	47.0	57.0	58.0	46.5	21.5	47.0	58.0	35.5	3.8	11.0	--	--	--	--
08-Oct-18	0	0	0	0	32.5	49.0	66.0	66.0	66.0	67.0	59.0	40.0	63.0	63.0	46.0	16.0	22.0	--	--	--	--
21-Sep-18	0	0	0	0	37.0	51.0	67.0	67.0	68.0	69.0	61.0	42.0	63.0	63.0	46.0	17.5	19.5	--	--	--	--
07-Sep-18	0	0	0	0	40.0	51.0	66.0	67.0	68.0	69.0	61.0	33.0	61.0	63.0	44.5	10.5	17.5	--	--	--	--
30-Jul-18	0	0	0	0	41.0	51.0	65.0	66.0	68.0	70.0	57.0	28.5	59.0	60.0	43.0	5.2	19.0	--	--	--	--
13-Jul-18	0	0	0	0	40.0	48.0	64.0	65.0	66.0	68.0	56.0	20.5	55.0	59.0	0	12.5	29.5	--	--	--	--
29-Jun-18	0	0	0	0	41.0	44.5	60.0	64.0	65.0	69.0	56.0	8.0	55.0	59.0	9.4	8.5	27.5	--	--	--	--
15-Jun-18	0	0	0	0	38.0	50.0	64.0	63.0	65.0	66.0	54.0	27.5	59.0	60.0	15.0	10.5	28.0	--	--	--	--
01-Jun-18	0	0	0	0	20.0	3.9	0	27.5	25.0	57.0	52.0	0.7	57.0	58.0	30.0	4.0	28.0	--	--	--	--
11-May-18	0	0	0	0	24.0	4.7	59.0	60.0	66.0	68.0	50.0	6.6	57.0	60.0	39.0	2.5	25.5	--	--	--	--
26-Apr-18	0	0	0	0	34.0	50.0	62.0	61.0	63.0	65.0	52.0	0	59.0	60.0	43.5	38.0	21.0	--	--	--	--
06-Apr-18	0	0	0	0	36.0	53.0	62.0	62.0	63.0	64.0	51.0	45.5	--	59.0	44.0	41.0	22.0	--	--	--	--
07-Mar-18	0	0	0	0	30.5	48.0	60.0	59.0	61.0	62.0	50.0	43.5	49.0	58.0	36.0	31.0	19.0	--	--	--	--
21-Feb-18	0	0	0	0	21.0	43.5	58.0	65.0	59.0	60.0	52.0	23.0	59.0	64.0	31.0	10.0	22.0	--	--	--	--
05-Feb-18	0	0	0	0	25.0	45.0	46.0	60.0	60.0	61.0	54.0	17.5	50.0	60.0	37.5	5.7	24.5	--	--	--	--
24-Jan-18	0	0	0	0	36.0	46.0	59.0	60.0	60.0	61.0	54.0	34.5	59.0	60.0	40.5	31.5	23.0	--	--	--	--
# Readings	*31*	*31*	*31*	*32*	*31*	*31*	*31*	*31*	*31*	*31*	*31*	*30*	*30*	*31*	*31*	*30*	*30*	*14*	*14*	*14*	*15*
Min. value	*0*	*0*	*0*	*0*	*0.4*	*3.9*	*0.0*	*2*	*25.0*	*56.0*	*47*	*0*	*5.7*	*51.5*	*0.0*	*0*	*9*	*0*	*0*	*0*	*0*
Max. value	*0*	*0*	*0*	*11*	*60.0*	*55.0*	*74.2*	*73.4*	*74.9*	*76.0*	*68.0*	*52.0*	*67.0*	*73.9*	*57.0*	*44.0*	*29.5*	*2.3*	*4.0*	*0.4*	*4.2*
AVERAGE	***0***	***0***	***0***	***1***	***31.0***	***40.1***	***57.4***	***59.6***	***62.3***	***66.2***	***57.0***	***24.0***	***58.1***	***63.3***	***35.1***	***13.8***	***17.8***	***0.2***	***2.2***	***0.0***	***1.8***
Location	*SG-302*	*SG-303*	*SG-304*	*SG-329*	*SP-01*	*SP-02*	*SP-03*	*SP-04*	*SP-05*	*SP-06*	*SP-07*	*SP-08*	*SP-09*	*SP-10*	*SP-11*	*SP-12*	*SP-13*	*VP-1*	*VP-2*	*VP-3*	*VP-4*

Terminal 5 / RA-3 Landfill Gas Treatment System

Monitoring Results January 2018 - June 2019

Parameter: CARBON DIOXIDE
(LMS-40 or GEM 2000 instrument field measurement - percent by volume.)

	Monitoring Location																				
Date	*SG-302*	*SG-303*	*SG-304*	*SG-329*	*SP-01*	*SP-02*	*SP-03*	*SP-04*	*SP-05*	*SP-06*	*SP-07*	*SP-08*	*SP-09*	*SP-10*	*SP-11*	*SP-12*	*SP-13*	*VP-1*	*VP-2*	*VP-3*	*VP-4*
19-Jun-19	*1.6*	*1.9*	*1.6*	*1.1*	0.4	16.0	2.6	0.1	3.5	3.3	0.9	*8.4*	3.8	3.3	8.7	--	--	4.8	*1.7*	*0*	*1.9*
05-Jun-19	*2.3*	*2.7*	*2.1*	*1.4*	15.0	17.0	3.2	0.1	3.7	3.4	1.2	*10.5*	4.1	3.4	10.1	*8.9*	*5.0*	5.9	--	--	*2.3*
23-May-19	*2.2*	*2.1*	*1.7*	*1.0*	4.8	15.0	3.2	0.1	3.2	3.7	1.6	*5.8*	3.8	3.3	3.1	*8.6*	*4.5*	4.5	*0.9*	*0*	*2.0*
07-May-19	*2.0*	*2.1*	*1.5*	*1.1*	0.2	5.8	3.5	2.9	2.8	2.2	2.4	*9.0*	4.9	4.4	1.9	*8.2*	*4.1*	4.5	*0.7*	*0*	*1.9*
23-Apr-19	*1.8*	*2.1*	*0.4*	*1.1*	1.9	15.0	3.8	2.8	3.1	2.9	2.2	--	4.2	4.0	2.1	*7.3*	*4.1*	3.8	*0.5*	*0*	*1.5*
10-Apr-19	*1.6*	*2.1*	*1.4*	*0.9*	--	--	--	--	--	--	--	*7.2*	--	--	--	*7.4*	*4.2*	--	*0.4*	*0*	*1.5*
26-Mar-19	1.1	2.0	1.0	0.8	6.1	2.4	2.8	2.4	4.0	4.6	1.1	6.4	5.0	4.5	3.7	6.3	3.8	3.4	0	0	1
18-Mar-19	1.1	2.2	1.1	0.6	4.5	15.0	2.6	0.0	2.6	3.3	0.8	5.9	4.5	3.8	0.0	--	--	3.1	0	0	1
01-Mar-19	0.5	2.6	1.9	0.8	4.0	12.0	2.7	0.0	3.2	3.5	0.8	6.3	4.6	4.2	7.0	0.1	3.8	0.8	0	0	1
15-Feb-19	1.0	0.0	2.1	1.1	7.3	6.3	4.6	4.3	4.4	5.9	2.6	0.0	8.2	6.0	0.0	0.0	4.6	1.8	0	0	2
31-Jan-19	2.3	4.3	2.2	1.6	4.1	15.1	3.5	0.0	3.4	3.4	0.8	6.0	5.7	4.8	8.1	8.6	4.8	4.0	0	0	1
11-Jan-19	--	--	--	1.4	2.8	6.6	4.3	0.0	4.7	4.9	1.2	--	5.8	4.5	4.6	1.9	1.7	2.7	0	0	1
26-Dec-18	2.6	4.5	2.9	1.9	7.1	14.0	4.0	4.7	4.7	5.7	1.3	6.4	7.7	5.8	9.1	9.3	4.6	8.0	0	0	0
11-Dec-18	2.6	0.3	3.3	2.2	3.3	15.0	2.9	0	3.3	3.6	0.9	3.8	3.0	2.4	5.1	7.0	5.5	3.9	0	0	0.6
30-Nov-18	2.0	3.2	3.8	2.6	5.1	18.0	3.9	0	3.8	4.0	1.7	9.5	7.8	5.2	10.0	8.5	4.8	4.0	0	0	0.3
20-Nov-18	2.4	3.4	2.4	3.5	5.2	18.0	3.5	0	3.8	4.2	0.9	8.5	4.5	3.8	10.0	8.6	5.0	--	--	--	--
02-Nov-18	2.2	3.0	3.4	0	9.2	6.7	4.0	3.7	7.7	9.3	3.8	13.5	10.0	8.8	10.5	10.0	6.0	--	--	--	--
08-Oct-18	2.1	3.8	3.5	2.1	7.2	19.0	3.9	0	4.2	4.7	2.3	10.0	4.4	4.0	10.0	11.0	5.7	--	--	--	--
21-Sep-18	2.0	4.0	3.6	2.1	6.6	18.0	3.8	0	4.0	4.4	2.4	10.0	4.4	3.9	9.3	12.0	5.7	--	--	--	--
07-Sep-18	1.7	4.1	2.0	2.0	6.6	19.0	3.0	0.1	3.6	4.1	2.3	13.0	4.2	3.7	9.5	13.0	6.2	--	--	--	--
30-Jul-18	1.6	1.9	3.8	1.8	6.6	20.0	3.5	0.2	4.0	4.1	2.1	14.0	4.4	4.0	11.0	12.0	5.4	--	--	--	--
13-Jul-18	2.1	3.2	2.1	1.5	7.1	20.0	4.0	0.2	4.6	4.5	1.9	2.0	4.4	4.1	0	9.9	5.6	--	--	--	--
29-Jun-18	2.4	2.9	2.1	1.5	6.6	18.0	4.1	0.4	4.3	5.1	2.1	8.7	5.6	4.5	3.4	9.8	5.7	--	--	--	--
15-Jun-18	2.4	2.3	2.1	1.5	6.4	21.0	3.4	0	3.9	4.1	1.8	5.8	4.4	3.8	4.2	8.9	4.9	--	--	--	--
01-Jun-18	2.4	2.0	1.9	0.3	8.1	0.7	0	2.6	2.3	4.8	4.5	2.2	6.3	5.9	9.5	9.9	5.5	--	--	--	--
11-May-18	0.1	0.6	1.8	0.7	7.1	0.7	4.5	0.7	5.5	6.1	1.1	6.4	5.6	5.0	11.0	8.9	5.1	--	--	--	--
26-Apr-18	1.4	2.1	0.8	1.0	4.7	21.0	3.2	0	3.6	3.9	0.7	2.0	4.1	3.6	6.4	6.0	4.8	--	--	--	--
06-Apr-18	1.7	2.0	2.1	1.6	4.5	19.0	3.4	0	3.5	4.1	0.7	4.6	--	3.3	6.6	5.8	4.5	--	--	--	--
07-Mar-18	1.3	2.0	1.9	1.2	4.3	17.0	3.9	0	4.4	4.1	0.7	3.8	5.5	3.9	4.0	5.4	4.8	--	--	--	--
21-Feb-18	1.1	1.5	2.0	1.5	5.8	16.0	5.8	0	5.5	6.0	0.8	5.0	5.9	4.7	6.7	7.5	4.8	--	--	--	--
05-Feb-18	0.6	0	0.4	1.8	5.6	16.0	3.7	4.6	4.6	4.8	1.0	6.8	7.1	5.3	8.5	7.1	4.6	--	--	--	--
24-Jan-18	0.5	2.2	2.9	1.8	4.3	16.0	4.3	0.3	4.2	4.9	0.8	2.1	4.9	4.7	7.0	6.0	4.6	--	--	--	--
# Readings	*31*	*31*	*31*	*32*	*31*	*31*	*31*	*31*	*31*	*31*	*31*	*30*	*30*	*31*	*31*	*30*	*30*	*14*	*14*	*14*	*15*
Min. value	*0.1*	*0.0*	*0*	*0.0*	*0.2*	*0.7*	*0.0*	*0.0*	*2.3*	*2.2*	*0.7*	*0.0*	*3.0*	*2.4*	*0.0*	*0.0*	*1.7*	*0.8*	*0.0*	*0.0*	*0.0*
Max. value	*2.6*	*4.5*	*3.8*	*3.5*	*15.0*	*21.0*	*5.8*	*4.7*	*7.7*	*9.3*	*4.5*	*14.0*	*10.0*	*8.8*	*11.0*	*13.0*	*6.2*	*8.0*	*1.7*	*0.0*	*2.3*
AVERAGE	***1.7***	***2.4***	***2.1***	***1.4***	***5.6***	***14.2***	***3.5***	***1.0***	***4.0***	***4.4***	***1.6***	***6.8***	***5.3***	***4.4***	***6.5***	***7.8***	***4.8***	***3.9***	***0.3***	***0.0***	***1.3***
Location	*SG-302*	*SG-303*	*SG-304*	*SG-329*	*SP-01*	*SP-02*	*SP-03*	*SP-04*	*SP-05*	*SP-06*	*SP-07*	*SP-08*	*SP-09*	*SP-10*	*SP-11*	*SP-12*	*SP-13*	*VP-1*	*VP-2*	*VP-3*	*VP-4*

Terminal 5 / RA-3 Landfill Gas Treatment System

Monitoring Results January 2018 - June 2019

Parameter: OXYGEN
(LMS-40 or GEM 2000 instrument field measurement - percent by volume.)

	Monitoring Location																				
Date	*SG-302*	*SG-303*	*SG-304*	*SG-329*	*SP-01*	*SP-02*	*SP-03*	*SP-04*	*SP-05*	*SP-06*	*SP-07*	*SP-08*	*SP-09*	*SP-10*	*SP-11*	*SP-12*	*SP-13*	*VP-1*	*VP-2*	*VP-3*	*VP-4*
19-Jun-19	17.5	17.5	18.4	18.7	18.2	0.9	0.5	19.8	0.5	0.0	0.5	2.2	0.5	0.5	0.8	--	--	8.6	0.7	12.6	0.6
05-Jun-19	17.7	17.6	18.5	19.6	2.2	0.5	1.1	0.5	0.5	1.3	0.7	1.6	0.4	0.6	0.4	2.2	1.5	9.5	--	--	1.9
23-May-19	16.6	17.6	18.0	18.9	3.0	1.0	0.5	0.5	0	0.6	0.5	6.0	0.0	0.5	3.2	0.5	0.7	9.0	0	10.4	0.6
07-May-19	15.5	17.7	17.7	18.4	19.6	3.4	3.4	1.7	1.4	0.5	0.8	5.6	0.5	0	11.5	0.5	0.6	9.6	0	9.3	0.5
23-Apr-19	15.1	17.4	19.6	17.7	11.5	0.5	1.6	0.7	1.3	0.5	0.6	--	0.5	0.5	10.8	0.6	1.2	9.7	0.5	9.4	0.5
10-Apr-19	15.9	18.0	17.4	18.8	--	--	--	--	--	--	--	0.9	--	--	--	2.5	0.6	--	0.5	9.7	0.5
26-Mar-19	15.9	18.1	7.7	18.7	2	12	1	0	1	0	1	6	1	1	4	1	1	0.1	1	11.0	0.5
18-Mar-19	15.6	17.7	17.2	19.1	1	1	1	1	1	0	1	1	1	1	20	--	--	10.4	1	9.5	0.5
01-Mar-19	17.9	16.7	15.0	18.0	2	1	1	0	0	1	5	1	1	1	1	20	1	17.0	1	8.9	0.6
15-Feb-19	19.3	21.8	18.2	20.0	4	5	4	3	3	0	2	22	0	5	22	21	3	19.5	0	8.0	0.0
31-Jan-19	14.4	15.0	0.0	16.8	0	0	0	0	0	0	0	0	0	0	0	0	0	11.0	0	8.7	0.0
11-Jan-19	--	--	--	15.0	0	6	0	0	0	0	0	--	0	0	3	13	14	9.9	0	8.6	0.0
26-Dec-18	13.8	14.2	13.7	13.7	0	0	0	0	0	0	0	0	0	0	0	0	0	4.0	0	8.2	8.2
11-Dec-18	14.6	8.6	14.3	14.1	0	0	0	0	0	0	0	0	0.1	0.1	0	0	0	9.4	0	8.3	0
30-Nov-18	15.5	14.7	15.4	13.7	0	0	0	0	0	0	0	0	0	0	0	0	0	8.8	0.2	9.7	0
20-Nov-18	15.8	16.4	16.6	8.0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	--	--	--	--
02-Nov-18	16.1	17.0	16.0	20.6	0.8	1.5	0.3	0	0.1	0	0.5	2.3	0	0.1	0.4	0	4.9	--	--	--	--
08-Oct-18	16.0	16.4	17.1	16.4	0	0	0	0	0	0	0	0	0	0	0	0	0.7	--	--	--	--
21-Sep-18	16.7	16.1	16.8	17.4	0	0.1	0	0	0	0	0	0.1	0	0	0	0.1	0	--	--	--	--
07-Sep-18	17.8	16.2	18.7	17.6	0.3	0.3	0.2	0	0.1	0	0.1	0.3	0.1	0.1	0.2	0.3	0.8	--	--	--	--
30-Jul-18	19.1	18.8	16.0	17.4	0	0	0	0	0	0	0.1	0	0	0	0	0	0	--	--	--	--
13-Jul-18	17.1	16.5	2.2	18.2	0	0	0	0	0	0	0	0.6	0	0	21.0	0	0	--	--	--	--
29-Jun-18	16.5	16.7	18.5	19.1	0	1.4	0	0	0	0	0	5.4	0	0	15.7	0	0.3	--	--	--	--
15-Jun-18	16.3	17.4	18.3	18.9	0	0	0	0	0	0	0	0.2	0	0	13.0	0	0	--	--	--	--
01-Jun-18	15.9	17.8	18.3	20.4	0.1	18.7	21.1	3.0	6.0	0.2	0.2	12.9	0	0	2.6	0	0	--	--	--	--
11-May-18	20.3	19.6	17.5	19.5	0	17.8	0	0	0	0	0	8.6	0	0	0	0	0	--	--	--	--
26-Apr-18	13.5	17.0	18.8	19.5	0	0	0	0	0	0	0	16.5	0	0	0	0	0	--	--	--	--
06-Apr-18	14.7	17.4	15.5	17.5	0	0	0	0	0	0	0	0	--	0	0	0	0	--	--	--	--
07-Mar-18	14.0	16.8	16.1	18.0	0.3	0	0	0.3	0.3	0.3	0.3	0	0.6	0	3.0	0	0.2	--	--	--	--
21-Feb-18	13.4	17.1	16.0	16.7	0.4	0	0	0	1.1	0	0	2.3	0	0	5.1	0	0	--	--	--	--
05-Feb-18	12.6	20.7	20.2	14.9	1.4	1.8	2.0	0	0	0	0.1	2.0	0.9	0.6	2.1	0	0	--	--	--	--
24-Jan-18	13.5	17.3	13.9	14.9	0	0	0	0	0	0	0	0	0	0	0	0	0	--	--	--	--
# Readings	*31*	*31*	*31*	*32*	*31*	*31*	*31*	*31*	*31*	*31*	*31*	*30*	*30*	*31*	*31*	*30*	*30*	*14*	*14*	*14*	*15*
Min. value	*12.6*	*8.6*	*0.0*	*8.0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*8*	*0*
Max. value	*20.3*	*21.8*	*20.2*	*20.6*	*19.6*	*18.7*	*21.1*	*19.8*	*6.0*	*1.3*	*5.0*	*21.9*	*0.9*	*4.8*	*21.8*	*21.4*	*13.6*	*19.5*	*0.7*	*12.6*	*8.2*
AVERAGE	***16.0***	***17.0***	***15.7***	***17.4***	***2.1***	***2.3***	***1.2***	***1.0***	***0.5***	***0.1***	***0.4***	***3.2***	***0.2***	***0.3***	***4.5***	***2.1***	***1.0***	***9.8***	***0.3***	***9.5***	***1.0***
Location	*SG-302*	*SG-303*	*SG-304*	*SG-329*	*SP-01*	*SP-02*	*SP-03*	*SP-04*	*SP-05*	*SP-06*	*SP-07*	*SP-08*	*SP-09*	*SP-10*	*SP-11*	*SP-12*	*SP-13*	*VP-1*	*VP-2*	*VP-3*	*VP-4*

Terminal 5 / RA-3 Landfill Gas Treatment System

Monitoring Results January 2018 - June 2019

Parameter: TEMPERATURE
degrees Fahrenheit (est.)

Date	Monitoring Location												
	SP-01	SP-02	SP-03	SP-04	SP-05	SP-06	SP-07	SP-08	SP-09	SP-10	SP-11	SP-12	SP-13
19-Jun-19	**68.7**	**74.0**	**70.6**	**67.1**	**64.2**	**65.7**	**65.0**	**61.7**	**70.2**	**74.3**	**74.6**	**--**	**--**
05-Jun-19	**73.9**	**77.7**	**70.9**	**65.6**	**66.9**	**64.6**	**65.0**	**60.0**	**71.7**	**73.1**	**76.4**	**67.2**	**72.2**
23-May-19	**66.2**	**70.5**	**66.3**	**63.4**	**63.5**	**62.3**	**63.5**	**58.4**	**68.2**	**68.9**	**68.8**	**64.4**	**65.7**
07-May-19	**64.0**	**71.6**	**65.4**	**62.0**	**61.1**	**60.8**	**59.8**	**54.9**	**66.7**	**68.0**	**71.0**	**61.3**	**62.0**
23-Apr-19	**56.8**	**60.8**	**58.0**	**57.5**	**56.4**	**57.3**	**56.5**	**--**	**58.2**	**60.3**	**60.5**	**57.5**	**58.3**
10-Apr-19	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**54.0**	**--**	**--**	**--**	**52.0**	**52.0**
26-Mar-19	50.0	55.0	51	53.0	50.0	52.0	51.0	51.0	52.0	56.0	55.0	51.0	50.0
18-Mar-19	47.0	52.0	50	51.0	50.0	50.0	51.0	51.0	51.0	53.0	52.0	--	--
01-Mar-19	42.6	51.8	49	52.0	65.0	46.0	48.9	51.0	54.0	48.0	43.5	51.0	50.0
15-Feb-19	43.0	43.0	44	46.2	50.0	44.0	46.1	50.0	47.0	44.0	46.3	43.1	43.6
31-Jan-19	50.0	52.1	50	52.3	56.3	51.6	50.3	53.0	54.1	50.3	52.8	48.7	50.9
11-Jan-19	49.6	51.6	50	54.1	51.6	51.8	51.6	--	50.1	50.9	51.3	50.7	48.7
26-Dec-18	47.1	50.7	--	51.6	47.8	50.0	50.0	50.9	48.3	49.7	44.3	48.0	44.4
11-Dec-18	48.2	50.7	48.4	53.0	47.1	51.8	51.4	55.0	46.5	51.8	48.2	51.4	50.1
30-Nov-18	51.8	54.9	54.1	55.9	52.6	54.3	53.6	57.0	51.4	55.7	54.1	50.7	52.1
20-Nov-18	48.7	52.3	47.1	55.5	52.0	52.7	51.4	58.0	49.9	55.4	54.3	51.6	50.7
02-Nov-18	62	65	63	65	62	66	63	61	63	66	62	60	62
08-Oct-18	68	72	69	68	64	61	65	65	65	66	66	63	55
21-Sep-18	74	71	73	73	70	73	69	70	71	75	76	70	71
07-Sep-18	84	89	82	71	81	81	80	74	92	89	81	81	78
30-Jul-18	84.1	93.7	91.0	78.8	79.8	80.9	79.1	75.0	88.3	87.4	89.8	78.2	81.1
13-Jul-18	83.0	86.0	88.7	79.0	86.0	78.0	75.5	69.8	91.0	81.0	82.4	73.0	75.3
29-Jun-18	73.0	79.0	74.0	83.0	68.0	72.0	70.0	65.0	82.0	77.0	76.0	65.0	68.0
15-Jun-18	74.7	81.3	85.3	69.8	81.4	71.6	71.7	73.7	89.0	71.3	71.8	70.5	71.0
01-Jun-18	67.9	73.7	72.3	66.0	66.0	65.6	64.9	66.2	60.9	70.0	65.0	70.3	70.0
11-May-18	66.0	70.3	68.7	62.9	63.1	62.6	60.7	73.9	67.0	66.2	69.4	64.2	66.2
26-Apr-18	60	69	69	64	65	71	78	74	82	80	78	72	78
06-Apr-18	64	65	63	63	58	60	59	63	--	73	69	65	63
07-Mar-18	53	55	54	59	59	51	55	56	51	51	58	51	59
21-Feb-18	52	53	51	52	56	56	49	50	49	51	50	50	51
05-Feb-18	58	59	59	60	59	60	59	59	61	58	58	51	58
24-Jan-18	55	56	51	58	51	58	56	58	53	53	53	54	54
# Readings	*31*	*31*	*30*	*31*	*31*	*31*	*31*	*30*	*30*	*31*	*31*	*30*	*30*
Min. value	*43*	*43*	*44*	*46*	*47*	*44*	*46*	*50*	*47*	*44*	*44*	*43*	*44*
Max. value	*84*	*94*	*91*	*83*	*86*	*81*	*80*	*75*	*92*	*89*	*90*	*81*	*81*
AVERAGE	***61***	***65***	***63***	***62***	***61***	***61***	***60***	***61***	***63***	***64***	***63***	***60***	***60***
Location	***SP-01***	***SP-02***	***SP-03***	***SP-04***	***SP-05***	***SP-06***	***SP-07***	***SP-08***	***SP-09***	***SP-10***	***SP-11***	***SP-12***	***SP-13***

ATTACHMENT 3

Semiannual Inspection of T-5 Ecology-Lead Sites

2019 Mid-Year Inspection

Second Quarter 2019

RA-1 (FORMER BURLINGTON NORTHERN BUCKLEY YARD PROPERTY), RA-2 AND RA-3 INSPECTION FORM FOR PAVEMENT AND BALLAST COVERS, SURFACE WATER COLLECTION SYSTEMS, AND SECURITY SYSTEMS

Name of Inspector: Warren Hansen, PE/Abby Hawley, EIT
Date (D/M/Y): 6/25/2019
Title: Civil Engineer/Environmental Engineer
Employer: Windward Environmental LLC

FORMER RA-1 BUCKLEY YARD, RA-2 AND RA-3 PAVEMENT AND BALLAST COVERS

1. Interview site personnel. Inquire about condition of pavement and ballast covers including location(s) of any penetrations, cracks, tears, gouges, persistent ponding of water on pavement or around surface water collection system components. Inquire about condition of security fencing and security measures effectiveness. Summarize information obtained from site personnel interviews in the space below along with the name, job title, and daytime telephone number of the interviewee(s).

   This inspection was conducted on June 25, 2019. Some tenant activity was occurring within the terminal area during the inspection; this activity was generally located in the south end of the original Terminal 5 area and the former Salmon Bay Steel North property (Remediation Area 2 [RA-2]). Some equipment is also being stored in the former Lockheed Yard II (RA-5). Gate and access security to the terminal continues to be maintained; a guard continues to control access at the terminal entrance.

   This inspection consisted of examining cap surfaces, select drainage features, fencing, and access controls (e.g., locks), at the former Burlington Northern Buckley Yard (BNBY) property (RA-1), RA-2, and the former Seattle Steel Inc. (SSI) property (RA-3). RA-5 was also inspected, at the client's request. The inspection focused on previously identified issues as well as any new problems. No interviews were conducted as part of this inspection.

   Repairs to the localized settling (approximately 115 × 40 ft) at RA-3 adjacent to the rails in the south portion of the terminal were made in 2016 (noted in the 2017 reports [2017 mid-year report: map note 1 in Attachment 1; 2017 end-of-year report: photos 1 and 2 in Attachment 2]); the majority of these repairs continue to be in good condition. The hole observed in this area during the 2018 end-of-year inspection has been patched and the repair appears to be in good condition.

   The chain-link security fencing surrounding the consolidated landfill was examined. Most of the vegetation along the fence on the west and south sides of the landfill has been removed, aiding in this inspection. One new hole was observed in the fencing on the west side of the landfill area and should be repaired (Attachment 1: map note 1; Attachment 2; photo 1).

   Vegetation—including butterfly bushes (*Buddleia davidii*)—is prevalent in the area near the south rail gates (RA-2; map notes 2 and 3). Vegetation overgrowth is an issue that requires ongoing maintenance, particularly during the current period of reduced activity at in this

portion of the terminal. It is recommended that the vegetation in RA-2 be removed before it damages the pavement cap system. Removal should include the removing plant roots within and below the pavement followed by pavement patching.

2. Inspect pavement and ballast covers, observable surface water collection system components, and site security measures. Identify areas which represent potential pathways for infiltration of surface water through pavement. Include exact location, the nature of the problem, and possible corrective actions. Estimate percentage of pavement with surficial cracks (cracks that do not completely penetrate pavement cover) if surficial cracking appears prevalent. If large areas of site pavement are inaccessible at the time of inspection due to container placement or site activities, identify these locations. Inspect surface water collection system catch basins and identify maintenance (clean out) or possible repair requirements. Also inspect perimeter fencing and comment on site security measures. Summarize inspection observations in spaces below.

   The pavements, ballast covers, fencing, and surface features associated with the stormwater drainage systems were examined during this inspection.

   Five areas of pavement mounding with cracks wider than ¼ in. were observed in RA-2 and RA-3 during the previous inspection. The cracks at three of these locations (see 2018 end-of-year inspection, Attachment 1, map notes 4, 5, and 6) have been sealed; the mounding in these areas should be monitored. Cracks at two of the observed locations have not been addressed and should be sealed:

   1. Map note 4 (RA-2): The impacted area is approximately 25 × 6 ft (photo 2). The cracks are approximately as wide as 1 in. and as deep as 5 in. (photo 3).
   2. Map note 5 (RA-2): This area includes cracking over an area of approximately 15 × 5 ft and mounding over an area of approximately 5 × 5 ft (photo 4). The cracks are as wide as approximately 2 in. (photo 5).

   These conditions are localized and do not compromise the overall cap performance. However, these mounding areas are in traffic areas and should be addressed. Near-term (i.e., temporary) sealing of the cracks should also be done to prevent further deterioration in these two locations. The cause of the mounding in the five areas (possibly buried piles or old foundations) should be determined and, if possible, removed.

   The hole in the pavement approximately 2 × 2 ft and approximately 4 ft deep observed near the northeast corner of RA-5 at the shoreline where the West Waterway enters Elliott Bay during the end-of-year 2018 inspection has been repaired; the repairs appear to be in good condition.

   Five cracks wider than ¼ in. penetrating the cap surface that were observed in RA-3 during the 2018 end-of-year inspection have been sealed (see 2018 end-of-year inspection report, Attachment 1: map notes 10 – 14 and Attachment 2: photos 13 – 17).

   Deterioration was observed at an area of pavement just west of the truck weight scales in RA-2 (map note 6). It appears that Ecology blocks were removed from the area, exposing a

difference in grade between two areas of pavement (photo 6). Underlying material is not exposed; this area should be monitored during future inspections to check for further deterioration or any exposure of underlying material.

During the inspection, the ballast covers appeared to be in good condition. The Burlington Northern Santa Fe (BNSF) access road was inspected; recent maintenance work was observed along the southern portion of the access road. Some potholes no deeper than 3 to 4 inches were observed on the portion of the access road running north to south (map note 7). These areas should be monitored during future inspections and BNSF should be notified of future repair needs, if necessary.

There were no signs of erosion or exposure of the underlying consolidated landfill liner during this inspection. During the 2018 end-of-year inspection, three locations were observed on the eastern side of the landfill from which vegetation had been completely cleared and loose dirt/sand had been placed (2018 end-of-year inspection report, Attachment 1: map notes 17, 18, and 19). Vegetation has re-established in one of these areas. The other two areas remain void of vegetation (map notes 8 and 9). A representative photo of these two areas is included in Attachment 2 (photo 7). These areas have the potential to erode; they should be inspected during future inspections (if not more often). There was no visual evidence that the underlying liner was exposed.

The landfill cover area east of Harbor Avenue SW and outside of the fenced consolidated landfill area was checked for signs of erosion. No erosion was observed is this area.

3. Immediately contact Port of Seattle Environmental Manager at (206) 787-3193 if any crack, tear, or hole is present in the pavement or ballast cover that provides direct contact to subsurface soils. Penetrations through the cap/covers that provide direct contact to subsurface soils require immediate repair. Minor surficial pavement cracks are to be repaired on a more routine maintenance schedule but on a schedule that prevents exacerbation of cracking to allow infiltration of surface water or direct contact with subsurface soils.

   The hole in the fence on the west side of the consolidated landfill should be repaired. The two localized areas of pavement mounding and cracking located in RA-2 should be addressed as described in Section 2.

RAILROAD TRACK AREA
Ballast covering ties, shoulders as designed: ___Y__
Ballast rutted or uneven, requiring regrading: ___N__
Repair Type/Location: _____

PAVEMENT AREA
Open cracks and/or ruts: None _____ Repair needed __X__
Surface Drainage (ponding): None __X__ Repair needed ____
Repair Type/Location: See Sections 1, 2, and 3 for information pavement deterioration in RA-2 and two areas in RA-2 where cracks are present in areas of pavement mounding.

SURFACE WATER COLLECTION
Slow drainage or ponding at catch basin: None __X__ Repair needed_____
Ponding in other areas: None __X__ Repair needed_____
Maintenance/Repair Type/Location: None.

SITE SECURITY
Signs, fence & gates in place Yes _____ Repair needed __X___
Repair Type/Location: The hole in the fence on the west side of the consolidated landfill should be patched.

4. Sketch site. Attach a site sketch indicating areas inspected, locations of problem areas (prevalent surface cracking in pavement, etc.), and inaccessible areas. Include photographs of problem areas if appropriate.

A map (Attachment 1) and photos (Attachment 2) are attached showing locations and issues noted in this inspection report.

CONSOLIDATED LANDFILL COVER

1. Inspect the cover surface semi-annually to check for erosion and any areas of ponding. If erosion extends to the depth of the geotextile layer, the geotextile must be inspected for any damage (punctures, tears, bulging, etc.) and repaired in accordance with the Field Quality Control Manual. The Port's Environmental Specialist shall be notified regarding any damage or alteration to the landfill cover or surface water collection systems.

Does erosion of the cover exist in any form resulting in the potential for exposure of the underlying geotextile layer? _____ YES __X__NO

No erosion was observed during this inspection. See Section 2 for information on two areas of the landfill covered with loose soil, which should be monitored during future inspections.

Are there areas of persistent ponding of water that result from depressions in the pavement surface or from lack of catch basin/storm drain maintenance?
_____ YES __X__NO
Note any problem areas on an attached site sketch or map and include photographs as needed.

No ponding was observed during this inspection.

SUMMARY OF RECOMMENDATIONS

The conditions identified in this report requiring follow-up actions are listed below:

Condition Noted	Map (Attachment 1) reference	Recommendation
Hole in fence on west side of consolidated landfill	1	Patch hole.

Condition Noted	Map (Attachment 1) reference	Recommendation
Vegetation growth near terminal entrance, RA-2	2, 3	Remove vegetation from these location and from throughout RA-2 during maintenance. Check during future inspections.
Elongated pavement mounding with cracks wider than ¼ in., RA-2	4	Evaluate and repair prior to new tenant occupancy. Clean and seal cracks. Check during future inspections.
Pavement mounding with cracks wider than ¼ in., RA-2	5	Evaluate and repair prior to new tenant occupancy. Clean and seal cracks. Check during future inspections.
Pavement deterioration at interface of lifts at different grades	6	Monitor during future inspections.
Potholes in BNSF access road	7	Monitor. Request BNSF to repair as needed.
Area of cleared vegetation covered with loose soil, east slope of consolidated landfill, RA-3	8, 9	Monitor.

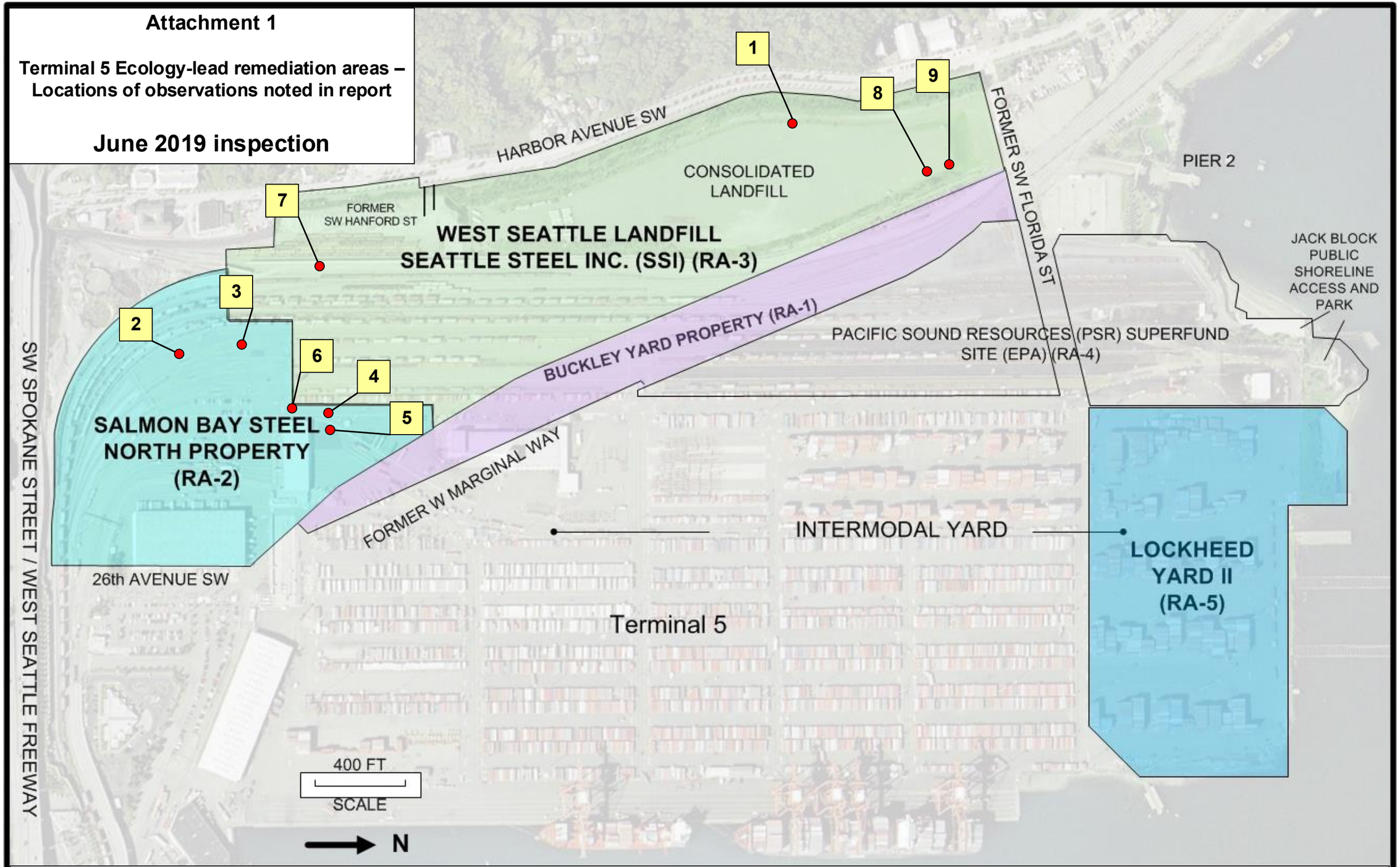
List attachments below:

- Attachment 1: Terminal 5 Ecology-lead remediation areas - Locations of observations noted in report (map)
- Attachment 2: Select Inspection Photographs

Attachment 1

Terminal 5 Ecology-lead remediation areas – Locations of observations noted in report

June 2019 inspection



Notes:

1. Hole in fence on west side of consolidated landfill
2. Vegetation growth near south rail gate
3. Vegetation growth near south rail gate
4. Pavement mounding with cracks wider than ¼ in.
5. Pavement mounding with cracks wider than ¼ in.
6. Pavement deterioration
7. Potholes in BNSF access road
8. Area cleared of vegetation and covered with loose soil
9. Area of cleared vegetation covered with loose soil

TERMINAL 5 EXPANSION (SOUTHWEST HARBOR PROJECT) – ECOLOGY-LEAD CONSENT DECREE REMEDIATION AREAS

Attachment 2: Select Inspection Photographs

Photo 1. Hole in fence, west side of consolidated landfill: RA-3 (map note 1)

Photo 2. Elongated mound in pavement with cracks as wide as 1 in.: RA-2 (map note 4)

Photo 3. Close up of elongated mound in pavement with cracks as wide as 1 in.: RA-2 (map note 4)

Photo 4. Mound in pavement with cracks as wide as 2 in.: RA-2 (map note 5)

Photo 5. Close-up of mound in pavement with cracks as wide as 2 in.: RA-2 (map note 5)

Photo 6. Pavement deterioration: RA-2 (map note 6)

Photo 7. Representative photo of two areas on east landfill slope, cleared of vegetation and covered with lose sandy soil: RA-3 (map notes 8 and 9)