



May 7, 2020

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

Subject: First Quarter 2020 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 provides the 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 landfill gas monitoring for January, February, and March 2020. This report also includes the second biannual cap inspection report for the 2019 reporting year, which was conducted in early 2020. 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.

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

Landfill Monitoring:

The landfill gas collection system is currently operating in passive mode. The system was transitioned to passive operation December 2016, by replumbing the system discharge piping to bypass the blower and shutting the blower off.

Landfill gas was monitored at the following locations during this quarter:

- Off-site soil gas probes located beyond the former landfill margin to the west, along Harbor Avenue (SG-302, SG-303, SG-304, and SG-329).
- On-site soil gas probes located beyond the former landfill margin to the north, east, southeast, and south of the former landfill (VP-1, VP-2, VP-3, and VP-4, respectively).
- System sampling ports located at various locations within the gas collection system piping (SP-01 through SP-13).

Monitoring was conducted on a twice-monthly schedule (Attachment 1). Cumulative monitoring results are tabulated in Attachment 2; findings for methane in on- and off-site soil gas probes are summarized below:

- Methane was not detected in any of the off-site soil gas probes along Harbor Avenue this quarter.
- In general, methane in the on-site soil gas probes was either not detected or was below the action level of 5 percent. Exceptions to this were the 1/29/20 reading of 8.2 percent in VP-4 and three readings of about 36 percent in VP-3. All other readings from these two probes during the quarter, including the three most recent monitoring events, were below the action level.
- Methane levels inside the landfill, as reflected by the system sampling ports in the landfill gas collection piping, ranged from non-detect to well over 50 percent, as would be expected.

The sporadic detections of methane in VP-3 at about 36 percent alternating with periods where it is not detected is puzzling. We propose to continue twice-monthly monitoring of all locations. We will double check the operation and calibration of our field instrument and will conduct a visual inspection of soil gas probe VP-3 to see if there are any obvious reasons for the anomalous readings. We will again reevaluate the monitoring results and make recommendations as necessary in the next quarterly monitoring report.

Cap Monitoring:

The required annual wet-season cap monitoring was not completed during this quarter due to weather and logistical limitations. Instead, the “2019” wet season cap monitoring will be completed during the first quarter of calendar year 2020 and will be reported in the next quarterly report.

B. Detailed description of any deviations from the required tasks not otherwise documented above or 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 deliverable will be the first quarter 2020 monitoring report, which will document the ongoing landfill gas monitoring and the annual 2019 cap monitoring (to be conducted in first quarter 2020).

Please contact me at (206) 787-3193 if you have any questions or comments about this report.

Sincerely,

Brick Spangler
Sr. Environmental Program Manager

Attachments:

Attachment 1 – 1Q20 Quarterly Landfill Gas Monitoring Results Memorandum

Attachment 2 – 1Q20 Quarterly Landfill Gas Cumulative Monitoring Results Tables

Attachment 3 – 4Q19 Biannual Cap Inspection Report (with attachments)

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



ATTACHMENT 1

1Q20 Landfill Gas Monitoring Results Memorandum

MEMORANDUM

DATE: May 7, 2020

TO: Brick Spangler, Port of Seattle

FROM: Mark Dage

RE: **Terminal 5 Landfill Gas Collection System Monitoring Results**
First Quarter 2020
17627-06

This memorandum summarizes the results of the first quarter 2020 monitoring at the Terminal 5 (T-5) Remediation Area 3 landfill. The location of the landfill in relation to nearby features is shown on Figure 1. The landfill gas collections system, soil gas probes, and system monitoring points are shown on Figure 2. A schematic cross-section through the landfill is shown on Figure 3.

Monitoring Conducted

This quarter's report includes twice-monthly gas monitoring. Gas concentrations were measured in the field using an LMS-40 or Landtec GEM 2000 gas analyzer. The landfill gas collection system is currently operating in passive mode. The system was transitioned to passive operation December 2016, by replumbing the system discharge piping to bypass the blower and shutting the blower off.

The following locations were monitored during this quarter:

- Off-site soil gas probes located beyond the former landfill margin to the west along Harbor Avenue (SG-302, SG-303, SG-304, and SG-329);
- On-site soil gas probes located beyond the former landfill margin to the north, east, southeast, and south of the former landfill (VP-1, VP-2, VP-3, and VP-4, respectively); and
- System sampling ports located at various locations within the gas collection system piping (SP-01 through SP-13).

Results

Complete monitoring results are presented in Attachment 2. A summary of methane concentrations is provided in the following sections.



Off-Site Soil Gas Probes

Methane was not detected in any of the off-site soil gas probes along Harbor Avenue this quarter.

On-Site Soil Gas Probes

In general, methane in the on-site soil gas probes was either not detected or was below the action level of 5 percent. Exceptions to this were the 1/29/20 reading of 8.2 percent in VP-4 and three readings of about 36 percent in VP-3. All other readings from these two probes during the quarter, including the three most recent monitoring events, were below the action level.

Collection System Sampling Ports

Methane levels inside the landfill, as reflected by the system sampling ports in the landfill gas collection piping, ranged from non-detect to well over 50 percent, as would be expected. Readings from the flow meter at the system outlet indicated an average exhaust rate of about 0.3 cubic feet per minute.

Conclusions

Because of the sporadic exceedances of the methane action levels in the two on-site soil-gas probes, we intend to continue twice-monthly monitoring. We will reevaluate the monitoring results and make recommendations as necessary in the next quarterly monitoring report (first quarter 2020).

Attachments:

Figure 1 – Vicinity Map Showing Nearby Structures

Figure 2 – Site Plan

Figure 3 – Cap Schematic Cross Section

Figure 4 – Methane Monitoring Results

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Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

--- Approximate Geomembrane Limits

0 250 500 1,000
Feet



Port of Seattle, Southwest Harbor Terminal 5
Seattle, Washington

Vicinity Map Showing Nearby Structures

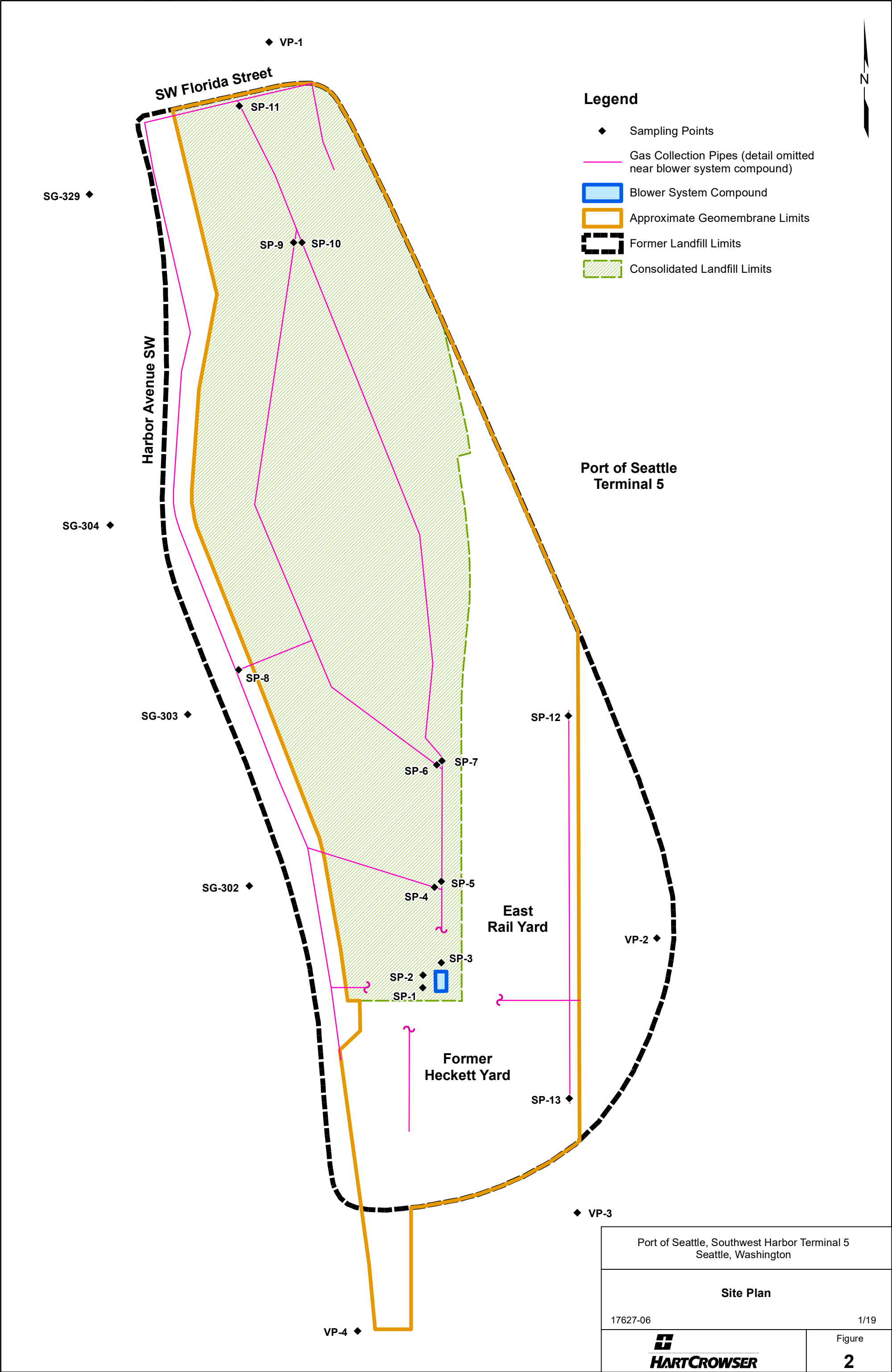
17627-06

1/19

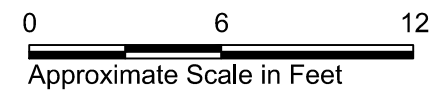
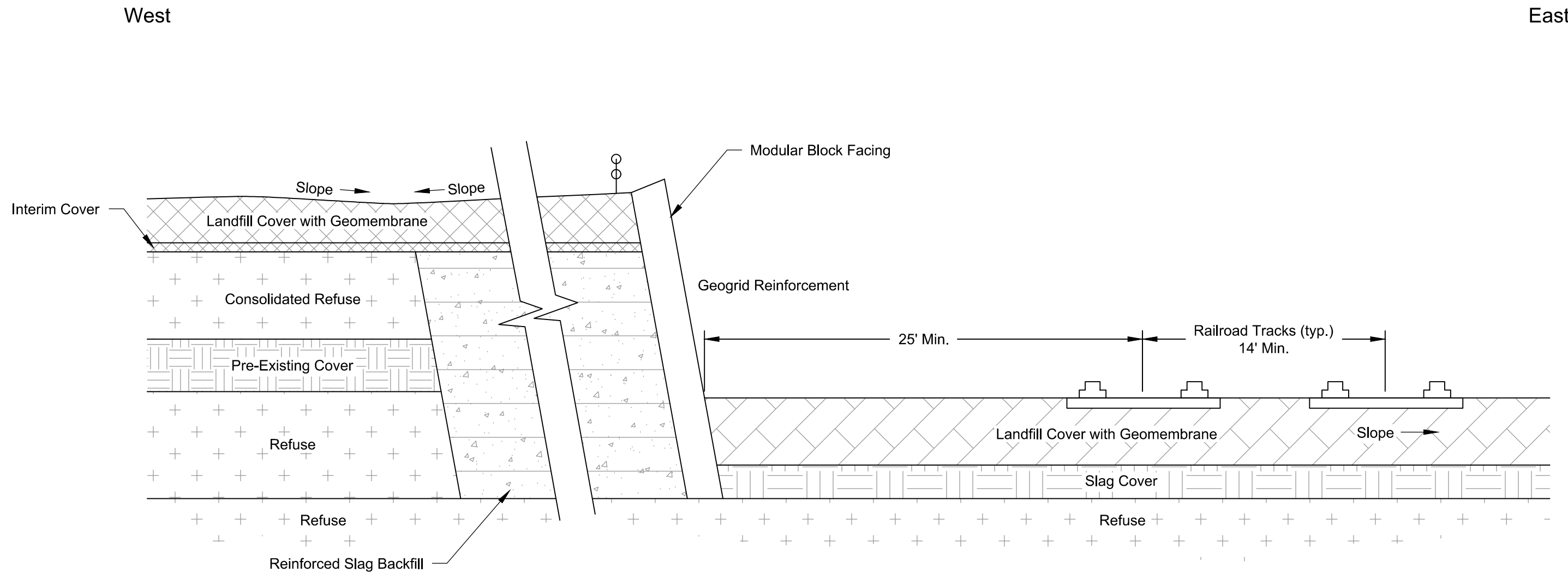


Figure

1

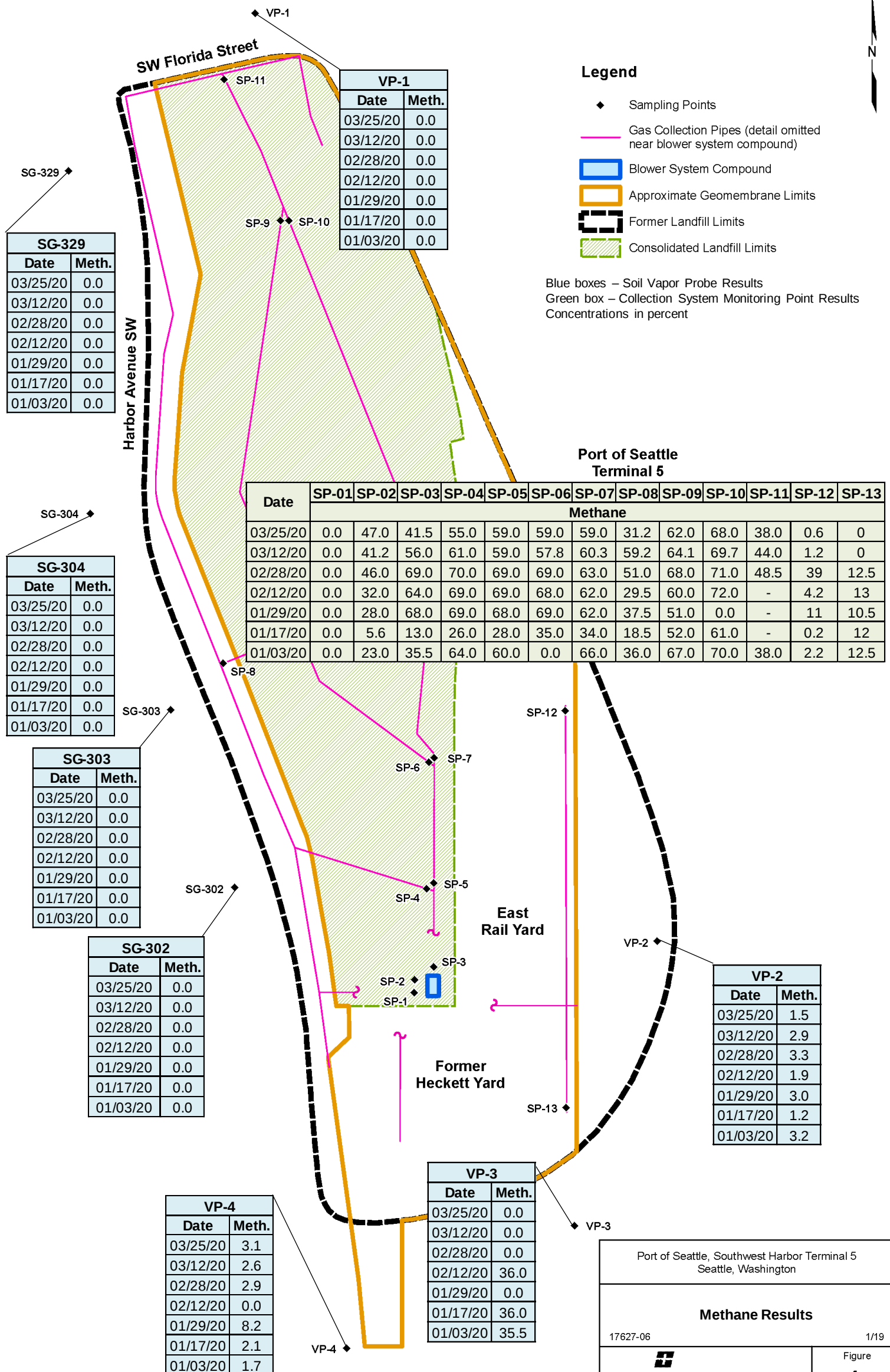
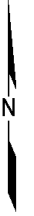


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Sources: Figure prepared from PDF "Cross Section - Final Landfill Cover System," created by Woodward-Clyde Consultants, dated 2/21/95.

Port of Seattle, Southwest Harbor Terminal 5 Seattle, Washington	
Cap Schematic Cross Section	
17627-06	1/19
	Figure 3





ATTACHMENT 2

1Q20 Landfill Gas Cumulative Monitoring Results Tables

Terminal 5 / RA-3 Landfill Gas Monitoring

Parameter: METHANE

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

Date	Off-Site Soil Gas Probes				On-Site Soil Gas Probes				Landfill Gas Collection System Monitoring Points												
	SG-302	SG-303	SG-304	SG-329	VP-1	VP-2	VP-3	VP-4	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
12/18/19	0.00	0.00	0.00	0.00	0.00	2.10	36.50	1.60	0.00	5.60	18.00	28.50	29.50	45.00	43.00	45.00	60.00	69.00	43.50	17.50	13.00
12/04/19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.70	52.00	66.00	71.00	70.00	72.00	66.00	0.00	63.00	71.00	--	0.10	0.10
11/06/19	0.00	0.00	0.00	0.00	--	3.10	0.00	0.70	0.00	49.00	18.50	49.50	45.50	65.00	69.00	22.50	66.00	71.00	41.00	2.70	22.50
10/22/19	0.00	0.00	0.00	0.00	0.00	5.30	0.00	3.40	0.20	26.50	70.30	72.10	75.20	77.80	66.70	12.90	63.60	65.40	0.80	10.50	28.30
10/08/19	0.00	0.00	0.00	0.00	0.00	4.90	0.00	2.80	0.30	30.50	65.00	72.80	61.00	73.90	66.40	32.30	63.20	63.80	0.90	9.90	12.20
09/23/19	0.00	0.00	0.00	0.00	0.00	4.90	0.00	1.80	0.00	31.70	28.90	70.10	69.30	71.80	65.70	18.00	63.00	66.60	32.30	7.20	20.10
09/12/19	0.00	0.00	0.00	0.00	0.00	6.70	0.00	3.00	0.00	40.60	26.70	67.80	68.20	71.40	66.70	18.80	61.00	65.60	36.90	6.40	19.20
08/29/19	0.00	0.00	0.00	0.00	0.00	7.10	0.00	1.90	0.40	16.70	70.90	71.60	75.10	77.10	66.70	19.00	66.90	68.30	31.00	5.20	20.70
08/14/19	0.00	0.00	0.00	0.00	0.00	5.80	0.00	3.40	0.20	8.80	70.20	73.60	75.20	77.90	65.90	11.40	66.30	69.20	32.60	4.80	18.70
07/26/19	-	0.00	0.00	0.00	-	5.90	0.00	-	0.90	33.50	66.00	72.00	62.00	71.90	60.40	34.10	63.80	64.70	0.00	10.80	12.20
07/11/19	0.00	0.00	0.00	0.00	0.00	5.50	0.00	4.40	0.80	49.00	58.00	72.00	72.00	75.00	65.00	12.50	67.00	67.00	41.00	0.60	13.50
06/19/19	0.00	0.00	0.00	0.00	0.00	4.00	0.00	4.20	8.40	51.00	66.00	1.80	74.00	76.00	65.00	15.50	66.00	68.00	39.50	--	--
06/05/19	0.00	0.00	0.00	0.00	0.00	--	--	2.90	51.00	55.00	65.60	67.30	68.50	67.10	59.30	30.70	60.50	63.10	36.30	9.00	9.00
05/23/19	0.00	0.00	0.00	0.00	0.00	4.00	0.00	2.40	49.00	48.00	67.00	70.00	71.00	73.00	62.00	24.00	67.00	68.00	57.00	2.00	13.00
05/07/19	0.00	0.00	0.00	0.00	0.00	2.90	0.00	1.10	0.40	13.50	23.50	38.50	44.50	56.00	54.00	4.90	64.00	67.00	4.40	1.50	10.50
04/23/19	0.00	0.00	0.00	0.00	0.00	1.60	0.00	2.90	22.00	51.00	45.00	58.00	50.00	69.00	68.00	--	64.00	67.00	33.50	4.60	9.70
04/10/19	0.00	0.00	0.00	0.00	--	2.60	0.40	0.50	--	--	--	--	--	--	--	33.50	--	--	--	0.00	10.00
03/26/19	0.00	0.00	0.00	0.00	0.00	2.20	0.00	2.50	11.00	11.50	47.00	65.00	67.00	70.00	60.00	6.90	64.00	69.00	56.00	7.50	9.50
03/18/19	0.00	0.00	0.00	0.00	0.00	0.90	0.00	0.40	32.00	49.00	69.00	72.00	70.00	71.00	61.00	20.00	59.00	70.00	4.30	--	--
03/01/19	0.00	0.00	0.00	0.00	0.00	0.70	0.00	0.00	26.50	38.00	66.00	71.00	68.00	70.00	60.00	17.50	64.00	69.00	42.00	0.70	9.60
02/15/19	0.00	0.00	0.00	0.00	0.00	0.06	0.00	3.20	10.70	12.10	27.10	36.00	38.70	57.90	53.30	0.00	63.60	51.50	0.00	0.00	10.20
01/31/19	0.10	0.00	0.00	0.00	0.00	1.70	0.00	1.10	42.60	43.40	74.20	73.40	74.90	74.40	64.50	42.30	64.70	73.90	45.70	18.80	9.80
01/11/19	--	--	--	11.00	2.30	2.30	0.00	2.60	43.00	18.50	64.00	66.00	64.00	65.00	59.00	--	66.00	67.00	39.00	15.50	14.50

Terminal 5 / RA-3 Landfill Gas Monitoring

Parameter: OXYGEN

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

	Off-Site Soil Gas Probes				On-Site Soil Gas Probes				Landfill Gas Collection System Monitoring Points												
	SG-302	SG-303	SG-304	SG-329	VP-1	VP-2	VP-3	VP-4	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
12/18/19	15.80	17.20	14.60	17.10	5.80	0.20	7.40	0.40	20.70	15.00	2.50	4.00	3.70	2.90	3.00	0.40	0.00	0.20	0.30	0.10	1.20
12/04/19	19.50	19.40	19.40		20.00	19.50	19.50	--	20.70	0.00	0.10	0.00	0.20	0.00	0.10	19.40	0.00	0.00	--	19.60	19.70
11/06/19	15.30	3.60	0.40	16.00	--	0.00	10.10	10.20	0.00	0.20	1.30	0.00	0.10	0.10	0.00	0.30	0.00	0.00	0.00	0.00	0.10
10/22/19	19.30	15.80	16.30	19.20	7.20	0.80	15.90	1.60	22.10	12.10	0.50	0.40	1.20	0.10	0.20	32.10	0.10	0.20	6.60	0.60	0.10
10/08/19	16.10	18.00	17.40	20.60	7.30	1.00	12.80	2.10	20.10	9.70	1.20	0.80	4.20	0.10	0.20	0.10	0.20	0.10	7.20	0.10	0.20
09/23/19	18.80	17.30	16.60	18.50	7.10	0.50	13.80	0.60	20.10	3.20	2.60	2.00	1.60	1.50	1.20	3.80	1.40	1.20	1.90	2.00	2.30
09/12/19	18.20	16.50	16.60	17.50	7.30	0.50	13.70	1.40	20.90	2.50	1.60	1.90	1.90	1.40	1.30	4.30	1.40	1.40	1.10	2.00	1.20
08/29/19	17.10	16.40	19.50	18.40	21.70	0.00	14.50	0.00	21.40	5.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.40	0.50	0.30
08/14/19	18.90	16.60	16.60	18.50	7.30	0.50	14.40	0.60	21.20	13.10	0.70	0.40	0.40	0.20	0.20	31.30	0.20	0.40	0.50	0.60	0.80
07/26/19	-	15.40	18.00	18.20	-	0.20	13.40	-	20.10	8.10	0.60	0.70	3.30	0.20	0.10	0.20	0.10	0.10	7.30	0.20	0.20
07/11/19	17.20	16.70	18.40	18.20	8.20	0.50	13.00	0.50	20.00	1.70	0.60	0.50	0.70	0.70	0.50	3.80	0.50	0.90	0.70	16.80	0.80
06/19/19	17.50	17.50	18.40	18.70	8.60	0.70	12.60	0.60	18.20	0.90	0.50	19.80	0.50	0.00	0.50	2.20	0.50	0.50	0.80	--	--
06/05/19	17.70	17.60	18.50	19.60	9.50	--	--	1.90	2.20	0.50	1.10	0.50	0.50	1.30	0.70	1.60	0.40	0.60	0.40	2.20	1.50
05/23/19	16.60	17.60	18.00	18.90	9.00	0.00	10.40	0.60	3.00	1.00	0.50	0.50	0.00	0.60	0.50	6.00	0.00	0.50	3.20	0.50	0.70
05/07/19	15.50	17.70	17.70	18.40	9.60	0.00	9.30	0.50	19.60	3.40	3.40	1.70	1.40	0.50	0.80	5.60	0.50	0.00	11.50	0.50	0.60
04/23/19	15.10	17.40	19.60	17.70	9.70	0.50	9.40	0.50	11.50	0.50	1.60	0.70	1.30	0.50	0.60	--	0.50	0.50	10.80	0.60	1.20
04/10/19	15.90	18.00	17.40	18.80	--	0.50	9.70	0.50	--	--	--	--	--	--	--	0.90	--	--	--	2.50	0.60
03/26/19	15.90	18.10	7.70	18.70	0.10	0.50	11.00	0.50	1.80	12.00	0.50	0.00	0.50	0.00	0.50	5.60	0.50	0.50	4.00	1.10	1.00
03/18/19	15.60	17.70	17.20	19.10	10.40	0.50	9.50	0.50	0.50	0.50	0.50	0.50	0.50	0.00	0.60	0.60	0.50	0.50	19.60	--	--
03/01/19	17.90	16.70	15.00	18.00	17.00	0.60	8.90	0.60	2.10	0.60	0.50	0.00	0.00	0.50	5.00	1.00	0.50	0.50	0.50	19.60	0.80
02/15/19	19.30	21.80	18.20	20.00	19.50	0.00	8.00	0.00	4.20	4.90	4.30	2.50	2.50	0.00	1.60	21.90	0.00	4.80	21.80	21.40	2.90
01/31/19	14.40	15.00	0.00	16.80	11.00	0.00	8.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
01/11/19	--	--	--	15.00	9.90	0.00	8.60	0.00	0.00	6.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	2.60	13.10	13.60

Terminal 5 / RA-3 Landfill Gas Monitoring

Parameter: CARBON DIOXIDE

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

Date	Off-Site Soil Gas Probes				On-Site Soil Gas Probes				Landfill Gas Collection System Monitoring Points												
	SG-302	SG-303	SG-304	SG-329	VP-1	VP-2	VP-3	VP-4	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
12/18/19	2.60	2.30	2.70	1.30	4.20	3.10	0.10	2.20	0.00	2.00	6.30	4.10	4.20	3.60	3.00	6.90	7.50	6.50	7.90	8.40	4.30
12/04/19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.10	18.00	3.40	0.70	4.10	4.60	1.10	0.00	5.90	4.50	--	0.00	0.00
11/06/19	2.70	16.20	20.20	2.30	--	4.00	0.00	2.50	20.50	16.00	7.20	2.70	3.60	3.50	3.90	11.00	6.70	4.90	9.00	9.40	4.90
10/22/19	2.10	3.20	2.50	1.50	7.50	4.10	0.00	2.80	0.20	6.50	4.20	1.80	5.20	5.30	2.50	11.40	4.80	3.20	10.20	11.60	4.90
10/08/19	3.80	2.90	3.10	2.00	7.60	4.20	0.30	3.30	0.10	6.20	3.40	0.20	2.40	3.80	0.80	13.60	3.80	3.20	8.00	10.90	6.70
09/23/19	2.30	3.80	2.40	2.00	6.90	5.10	0.00	2.30	0.00	10.80	5.40	0.50	4.20	4.20	2.50	11.70	4.30	5.00	10.80	8.40	5.90
09/12/19	2.00	3.30	2.20	2.10	7.10	4.60	0.00	2.50	0.00	15.30	7.10	0.40	3.60	4.40	3.10	10.00	4.70	4.10	11.30	10.50	5.90
08/29/19	2.70	4.50	2.00	2.00	0.00	4.80	0.00	3.00	0.10	7.20	5.10	1.70	5.10	4.60	2.70	14.60	5.30	4.80	11.70	12.10	6.20
08/14/19	2.20	3.90	2.50	1.90	7.50	4.00	0.00	2.60	0.10	3.60	3.70	0.80	4.40	5.00	2.50	12.90	5.10	4.50	11.70	11.60	5.80
07/26/19	-	4.30	2.70	2.00	-	3.50	0.00	-	0.20	4.20	2.40	0.30	2.40	4.30	1.30	11.90	3.70	3.20	7.10	11.80	6.30
07/11/19	1.60	2.70	1.80	1.40	4.80	2.30	0.00	2.00	0.10	15.00	2.80	2.20	3.40	3.90	0.90	8.90	3.80	3.20	8.60	1.60	4.60
06/19/19	1.60	1.90	1.60	1.10	4.80	1.70	0.00	1.90	0.40	16.00	2.60	0.10	3.50	3.30	0.90	8.40	3.80	3.30	8.70	--	--
06/05/19	2.30	2.70	2.10	1.40	5.90	--	--	2.30	15.00	17.00	3.20	0.10	3.70	3.40	1.20	10.50	4.10	3.40	10.10	8.90	5.00
05/23/19	2.20	2.10	1.70	1.00	4.50	0.90	0.00	2.00	4.80	15.00	3.20	0.10	3.20	3.70	1.60	5.80	3.80	3.30	3.10	8.60	4.50
05/07/19	2.00	2.10	1.50	1.10	4.50	0.70	0.00	1.90	0.20	5.80	3.50	2.90	2.80	2.20	2.40	9.00	4.90	4.40	1.90	8.20	4.10
04/23/19	1.80	2.10	0.40	1.10	3.80	0.50	0.00	1.50	1.90	15.00	3.80	2.80	3.10	2.90	2.20	--	4.20	4.00	2.10	7.30	4.10
04/10/19	1.60	2.10	1.40	0.90	--	0.40	0.00	1.50	--	--	--	--	--	--	--	7.20	--	--	--	7.40	4.20
03/26/19	1.10	2.00	1.00	0.80	3.40	0.20	0.00	1.20	6.10	2.40	2.80	2.40	4.00	4.60	1.10	6.40	5.00	4.50	3.70	6.30	3.80
03/18/19	1.10	2.20	1.10	0.60	3.10	0.10	0.00	1.30	4.50	15.00	2.60	0.00	2.60	3.30	0.80	5.90	4.50	3.80	0.00	--	--
03/01/19	0.50	2.60	1.90	0.80	0.80	0.00	0.00	1.30	4.00	12.00	2.70	0.00	3.20	3.50	0.80	6.30	4.60	4.20	7.00	0.10	3.80
02/15/19	1.00	0.00	2.10	1.10	1.80	0.02	0.00	1.70	7.30	6.30	4.60	4.30	4.40	5.90	2.60	0.00	8.20	6.00	0.00	0.00	4.60
01/31/19	2.30	4.30	2.20	1.60	4.00	0.20	0.00	0.90	4.10	15.10	3.50	0.00	3.40	3.40	0.80	6.00	5.70	4.80	8.10	8.60	4.80
01/11/19	--	--	--	1.40	2.70	0.00	0.00	0.60	2.80	6.60	4.30	0.00	4.70	4.90	1.20	--	5.80	4.50	4.60	1.90	1.70

Terminal 5 / RA-3 Landfill Gas Monitoring

Parameter: TEMPERATURE

(IR thermometer, degrees Fahrenheit)

Date	Landfill Gas Collection System Monitoring Points												
	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
12/18/19	46.20	48.20	46.70	50.60	48.70	51.90	50.90	54.60	47.30	51.10	43.00	-	-
12/04/19	51.60	52.50	52.10	56.00	51.40	53.50	52.20	50.90	51.50	52.70	--	51.60	50.60
11/06/19	53.40	56.20	54.30	57.80	52.10	55.10	53.50	59.80	52.90	57.30	52.70	53.60	53.00
10/22/19	63.20	78.10	76.30	68.90	72.10	65.40	66.60	73.40	80.10	70.60	71.60	73.10	78.20
10/08/19	60.30	73.20	70.90	65.30	63.60	78.20	70.90	64.60	78.20	76.60	75.30	72.10	75.50
09/23/19	65.30	72.10	70.50	70.30	64.80	67.70	65.00	69.30	69.90	72.10	72.50	68.50	68.60
09/12/19	65.90	72.10	70.60	69.80	65.90	69.70	66.00	68.70	70.80	73.90	72.50	67.50	68.40
08/29/19	71.90	78.40	73.20	71.60	68.30	72.60	69.20	69.50	73.80	76.60	78.60	72.30	73.20
08/14/19	74.90	80.50	75.90	71.60	69.10	72.10	68.60	67.40	78.00	83.20	81.00	81.10	77.50
07/26/19	75.20	82.40	76.20	70.70	69.50	84.80	74.50	64.80	82.00	80.40	-	72.30	76.60
07/11/19	72.00	74.20	70.70	68.80	68.00	69.00	68.00	64.70	73.00	75.10	75.90	69.40	69.40
06/19/19	72.00	74.20	70.70	68.80	68.00	69.00	68.10	64.70	73.00	75.10	75.90	69.40	69.40
06/05/19	73.90	77.70	70.90	65.60	66.90	64.60	65.00	60.00	71.70	73.10	76.40	67.20	72.20
05/23/19	66.20	70.50	66.30	63.40	63.50	62.30	63.50	58.40	68.20	68.90	68.80	64.40	65.70
05/07/19	64.00	71.60	65.40	62.00	61.10	60.80	59.80	54.90	66.70	68.00	71.00	61.30	62.00
04/23/19	56.80	60.80	58.00	57.50	56.40	57.30	56.50	--	58.20	60.30	60.50	57.50	58.30
04/10/19	--	--	--	--	--	--	--	54.00	--	--	--	52.00	52.00
03/26/19	50.00	55.00	51.00	53.00	50.00	52.00	51.00	51.00	52.00	56.00	55.00	51.00	50.00
03/18/19	47.00	52.00	50.00	51.00	50.00	50.00	51.00	51.00	51.00	53.00	52.00	--	--
03/01/19	42.60	51.80	48.90	52.00	65.00	46.00	48.90	51.00	54.00	48.00	43.50	51.00	50.00
02/15/19	43.00	43.00	44.00	46.20	50.00	44.00	46.10	50.00	47.00	44.00	46.30	43.10	43.60
01/31/19	50.00	52.10	49.90	52.30	56.30	51.60	50.30	53.00	54.10	50.30	52.80	48.70	50.90
01/11/19	49.60	51.60	50.00	54.10	51.60	51.80	51.60	--	50.10	50.90	51.30	50.70	48.70

Terminal 5 / RA-3 Landfill Gas Monitoring

Parameter: PRESSURE

(Gauge - inches of water.)

Date	Off-Site Soil Gas Probes				On-Site Soil Gas Probes				Landfill Gas Collection System Monitoring Points												
	SG-302	SG-303	SG-304	SG-329	VP-1	VP-2	VP-3	VP-4	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
12/18/19	0.00	0.00	0.02	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.08	0.00	0.08	0.00	0.04
12/04/19	0.00	0.00	0.02	0.02	0.00	0.00	0.00	--	0.10	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	--	0.00	0.00
11/06/19	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.10	0.00	0.00	0.08	0.00	0.00	0.02	0.04	0.00	0.00	0.08	0.00	0.00
10/22/19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00
10/08/19	0.00	0.00	0.10	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.00	0.00	0.00
09/23/19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09/12/19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.02	0.00	0.00	0.06	0.00	0.00	0.10	0.00	0.00	0.00
08/29/19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00
08/14/19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
07/26/19	-	0.00	0.12	0.13	-	0.00	0.00	(0.02)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.00
07/11/19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00
06/19/19	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	--
06/05/19	0.00	0.00	0.00	0.00	0.00	--	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00
05/23/19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.06	0.00
05/07/19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.80	0.00	0.00
04/23/19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.06	0.00	0.00
04/10/19	0.00	0.00	0.02	0.00	--	0.00	0.00	0.00	--	--	--	--	--	--	--	0.00	--	--	--	0.02	0.00
03/26/19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
03/18/19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	--
03/01/19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
02/15/19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.00	0.00	0.00	>1	0.00	0.00
01/31/19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
01/11/19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.10	0.00	0.60	0.00	0.00



ATTACHMENT 3

4Q19 Biannual Cap Inspection Report

4Q19 Biannual Cap Inspection Report
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 (Windward Environmental)/Andrew Kaparos, PE (Hart Crowser)

Date (D/M/Y): 3/09 and 3/11/2020

Title: Civil Engineers

Employer: Windward Environmental LLC /Hart Crowser Inc.

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 in March 2020. 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]). 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).

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. Several Holes were observed in the fencing on the west side of the landfill area and should be repaired (Attachment 1: map notes 1 and 2; Attachment 2; photos 1 and 2).

Vegetation—including butterfly bushes (*Buddleia davidii*)—is prevalent in the area near the south rail gates (RA-2; map notes 3 and 4). 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. Port Maintenance has been applying mulch to the west slope between the consolidated landfill pavement and the west drainage swale. Heavy machinery used in the area has caused damage to the swale asphalt pavement at three locations (Attachment 1, map notes 5, 6 and 7; Attachment 2, photos 3, 4 and 5).

Two areas of pavement mounding with cracks wider than ¼ in. observed in previous inspections are still present in RA-2 (Attachment 1, map notes 8 and 9; Attachment 2, photos 6, and 7) , and a new similar area was observed to the west (map note 10, photo 8). The cracks at three of these locations should be sealed. The mounding at these locations are in high traffic areas and should be addressed. The cause(s) of the mounding in the areas (possibly buried piles or old foundations) should be determined and, if possible, removed.

Deterioration was observed at an area of pavement just west of the truck weight scales in RA-2 (map note 11). It appears that Ecology blocks were removed from the area, exposing a difference in grade between two areas of pavement (photo 9). Underlying material is not exposed; this area was noted during the last inspection and no additional deterioration has occurred. No action is required at this time.

During the inspection, the ballast covers appeared to be in good condition. The Burlington Northern Santa Fe (BNSF) access road was inspected and recent maintenance work (recently filled potholes) was noted along the portion of the access road adjacent to the consolidated landfill.

There were no signs of erosion or exposure of the underlying consolidated landfill liner during this inspection.

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 in 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 holes in the fence on the west side of the consolidated landfill should be repaired. The 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 areas in RA-2 where cracks are present in areas of pavement mounding. Three small areas of pavement damage in the west drainage swale (west side of consolidated landfill) should be repaired to prevent future erosion.

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 two holes 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.

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
Holes in fence on west side of consolidated landfill	1,2	Repair holes.
Vegetation growth near terminal entrance, RA-2	3,4	Remove vegetation from these locations and from throughout RA-2 during maintenance. Check during future inspections.
Small areas of damaged pavement in landfill drainage swale	5,6,7	Replace damaged asphalt pavement
Elongated pavement mounding with cracks wider than ¼ in., RA-2	8,9,10	Evaluate and repair prior to new tenant occupancy. Clean and seal cracks where needed. Check during future inspections.
Pavement deterioration at interface of lifts at different grades	11	Monitor during future inspections.

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

2019 end-of-year inspection



Notes:

- 1. Hole in chain-link fence
- 2. Hole in chain-link fence
- 3. Vegetation growth near south rail gate
- 4. Vegetation growth near south rail gate

- 5. Damage to drainage swale pavement
- 6. Damage to drainage swale pavement
- 7. Crack in swale drainage pavement
- 8. Pavement mounding with cracks wider than ¼ in.

- 9. Pavement mounding with cracks wider than ¼ in.
- 10. Pavement mounding with cracks wider than ¼ in.
- 11. Pavement deterioration

ATTACHMENT 2: SELECT INSPECTION PHOTOGRAPHS



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



Photo 2. Hole in fence, west side of consolidated landfill: RA-3 (map note 2)



Photo 3. Damaged pavement in drainage swale (map note 5)



Photo 4. Damaged pavement in drainage swale (map note 6)



Photo 5. Damaged pavement in drainage swale (map note 7)

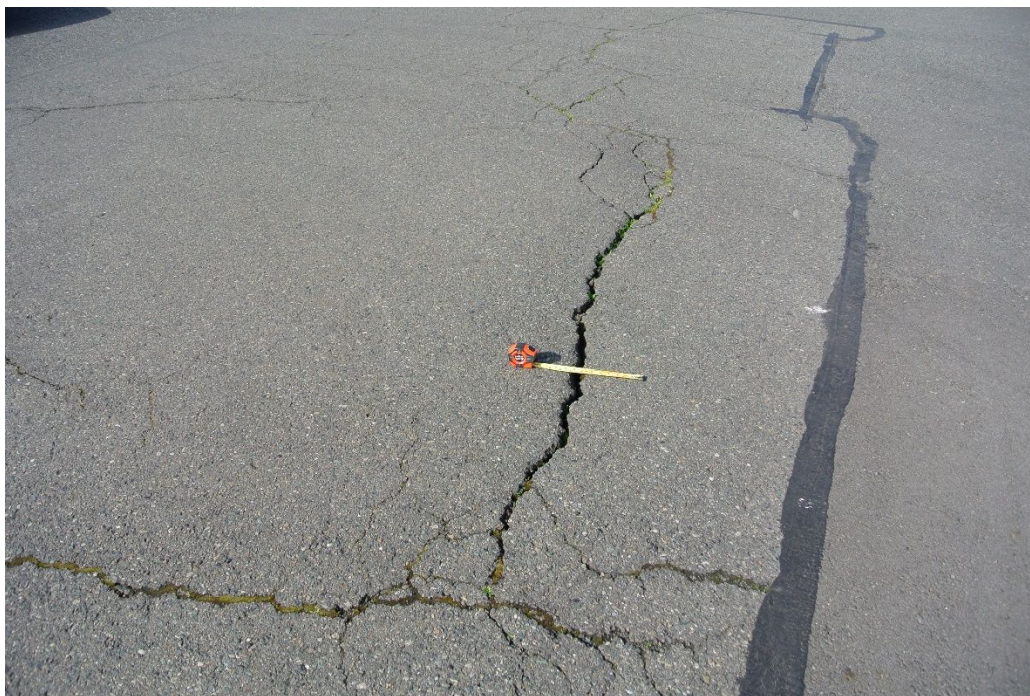


Photo 6. Pavement mounding and cracking in RA-2 (map note 8)

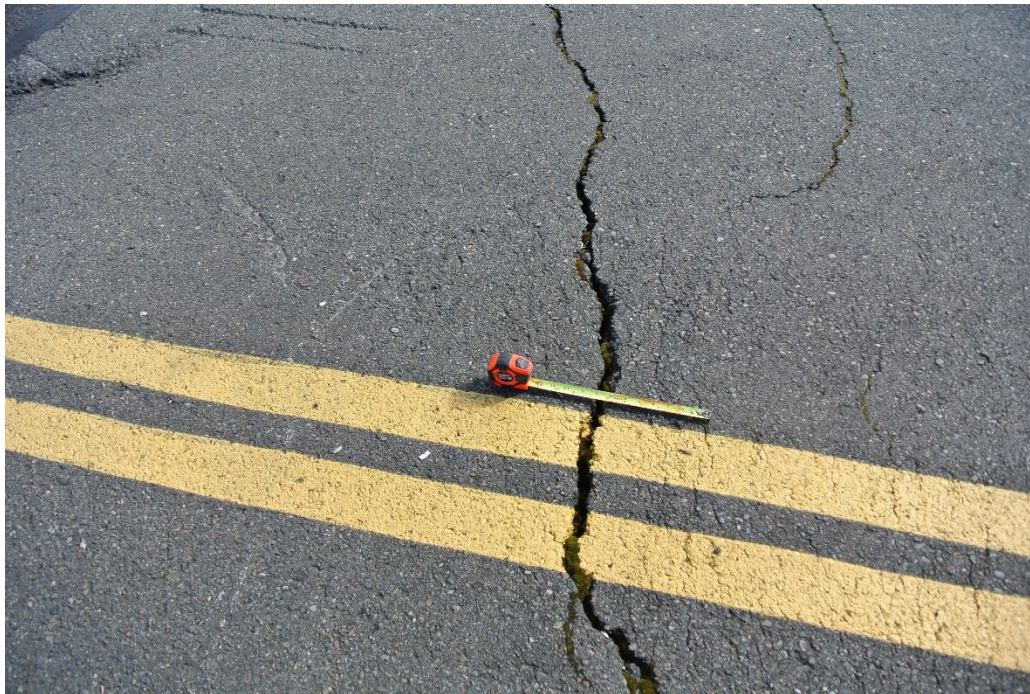


Photo 7. Pavement mounding and cracking in RA-2 (map note 9)



Photo 8. Pavement mounding and cracking in RA-2 (map note 10)



Photo 9. Pavement deterioration (map note 11)