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# Halifax Landfill 2044 Branch Road Halifax, Vermont

VTDEC Project# NS95-0165  
Solid Waste Facility ID# WH280  
KAS Job# 610110045

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## SPRING 2019 SEMI-ANNUAL WATER QUALITY MONITORING REPORT

July 25, 2019

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Prepared for:

Town of Halifax  
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Halifax, VT 05358



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## **Introduction**

KAS, Inc. (KAS) conducted a semi-annual water quality monitoring event on May 29, 2019 at the Halifax Landfill (Site Location Map and Site Map in Appendix A). A groundwater sample was collected from monitoring well MW-3 and analyzed for perfluorinated compounds (PFCs) via EPA Method 537 (short list). The May 2019 sampling effort was conducted in accordance with the current landfill certification. The sample was field analyzed for temperature, pH, and specific conductance using a properly calibrated YSI® Pro Multi-Meter. The depth to water was gauged using a Geotech™ water level indicator.

## **Results**

### *Field measurements*

Depth to water in MW-3 was measured at 5.57 feet below top of casing (btoc). The water temperature was 10.5 degrees Celsius and a pH value of 6.52 standard units was recorded at the time of sampling. The depth to water, temperature and pH measurements recorded are within range of historical measurements. A specific conductance reading of 306.8  $\mu\text{S}/\text{cm}$  was noted at the time of sampling and is within range of historical fluctuations. Field measurement data is tabulated in Appendix B.

### *Laboratory results*

Analytical testing indicated the presence of several PFCs in the groundwater sample collected from MW-3. A combined concentration of perfluorooctanoic acid (PFOA), perfluorooctanesulfonic acid (PFOS), perfluorohexanesulfonic acid (PFHxS) and perfluoroheptanoic acid (PFHpA) in MW-3 was reported at 167 nanograms per liter (ng/l) which exceeds the Vermont Groundwater Enforcement Standard (VGES) of 20 ng/l. No PFCs were detected above laboratory method detection limits in the trip blank sample. Current and historical analytical data is tabulated in Appendix B and a copy of the laboratory report is provided in Appendix C.

PFC concentrations at MW-3 increased compared to the previous sampling in October 2018; however, current concentrations remain below the peak high of 227 ng/l detected in May 2018. The data set continues to show PFC concentrations fluctuate over time. While an overall increasing trend appears apparent based on the linear trend R-square value (See Graph in Appendix B), a statistically significant trend has not been established. The figure on page 2 (Figure 1) is the concentration of total PFCs in MW-3 over time using a concentration linear trend generated by the Groundwater Spatio-Temporal Data Analysis Tool (GWSDAT Version 2.12). The solid green line shows the trend estimate and the dashed green lines are the 95% confidence intervals. The statistical significance of this trend is assessed using the Mann-Kendall trend test. If the Mann-Kendall p-value is below 0.05, then the estimated trend is statistically significantly different from 0, meaning that there is a trend within the data (GWSDAT User Manual v2.12). The Mann-Kendall p-value for MW-3 is 0.26; which is above 0.05, indicating a statistically relevant trend could not be established.

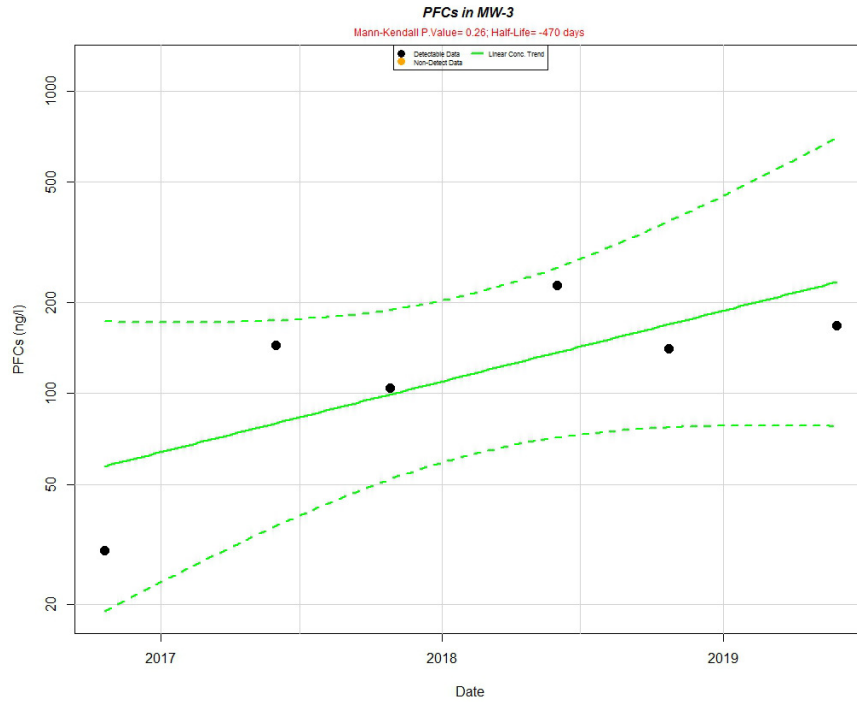


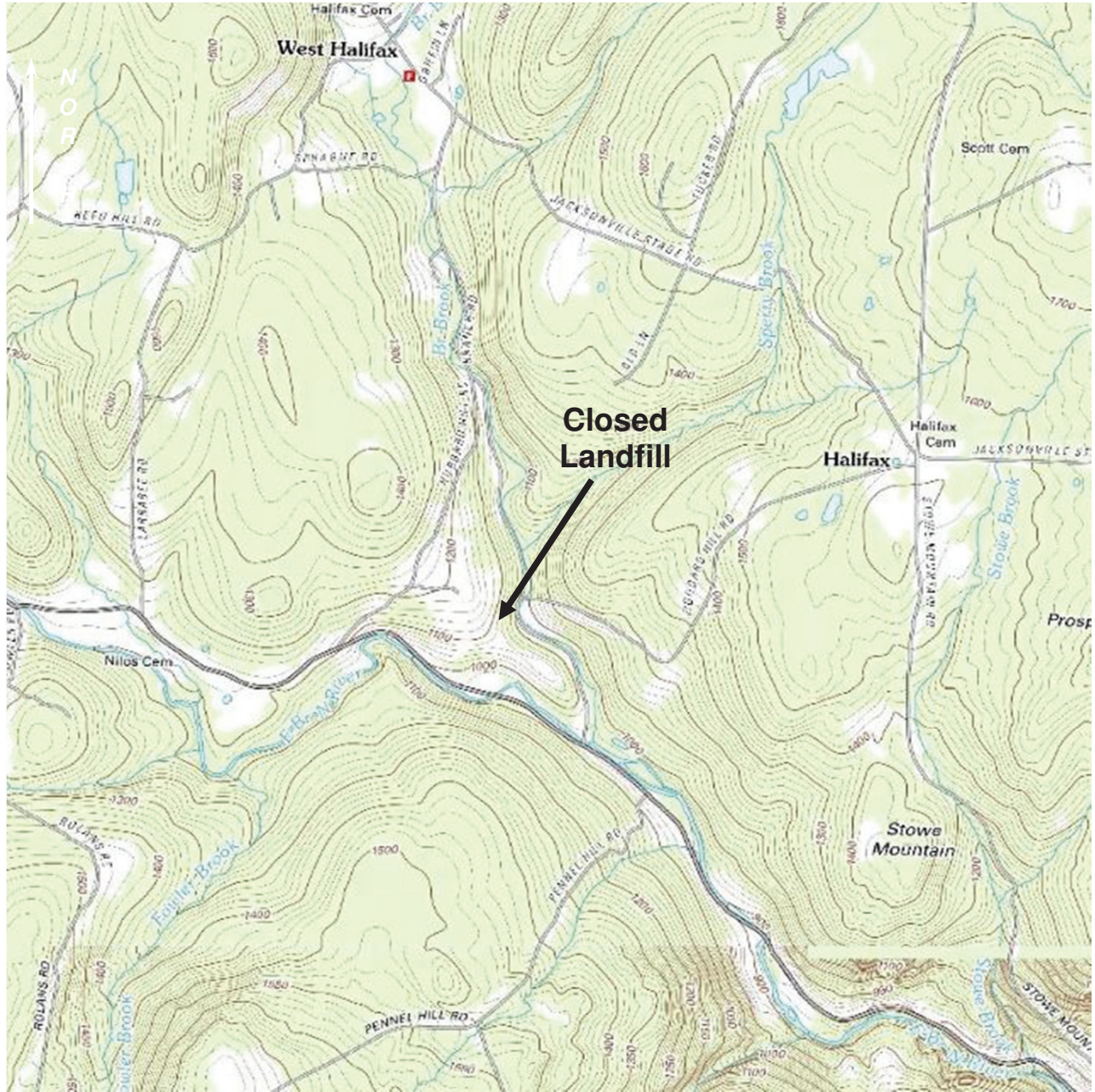
Figure 1. Total PFC concentration trend for monitoring wells MW-3

A seasonal correlation between PFC levels and depth to groundwater remains unclear; however, lower PFC concentrations are apparent during fall sampling events. The next groundwater monitoring event is scheduled to occur in October 2019.



## **APPENDIX A**

### **Site Location Map and Site Map**



KAS Job Number: 610110045

Source: <http://anrmaps.vermont.gov/websites/anra5/>



**TOWN OF HALIFAX CLOSED LANDFILL**  
**2044 Branch Road, Halifax, VT**

**Site Location Map**

Date: 05/25/16	Drawing No. 0	Scale: NTS	By: CS
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MONITORING WELL



SURFACE WATER SAMPLE

\* monitoring well and surface water locations are approximate



**HALIFAX CLOSED LANDFILL**

2044 Branch Road, Halifax, VT

**SITE MAP**

VTDEC Project: NS95-0165  
 KAS Job Number: 610110045  
 Source: Google Earth

Date: 07/31/17

Drawing No. 2

Scale: NTS

By: RT



## **APPENDIX B**

### **Historical Sampling Data**



GROUNDWATER QUALITY SUMMARY

HALIFAX LANDFILL  
HALIFAX, VT

MW-3

Parameter (PPM unless noted)	VGES	PAL	SAMPLING DATE:																
			Aug-93	Dec-95	May-96	Nov-96	May-97	Oct-97	May-98	Oct-98	May-99	Oct-99	May-00	Dec-00	Oct-01	Jan-02	Jun-02	Dec-02	Jun-03
pH**	change of 1 ph unit		6.4	6.27	6.1	6.1	6.4	6.3	6.2	5.8	6.2	6	6.6	6.5	6.5	nt	6.5	6.6	6.7
Conductivity (µS/cm)**	change of 100 µS/cm		328	440	600	610	530	380	480	280	340	390	520	500	320	nt	360	430	
COD**	change of 25 ppm		6.9	ND<50	22	16	16	18	10	20	20	10	20	10	10	nt	30	20	20
Chloride*	250   125		14	27	29	26	20	1	17	8	14	ND<1	18	17	8	nt	15	10	12
Sodium* <sup>§</sup> ** (change of 10 ppm)	250	125	nt	23	28	27	23	15	18	11	14	nt	21	16	13	nt	39	11	16
Ca Hardness**	change of 100	NA	nt	nt	230	nt	230	160	220	120	150	190	230	190	130	nt	130	220	
Dissolved Chromium	0.1	0.05	nt	ND<0.05	ND<0.002	ND<0.002	0.003	ND<0.002	ND<0.002	0.004	ND<0.002	ND<0.002	ND<0.002	0.005	0.004	nt	ND<0.001	ND<0.001	ND<0.001
Dissolved Copper	1.3	0.65	nt	ND<0.05	ND<0.01	ND<0.01	0.03	ND<0.01	ND<0.01	0.02	ND<0.01	ND<0.01	0.01	0.02	0.002	nt	0.003	0.001	0.002
Dissolved Iron*	0.3	0.15	0.06	nt	ND<0.05	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	0.18	nt	nt
Dissolved Manganese*	0.05	0.025	ND<0.02	ND<0.05	ND<0.005	0.046	0.22	0.075	0.38	0.45	0.21	0.067	0.12	0.28	0.015	nt	0.005	ND<0.005	ND<0.005
Dissolved Nickel	0.1	0.05	nt	ND<0.05	ND<0.01	ND<0.01	ND<0.01	ND<0.01	ND<0.01	ND<0.01	ND<0.01	ND<0.01	nt	ND<0.01	ND<0.01	0.002	nt	0.003	ND<0.001
Dissolved Zinc*	5	2.5	nt	ND<0.05	0.07	0.057	0.095	0.015	0.058	0.042	0.013	0.015	0.014	0.024	0.24	nt	0.23	0.084	0.2
Dissolved Arsenic	0.05	0.005	nt	ND<0.010	ND<0.002	ND<0.01	ND<0.01	ND<0.01	ND<0.01	ND<0.01	ND<0.01	ND<0.01	ND<0.01	ND<0.01	0.003	nt	ND<0.001	ND<0.001	ND<0.001
Dissolved Cadmium	0.005	0.0025	nt	ND<0.005	ND<0.0005	ND<0.001	ND<0.001	ND<0.001	nt	ND<0.001	ND<0.001	ND<0.001	0.002	ND<0.001	ND<0.001	nt	ND<0.001	ND<0.001	ND<0.001
Dissolved Lead	0.015	0.005	nt	ND<0.005	ND<0.001	ND<0.01	ND<0.01	ND<0.01	ND<0.01	0.01	ND<0.01	ND<0.01	ND<0.01	ND<0.01	ND<0.001	nt	ND<0.001	ND<0.001	ND<0.001
Calcium	NA	NA	nt	nt	nt	nt	nt	nt	2.3	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
Methylene Chloride	0.005	0.0005	ND<10	ND<2	ND<2	ND<2	ND<2	nt	ND<2	nt	nt	ND<5	nt	nt	nt	ND<5	nt	1600 <sup>E</sup>	560

Parameter (PPM unless noted)	VGES	PAL	SAMPLING DATE:																
			11/3/03	6/17/04	10/28/04	12/1/05	5/6/06	10/6/06	5/7/07	10/7/07	5/8/08	10/24/08	5/15/09	10/22/09	5/10/10	10/13/10	5/25/11	10/26/11	5/8/12
pH**	change of 1 ph unit		6.1	6.1	ns	ns	nt	6.63	5.67	6.41	6.41	6.78	6.59	NR	6.15	6.49	6.03	6.63	6.70
Conductivity (µS/cm) **	change of 100 µS/cm		450	420	ns	ns	nt	391	329	128	128	413	92	108	83.4	223.3	83.8	387.6	599
Temperature (degrees C)	change of 5.6 deg C		nt	nt	ns	ns	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	10.9	11.7
Depth to Water (feet btoc)	NA	NA	nt	nt	ns	ns	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	4.60	4.41
COD**	change of 25 ppm		10	20	ns	ns	121	60	ND<10	50	10	<10	28	290	29	27	11	18	nt
Chloride*	250   125		12	12	ns	ns	1460	1	ND<10	6	9	7	2.8	6.2	ND<2.5	5.7	4.3	12	6.2
Sodium* <sup>§</sup> ** (change of 10 ppm)	250	125	17	28	ns	ns	17.6	ND<5	15	ND<5	16	13	2.3	2.7	1.9	10	2	12	13
Ca Hardness**	change of 100	NA	170	180	ns	ns	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
Dissolved Chromium	0.1	0.05	ND<0.001	ND<0.001	ns	ns	ND<0.002	ND<0.001	0.004	ND<0.001	0.002	ND<0.001	ND<0.02	ND<0.02	ND<0.005	ND<0.005	ND<0.005	ND<0.005	ND<0.020
Dissolved Copper	1.3	0.65	0.001	0.002	ns	ns	ND<0.05	0.002	0.01	0.002	0.002	ND<0.001	ND<0.02	ND<0.02	ND<0.02	ND<0.02	ND<0.02	ND<0.020	nt
Dissolved Iron*	0.3	0.15	ND<0.05	ND<0.05	ns	ns	0.35	0.1	3.6	0.08	ND<0.05	ND<0.05	0.17	0.88	0.1	0.11	0.2	ND<0.020	ND<0.020
Dissolved Manganese*	0.05	0.025	ND<0.005	ND<0.005	ns	ns	0.05	0.006	0.079	0.007	ND<0.005	ND<0.005	ND<0.02	0.15	ND<0.02	ND<0.02	ND<0.020	ND<0.020	ND<0.020
Dissolved Nickel	0.1	0.05	ND<0.001	0.002	ns	ns	ND<0.05	0.003	0.007	0.003	0.005	0.004	ND<0.02	ND<0.02	ND<0.005	ND<0.005	ND<0.005	ND<0.005	nt
Dissolved Zinc*	5	2.5	0.078	0.13	ns	ns	ND<0.01	0.047	0.045	0.033	0.013	0.007	ND<0.02	ND<0.02	ND<0.005	ND<0.005	0.007	ND<0.020	nt
Dissolved Arsenic	0.05	0.005	ND<0.001	ND<0.001	ns	ns	ND<0.002	ND<0.002	ND<0.001	ND<0.001	ND<0.001	ND<0.001	ND<0.002	ND<0.002	ND<0.001	ND<0.001	ND<0.001	ND<0.020	nt
Dissolved Cadmium	0.005	0.0025	ND<0.001	ND<0.001	ns	ns	ND<0.0005	ND<0.0005	ND<0.001	ND<0.001	ND<0.001	ND<0.001	ND<0.002	ND<0.002	ND<0.002	ND<0.002	ND<0.002	ND<0.002	nt
Dissolved Lead	0.015	0.005	ND<0.001	ND<0.001	ns	ns	ND<0.002	ND<0.001	0.003	ND<0.001	ND<0.001	ND<0.001	ND<0.001	ND<0.001	ND<0.001	ND<0.001	ND<0.001	ND<0.001	nt
Calcium	NA	AN	nt	nt	ns	ns	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
Methylene Chloride	0.005	0.0005	ND<5	ND<5	ns	ns	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt

continued on next page

Notes:

Only detected or previously detected volatile organic compounds are listed.

btoc = below top of casing

ND<xx = Not Detected< Detection Limit

VGES = Vermont Groundwater Enforcement Standard (December 2016)

PAL = Preventative Action Level (December 2016)

NA = No VGES/PAL available

Results reported above detection limits are indicated in bold.

ns = not sampled

nt = not tested during sampling round

\* = secondary groundwater quality standards (mg/L or ppm)

\*\* = maximum acceptable change (units as noted)

\*\*\* = All perfluorinated compound values reported in ng/L. Analysis via EPA Method 537 (short list)

VGES and PALs pertain to total metals and are provided for reference only

E - The reported value exceeds largest calibration standard. Extrapolation of the calibration curve was employed to obtain the reported value.

	= exceeds PAL
	= exceeds VGES
	= exceeds max acceptable change





GROUNDWATER QUALITY SUMMARY

HALIFAX LANDFILL  
HALIFAX, VT

MW-3 (continued)

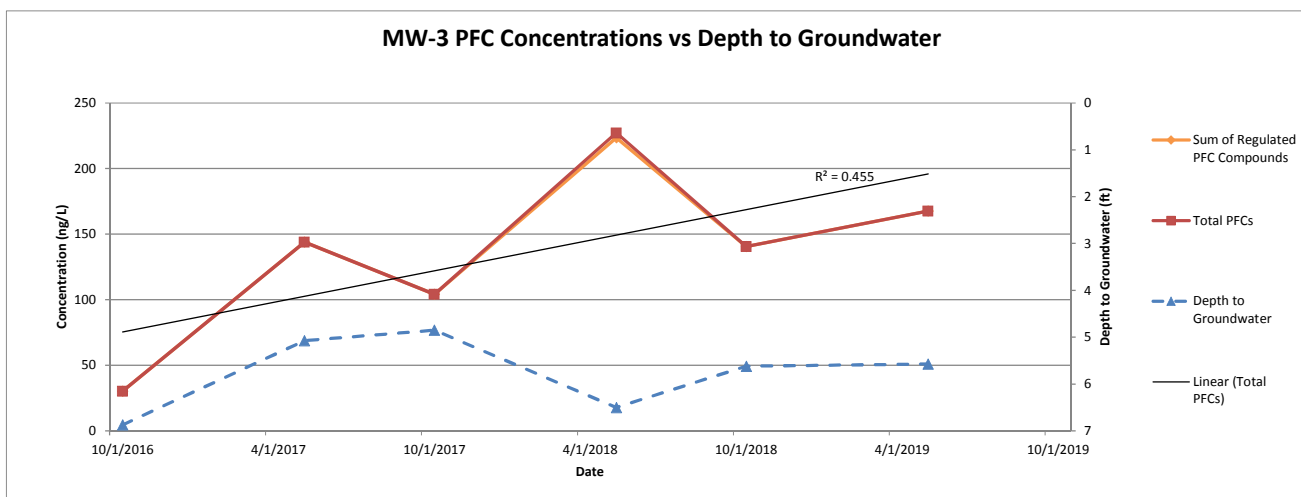
Parameter (PPM unless noted)	VGES	PAL	SAMPLING DATE:													
			10/9/12	5/30/13	10/16/13	5/15/14	10/21/14	5/28/15	10/29/15	May-16	10/19/16	5/30/2017	10/25/2017	5/30/2018	10/23/2018	5/29/2019
pH**	change of 1 ph unit		<b>6.06</b>	<b>6.71</b>	<b>6.09</b>	<b>6.05</b>	<b>5.73</b>	<b>6.56</b>	<b>6.71</b>	ns	nt	<b>7.04</b>	<b>6.51</b>	<b>6.55</b>	<b>6.53</b>	<b>6.52</b>
Conductivity (µS/cm)**	change of 100 µs/cm		<b>293</b>	<b>215.6</b>	<b>625</b>	<b>358.1</b>	<b>187</b>	<b>376</b>	<b>340.6</b>	ns	nt	<b>470.7</b>	<b>500</b>	<b>388</b>	<b>160.7</b>	<b>306.8</b>
Temperature (degrees C)	change of 5.6 deg C		<b>11.5</b>	<b>15.7</b>	<b>11.3</b>	<b>12.5</b>	<b>13.2</b>	<b>10.7</b>	<b>13.0</b>	ns	nt	<b>9.9</b>	<b>13.2</b>	<b>10.9</b>	<b>9.7</b>	<b>10.5</b>
Depth to Water (feet btoc)	NA	NA	<b>5.63</b>	<b>4.38</b>	<b>5.49</b>	<b>5.23</b>	<b>5.34</b>	<b>5.55</b>	<b>4.51</b>	ns	<b>6.87</b>	<b>5.07</b>	<b>4.85</b>	<b>6.50</b>	<b>5.62</b>	<b>5.57</b>
COD**	change of 25 ppm		nt	<b>22</b>	nt	nt	nt	nt	nt	ns	nt	nt	nt	nt	nt	nt
Chloride*	250	125	<b>19</b>	<b>12</b>	<b>6.5</b>	<b>5.7</b>	<b>6.7</b>	<b>4.5</b>	<b>52</b>	ns	nt	nt	nt	nt	nt	nt
Sodium* & ** (change of 10 ppm)	250	125	<b>12</b>	<b>13</b>	nt	nt	nt	nt	nt	ns	nt	nt	nt	nt	nt	nt
Dissolved Chromium	0.1	0.05	nt	ND<0.005	nt	nt	nt	nt	nt	ns	nt	nt	nt	nt	nt	nt
Dissolved Copper	1.3	0.65	nt	ND<0.020	nt	nt	nt	nt	nt	ns	nt	nt	nt	nt	nt	nt
Dissolved Iron*	0.3	0.15	ND<0.020	ND<0.020	<b>0.030</b>	<b>0.086</b>	<b>0.020</b>	ND<0.020	ND<0.020	ns	nt	nt	nt	nt	nt	nt
Dissolved Manganese*	0.05	0.025	ND<0.020	ND<0.020	ND<0.020	ND<0.020	ND<0.020	ND<0.020	ND<0.020	ns	nt	nt	nt	nt	nt	nt
Dissolved Nickel	0.1	0.05	nt	ND<0.005	nt	nt	nt	nt	nt	ns	nt	nt	nt	nt	nt	nt
Dissolved Zinc*	5	2.5	nt	ND<0.020	nt	nt	nt	nt	nt	ns	nt	nt	nt	nt	nt	nt
Dissolved Arsenic	0.05	0.005	nt	ND<0.001	nt	nt	nt	nt	nt	ns	nt	nt	nt	nt	nt	nt
Dissolved Cadmium	0.005	0.0025	nt	ND<0.002	nt	nt	nt	nt	nt	ns	nt	nt	nt	nt	nt	nt
Dissolved Lead	0.015	0.0015	nt	ND<0.001	nt	nt	nt	nt	nt	ns	nt	nt	nt	nt	nt	nt
Perfluorobutanesulfonic acid (PFBS)***	NA	NA	nt	nt	nt	nt	nt	nt	nt	ns	ND<11	ND<6.6	ND<6.6	<b>3.75</b>	ND<6.6	ND<6.6
Perfluorohexanesulfonic acid (PFHxS)***			nt	nt	nt	nt	nt	nt	nt	ns	ND<3.8	<b>11.7</b>	<b>9.2</b>	<b>13.1</b>	<b>12.3</b>	<b>10.1</b>
Perfluoroheptanoic acid (PFHpA)***			nt	nt	nt	nt	nt	nt	nt	ns	<b>2.06</b>	<b>22</b>	<b>13.2</b>	<b>41.2</b>	<b>15.1</b>	<b>21.4</b>
Perfluorooctanoic acid (PFOA)***	20	10	nt	nt	nt	nt	nt	nt	nt	ns	<b>11.5</b>	<b>78.2</b>	<b>44.9</b>	<b>134</b>	<b>76.8</b>	<b>106</b>
Perfluorooctanesulfonic acid (PFOS)***			nt	nt	nt	nt	nt	nt	nt	ns	<b>16.7</b>	<b>32.1</b>	<b>37</b>	<b>33.3</b>	<b>36.4</b>	<b>30</b>
Perfluorononanoic acid (PFNA)***			nt	nt	nt	nt	nt	nt	nt	ns	ND<2.3	ND<1.5	ND<1.5	<b>1.9</b>	ND<1.5	ND<1.5

Notes:  
 Only detected or previously detected volatile organic compounds are listed.  
 btoc = below top of casing  
 ND<xx = Not Detected< Detection Limit  
 VGES = Vermont Groundwater Enforcement Standard (July 2018)  
 PAL = Preventative Action Level (July 2018)  
 NA = No VGES/PAL available  
 Results reported above detection limits are indicated in bold.

ns = not sampled  
 nt = not tested during sampling round  
 \* = secondary groundwater quality standards (mg/L or ppm)  
 \*\* = maximum acceptable change (units as noted)

\*\*\* = All perfluorinated compound values reported in ng/L. Analysis via EPA Method 537 (short list). For PFHxS, PFHpA, PFOA, PFOS and PFNA, the VGES and PAL standards apply to the sum of these compounds.  
 VGES and PALs pertain to total metals and are provided for reference only  
 E - The reported value exceeds largest calibration standard. Extrapolation of the calibration curve was employed to obtain the reported value.

= exceeds PAL, at time of sampling  
 = exceeds VGES, at time of sampling  
 = exceeds max acceptable change, at time of sampling





## **APPENDIX C**

### **Laboratory Report**

**NORTHERN LAKE SERVICE, INC.**  
 Analytical Laboratory and Environmental Services  
 400 North Lake Avenue - Crandon, WI 54520  
 Ph: (715)-478-2777 Fax: (715)-478-3060

# ANALYTICAL REPORT

WDNR Laboratory ID No. 721026460  
 WDATCP Laboratory Certification No. 105-330  
 EPA Laboratory ID No. WI00034

Printed: 06/23/19 Page 1 of 1

**Client:** KAS  
 Attn: Rebecca Treat  
 589 Avenue D, Suite 10  
 PO Box 787  
 Williston, VT 05495

**NLS Project:** 323075  
**NLS Customer:** 108400  
 Phone: 802 383 0486  
 PO # 610110045

**Project:** Halifax Landfill

MW-3 NLS ID: 1126057

COC: 211768:1 Matrix: GW  
 Collected: 05/29/19 18:46 Received: 06/07/19

Parameter	Result	Units	Dilution	LOD	LOQ	Analyzed	Method	Lab
Perfluorinated Chemicals by EPA Method 537 Rev 1.1	see attached					06/17/19	EPA 537 Rev 1.1	721026460
Solid Phase Extraction by EPA Method 537	yes					06/10/19	EPA 537	721026460

Trip Balnk NLS ID: 1126058

COC: 211768:2 Matrix: FB  
 Collected: 05/29/19 18:34 Received: 06/07/19

Parameter	Result	Units	Dilution	LOD	LOQ	Analyzed	Method	Lab
Perfluorinated Chemicals by EPA Method 537 Rev 1.1	see attached					06/15/19	EPA 537 Rev 1.1	721026460
Solid Phase Extraction by EPA Method 537	yes					06/09/19	EPA 537	721026460

Values in brackets represent results greater than or equal to the LOD but less than the LOQ and are within a region of "Less-Certain Quantitation". Results greater than or equal to the LOQ are considered to be in the region of "Certain Quantitation". LOD and/or LOQ tagged with an asterisk(\*) are considered Reporting Limits. All LOD/LOQs adjusted to reflect dilution and/or solids content.

ND = Not Detected (< LOD)    LOD = Limit of Detection    LOQ = Limit of Quantitation    NA = Not Applicable  
 DWB = Dry Weight Basis    %DWB = (mg/kg DWB) / 10000    1000 ug/L = 1 mg/L  
 MCL = Maximum Contaminant Levels for Drinking Water Samples.    Shaded results indicate >MCL.

Reviewed by:



Authorized by:  
 R. T. Krueger  
 President

**ANALYTICAL RESULTS: Perfluorinated Chemicals by EPA 537 Rev 1.1 Safe Drinking Water Analysis**

Customer: KAS NLS Project: 323075 PO # 610110045

Project Description: Halifax Landfill

Project Title: Template: 537PPT Printed: 06/23/2019 20:44

Sample: 1126057 MW-3 Collected: 05/29/19 Analyzed: 06/17/19 - Analytes: 6

ANALYTE NAME	RESULT	UNITS WWB	DIL	LOD	LOQ	Note
perfluorobutanesulfonic acid (PFBS)	ND	ppt	1	6.6	21	
perfluoroheptanoic acid (PFHpA)	21.4	ppt	1	0.80	2.6	
perfluorohexanesulfonic acid (PFHxS)	10.1	ppt	1	2.8	8.8	
perfluorooctanoic acid (PFOA)	106	ppt	1	1.2	3.9	
perfluorononanoic acid (PFNA)	ND	ppt	1	1.5	4.9	
perfluorooctanesulfonic acid (PFOS)	30	ppt	1	1.7	5.3	
C13-PFHxA (SURR)	73.51%		1			S
C13-PFDA (SURR)	75.803%		1			S

**NOTES APPLICABLE TO THIS ANALYSIS:**

S = This compound is a surrogate used to evaluate the quality control of a method.

Sample: 1126058 Trip Balnk Collected: 05/29/19 Analyzed: 06/15/19 - Analytes: 6

ANALYTE NAME	RESULT	UNITS WWB	DIL	LOD	LOQ	Note
perfluorobutanesulfonic acid (PFBS)	ND	ppt	1	6.6	21	
perfluoroheptanoic acid (PFHpA)	ND	ppt	1	0.80	2.6	
perfluorohexanesulfonic acid (PFHxS)	ND	ppt	1	2.8	8.8	
perfluorooctanoic acid (PFOA)	ND	ppt	1	1.2	3.9	
perfluorononanoic acid (PFNA)	ND	ppt	1	1.5	4.9	
perfluorooctanesulfonic acid (PFOS)	ND	ppt	1	1.7	5.3	
C13-PFHxA (SURR)	80.544%		1			S
C13-PFDA (SURR)	92.81%		1			S

**NOTES APPLICABLE TO THIS ANALYSIS:**

S = This compound is a surrogate used to evaluate the quality control of a method.

The PFOA branch isotope peak is included in the PFOA calculation per EPA directive.

# SAMPLE COLLECTION AND CHAIN OF CUSTODY RECORD

# NORTHERN LAKE SERVICE, INC.

Analytical Laboratory and Environmental Services

400 North Lake Avenue • Crandon, WI 54520-1298

Tel: (715) 478-2777 • Fax: (715) 478-3060

Wisconsin DNR cert ID  
**721026460 (Cran) / 268533760 (Wauk)**  
 Wisconsin DATCP ID  
**105-000330 (Cran) / 105-000479 (Wauk)**

CLIENT <b>KAS, INC.</b>		
ADDRESS <b>PO BOX 787</b>		
CITY <b>WILLISTON</b>	STATE <b>VT</b>	ZIP <b>05495</b>
PROJECT DESCRIPTION / NO. <b>HALIFAX LANDFILL</b>		QUOTATION NO.
DNR FID #	DNR LICENSE #	
CONTACT <b>REBECCA TREAT</b>		PHONE <b>802-383-0486</b>
PURCHASE ORDER NO. <b>610110045</b>		FAX <b>802-383-0790</b>

MATRIX:  
 SW = surface water  
 WW = waste water  
 GW = groundwater  
 DW = drinking water  
 TIS = tissue  
 AIR = air  
 SOIL = soil  
 SED = sediment  
 PROD = product  
 SL = sludge  
 OTHER

USE BOXES BELOW: Indicate Y or N if GW Sample is field filtered.  
 Indicate G or C if WW Sample is Grab or Composite.

ANALYZE PER ORDER OF ANALYSIS  
 PFG vs FGA 575  
 SH-14 Test

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NO. 211768

ITEM NO.	NLS LAB. NO.	SAMPLE ID	COLLECTION		MATRIX (See above)	ANALYZE PER ORDER OF ANALYSIS	USE BOXES BELOW: Indicate Y or N if GW Sample is field filtered. Indicate G or C if WW Sample is Grab or Composite.												COLLECTION REMARKS (i.e. DNR Well ID #)							
			DATE	TIME																						
1.	112608	mW-3	5/29/19	1846	GW	X																				
2.	058	TRIP BLANK	↓	1834	BLANK H <sub>2</sub> O	↓																				
3.																										
4.																										
5.																										
6.																										
7.																										
8.																										
9.																										
10.																										

ONE SAMPLE PER LINE

COLLECTED BY (signature) <i>[Signature]</i>		CUSTODY SEAL NO. (IF ANY)		DATE/TIME 5/29/19/190	
RELINQUISHED BY (signature) <i>[Signature]</i>		RECEIVED BY (signature) <i>[Signature]</i>		DATE/TIME 6/11/19/900	
DISPATCHED BY (signature) <i>[Signature]</i>		METHOD OF TRANSPORT UPS NEXT DAY		DATE/TIME 6/6/19/100	
RECEIVED AT NLS BY (signature) <i>[Signature]</i>		DATE/TIME 6/7/19	CONDITION 10	TEMP.	
REMARKS & OTHER INFORMATION					
COOLER #		WDNR FACILITY NUMBER		E-MAIL ADDRESS	

REPORT TO <i>Rebecca@Kas-consulting.com</i> <i>KAS, INC.</i>
INVOICE TO <i>SAME AS ABOVE</i>

PRESERVATIVE:  
 NP = no preservative  
 S = sulfuric acid  
 N = nitric acid  
 Z = zinc acetate  
 M = methanol  
 OH = sodium hydroxide  
 HA = hydrochloric & ascorbic acid  
 H = hydrochloric acid

**IMPORTANT:**

1. TO MEET REGULATORY REQUIREMENTS, THIS FORM **MUST** BE COMPLETED IN DETAIL AND INCLUDED IN THE COOLER CONTAINING THE SAMPLES DESCRIBED.
2. PLEASE USE ONE LINE PER SAMPLE, **NOT** PER BOTTLE.
3. RETURN THIS FORM WITH SAMPLES - CLIENT MAY KEEP YELLOW COPY.
4. PARTIES COLLECTING SAMPLE, LISTED AS **REPORT TO** AND LISTED AS **INVOICE TO** AGREE TO STANDARD TERMS & CONDITIONS ON REVERSE