

TO: Richard Conforti
FROM: Clifford Yantz
RE: PFAS Sampling Event
FILE: 15388/64737/5
DATE: February 8, 2018 (Revised August 17, 2018)

cc: Mr. Joseph Rogers - MDEQ
Mr. John McCabe – MDEQ
Mr. Grant Trigger – RACER Trust
Mr. David Favero – RACER Trust
Mr. Kevin Schneider – O’Brien & Gere

This technical memorandum has been prepared **and updated** on behalf of the Revitalizing Auto Communities Environmental Response Trust (RACER Trust) to document the 2017 per- and polyfluorinated alkyl substances (PFAS) groundwater sampling event conducted in December 2017 at Coldwater Road Landfill facility located in Flint, Michigan (Site) (**Figure 1**). The temporary monitoring well installation and groundwater sampling was conducted in response to the MDEQ’s Comments to the Per- and Polyfluorinated Substances Sampling Event – Letter Dated October 12, 2017. **This technical memorandum has been updated to correct the miss reported concentration of perfluorooctane sulfonate (PFOS) in the groundwater sample from temporary well SBP-1.**

BACKGROUND

The RACER Trust Coldwater Road Landfill facility consists of the wastewater treatment sludge monofill landfill, Remaining Materials Area (RMA, where nickel impacted soils were closed in place), former WWTP (decommissioned and demolished in 1999), restored wetlands, and leachate accumulation facility.

The Site is bordered on the south and east by the RACER Trust Coldwater Road Industrial Land, which formerly contained several manufacturing buildings and support facilities. The buildings on the Coldwater Road Industrial Land were decommissioned and demolished between 1999 and 2001.

During the facility operation, there was a potential that PFAS were used in the manufacturing process and could have been processed through the wastewater treatment plant and incorporated in the wastewater treatment sludge stabilized and placed in the landfill.

As recommended by the MDEQ following a step-wise approach, OBG collected samples for PFAS analysis from the vaults, sumps and select monitoring wells during two previous events (November 2016 and June 2017).

During the previous events, PFAS was detected above the MDEQ established drinking water criteria of 70 ng/L (0.070 µg/L) for combined concentrations of PFOA and PFOS in Vaults A through Vault F, Sumps A through Sump F, and monitoring well B-7. See **Table 1** and **Table 2** for further details.

TEMPORARY MONITORING WELL INSTALLATION

To further investigate PFAS in the groundwater, three temporary monitoring wells were installed and sampled near along the western property line of the Site. SBP-1 was located approximately due west of monitoring well OBG-MW-5, SBP-3 was located approximately due west of monitoring well B-7, and SBP-2 was located approximately 100 ft to the north of SBP-3. SBP-3A was installed 20 ft south of SBP-3 as a second attempt to encounter groundwater in the area. Due to access limitations to the proposed boring location and line of sight issues, SBP-2 and SBP-3 (and SBP-3A), ended up further northwest of monitoring well B-7 than intended. See **Figure 2** for boring locations.

The four soil borings were advanced by Fibertec, Inc. of Brighton, Michigan utilizing direct push drilling techniques (Geoprobe® 6620 track-mounted drilling rig). Five-foot-long, 1.25-inch Macro-Core® samplers were used to collect soil cores continuously from grade to the terminal depth of each boring. The soil borings were advanced to a depth of 25 feet below ground surface (ft bgs).

Once the soil core depth was reached for each run, the sampler was removed from the borehole, detached from the drill rods, and the acetate sleeve was cut length-wise and opened to allow for observation of the subsurface soil. The soil cores were visually inspected and logged by an OBG soil scientist in accordance with the Unified Soil Classification System (USCS). See [Attachment A](#) for soil boring logs. From the soil boring logs a north-south and east-west cross section were made through the area of concern. See [Figure 3](#) for cross sections.

In three of the soil borings, temporary one inch PVC monitoring wells with a 5-foot screen were installed where groundwater was encountered.

Subsequent to the sample collection the monitoring well casing was removed and the boreholes were backfilled with granular bentonite. Once each borehole was backfilled, the ground surface at each location was restored to its original condition.

SAMPLING PROTOCOL

For this sampling event, the sample team followed the protocol set forth in the PFOS-PFAS Work Plan dated October 7, 2016.

Special care was taken during sampling and transport of the samples to avoid contamination from clothing, sampling material, and storage containers due to the extremely low detection limits for PFAS (<1 ng/L), because PFAS are used in a variety of applications and products, such as fire retardants, water repellent clothing, microwavable food wrappers, cosmetics, etc.

The sample team wore natural fiber (predominantly 100% cotton, or as near to 100% as possible) clothing (especially no water repellent materials [coats, gloves, shoes, etc.]) and avoided bathing with or applying particular products (deodorants/antiperspirants, lotions, cosmetics, etc.) prior to sampling to minimize the potential for cross contamination.

SAMPLING & ANALYSIS

The sample collection activities were completed on December 8, 2017 in accordance with the PFOS-PFAS Work Plan dated October 7, 2016 (GHD, 2016 in collaboration with OBG), including OBG site-specific Groundwater Sampling Standard Operating Procedure.

SAMPLE PROCEDURE

Due to the slow infiltration of groundwater during the well installation and after consultation with MDEQ, the monitoring wells were allowed to stabilize for approximately 24 hours prior to sample collection. Therefore, the temporary wells were not developed or purged prior to sampling, adding to the turbidity of the samples, which were then decanted by the laboratory prior to extraction due to the excess sediment, so that the solid-phase column of the liquid chromatograph would not clog. Therefore, the laboratory does not believe the turbidity affected the sample results.

Groundwater sampling was performed using new HDPE sample tubing lowered approximately to the midpoint of the well screen and connected to a peristaltic pump.

Due to the low volume of water while each well was being purged, field indicator parameters were not collected during this sampling event.

Samples selected for analysis were placed directly into clean, laboratory pre-preserved and supplied containers, labeled, placed in an ice-filled cooler, and transported to TestAmerica Laboratories, Inc. in Sacramento, California under appropriate chain-of-custody (COC) protocols. The samples were submitted to the laboratory for analysis on a standard turnaround time.

Samples were analyzed for the presence of PFAS by United States Environmental Protection Agency (US EPA) Method 537 (no preservation). The following QC samples were collected in accordance with methods described in the Work Plan and MDEQ guidance: a field duplicate, equipment blank (on the tubing used with the peristaltic pump), and a field (ambient) blank.

ANALYTICAL RESULTS

The analytical results for the samples collected at the Coldwater Road Landfill facility, and the equipment blank and field (ambient) blank samples are presented in [Table 4](#) and discussed below. The complete analytical laboratory report is contained in [Attachment B](#). The analytical results from the previous and current sampling events can be found in [Table 1](#) through [Table 3](#).

On January 10, 2018, the MDEQ established a drinking water criteria of 70 ng/L (0.070 µg/L) for combined concentrations of PFOA and PFOS.

- **SBP-1-GW** – PFOA was detected at a concentration of 38 ng/L (0.038 µg/L) and PFOS was detected at a concentration of ~~1,700 less than the detection limit of 2~~ ng/L (~~1.7000-002~~ µg/L), the combined concentration was ~~above~~~~below~~ the MDEQ drinking water criteria.
- **SBP-2-GW / DUP-1** – the combined concentration from SBP-2-GW was below the MDEQ drinking water criteria. PFOA from DUP-1 was detected at a concentration of 28 ng/L (0.028 µg/L) and PFOS from DUP-1 was detected at a concentration of 55 ng/L (0.055 µg/L), which were above the MDEQ drinking water criteria.
- **SBP-3-GW** – PFOA was detected at a concentration less than the detection limit of 2 ng/L (0.002 µg/L) and PFOS was detected at a concentration of 4.1 ng/L (0.0041 µg/L), the combined concentration was below the MDEQ drinking water criteria.

The relative percent difference (RPD) for the duplicate sample results for SBP-2-GW were within acceptable limits; except for PFOS for which the original sample concentration was 30 ng/L (0.030 µg/L) and in the duplicate sample the concentration was 55 ng/L (0.055 µg/L). Perfluorobutanoic acid (PFBA) and perfluorohexanesulfonic acid (PFHxS) were detected in laboratory method blank associated with this sampling event (see [Table 3](#)); therefore, the associated samples were B qualified and the results for both of these compounds in the groundwater sample from SBP-3-GW were qualified as non-detect. The other sample results were not affected by this laboratory excursion. However, no PFAS were detected in equipment blank and field blank associated with the field procedures/methods for this sampling event.

On January 10, 2018, O'Brien & Gere reviewed the MDEQ Wellogic database for water wells in the Coldwater Road Landfill Site area, two wells were found in proximity to the landfill. Former well B-11 was installed during the site investigation work on the east side of Saginaw Road, on the landfill property. This well has since been properly abandoned. The second well is located at 6465 North Saginaw St on the west side of Saginaw Road. It appears the well is cased off to 140 ft and the target withdrawal zones are the sandstones and/or limestones at depths greater than 140 ft. This is beneath the "regional" glacial aquifer at the Site. In addition, this location is side- and/or upgradient of the Site within the regional aquifer. The presence of the well was not field verified.

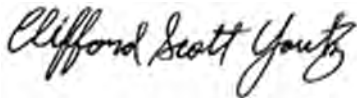
SUMMARY

The analytical results from **SBP-1-GW of 1,738 ng/L (1.738 µg/L) and Dup-1 (SBP-2-GW) of 83 ng/L (0.083 µg/L)** for combined concentrations of PFOA and PFOS **were** above the MDEQ drinking water criteria of 70 ng/L (0.070 µg/L). After MDEQ has reviewed this report RACER would like to hold a conference call to discuss the results and establish a path forward.

If you have any questions regarding this technical memorandum, please contact Cliff at (313) 333-0211.

Very truly yours,

O'BRIEN & GERE ENGINEERS, INC.



Clifford S. Yantz, PG
Scientist-3

ENCLOSURES:

- Table 1 – PFAS Analytical Results – November 2016
- Table 2 – PFAS Analytical Results – June 2017
- Table 3 – PFAS Analytical Results – December 2017 – **Revised 08-2018**
- Figure 1 – Site Location Map
- Figure 2 – Sample Location Map
- Figure 3 – Cross Sections
- Attachment A – Soil Boring Logs
- Attachment B – Analytical Laboratory Results



TABLES

TABLE 1
RACER Trust - Coldwater Road Landfill
Per-and Polyfluorinated Substances Sampling Results - November 2016

Perfluorinated Compound	Well/Sample	B-7	B-7	B-19Ar	Sump D	Equipment	Watera	Field Blank
	Sample Date:	11/30/2016	11/30/2016	11/30/2016	11/29/2016	11/29/2016	11/29/2016	11/30/2016
Perfluorobutanoic acid (PFBA)		9.2 J	7.1 J	1.0 J	440 B / U	<1.9	<1.8	<2.0
Perfluoropentanoic acid (PFPeA)		2.6	1.7 J	<2.0	300 J	<1.9	<1.8	<2.0
Perfluorohexanoic acid (PFHxA)		3.9	3.1	<2.0	99 JN	<1.9	<1.8	<2.0
Perfluoroheptanoic acid (PFHpA)		2.4	1.6 J	<2.0	24	<1.9	<1.8	<2.0
Perfluorooctanoic acid (PFOA)		9.2 JN	7.6 JN	0.84 JN	130 JN	<1.9	<1.8	<2.0
Perfluorononanoic acid (PFNA)		0.87 J	0.79 J	<2.0	7.1 JN	<1.9	<1.8	<2.0
Perfluorotetradecanoic acid (PFTeA)		<2.0 U	<2.0 U	<2.0 U	<19	<2.0 U	<2.0 U	<2.0 U
Perfluorobutanesulfonic acid (PFBS)		5.7	5.8	<2.0	74	<1.9	<1.8	<2.0
Perfluorohexanesulfonic acid (PFHxS)		23	22 JN	1.0 J	370	<1.9	<1.8	<2.0
Perfluoroheptanesulfonic Acid (PFHpS)		3.8	3.9	<2.0	83	<1.9	<1.8	<2.0
Perfluorooctanesulfonic acid (PFOS)		220	230	3.9	5,800	<1.9	<1.8	<2.0

Notes

- 1) Concentrations in ng/L.
- 2) < = Not detected at specified reporting limit.
- 3) J - Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
- 4) JN - Indicates that the target analyte has been "tentatively identified" as present and the associated numerical value is the estimated concentration in the sample. This qualifier may be applied due to data interpretation issues.
- 5) U - Indicates that the analyte was not detected and the sample RL is presented. This qualifier is also used to signify blank excursions.
- 6) F1 - MS and/or MSD Recovery is outside acceptance limits.
- 7) F2 - MS/MSD RPD exceeds control limits.
- 8) Concentrations above the USEPA advisory level (70 ng/L PFOA+PFOS) and/or MDEQ proposed drinking water criteria (70 ng/L PFOA/70 ng/L PFOS) are highlighted in yellow.



TABLE 2
RACER Trust - Coldwater Road Landfill
Per-and Polyfluorinated Substances Sampling Results - June 2017

Perfluorinated Compound	Well/Sample ID: Sample Date:	B-9	B-18A	B-24r	B-27D	B-28	OBG-MW-7	OBG-MW-9	FB-01	EB-01 Bladder			
		6/20/2017	6/20/2017	6/20/2017	6/20/2017	6/20/2017	6/20/2017	6/20/2017	6/20/2017	6/19/2017	6/20/2017		
Perfluorobutanoic acid (PFBA)		14 B/	4.2 B/	14 B/	2.0 B/	2.9 B/	8.0 B/	1.4 J B/	0.92 J B/	0.59 J B/			
Perfluoropentanoic acid (PFPeA)		2.2	<0.94	<0.93	<0.95	<0.96	<0.96	<0.94	<0.95	<0.98			
Perfluorohexanoic acid (PFHxA)		9.3	<0.75	3.9	<0.75	0.92 J/	1.0 J/	<0.75	<0.76	<0.78			
Perfluoroheptanoic acid (PFHpA)		4.2	<76	1.7 J/	<0.77	<0.78	<0.78	<0.76	<0.77	<0.79			
Perfluorooctanoic acid (PFOA)		15	1.2 J/	3.9	<0.72	0.79 J/	<0.72	1.1 J/	<0.72	<0.74			
Perfluoroundecanoic acid (PFUnA)		<0.73	<0.71	<0.70	1.4 J/	<0.73	<0.72	<0.71	<0.72	<0.74			
Perfluorotetradecanoic acid (PFTeA)		1.2 J B/	<0.19	<0.19	<0.19	<0.19	1.0 J B/	<0.19	<0.19	0.89 J B/			
Perfluorobutanesulfonic acid (PFBS)		2.3	<0.87	3.7	<0.88	<0.89	<0.86	2.0	<0.89	<0.91			
Perfluorohexanesulfonic acid (PFHxS)		6.9	<0.83	5.4	<0.83	<0.84	<0.84	5.0	<0.84	<0.86			
Perfluoroheptanesulfonic Acid (PFHpS)		0.70 J/	<0.68	<0.67	<0.68	<0.69	<0.69	<0.68	<0.69	<0.70			
Perfluorooctanesulfonic acid (PFOS)		13	1.3 J/	5.0	<1.2	1.7 J/	<1.9	2.9	1.4 J/	<1.3			
Perfluorooctance Sulfonamide (FOSA)		3.3 J H/	<0.61	0.66 J/	<0.61	1.2 J/	<0.62	<0.61	<0.62	<0.63			
6:2FTS		<3.7	<3.6	<3.6	<3.7	3.7	<3.7	<3.6	<3.7	<3.8			
Perfluorinated Compound	Well/Sample ID: Sample Date:	SUMP A	Vault A	SUMP B	Vault B	SUMP C	Vault C	Vault D	SUMP E	Vault E	DUP 1 (Vault E)	SUMP F	Vault F
		6/19/2017	6/19/2017	6/19/2017	6/19/2017	6/19/2017	6/19/2017	6/19/2017	6/19/2017	6/19/2017	6/19/2017	6/19/2017	6/19/2017
Perfluorobutanoic acid (PFBA)		220 B/	18.0 B/	480 B/	4.6 B/	490 B/	19 B/	5.3 B/	48 B/	8.6 B	8.0 B/	260 B	6.8 B/
Perfluoropentanoic acid (PFPeA)		260	1.9	410	<0.98	1100 Cl/	<0.94	7	86	<0.96	4.7	330	15
Perfluorohexanoic acid (PFHxA)		110	4.9	280	0.79 J	390	6.0	<0.80	65	6.5	6.3	150	13
Perfluoroheptanoic acid (PFHpA)		<0.78	4.4	17	<0.79	80	3.3	<0.96 J	77	5.5	5.3	67	12
Perfluorooctanoic acid (PFOA)		54	16.0	230	4.1	230	12	9.9	95	24	25	80	57
Perfluorononanoic acid (PFNA)		<0.64	<0.64	29 Cl/	<0.65	18	<0.62	<0.67	21	<0.63	0.6 J/	9.7	1.2 J
Perfluorodecanoic acid (PFDA)		<0.43	<0.43	<0.43	<0.44	<0.43	<0.42	<0.45	1.6 J/	<0.43	<0.43	1.0 J/	<0.42
Perfluoroundecanoic acid (PFUnA)		<0.73	<0.73	<0.73	<0.74	<0.73	<0.71	<0.76	1.7 J/	<0.72	<0.74	<0.74	<0.71
Perfluorotetradecanoic acid (PFTeA)		<0.19	<0.19	0.37 J B/	<0.20	<0.19	0.21 J B/	0.25 J B/	0.21 J B/	<0.19	0.4 J B/	<0.20	<0.19
Perfluorobutanesulfonic acid (PFBS)		310 Cl/	9.3	190 J/	4.1	410	<0.88	11	57	13	12	100	12
Perfluorohexanesulfonic acid (PFHxS)		410	32	650	12	1200	<0.83	33	170	65	63	390	35
Perfluoroheptanesulfonic Acid (PFHpS)		150	7.2	140	2.4	200	<0.68	8.4	55	15	15.0	82	7.3
Perfluorodecanesulfonic acid (PFDS)		4.3	<1.2	2.6	<1.2	1.9	<1.2	<1.2	1.2 J/	<1.2	<1.2	<1.2	<1.2
Perfluorooctanesulfonic acid (PFOS)		13000	450	9600	150.0	12000	440	350	3400	730	730	5400	300
Perfluorooctance Sulfonamide (FOSA)		8.1 J B/	<0.62	6.1 J B/	<0.63	8.2 J B/	<0.61	<0.65	4.7 J B/	3.5 J H/	16 J B/	6.1 J B/	22 J H/

Notes

- 1) Concentrations in ng/L.
- 2) < = Not detected at specified detection limit.
- 3) B = Compound was found in the blank and the sample.
- 4) Cl = The peak identified in the data system exhibited chromatographic interference that could not be resolved. There is reason to suspect there may be high bias.
- 5) J = Result is less than the Reporting Limit (RL) but greater than or equal to the Method Detection Limit (MDL) and the concentration is an approximate value.
- 6) H = Sample was Prepped or analyzed beyond the specified holding time.
- 7) Dup = Duplicate sample.
- 8) Concentrations above the USEPA advisory level (70 ng/L PFOA+PFOS) and/or MDEQ proposed drinking water criteria (70 ng/L PFOA/70 ng/L PFOS) are highlighted in yellow.



TABLE 3 - Revised 08-2018
RACER Trust - Coldwater Road Landfill
Per-and Polyfluorinated Substances Sampling Results - December 2017

Perfluorinated Compound	Well/Sample ID:	SBP-1-GW	SBP-2-GW	SBP-2-GW/ SBP-DUP-1	SBP-3-GW	Equipment Blank-1	Field Blank-1
	Sample Date:	12/8/2017	12/8/2017	12/8/2017	12/8/2017	12/8/2017	12/8/2017
Perfluorobutanoic acid (PFBA)		24 B	55 B	51 B	1.3 B / U	<2	0.38 J B
Perfluoropentanoic acid (PFPeA)		4.2	7.1	7.5	<2	<2	<2
Perfluorohexanoic acid (PFHxA)		5.8	12	16	<2	<2	<2
Perfluoroheptanoic acid (PFHpA)		5.2	7.4	9.8	0.36 J	<2	<2
Perfluorooctanoic acid (PFOA)		38	25	28	<2	<2	<2
Perfluorononanoic acid (PFNA)		0.49 J	<2	0.39 J	0.27 J	<2	<2
Perfluorotetradecanoic acid (PFTeA)		0.49 J	<2	<2	<2	<2	<2
Perfluorobutanesulfonic acid (PFBS)		21	150	130	0.48 J	<2	<2
Perfluorohexanesulfonic acid (PFHxS)		210 B	280 B	390 B	0.78 J B / U	0.28 J B	0.40 J B
Perfluoroheptanesulfonic Acid (PFHpS)		50	3.2	6.1	<2	<2	<2
Perfluorooctanesulfonic acid (PFOS)		1,700<2	30	55	4.1	<2	<2

Notes

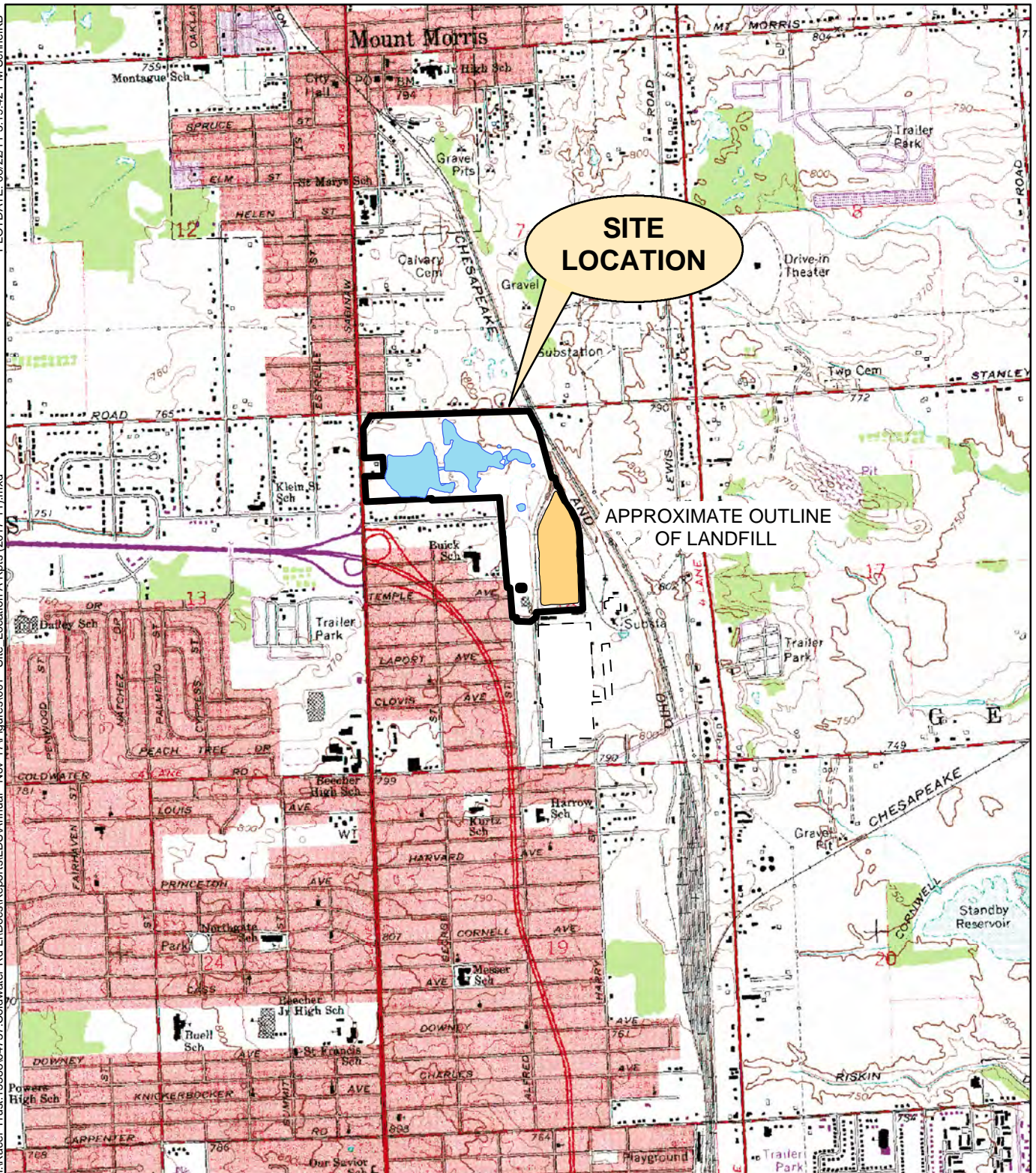
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- 3) J - Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
- 4) B = Compound was found in the blank and the sample.
- 5) U - Indicates that the analyte was not detected and the sample RL is presented. This qualifier is also used to signify blank excursions.
- 6) Concentrations above the USEPA advisory level (70 ng/L PFOA+PFOS) and/or MDEQ proposed drinking water criteria (70 ng/L PFOA+PFOS) are highlighted in yellow.



FIGURES

PLOTDATE: 08/22/11 3:19:42 PM SchneiKB

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RACER TRUST
 COLDWATER ROAD LANDFILL FACILITY
 FLINT, MICHIGAN

SITE LOCATION MAP



Miles








PLOTDATE: 08/22/11 3:14:42 PM ONeillium

I:\Racer Trust-153981685\GIS\Coldwater-Rd-LIN\DCross-Sections\Figure 2 - Well Locations-1.mxd

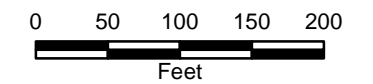


LEGEND

-  MONITORING WELL LOCATION
-  NEW TEMPORARY WELL LOCATION
-  NEW BORING LOCATION
-  NEW VAPOR POINT LOCATION
-  HISTORIC SOIL BORING LOCATION

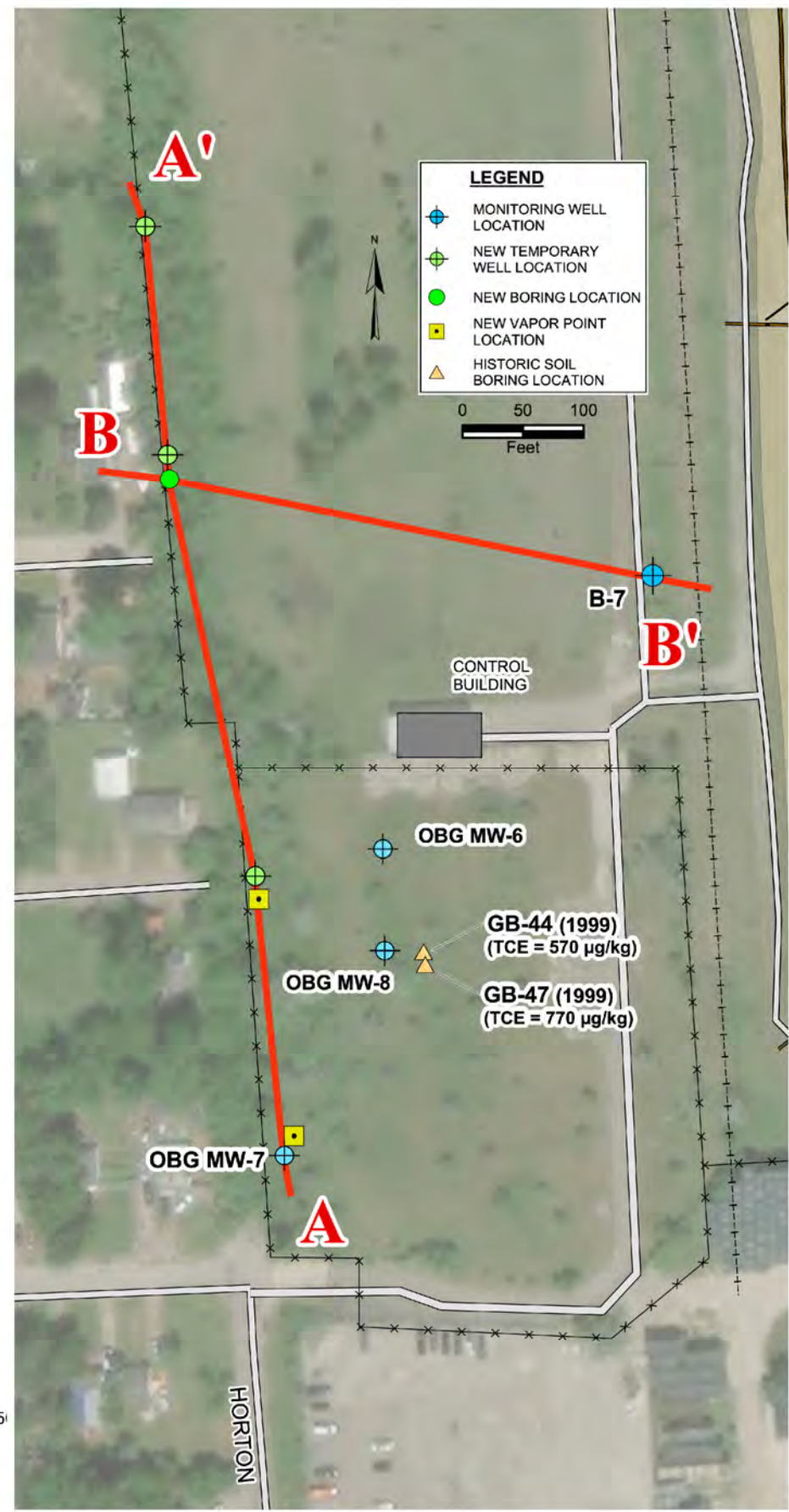
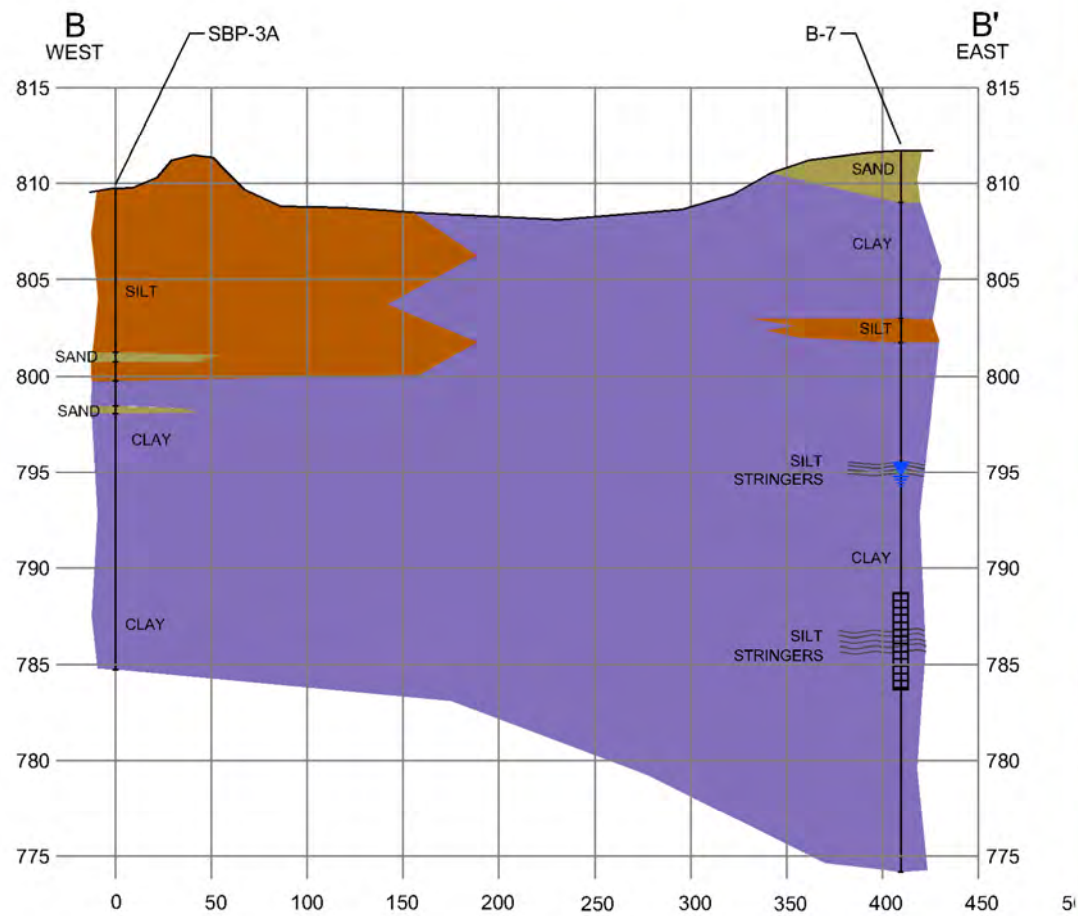
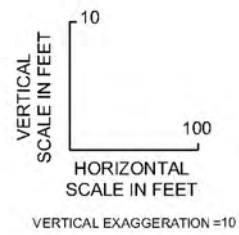
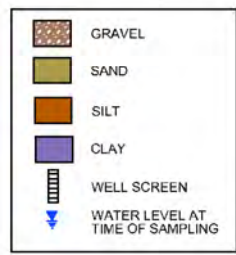
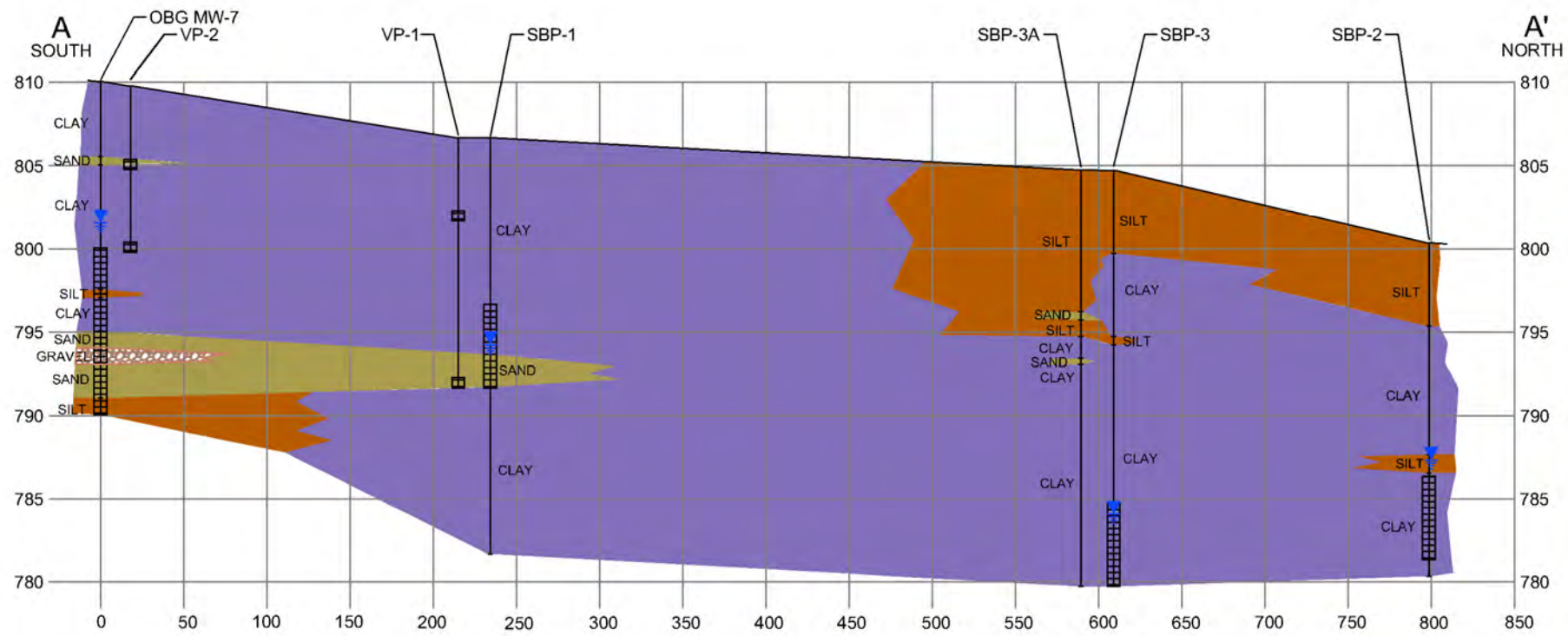
RACER TRUST
COLDWATER ROAD
LANDFILL FACILITY
FLINT, MICHIGAN

**EXISTING MONITORING WELLS
TEMPORARY WELLS
VAPOR POINTS AND
HISTORICAL SOIL BORINGS**



JANUARY 2018

Feb. 02, 2018 8:36am PLOTTED BY: O'Neill.M. SAVED BY: O'Neill.M.
 I:\Vocccer-Truitt\15388\68545\Coldwater-Rd-LVM-D\Cross Sections\Figure 1 - Geologic Cross-Section A-A'.dwg Layout1
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DRAWN BY:	JMO	DATE:	01/16/2018
CHECKED BY:	CSY	DATE:	01/16/2018
APPROVED BY:	CSY	DATE:	01/16/2018
DRAWING NO:			
REFERENCE:			


GEOLOGIC CROSS-SECTION A-A'
GEOLOGIC CROSS-SECTION B-B'

RACER
 COLDWATER ROAD LANDFILL SITE
 FLINT, MICHIGAN



PROJECT NO.
68545

FIGURE NO.
3



ATTACHMENT A
Soil Boring Logs

SOIL BORING LOG

REPORT OF BORING: SBP-1

CLIENT: **HAUER**
 PROJECT NAME: **Colowater PFA/LS study**
 PROJECT LOCATION: **Flint**
 FILE NO.: **(6477)**
 BORING COMPANY: **Fiber tec**
 FOREMAN: **Paul**
 OBG GEOLOGIST: **KBS**

Boring Location: **Southern most location - west perimeter**
 Drilling equipment: **Geoprobe 6620**
 Sampling equipment: **Macro core 5ft**
 Borehole Diameter: **2.5"**
 Total Depth: **25ft**
 Start date: **12/7/17**
 Completion date: **12/7/17**

Surface Elevation:
 Northing:
 Easting:
 Depth to ground water:

LEGEND: Cement/grout Screen
 Sand Pack Riser
 Bentonite

DEPTH BELOW GRADE	No.	CORE INTERVAL (ft bg)	PENETRATION/RECOVERY (ft bg)	Analytical Sample Interval (ft bg)	SAMPLE DESCRIPTION	STRATUM CHANGE GENERAL DESCRIPT	Equipment Installed		Field Testing	
									PID Reading	USCS symbol
0	1		5/5		0" - med brown fm, silty CLAY, little to some sand					
1					6" - 3" fine, rts. trace gravel					
2					med/lt, silty CLAY, trace gravel, stiff, low plastic					
3					3-3.5" med, clay, silty CLAY, trace gravel, dark brown					
4					4' cut					
5			5/5		3.5-8" med, clay, silty CLAY, med many nodules					
6					trace gravel, stiff, low plastic					
7										
8					8-8" med, moist, silty CLAY, soft, plastic, trace gravel					
9					8-8-11" med, dm, med to soft, silty CLAY					
10			5/5		trace gravel					
11					11-15" med, fm, silty CLAY, stiff, low plastic					
12					trace gravel					
13					13-13.1" coarse sand					
14										
15			5/3.5		15-19.5" med gray, fm, ^{to moist} silty CLAY, med plastic,					
16					trace gravel					
17										
18										
19					19-25" med light gray, fm to moist, silty CLAY,					
20					med plastic, trace gravel					
21										
22										
23										
24										
EOB 25 ft										

Notes: 0.5' water in bottom of bore hole @ 10' depth after 5 min
 1" temp PVC well set @ 15ft by 5' screen

SOIL BORING LOG

CLIENT: KACOR
PROJECT NAME: PFAS/VI study
PROJECT LOCATION: Flint
FILE NO.: 64737
BORING COMPANY: Fibertec
FOREMAN: Rex
OBG GEOLOGIST: KES

Boring Location: Northern most location - west perimeter
Drilling equipment: Geoprobe UG20
Sampling equipment: Macro core SFT
Borehole Diameter: 2.5"
Total Depth: 20ft
Start date: 10/7/17
Completion date: 10/7/17

Surface Elevation:
Northing:
Easting:
Depth to ground water:
LEGEND: / Cement/grout == Screen
Sand Pack Riser
Bentonite

DEPTH BELOW GRADE	CORE INTERVAL No.	CORE INTERVAL (ft bg)	PENETRATION/RECOVERY (ft bg)	Analytical Sample Interval (ft bg)	SAMPLE DESCRIPTION	STRATUM CHANGE GENERAL DESCRIPT	Equipment Installed	Field Testing	
								PID Reading	USCS symbol
0			5/5		0-1 med brown, clayey silt, little sand, trace gravel bits, glass, etc				
1					1-5 MBS, 4M clayey silt, trace gravel				
2									
3									
4									
5			5/5		5-6.5 MBS, 4M, silty clay, trace gravel, stiff				
6									
7					6.5-7.5 olive brown, 4M to moist, silty clay, trace gravel silt, med plastic				
8					7.5 dark grey brown, w/ fibrous material				
9					7.5-10 med brown granular, silty clay, trace gravel soft, plastic, moist				
10			3/5						
11					10-12.5 olive brown, 4M to moist, silty clay, light grey mottling, stiff, med plastic				
12									
13					12.5- soft, moist slightly brown silt @ 12.7				
14					13-15 MBS, 4M silty clay, stiff, light grey mottling				
15			5/5						
16					15-19 MBS, 4M to moist, silty clay, stiff, low plastic trace gravel bits, silt @ 18'				
17									
18									
19					19-20 greyish brown, 4M to moist, silty clay MBS, mottling				
20									
21					EOB 20'				
22									
23									
24									

Notes: collapsed @ 12' 1" PVC well set 19ftbg sft screen
Moist/soft 7-7.5SS, 12-13 wet

SOIL BORING LOG

REPORT OF BORING: **SBP-3**

Boring Location: **middle location - west perimeter**
 Drilling equipment: **Geoprobe GC300T-4**
 Sampling equipment: **Macro core 5'**
 Borehole Diameter: **2.5" ODF**
 Total Depth: **25ft**
 Start date: **10/17/17**
 Completion date: **10/17/17**

PAGE **1** OF **1**

CLIENT: **RACER**
 PROJECT NAME: **PEAS/VE STUDY**
 PROJECT LOCATION: **link**
 FILE NO.: **61737**
 BORING COMPANY: **FIGURE**
 FOREMAN: **RAK**
 OBG GEOLOGIST: **KBS**

Surface Elevation:
 Northing:
 Easting:
 Depth to ground water:

LEGEND: Cement/grout Screen
 Sand Pack Riser
 Bentonite

DEPTH BELOW GRADE	No.	CORE INTERVAL (ft bg)	PENETRATION/RECOVERY (ft bg)	Analytical Sample Interval (ft bg)	SAMPLE DESCRIPTION	STRATUM CHANGE GENERAL DESCRIPT	Equipment Installed		Field Testing	
							PID Reading	USCS symbol		
0			5/5		0-4" Mud w/brn, dy/light brown, clayey silt, 9365 bits					
1					6"-5" MYS, dy, clayey silt, trace gravel trace to white sand 4-5'					
2										
3					3-3.5 rust colored silt					
4										
5			5/5		5-10 MYS, dy, silty CLAY, trace gravel stiff to very stiff, non plastic					
6										
7					7-8 Janky brown clay					
8										
9					10-10.3 dy silt					
10			5/5		10-25 med/light gray, dy to silty must, trace gravel, silty CLAY					
11					stiff,					
12										
13										
14										
15			5/5		SAP, must					
16										
17										
18										
19										
20			5/5							
21										
22										
23										
24										

Notes: **1" temp PVC well set @ 25ftbg**
COB 35'

SOIL BORING LOG

REPORT OF BORING: SGP-3a

Boring Location: 20 South of SBL-3, West Perimeter Drive
 Drilling equipment: Geoprobe 6620
 Sampling equipment: Macro core 3ft
 Borehole Diameter: 3.5"
 Total Depth: 25'
 Start date: 12/7/17 1240
 Completion date: 12/7/17

PAGE 1 OF 1
 Surface Elevation:
 Northing:
 Easting:
 Depth to ground water:

CLIENT: RACER
 PROJECT NAME: PFAS/VE STUDY
 PROJECT LOCATION: Flint
 FILE NO.: 104237
 BORING COMPANY: Fibertec
 FOREMAN: Ben
 OBG GEOLOGIST: KAS

LEGEND: / Cement/grout == Screen
 Sand Pack Riser
 Bentonite

DEPTH BELOW GRADE	CORE INTERVAL (ft bg)	PENETRATION/RECOVERY (ft bg)	Analytical Sample Interval (ft bg)	SAMPLE DESCRIPTION	STRATUM CHANGE GENERAL DESCRIPT	Equipment Installed		Field Testing	
						PID Reading	USCS symbol		
0		5/5		0-6" mud brown, dry/slightly moist, clayey silt, grass. 20%					
1				6"-70" MYS, dry, clayey silt, trace gravel mid trace DS; silty sand 2 polyprop. silt					
2									
3									
4									
5		5/5		5-					
6									
7									
8				8.5-9 - silty sand moist to wet					
9									
10		5/5		10-10.5 med light gray, slightly moist, stiff silty clay, trace gravel 100 plastic					
11									
12				11.3-11.4 MYS clayey silt, moist to wet					
13									
14									
15		5/5		14.8 little to some fine sand plastic, soft saturation @ 14'					
16									
17									
18									
19									
20									
21									
22									
23									
24									

Notes: EOC 25'

ATTACHMENT B
Analytical Laboratory
Results

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Sacramento
880 Riverside Parkway
West Sacramento, CA 95605
Tel: (916)373-5600

TestAmerica Job ID: 320-34102-1
TestAmerica SDG: Coldwater Rd. Candfill-RACER
Client Project/Site: Coldwater Rd Landfill - RACER

For:
O'Brien & Gere Inc of North America
37000 Grand River Ave
Suite 260
Farmington Hills, Michigan 48335

Attn: Mr. Clifford Yantz



Authorized for release by:
12/22/2017 1:09:57 PM

Jill Kellmann, Manager of Project Management
(916)374-4402
jill.kellmann@testamericainc.com

LINKS

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The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Definitions/Glossary

Client: O'Brien & Gere Inc of North America
Project/Site: Coldwater Rd Landfill - RACER

TestAmerica Job ID: 320-34102-1
SDG: Coldwater Rd. Landfill-RACER

Qualifiers

LCMS

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
*	Isotope Dilution analyte is outside acceptance limits.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Case Narrative

Client: O'Brien & Gere Inc of North America
Project/Site: Coldwater Rd Landfill - RACER

TestAmerica Job ID: 320-34102-1
SDG: Coldwater Rd. Landfill-RACER

Job ID: 320-34102-1

Laboratory: TestAmerica Sacramento

Narrative

Receipt

The samples were received on 12/9/2017 10:10 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 2.3° C.

LCMS

Method(s) 537 (modified): The Isotope Dilution Analyte (IDA) recovery associated with the following sample is below the method recommended limit for 13C8 FOSA: SBP-1-GW (320-34102-3). Generally, data quality is not considered affected if the IDA signal-to-noise ratio is greater than 10:1, which is achieved for all IDA in the sample.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Organic Prep

Method(s) 3535: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-199523.

Method(s) 3535: The following samples: SBP-2-GW (320-34102-1), SBP-3-GW (320-34102-2), SBP-1-GW (320-34102-3) and SBP-DUP-1 (320-34102-4) were decanted prior to extraction due to excess sediment that had the potential to clog the solid-phase column.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



Detection Summary

Client: O'Brien & Gere Inc of North America
Project/Site: Coldwater Rd Landfill - RACER

TestAmerica Job ID: 320-34102-1
SDG: Couldwater Rd. Candfill-RACER

Client Sample ID: SBP-2-GW

Lab Sample ID: 320-34102-1

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanoic acid (PFBA)	55	B	2.0	0.35	ng/L	1		537 (modified)	Total/NA
Perfluoropentanoic acid (PFPeA)	7.1		2.0	0.49	ng/L	1		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	12		2.0	0.58	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	7.4		2.0	0.25	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	25		2.0	0.85	ng/L	1		537 (modified)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	150		2.0	0.20	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	280	B	2.0	0.17	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanesulfonic Acid (PFHpS)	3.2		2.0	0.19	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	30		2.0	0.54	ng/L	1		537 (modified)	Total/NA

Client Sample ID: SBP-3-GW

Lab Sample ID: 320-34102-2

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanoic acid (PFBA)	1.3	J B	2.0	0.35	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.36	J	2.0	0.25	ng/L	1		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	0.27	J	2.0	0.27	ng/L	1		537 (modified)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	0.48	J	2.0	0.20	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	0.78	J B	2.0	0.17	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	4.1		2.0	0.55	ng/L	1		537 (modified)	Total/NA

Client Sample ID: SBP-1-GW

Lab Sample ID: 320-34102-3

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanoic acid (PFBA)	24	B	2.0	0.35	ng/L	1		537 (modified)	Total/NA
Perfluoropentanoic acid (PFPeA)	4.2		2.0	0.49	ng/L	1		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	5.8		2.0	0.58	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	5.2		2.0	0.25	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	38		2.0	0.84	ng/L	1		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	0.49	J	2.0	0.27	ng/L	1		537 (modified)	Total/NA
Perfluorotetradecanoic acid (PFTeA)	0.49	J	2.0	0.29	ng/L	1		537 (modified)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	21		2.0	0.20	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	210	B	2.0	0.17	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanesulfonic Acid (PFHpS)	50		2.0	0.19	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	1700		9.9	2.7	ng/L	5		537 (modified)	Total/NA

Client Sample ID: SBP-DUP-1

Lab Sample ID: 320-34102-4

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanoic acid (PFBA)	51	B	2.0	0.34	ng/L	1		537 (modified)	Total/NA
Perfluoropentanoic acid (PFPeA)	7.5		2.0	0.48	ng/L	1		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	16		2.0	0.57	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	9.8		2.0	0.25	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	28		2.0	0.84	ng/L	1		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	0.39	J	2.0	0.27	ng/L	1		537 (modified)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	130		2.0	0.20	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	390	B	2.0	0.17	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanesulfonic Acid (PFHpS)	6.1		2.0	0.19	ng/L	1		537 (modified)	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Detection Summary

Client: O'Brien & Gere Inc of North America
Project/Site: Coldwater Rd Landfill - RACER

TestAmerica Job ID: 320-34102-1
SDG: Coldwater Rd. Landfill-RACER

Client Sample ID: SBP-DUP-1 (Continued)

Lab Sample ID: 320-34102-4

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanesulfonic acid (PFOS)	55		2.0	0.53	ng/L	1		537 (modified)	Total/NA

Client Sample ID: Field Blank-1

Lab Sample ID: 320-34102-5

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanoic acid (PFBA)	0.38	J B	2.0	0.35	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	0.40	J B	2.0	0.17	ng/L	1		537 (modified)	Total/NA

Client Sample ID: Equipment Blank-1

Lab Sample ID: 320-34102-6

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	0.28	J B	2.0	0.17	ng/L	1		537 (modified)	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Client Sample Results

Client: O'Brien & Gere Inc of North America
Project/Site: Coldwater Rd Landfill - RACER

TestAmerica Job ID: 320-34102-1
SDG: Couldwater Rd. Candfill-RACER

Client Sample ID: SBP-2-GW

Lab Sample ID: 320-34102-1

Date Collected: 12/08/17 14:30

Matrix: Water

Date Received: 12/09/17 10:10

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	55	B	2.0	0.35	ng/L		12/12/17 12:00	12/13/17 12:48	1
Perfluoropentanoic acid (PFPeA)	7.1		2.0	0.49	ng/L		12/12/17 12:00	12/13/17 12:48	1
Perfluorohexanoic acid (PFHxA)	12		2.0	0.58	ng/L		12/12/17 12:00	12/13/17 12:48	1
Perfluoroheptanoic acid (PFHpA)	7.4		2.0	0.25	ng/L		12/12/17 12:00	12/13/17 12:48	1
Perfluorooctanoic acid (PFOA)	25		2.0	0.85	ng/L		12/12/17 12:00	12/13/17 12:48	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.27	ng/L		12/12/17 12:00	12/13/17 12:48	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.31	ng/L		12/12/17 12:00	12/13/17 12:48	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L		12/12/17 12:00	12/13/17 12:48	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.55	ng/L		12/12/17 12:00	12/13/17 12:48	1
Perfluorotridecanoic Acid (PFTriA)	ND		2.0	1.3	ng/L		12/12/17 12:00	12/13/17 12:48	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.29	ng/L		12/12/17 12:00	12/13/17 12:48	1
Perfluorobutanesulfonic acid (PFBS)	150		2.0	0.20	ng/L		12/12/17 12:00	12/13/17 12:48	1
Perfluorohexanesulfonic acid (PFHxS)	280	B	2.0	0.17	ng/L		12/12/17 12:00	12/13/17 12:48	1
Perfluoroheptanesulfonic Acid (PFHpS)	3.2		2.0	0.19	ng/L		12/12/17 12:00	12/13/17 12:48	1
Perfluorodecanesulfonic acid (PFDS)	ND		2.0	0.32	ng/L		12/12/17 12:00	12/13/17 12:48	1
Perfluorooctanesulfonic acid (PFOS)	30		2.0	0.54	ng/L		12/12/17 12:00	12/13/17 12:48	1
Perfluorooctane Sulfonamide (FOSA)	ND		2.0	0.35	ng/L		12/12/17 12:00	12/13/17 12:48	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C8 FOSA	105		25 - 150	12/12/17 12:00	12/13/17 12:48	1
13C4 PFBA	30		25 - 150	12/12/17 12:00	12/13/17 12:48	1
13C2 PFHxA	82		25 - 150	12/12/17 12:00	12/13/17 12:48	1
13C4 PFOA	103		25 - 150	12/12/17 12:00	12/13/17 12:48	1
13C5 PFNA	122		25 - 150	12/12/17 12:00	12/13/17 12:48	1
13C2 PFDA	110		25 - 150	12/12/17 12:00	12/13/17 12:48	1
13C2 PFUnA	106		25 - 150	12/12/17 12:00	12/13/17 12:48	1
13C2 PFDoA	109		25 - 150	12/12/17 12:00	12/13/17 12:48	1
18O2 PFHxS	99		25 - 150	12/12/17 12:00	12/13/17 12:48	1
13C4 PFOS	112		25 - 150	12/12/17 12:00	12/13/17 12:48	1
13C4-PFHpA	91		25 - 150	12/12/17 12:00	12/13/17 12:48	1
13C5 PFPeA	77		25 - 150	12/12/17 12:00	12/13/17 12:48	1
13C3-PFBS	96		25 - 150	12/12/17 12:00	12/13/17 12:48	1
13C2-PFTeDA	108		25 - 150	12/12/17 12:00	12/13/17 12:48	1

Client Sample ID: SBP-3-GW

Lab Sample ID: 320-34102-2

Date Collected: 12/08/17 15:00

Matrix: Water

Date Received: 12/09/17 10:10

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	1.3	J B	2.0	0.35	ng/L		12/12/17 12:00	12/13/17 12:56	1
Perfluoropentanoic acid (PFPeA)	ND		2.0	0.50	ng/L		12/12/17 12:00	12/13/17 12:56	1
Perfluorohexanoic acid (PFHxA)	ND		2.0	0.59	ng/L		12/12/17 12:00	12/13/17 12:56	1
Perfluoroheptanoic acid (PFHpA)	0.36	J	2.0	0.25	ng/L		12/12/17 12:00	12/13/17 12:56	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.86	ng/L		12/12/17 12:00	12/13/17 12:56	1
Perfluorononanoic acid (PFNA)	0.27	J	2.0	0.27	ng/L		12/12/17 12:00	12/13/17 12:56	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.31	ng/L		12/12/17 12:00	12/13/17 12:56	1

TestAmerica Sacramento

Client Sample Results

Client: O'Brien & Gere Inc of North America
Project/Site: Coldwater Rd Landfill - RACER

TestAmerica Job ID: 320-34102-1
SDG: Couldwater Rd. Candfill-RACER

Client Sample ID: SBP-3-GW

Lab Sample ID: 320-34102-2

Date Collected: 12/08/17 15:00

Matrix: Water

Date Received: 12/09/17 10:10

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L		12/12/17 12:00	12/13/17 12:56	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.56	ng/L		12/12/17 12:00	12/13/17 12:56	1
Perfluorotridecanoic Acid (PFTriA)	ND		2.0	1.3	ng/L		12/12/17 12:00	12/13/17 12:56	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.29	ng/L		12/12/17 12:00	12/13/17 12:56	1
Perfluorobutanesulfonic acid (PFBS)	0.48	J	2.0	0.20	ng/L		12/12/17 12:00	12/13/17 12:56	1
Perfluorohexanesulfonic acid (PFHxS)	0.78	J B	2.0	0.17	ng/L		12/12/17 12:00	12/13/17 12:56	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		2.0	0.19	ng/L		12/12/17 12:00	12/13/17 12:56	1
Perfluorodecanesulfonic acid (PFDS)	ND		2.0	0.32	ng/L		12/12/17 12:00	12/13/17 12:56	1
Perfluorooctanesulfonic acid (PFOS)	4.1		2.0	0.55	ng/L		12/12/17 12:00	12/13/17 12:56	1
Perfluorooctane Sulfonamide (FOSA)	ND		2.0	0.35	ng/L		12/12/17 12:00	12/13/17 12:56	1
<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
13C8 FOSA	84		25 - 150				12/12/17 12:00	12/13/17 12:56	1
13C4 PFBA	73		25 - 150				12/12/17 12:00	12/13/17 12:56	1
13C2 PFHxA	103		25 - 150				12/12/17 12:00	12/13/17 12:56	1
13C4 PFOA	105		25 - 150				12/12/17 12:00	12/13/17 12:56	1
13C5 PFNA	112		25 - 150				12/12/17 12:00	12/13/17 12:56	1
13C2 PFDA	98		25 - 150				12/12/17 12:00	12/13/17 12:56	1
13C2 PFUnA	108		25 - 150				12/12/17 12:00	12/13/17 12:56	1
13C2 PFDoA	113		25 - 150				12/12/17 12:00	12/13/17 12:56	1
18O2 PFHxS	103		25 - 150				12/12/17 12:00	12/13/17 12:56	1
13C4 PFOS	104		25 - 150				12/12/17 12:00	12/13/17 12:56	1
13C4-PFHpA	101		25 - 150				12/12/17 12:00	12/13/17 12:56	1
13C5 PFPeA	115		25 - 150				12/12/17 12:00	12/13/17 12:56	1
13C3-PFBS	109		25 - 150				12/12/17 12:00	12/13/17 12:56	1
13C2-PFTeDA	110		25 - 150				12/12/17 12:00	12/13/17 12:56	1

Client Sample ID: SBP-1-GW

Lab Sample ID: 320-34102-3

Date Collected: 12/08/17 15:35

Matrix: Water

Date Received: 12/09/17 10:10

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	24	B	2.0	0.35	ng/L		12/12/17 12:00	12/13/17 13:04	1
Perfluoropentanoic acid (PFPeA)	4.2		2.0	0.49	ng/L		12/12/17 12:00	12/13/17 13:04	1
Perfluorohexanoic acid (PFHxA)	5.8		2.0	0.58	ng/L		12/12/17 12:00	12/13/17 13:04	1
Perfluoroheptanoic acid (PFHpA)	5.2		2.0	0.25	ng/L		12/12/17 12:00	12/13/17 13:04	1
Perfluorooctanoic acid (PFOA)	38		2.0	0.84	ng/L		12/12/17 12:00	12/13/17 13:04	1
Perfluorononanoic acid (PFNA)	0.49	J	2.0	0.27	ng/L		12/12/17 12:00	12/13/17 13:04	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.31	ng/L		12/12/17 12:00	12/13/17 13:04	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L		12/12/17 12:00	12/13/17 13:04	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.55	ng/L		12/12/17 12:00	12/13/17 13:04	1
Perfluorotridecanoic Acid (PFTriA)	ND		2.0	1.3	ng/L		12/12/17 12:00	12/13/17 13:04	1
Perfluorotetradecanoic acid (PFTeA)	0.49	J	2.0	0.29	ng/L		12/12/17 12:00	12/13/17 13:04	1
Perfluorobutanesulfonic acid (PFBS)	21		2.0	0.20	ng/L		12/12/17 12:00	12/13/17 13:04	1

TestAmerica Sacramento

Client Sample Results

Client: O'Brien & Gere Inc of North America
Project/Site: Coldwater Rd Landfill - RACER

TestAmerica Job ID: 320-34102-1
SDG: Couldwater Rd. Candfill-RACER

Client Sample ID: SBP-1-GW

Lab Sample ID: 320-34102-3

Date Collected: 12/08/17 15:35

Matrix: Water

Date Received: 12/09/17 10:10

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanesulfonic acid (PFHxS)	210	B	2.0	0.17	ng/L	-	12/12/17 12:00	12/13/17 13:04	1
Perfluoroheptanesulfonic Acid (PFHpS)	50		2.0	0.19	ng/L	-	12/12/17 12:00	12/13/17 13:04	1
Perfluorodecanesulfonic acid (PFDS)	ND		2.0	0.32	ng/L	-	12/12/17 12:00	12/13/17 13:04	1
Perfluorooctane Sulfonamide (FOSA)	ND		2.0	0.35	ng/L	-	12/12/17 12:00	12/13/17 13:04	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C8 FOSA	20	*	25 - 150				12/12/17 12:00	12/13/17 13:04	1
13C4 PFBA	67		25 - 150				12/12/17 12:00	12/13/17 13:04	1
13C2 PFHxA	115		25 - 150				12/12/17 12:00	12/13/17 13:04	1
13C4 PFOA	103		25 - 150				12/12/17 12:00	12/13/17 13:04	1
13C5 PFNA	128		25 - 150				12/12/17 12:00	12/13/17 13:04	1
13C2 PFDA	59		25 - 150				12/12/17 12:00	12/13/17 13:04	1
13C2 PFUnA	138		25 - 150				12/12/17 12:00	12/13/17 13:04	1
13C2 PFDoA	149		25 - 150				12/12/17 12:00	12/13/17 13:04	1
18O2 PFHxS	113		25 - 150				12/12/17 12:00	12/13/17 13:04	1
13C4-PFHpA	99		25 - 150				12/12/17 12:00	12/13/17 13:04	1
13C5 PFPeA	120		25 - 150				12/12/17 12:00	12/13/17 13:04	1
13C3-PFBS	137		25 - 150				12/12/17 12:00	12/13/17 13:04	1
13C2-PFTeDA	138		25 - 150				12/12/17 12:00	12/13/17 13:04	1

Method: 537 (modified) - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	1700		9.9	2.7	ng/L	-	12/12/17 12:00	12/18/17 20:39	5
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C4 PFOS	118		25 - 150				12/12/17 12:00	12/18/17 20:39	5

Client Sample ID: SBP-DUP-1

Lab Sample ID: 320-34102-4

Date Collected: 12/08/17 00:00

Matrix: Water

Date Received: 12/09/17 10:10

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	51	B	2.0	0.34	ng/L	-	12/12/17 12:00	12/13/17 13:12	1
Perfluoropentanoic acid (PFPeA)	7.5		2.0	0.48	ng/L	-	12/12/17 12:00	12/13/17 13:12	1
Perfluorohexanoic acid (PFHxA)	16		2.0	0.57	ng/L	-	12/12/17 12:00	12/13/17 13:12	1
Perfluoroheptanoic acid (PFHpA)	9.8		2.0	0.25	ng/L	-	12/12/17 12:00	12/13/17 13:12	1
Perfluorooctanoic acid (PFOA)	28		2.0	0.84	ng/L	-	12/12/17 12:00	12/13/17 13:12	1
Perfluorononanoic acid (PFNA)	0.39	J	2.0	0.27	ng/L	-	12/12/17 12:00	12/13/17 13:12	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.30	ng/L	-	12/12/17 12:00	12/13/17 13:12	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L	-	12/12/17 12:00	12/13/17 13:12	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.54	ng/L	-	12/12/17 12:00	12/13/17 13:12	1
Perfluorotridecanoic Acid (PFTriA)	ND		2.0	1.3	ng/L	-	12/12/17 12:00	12/13/17 13:12	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.29	ng/L	-	12/12/17 12:00	12/13/17 13:12	1
Perfluorobutanesulfonic acid (PFBS)	130		2.0	0.20	ng/L	-	12/12/17 12:00	12/13/17 13:12	1
Perfluorohexanesulfonic acid (PFHxS)	390	B	2.0	0.17	ng/L	-	12/12/17 12:00	12/13/17 13:12	1
Perfluoroheptanesulfonic Acid (PFHpS)	6.1		2.0	0.19	ng/L	-	12/12/17 12:00	12/13/17 13:12	1

TestAmerica Sacramento

Client Sample Results

Client: O'Brien & Gere Inc of North America
Project/Site: Coldwater Rd Landfill - RACER

TestAmerica Job ID: 320-34102-1
SDG: Couldwater Rd. Candfill-RACER

Client Sample ID: SBP-DUP-1

Lab Sample ID: 320-34102-4

Date Collected: 12/08/17 00:00

Matrix: Water

Date Received: 12/09/17 10:10

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorodecanesulfonic acid (PFDS)	ND		2.0	0.31	ng/L		12/12/17 12:00	12/13/17 13:12	1
Perfluorooctanesulfonic acid (PFOS)	55		2.0	0.53	ng/L		12/12/17 12:00	12/13/17 13:12	1
Perfluorooctane Sulfonamide (FOSA)	ND		2.0	0.34	ng/L		12/12/17 12:00	12/13/17 13:12	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C8 FOSA	101		25 - 150				12/12/17 12:00	12/13/17 13:12	1
13C4 PFBA	27		25 - 150				12/12/17 12:00	12/13/17 13:12	1
13C2 PFHxA	75		25 - 150				12/12/17 12:00	12/13/17 13:12	1
13C4 PFOA	94		25 - 150				12/12/17 12:00	12/13/17 13:12	1
13C5 PFNA	117		25 - 150				12/12/17 12:00	12/13/17 13:12	1
13C2 PFDA	113		25 - 150				12/12/17 12:00	12/13/17 13:12	1
13C2 PFUnA	98		25 - 150				12/12/17 12:00	12/13/17 13:12	1
13C2 PFDoA	105		25 - 150				12/12/17 12:00	12/13/17 13:12	1
18O2 PFHxS	96		25 - 150				12/12/17 12:00	12/13/17 13:12	1
13C4 PFOS	109		25 - 150				12/12/17 12:00	12/13/17 13:12	1
13C4-PFHpA	85		25 - 150				12/12/17 12:00	12/13/17 13:12	1
13C5 PFPeA	70		25 - 150				12/12/17 12:00	12/13/17 13:12	1
13C3-PFBS	99		25 - 150				12/12/17 12:00	12/13/17 13:12	1
13C2-PFTeDA	117		25 - 150				12/12/17 12:00	12/13/17 13:12	1

Client Sample ID: Field Blank-1

Lab Sample ID: 320-34102-5

Date Collected: 12/08/17 00:00

Matrix: Water

Date Received: 12/09/17 10:10

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	0.38	J B	2.0	0.35	ng/L		12/12/17 12:00	12/13/17 13:20	1
Perfluoropentanoic acid (PFPeA)	ND		2.0	0.48	ng/L		12/12/17 12:00	12/13/17 13:20	1
Perfluorohexanoic acid (PFHxA)	ND		2.0	0.57	ng/L		12/12/17 12:00	12/13/17 13:20	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.25	ng/L		12/12/17 12:00	12/13/17 13:20	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.84	ng/L		12/12/17 12:00	12/13/17 13:20	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.27	ng/L		12/12/17 12:00	12/13/17 13:20	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.31	ng/L		12/12/17 12:00	12/13/17 13:20	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L		12/12/17 12:00	12/13/17 13:20	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.54	ng/L		12/12/17 12:00	12/13/17 13:20	1
Perfluorotridecanoic Acid (PFTriA)	ND		2.0	1.3	ng/L		12/12/17 12:00	12/13/17 13:20	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.29	ng/L		12/12/17 12:00	12/13/17 13:20	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.20	ng/L		12/12/17 12:00	12/13/17 13:20	1
Perfluorohexanesulfonic acid (PFHxS)	0.40	J B	2.0	0.17	ng/L		12/12/17 12:00	12/13/17 13:20	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		2.0	0.19	ng/L		12/12/17 12:00	12/13/17 13:20	1
Perfluorodecanesulfonic acid (PFDS)	ND		2.0	0.32	ng/L		12/12/17 12:00	12/13/17 13:20	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	0.53	ng/L		12/12/17 12:00	12/13/17 13:20	1
Perfluorooctane Sulfonamide (FOSA)	ND		2.0	0.35	ng/L		12/12/17 12:00	12/13/17 13:20	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C8 FOSA	91		25 - 150				12/12/17 12:00	12/13/17 13:20	1
13C4 PFBA	102		25 - 150				12/12/17 12:00	12/13/17 13:20	1
13C2 PFHxA	102		25 - 150				12/12/17 12:00	12/13/17 13:20	1
13C4 PFOA	98		25 - 150				12/12/17 12:00	12/13/17 13:20	1

TestAmerica Sacramento

Client Sample Results

Client: O'Brien & Gere Inc of North America
Project/Site: Coldwater Rd Landfill - RACER

TestAmerica Job ID: 320-34102-1
SDG: Couldwater Rd. Candfill-RACER

Client Sample ID: Field Blank-1

Lab Sample ID: 320-34102-5

Date Collected: 12/08/17 00:00

Matrix: Water

Date Received: 12/09/17 10:10

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C5 PFNA	106		25 - 150	12/12/17 12:00	12/13/17 13:20	1
13C2 PFDA	97		25 - 150	12/12/17 12:00	12/13/17 13:20	1
13C2 PFUnA	98		25 - 150	12/12/17 12:00	12/13/17 13:20	1
13C2 PFDoA	94		25 - 150	12/12/17 12:00	12/13/17 13:20	1
18O2 PFHxS	99		25 - 150	12/12/17 12:00	12/13/17 13:20	1
13C4 PFOS	102		25 - 150	12/12/17 12:00	12/13/17 13:20	1
13C4-PFHpA	102		25 - 150	12/12/17 12:00	12/13/17 13:20	1
13C5 PFPeA	99		25 - 150	12/12/17 12:00	12/13/17 13:20	1
13C3-PFBS	97		25 - 150	12/12/17 12:00	12/13/17 13:20	1
13C2-PFTeDA	105		25 - 150	12/12/17 12:00	12/13/17 13:20	1

Client Sample ID: Equipment Blank-1

Lab Sample ID: 320-34102-6

Date Collected: 12/08/17 00:00

Matrix: Water

Date Received: 12/09/17 10:10

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	ND		2.0	0.35	ng/L		12/12/17 12:00	12/13/17 13:27	1
Perfluoropentanoic acid (PFPeA)	ND		2.0	0.49	ng/L		12/12/17 12:00	12/13/17 13:27	1
Perfluorohexanoic acid (PFHxA)	ND		2.0	0.58	ng/L		12/12/17 12:00	12/13/17 13:27	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.25	ng/L		12/12/17 12:00	12/13/17 13:27	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.85	ng/L		12/12/17 12:00	12/13/17 13:27	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.27	ng/L		12/12/17 12:00	12/13/17 13:27	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.31	ng/L		12/12/17 12:00	12/13/17 13:27	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L		12/12/17 12:00	12/13/17 13:27	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.55	ng/L		12/12/17 12:00	12/13/17 13:27	1
Perfluorotridecanoic Acid (PFTriA)	ND		2.0	1.3	ng/L		12/12/17 12:00	12/13/17 13:27	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.29	ng/L		12/12/17 12:00	12/13/17 13:27	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.20	ng/L		12/12/17 12:00	12/13/17 13:27	1
Perfluorohexanesulfonic acid (PFHxS)	0.28	J B	2.0	0.17	ng/L		12/12/17 12:00	12/13/17 13:27	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		2.0	0.19	ng/L		12/12/17 12:00	12/13/17 13:27	1
Perfluorodecanesulfonic acid (PFDS)	ND		2.0	0.32	ng/L		12/12/17 12:00	12/13/17 13:27	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	0.54	ng/L		12/12/17 12:00	12/13/17 13:27	1
Perfluorooctane Sulfonamide (FOSA)	ND		2.0	0.35	ng/L		12/12/17 12:00	12/13/17 13:27	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C8 FOSA	93		25 - 150	12/12/17 12:00	12/13/17 13:27	1
13C4 PFBA	93		25 - 150	12/12/17 12:00	12/13/17 13:27	1
13C2 PFHxA	100		25 - 150	12/12/17 12:00	12/13/17 13:27	1
13C4 PFOA	103		25 - 150	12/12/17 12:00	12/13/17 13:27	1
13C5 PFNA	109		25 - 150	12/12/17 12:00	12/13/17 13:27	1
13C2 PFDA	107		25 - 150	12/12/17 12:00	12/13/17 13:27	1
13C2 PFUnA	113		25 - 150	12/12/17 12:00	12/13/17 13:27	1
13C2 PFDoA	109		25 - 150	12/12/17 12:00	12/13/17 13:27	1
18O2 PFHxS	100		25 - 150	12/12/17 12:00	12/13/17 13:27	1
13C4 PFOS	105		25 - 150	12/12/17 12:00	12/13/17 13:27	1
13C4-PFHpA	100		25 - 150	12/12/17 12:00	12/13/17 13:27	1
13C5 PFPeA	101		25 - 150	12/12/17 12:00	12/13/17 13:27	1
13C3-PFBS	97		25 - 150	12/12/17 12:00	12/13/17 13:27	1

TestAmerica Sacramento

Client Sample Results

Client: O'Brien & Gere Inc of North America
Project/Site: Coldwater Rd Landfill - RACER

TestAmerica Job ID: 320-34102-1
SDG: Coldwater Rd. Landfill-RACER

Client Sample ID: Equipment Blank-1

Date Collected: 12/08/17 00:00

Date Received: 12/09/17 10:10

Lab Sample ID: 320-34102-6

Matrix: Water

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
13C2-PFTeDA	106		25 - 150

<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
12/12/17 12:00	12/13/17 13:27	1

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15

Isotope Dilution Summary

Client: O'Brien & Gere Inc of North America
 Project/Site: Coldwater Rd Landfill - RACER

TestAmerica Job ID: 320-34102-1
 SDG: Coldwater Rd. Landfill-RACER

Method: 537 (modified) - Fluorinated Alkyl Substances

Matrix: Water

Prep Type: Total/NA

Percent Isotope Dilution Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	PFOSA (25-150)	PFBA (25-150)	PFHxA (25-150)	PFOA (25-150)	PFNA (25-150)	PFDA (25-150)	PFUnA (25-150)	PFDaA (25-150)
320-34102-1	SBP-2-GW	105	30	82	103	122	110	106	109
320-34102-2	SBP-3-GW	84	73	103	105	112	98	108	113
320-34102-3	SBP-1-GW	20 *	67	115	103	128	59	138	149
320-34102-3 - DL	SBP-1-GW								
320-34102-4	SBP-DUP-1	101	27	75	94	117	113	98	105
320-34102-5	Field Blank-1	91	102	102	98	106	97	98	94
320-34102-6	Equipment Blank-1	93	93	100	103	109	107	113	109
LCS 320-199523/2-A	Lab Control Sample	94	106	105	103	115	104	100	95
LCSD 320-199523/3-A	Lab Control Sample Dup	94	109	107	103	113	105	101	99
MB 320-199523/1-A	Method Blank	97	111	103	105	107	106	103	100

Percent Isotope Dilution Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	PFHxS (25-150)	PFOS (25-150)	PFHpA (25-150)	PFPeA (25-150)	3C3-PFBs (25-150)	PFTDA (25-150)
320-34102-1	SBP-2-GW	99	112	91	77	96	108
320-34102-2	SBP-3-GW	103	104	101	115	109	110
320-34102-3	SBP-1-GW	113		99	120	137	138
320-34102-3 - DL	SBP-1-GW		118				
320-34102-4	SBP-DUP-1	96	109	85	70	99	117
320-34102-5	Field Blank-1	99	102	102	99	97	105
320-34102-6	Equipment Blank-1	100	105	100	101	97	106
LCS 320-199523/2-A	Lab Control Sample	103	109	103	105	101	113
LCSD 320-199523/3-A	Lab Control Sample Dup	103	106	108	106	107	109
MB 320-199523/1-A	Method Blank	108	105	108	109	105	113

Surrogate Legend

- PFOSA = 13C8 FOSA
- PFBA = 13C4 PFBA
- PFHxA = 13C2 PFHxA
- PFOA = 13C4 PFOA
- PFNA = 13C5 PFNA
- PFDA = 13C2 PFDA
- PFUnA = 13C2 PFUnA
- PFDaA = 13C2 PFDaA
- PFHxS = 18O2 PFHxS
- PFOS = 13C4 PFOS
- PFHpA = 13C4-PFHpA
- PFPeA = 13C5 PFPeA
- 13C3-PFBs = 13C3-PFBs
- PFTDA = 13C2-PFTeDA

QC Sample Results

Client: O'Brien & Gere Inc of North America
 Project/Site: Coldwater Rd Landfill - RACER

TestAmerica Job ID: 320-34102-1
 SDG: Couldwater Rd. Candfill-RACER

Method: 537 (modified) - Fluorinated Alkyl Substances

Lab Sample ID: MB 320-199523/1-A
Matrix: Water
Analysis Batch: 199723

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 199523

Analyte	MB Result	MB Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	0.357	J	2.0	0.35	ng/L		12/12/17 12:00	12/13/17 12:24	1
Perfluoropentanoic acid (PFPeA)	ND		2.0	0.49	ng/L		12/12/17 12:00	12/13/17 12:24	1
Perfluorohexanoic acid (PFHxA)	ND		2.0	0.58	ng/L		12/12/17 12:00	12/13/17 12:24	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.25	ng/L		12/12/17 12:00	12/13/17 12:24	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.85	ng/L		12/12/17 12:00	12/13/17 12:24	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.27	ng/L		12/12/17 12:00	12/13/17 12:24	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.31	ng/L		12/12/17 12:00	12/13/17 12:24	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L		12/12/17 12:00	12/13/17 12:24	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.55	ng/L		12/12/17 12:00	12/13/17 12:24	1
Perfluorotridecanoic Acid (PFTriA)	ND		2.0	1.3	ng/L		12/12/17 12:00	12/13/17 12:24	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.29	ng/L		12/12/17 12:00	12/13/17 12:24	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.20	ng/L		12/12/17 12:00	12/13/17 12:24	1
Perfluorohexanesulfonic acid (PFHxS)	0.331	J	2.0	0.17	ng/L		12/12/17 12:00	12/13/17 12:24	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		2.0	0.19	ng/L		12/12/17 12:00	12/13/17 12:24	1
Perfluorodecanesulfonic acid (PFDS)	ND		2.0	0.32	ng/L		12/12/17 12:00	12/13/17 12:24	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	0.54	ng/L		12/12/17 12:00	12/13/17 12:24	1
Perfluorooctane Sulfonamide (FOSA)	ND		2.0	0.35	ng/L		12/12/17 12:00	12/13/17 12:24	1

Isotope Dilution	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C8 FOSA	97		25 - 150	12/12/17 12:00	12/13/17 12:24	1
13C4 PFBA	111		25 - 150	12/12/17 12:00	12/13/17 12:24	1
13C2 PFHxA	103		25 - 150	12/12/17 12:00	12/13/17 12:24	1
13C4 PFOA	105		25 - 150	12/12/17 12:00	12/13/17 12:24	1
13C5 PFNA	107		25 - 150	12/12/17 12:00	12/13/17 12:24	1
13C2 PFDA	106		25 - 150	12/12/17 12:00	12/13/17 12:24	1
13C2 PFUnA	103		25 - 150	12/12/17 12:00	12/13/17 12:24	1
13C2 PFDoA	100		25 - 150	12/12/17 12:00	12/13/17 12:24	1
18O2 PFHxS	108		25 - 150	12/12/17 12:00	12/13/17 12:24	1
13C4 PFOS	105		25 - 150	12/12/17 12:00	12/13/17 12:24	1
13C4-PFHpA	108		25 - 150	12/12/17 12:00	12/13/17 12:24	1
13C5 PFPeA	109		25 - 150	12/12/17 12:00	12/13/17 12:24	1
13C3-PFBS	105		25 - 150	12/12/17 12:00	12/13/17 12:24	1
13C2-PFTeDA	113		25 - 150	12/12/17 12:00	12/13/17 12:24	1

Lab Sample ID: LCS 320-199523/2-A
Matrix: Water
Analysis Batch: 199723

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 199523

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorobutanoic acid (PFBA)	40.0	41.7		ng/L		104	78 - 138
Perfluoropentanoic acid (PFPeA)	40.0	38.0		ng/L		95	66 - 136
Perfluorohexanoic acid (PFHxA)	40.0	38.3		ng/L		96	76 - 136
Perfluoroheptanoic acid (PFHpA)	40.0	40.5		ng/L		101	78 - 138
Perfluorooctanoic acid (PFOA)	40.0	37.1		ng/L		93	70 - 130
Perfluorononanoic acid (PFNA)	40.0	41.8		ng/L		104	77 - 137
Perfluorodecanoic acid (PFDA)	40.0	39.4		ng/L		99	74 - 134
Perfluoroundecanoic acid (PFUnA)	40.0	34.8		ng/L		87	68 - 128

TestAmerica Sacramento

QC Sample Results

Client: O'Brien & Gere Inc of North America
 Project/Site: Coldwater Rd Landfill - RACER

TestAmerica Job ID: 320-34102-1
 SDG: Couldwater Rd. Candfill-RACER

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: LCS 320-199523/2-A
Matrix: Water
Analysis Batch: 199723

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 199523

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorododecanoic acid (PFDoA)	40.0	41.9		ng/L		105	72 - 132
Perfluorotridecanoic Acid (PFTriA)	40.0	43.7		ng/L		109	56 - 163
Perfluorotetradecanoic acid (PFTeA)	40.0	38.2		ng/L		95	63 - 123
Perfluorobutanesulfonic acid (PFBS)	35.4	37.5		ng/L		106	79 - 139
Perfluorohexanesulfonic acid (PFHxS)	36.4	35.7		ng/L		98	77 - 137
Perfluoroheptanesulfonic Acid (PFHpS)	38.1	37.4		ng/L		98	83 - 143
Perfluorodecanesulfonic acid (PFDS)	38.6	35.6		ng/L		92	75 - 135
Perfluorooctanesulfonic acid (PFOS)	37.1	37.3		ng/L		100	74 - 134
Perfluorooctane Sulfonamide (FOSA)	40.0	40.9		ng/L		102	82 - 142

Isotope Dilution	LCS %Recovery	LCS Qualifier	Limits
13C8 FOSA	94		25 - 150
13C4 PFBA	106		25 - 150
13C2 PFHxA	105		25 - 150
13C4 PFOA	103		25 - 150
13C5 PFNA	115		25 - 150
13C2 PFDA	104		25 - 150
13C2 PFUnA	100		25 - 150
13C2 PFDoA	95		25 - 150
18O2 PFHxS	103		25 - 150
13C4 PFOS	109		25 - 150
13C4-PFHpA	103		25 - 150
13C5 PFPeA	105		25 - 150
13C3-PFBS	101		25 - 150
13C2-PFTeDA	113		25 - 150

Lab Sample ID: LCSD 320-199523/3-A
Matrix: Water
Analysis Batch: 199723

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 199523

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanoic acid (PFBA)	40.0	39.3		ng/L		98	78 - 138	6	30
Perfluoropentanoic acid (PFPeA)	40.0	36.9		ng/L		92	66 - 136	3	30
Perfluorohexanoic acid (PFHxA)	40.0	37.1		ng/L		93	76 - 136	3	30
Perfluoroheptanoic acid (PFHpA)	40.0	39.4		ng/L		98	78 - 138	3	30
Perfluorooctanoic acid (PFOA)	40.0	35.9		ng/L		90	70 - 130	3	30
Perfluorononanoic acid (PFNA)	40.0	37.7		ng/L		94	77 - 137	10	30
Perfluorodecanoic acid (PFDA)	40.0	36.7		ng/L		92	74 - 134	7	30
Perfluoroundecanoic acid (PFUnA)	40.0	35.2		ng/L		88	68 - 128	1	30
Perfluorododecanoic acid (PFDoA)	40.0	39.0		ng/L		98	72 - 132	7	30

TestAmerica Sacramento

QC Sample Results

Client: O'Brien & Gere Inc of North America
 Project/Site: Coldwater Rd Landfill - RACER

TestAmerica Job ID: 320-34102-1
 SDG: Coldwater Rd. Landfill-RACER

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: LCSD 320-199523/3-A
Matrix: Water
Analysis Batch: 199723

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 199523

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorotridecanoic Acid (PFTriA)	40.0	42.3		ng/L		106	56 - 163	3	30
Perfluorotetradecanoic acid (PFTeA)	40.0	39.0		ng/L		98	63 - 123	2	30
Perfluorobutanesulfonic acid (PFBS)	35.4	34.5		ng/L		97	79 - 139	8	30
Perfluorohexanesulfonic acid (PFHxS)	36.4	34.9		ng/L		96	77 - 137	2	30
Perfluoroheptanesulfonic Acid (PFHpS)	38.1	36.3		ng/L		95	83 - 143	3	30
Perfluorodecanesulfonic acid (PFDS)	38.6	35.3		ng/L		91	75 - 135	1	30
Perfluorooctanesulfonic acid (PFOS)	37.1	36.8		ng/L		99	74 - 134	1	30
Perfluorooctane Sulfonamide (FOSA)	40.0	40.2		ng/L		100	82 - 142	2	30

Isotope Dilution	LCSD		Limits
	%Recovery	Qualifier	
13C8 FOSA	94		25 - 150
13C4 PFBA	109		25 - 150
13C2 PFHxA	107		25 - 150
13C4 PFOA	103		25 - 150
13C5 PFNA	113		25 - 150
13C2 PFDA	105		25 - 150
13C2 PFUnA	101		25 - 150
13C2 PFDoA	99		25 - 150
18O2 PFHxS	103		25 - 150
13C4 PFOS	106		25 - 150
13C4-PFHpA	108		25 - 150
13C5 PFPeA	106		25 - 150
13C3-PFBS	107		25 - 150
13C2-PFTeDA	109		25 - 150

QC Association Summary

Client: O'Brien & Gere Inc of North America
 Project/Site: Coldwater Rd Landfill - RACER

TestAmerica Job ID: 320-34102-1
 SDG: Couldwater Rd. Candfill-RACER

LCMS

Prep Batch: 199523

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-34102-1	SBP-2-GW	Total/NA	Water	3535	
320-34102-2	SBP-3-GW	Total/NA	Water	3535	
320-34102-3 - DL	SBP-1-GW	Total/NA	Water	3535	
320-34102-3	SBP-1-GW	Total/NA	Water	3535	
320-34102-4	SBP-DUP-1	Total/NA	Water	3535	
320-34102-5	Field Blank-1	Total/NA	Water	3535	
320-34102-6	Equipment Blank-1	Total/NA	Water	3535	
MB 320-199523/1-A	Method Blank	Total/NA	Water	3535	
LCS 320-199523/2-A	Lab Control Sample	Total/NA	Water	3535	
LCSD 320-199523/3-A	Lab Control Sample Dup	Total/NA	Water	3535	

Analysis Batch: 199723

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-34102-1	SBP-2-GW	Total/NA	Water	537 (modified)	199523
320-34102-2	SBP-3-GW	Total/NA	Water	537 (modified)	199523
320-34102-3	SBP-1-GW	Total/NA	Water	537 (modified)	199523
320-34102-4	SBP-DUP-1	Total/NA	Water	537 (modified)	199523
320-34102-5	Field Blank-1	Total/NA	Water	537 (modified)	199523
320-34102-6	Equipment Blank-1	Total/NA	Water	537 (modified)	199523
MB 320-199523/1-A	Method Blank	Total/NA	Water	537 (modified)	199523
LCS 320-199523/2-A	Lab Control Sample	Total/NA	Water	537 (modified)	199523
LCSD 320-199523/3-A	Lab Control Sample Dup	Total/NA	Water	537 (modified)	199523

Analysis Batch: 200476

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-34102-3 - DL	SBP-1-GW	Total/NA	Water	537 (modified)	199523

Lab Chronicle

Client: O'Brien & Gere Inc of North America
Project/Site: Coldwater Rd Landfill - RACER

TestAmerica Job ID: 320-34102-1
SDG: Couldwater Rd. Candfill-RACER

Client Sample ID: SBP-2-GW

Date Collected: 12/08/17 14:30

Date Received: 12/09/17 10:10

Lab Sample ID: 320-34102-1

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			249.7 mL	10.00 mL	199523	12/12/17 12:00	KMK	TAL SAC
Total/NA	Analysis	537 (modified)		1			199723	12/13/17 12:48	JRB	TAL SAC

Client Sample ID: SBP-3-GW

Date Collected: 12/08/17 15:00

Date Received: 12/09/17 10:10

Lab Sample ID: 320-34102-2

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			247.4 mL	10.00 mL	199523	12/12/17 12:00	KMK	TAL SAC
Total/NA	Analysis	537 (modified)		1			199723	12/13/17 12:56	JRB	TAL SAC

Client Sample ID: SBP-1-GW

Date Collected: 12/08/17 15:35

Date Received: 12/09/17 10:10

Lab Sample ID: 320-34102-3

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			251.5 mL	10.00 mL	199523	12/12/17 12:00	KMK	TAL SAC
Total/NA	Analysis	537 (modified)		1			199723	12/13/17 13:04	JRB	TAL SAC
Total/NA	Prep	3535	DL		251.5 mL	10.00 mL	199523	12/12/17 12:00	KMK	TAL SAC
Total/NA	Analysis	537 (modified)	DL	5			200476	12/18/17 20:39	ABH	TAL SAC

Client Sample ID: SBP-DUP-1

Date Collected: 12/08/17 00:00

Date Received: 12/09/17 10:10

Lab Sample ID: 320-34102-4

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			254.1 mL	10.00 mL	199523	12/12/17 12:00	KMK	TAL SAC
Total/NA	Analysis	537 (modified)		1			199723	12/13/17 13:12	JRB	TAL SAC

Client Sample ID: Field Blank-1

Date Collected: 12/08/17 00:00

Date Received: 12/09/17 10:10

Lab Sample ID: 320-34102-5

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			252.9 mL	10.00 mL	199523	12/12/17 12:00	KMK	TAL SAC
Total/NA	Analysis	537 (modified)		1			199723	12/13/17 13:20	JRB	TAL SAC

Lab Chronicle

Client: O'Brien & Gere Inc of North America
Project/Site: Coldwater Rd Landfill - RACER

TestAmerica Job ID: 320-34102-1
SDG: Coldwater Rd. Landfill-RACER

Client Sample ID: Equipment Blank-1

Lab Sample ID: 320-34102-6

Date Collected: 12/08/17 00:00

Matrix: Water

Date Received: 12/09/17 10:10

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			248.9 mL	10.00 mL	199523	12/12/17 12:00	KMK	TAL SAC
Total/NA	Analysis	537 (modified)		1			199723	12/13/17 13:27	JRB	TAL SAC

Laboratory References:

TAL SAC = TestAmerica Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

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Accreditation/Certification Summary

Client: O'Brien & Gere Inc of North America
 Project/Site: Coldwater Rd Landfill - RACER

TestAmerica Job ID: 320-34102-1
 SDG: Couldwater Rd. Candfill-RACER

Laboratory: TestAmerica Sacramento

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	EPA Region	Identification Number	Expiration Date
Oregon	NELAP	10	4040	01-28-18

The following analytes are included in this report, but accreditation/certification is not offered by the governing authority:

Analysis Method	Prep Method	Matrix	Analyte
537 (modified)	3535	Water	Perfluorobutanesulfonic acid (PFBS)
537 (modified)	3535	Water	Perfluorobutanoic acid (PFBA)
537 (modified)	3535	Water	Perfluorodecanesulfonic acid (PFDS)
537 (modified)	3535	Water	Perfluorodecanoic acid (PFDA)
537 (modified)	3535	Water	Perfluorododecanoic acid (PFDoA)
537 (modified)	3535	Water	Perfluoroheptanesulfonic Acid (PFHpS)
537 (modified)	3535	Water	Perfluoroheptanoic acid (PFHpA)
537 (modified)	3535	Water	Perfluorohexanesulfonic acid (PFHxS)
537 (modified)	3535	Water	Perfluorohexanoic acid (PFHxA)
537 (modified)	3535	Water	Perfluorononanoic acid (PFNA)
537 (modified)	3535	Water	Perfluorooctane Sulfonamide (FOSA)
537 (modified)	3535	Water	Perfluorooctanesulfonic acid (PFOS)
537 (modified)	3535	Water	Perfluorooctanoic acid (PFOA)
537 (modified)	3535	Water	Perfluoropentanoic acid (PFPeA)
537 (modified)	3535	Water	Perfluorotetradecanoic acid (PFTeA)
537 (modified)	3535	Water	Perfluorotridecanoic Acid (PFTriA)
537 (modified)	3535	Water	Perfluoroundecanoic acid (PFUnA)

Method Summary

Client: O'Brien & Gere Inc of North America
Project/Site: Coldwater Rd Landfill - RACER

TestAmerica Job ID: 320-34102-1
SDG: Coldwater Rd. Landfill-RACER

Method	Method Description	Protocol	Laboratory
537 (modified)	Fluorinated Alkyl Substances	EPA	TAL SAC

Protocol References:

EPA = US Environmental Protection Agency

Laboratory References:

TAL SAC = TestAmerica Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

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Sample Summary

Client: O'Brien & Gere Inc of North America
Project/Site: Coldwater Rd Landfill - RACER

TestAmerica Job ID: 320-34102-1
SDG: Coldwater Rd. Landfill-RACER

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-34102-1	SBP-2-GW	Water	12/08/17 14:30	12/09/17 10:10
320-34102-2	SBP-3-GW	Water	12/08/17 15:00	12/09/17 10:10
320-34102-3	SBP-1-GW	Water	12/08/17 15:35	12/09/17 10:10
320-34102-4	SBP-DUP-1	Water	12/08/17 00:00	12/09/17 10:10
320-34102-5	Field Blank-1	Water	12/08/17 00:00	12/09/17 10:10
320-34102-6	Equipment Blank-1	Water	12/08/17 00:00	12/09/17 10:10

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Login Sample Receipt Checklist

Client: O'Brien & Gere Inc of North America

Job Number: 320-34102-1
SDG Number: Couldwater Rd. Candfill-RACER

Login Number: 34102

List Number: 1

Creator: Aguayo, Alonso

List Source: TestAmerica Sacramento

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

