



**de maximis, inc.**

450 Montbrook Lane  
Knoxville, TN 37919  
(865)691-5052  
(865)691-9835 FAX

March 4, 2020

**Emerging Contaminant Results  
Pollution Abatement Services, Site No. 738001  
Oswego, NY**

Dear Mr. Long:

de maximis inc., project coordinator for the Parties to the 1998 Consent Decree 98CV0112-NPMGJD for the Pollution Abatement Services (PAS) Site in Oswego New York, is providing this Summary Report for the sampling and analysis of per- and polyfluoroalkyl substances (PFAS) and 1,4-dioxane performed in November 2019 at the PAS Site.

**Scope of Work**

This letter provides the data for the sampling and analysis program for per- and polyfluoroalkyl substance (PFAS) and 1,4-dioxane performed at the PAS Site during the November 2019 semi-annual sampling event. The groundwater samples were collected from three existing monitoring wells: LR-2, SWW-5, and M-21 in accordance with the approved sampling plan. Well LR-2 is located upgradient of the Site, SWW-5 is located within the PAS containment system and M-21 is located downgradient of the Site as shown on **Figure 1**.

Construction information for these wells is as follows:

Well ID	Well Diameter	Screened Interval (Ft Below grade)
LR-2	2 inch	45.8 - 55.8
SWW-5	3 inch	7 - 17
M-21	3 inch	11.5 - 21.5

## Groundwater Sampling

The groundwater samples were collected while wearing appropriate personal protective equipment (PPE). PFAS constituents were sampled first followed by sampling for 1,4-dioxane. Additionally, special PFAS-related precautions were taken in accordance with the approved Sampling and Analysis Plan (SAP) during the sampling to minimize potential sample contamination.

Specifically, groundwater samples were collected using a low-flow sampling method at flow rates not less than 100 milliliters per minute (ml/min) and no greater than 500 ml/min. During purging, depth to water was measured every 3 to 5 minutes. Water quality parameters were measured and included temperature, conductivity, pH, oxidation-reduction potential (ORP), and, dissolved oxygen (DO). Turbidity readings were also collected. These results were recorded on the corresponding field forms presented in Attachment I. The water quality measurements were taken to achieve the following:

- pH within  $\pm 0.1$  Standard Units (SU)
- Specific conductivity within  $\pm 3\%$
- ORP within  $\pm 10$  millivolts (mV)
- DO within  $\pm 10\%$
- Turbidity within  $\pm 10\%$  (ideally less than 50 nephelometric turbidity units [NTUs])

### Quality Control Samples

As approved by NYSDEC, OBG performed the sampling consistent with protocols for PFAS and 1,4-dioxane and analysis was completed by Eurofins TestAmerica using modified USEPA Method 537 with quantification of 21 PFAS, and analysis for 1,4-dioxane was completed using USEPA Method 8270 with selected ion monitoring (SIM) (Attachment II). Quality control (QC) samples were collected, and the analytical data package was validated by ddms in a report dated February 21, 2020.

As prescribed in the approved SAP, one set of quality control (QC) samples was collected during the sampling event for the PFAS and 1,4-dioxane analyses. The QC samples for the PFAS and 1,4-dioxane analyses included one blind duplicate sample, one matrix spike/matrix spike duplicate (MS/MSD) sample pair, and one equipment blank. In addition, one field reagent blank was collected as part of the PFAS QC samples.

Analysis	No. of Samples	Field Blank	Blind Duplicate	Equipment Blank	MS	MSD	Total
<b>PFAS</b>	3	1	1	1	1	1	8
<b>1,4-dioxane</b>	3	0	1	1	1	1	7

### Validation and Results

Validation of the results was performed by ddms and provided in the report dated February 21, 2020. (Attachment III) The results indicate that PFAS are present at low levels in both on and off-Site wells. Concentrations were generally less than 20 ppt. The highest concentrations were observed at SWW-5 within the PAS containment area. 1,4-dioxane was also detected in well SWW-5 at 1000 ppb J and in M-21 at 630 ppb J. The 1-4-dioxane results in SWW-5 and M-21 were identified as estimated biased high due to a high laboratory control sample recovery and also given the J qualifier during validation due to calibration and recovery issues in the lab.



**Conclusion**

The data indicate detections of 1-4 dioxane on Site and immediately down gradient. However, it is important to note that well SWW-5 is on the PAS Site controlled by the City of Oswego and the State of New York and well M-21 is located on the Industrial Precision Products property controlled by an environmental easement completed in February 2006. In addition, all properties in proximity and down gradient of the PAS Site are within the Oswego City Limits and no potable wells are permitted within the City limits. Therefore, at this time no further action is proposed.

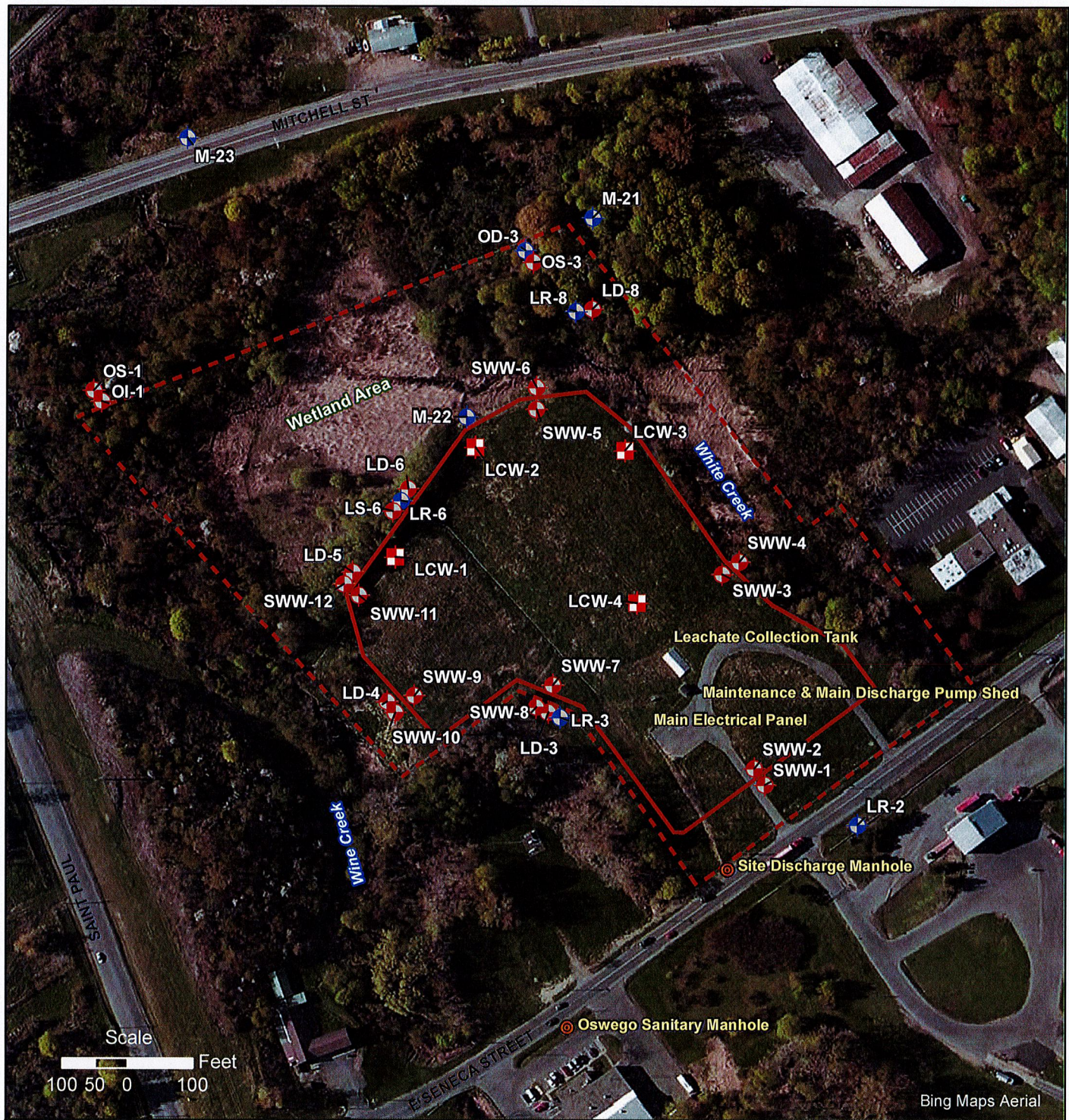
Should you have any questions, please contact me via e-mail or call me at 865-691-5052.

*Sincerely,*

A handwritten signature in blue ink that reads "Clay McClarnon".

Clay McClarnon

CC: PAS Management Committee  
Patricia Pierre, USEPA



**LEGEND**

**Sample Locations**

- Bedrock Monitoring Well
- Leachate Collection Well (Overburden)
- Overburden Monitoring Well
- Manhole
- Fence (Site Boundary)
- Slurry Wall

**EXISTING SITE WELLS**

PAS Site, Oswego, New York



Project No.: 3131  
 Plot Date: 4 May 2012  
 Arc Operator: BJAR  
 Reviewed by:

**Figure 1**



# ATTACHMENT I

**Eurofins TestAmerica, Buffalo**

10 Hazelwood Drive  
 Amherst, NY 14228-2298  
 Phone: 716-691-2600 Fax: 716-691-7991

**Chain of Custody Record**

<b>Client Information</b>				Sampler: <b>Allie Berry</b>	Lab PM: Schove, John R	Carrier Tracking No(s):	COC No: 480-137797-30986.1																																																																																																																																																																																																							
Client Contact: Ms. Deborah Wright				Phone: <b>835-256-5457</b>	E-Mail: john.schove@testamericainc.com		Page: Page 1 of 1																																																																																																																																																																																																							
Company: O'Brien & Gere Inc of North America				<b>Analysis Requested</b>				Job #:																																																																																																																																																																																																						
Address: PO BOX 4873								<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td rowspan="10" style="writing-mode: vertical-rl; transform: rotate(180deg);">Field Filtered Sample (Yes or No)</td> <td rowspan="10" style="writing-mode: vertical-rl; transform: rotate(180deg);">Perpet MS/MSD (Yes or No)</td> <td rowspan="10" style="writing-mode: vertical-rl; transform: rotate(180deg);">PFC_IDA - PFAS Standard List (21 analytes)</td> <td rowspan="10" style="writing-mode: vertical-rl; transform: rotate(180deg);">8270D_SIM_MS_ID - SIM List</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table>				Field Filtered Sample (Yes or No)	Perpet MS/MSD (Yes or No)	PFC_IDA - PFAS Standard List (21 analytes)	8270D_SIM_MS_ID - SIM List																																																																																																																																																																																															
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Due Date Requested:				<b>Total Number of Containers</b>				Preservation Codes: A - HCL                  M - Hexane B - NaOH                N - None C - Zn Acetate        O - AsNaO2 D - Nitric Acid        P - Na2O4S E - NaHSO4            Q - Na2SO3 F - MeOH                R - Na2S2O3 G - Amchlor            S - H2SO4 H - Ascorbic Acid    T - TSP Dodecahydrate I - Ice                    U - Acetone J - DI Water            V - MCAA K - EDTA                W - pH 4-5 L - EDA                  Z - other (specify)  Other:																																																																																																																																																																																																						
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Email: deborah.wright@ramboll.com								<b>Special Instructions/Note:</b>																																																																																																																																																																																																						
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EB-110519	11/5/19	1045	G	Water		X	Y																																																																																																																																																																																																							
FR-110519	11/5/19	0935	G	Water		X	X																																																																																																																																																																																																							
SWW-5-110519	11/5/19	1330	G	Water		X	X																																																																																																																																																																																																							
LL-2-110519	11/5/19	1500	G	Water		X	Y																																																																																																																																																																																																							
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Deliverable Requested: I, II, III, IV, Other (specify)				Special Instructions/QC Requirements:			

Empty Kit Relinquished by:		Date:	Time:	Method of Shipment:	
Relinquished by: <i>AMW MW</i>		Date/Time: 11/5/19 0740	Company: Ramboll	Received by: <i>REIGHLIG</i>	Date/Time: 11-5-19, 17:40
Relinquished by:		Date/Time:	Company:	Received by:	Date/Time:
Relinquished by:		Date/Time:	Company:	Received by:	Date/Time:
Custody Seals Intact: Δ Yes    Δ No		Custody Seal No.:		Cooler Temperature(s) °C and Other Remarks:	









# ATTACHMENT II

## ANALYTICAL REPORT

Eurofins TestAmerica, Buffalo  
10 Hazelwood Drive  
Amherst, NY 14228-2298  
Tel: (716)691-2600

Laboratory Job ID: 480-162320-1  
Client Project/Site: PAS Osewgo EC Sampling

**For:**

O'Brien & Gere Inc of North America  
PO BOX 4873  
Syracuse, New York 13221

Attn: Ms. Deborah Wright



Authorized for release by:  
12/6/2019 5:49:51 PM

Alexander Gilbert, Project Management Assistant I  
[alexander.gilbert@testamericainc.com](mailto:alexander.gilbert@testamericainc.com)

Designee for

John Schove, Project Manager II  
(716)504-9838  
[john.schove@testamericainc.com](mailto:john.schove@testamericainc.com)

### LINKS

Review your project  
results through  
**TotalAccess**

Have a Question?



Visit us at:  
[www.testamericainc.com](http://www.testamericainc.com)

*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: PAS Osewgo EC Sampling

Job ID: 480-162320-1

## Qualifiers

### GC/MS Semi VOA

Qualifier	Qualifier Description
*	LCS or LCSD is outside acceptance limits.
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.
B	Compound was found in the blank and sample.
E	Result exceeded calibration range.

### LCMS

Qualifier	Qualifier Description
*	LCS or LCSD is outside acceptance limits.
I	Value is EMPC (estimated maximum possible concentration).
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

## 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: PAS Osewgo EC Sampling

Job ID: 480-162320-1

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## Job ID: 480-162320-1

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Laboratory: Eurofins TestAmerica, Buffalo

### Narrative

#### Job Narrative 480-162320-1

#### Comments

No additional comments.

#### Receipt

The samples were received on 11/6/2019 8:00 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 3.3° C.

#### GC/MS Semi VOA

Method 8270D SIM ID: Due to cross-contamination from high abundances of 1,4-Dioxane in samples associated with this job, the Method Blank (MB) contained 1,4-Dioxane above the reporting limit, and the Laboratory Control Sample (LCS) recovered above the upper control limit. The results have been qualified and reported. The following samples are impacted: M-21-110519 (480-162320-1), M-21-110519 (480-162320-1[MSJ]), M-21-110519 (480-162320-1[MSD]), EB-110519 (480-162320-2), SWW-5-110519 (480-162320-4), LR-2-110519 (480-162320-5) and FD-110519 (480-162320-6)

Method 8270D SIM ID: The recovery of 1,4-Dioxane in the following samples were over the upper range of the initial calibration: M-21-110519 (480-162320-1), M-21-110519 (480-162320-1[MSJ]), M-21-110519 (480-162320-1[MSD]) and SWW-5-110519 (480-162320-4). Due to the level of dilution required, the IDA 1,4-Dioxane-d8 would be diluted to a level that could not be detected; therefore, the recovery of 1,4-Dioxane could not be calculated. The results from the lower dilution have been qualified with an "E" flag and reported.

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

#### LCMS

Method 537 (modified): The laboratory control sample (LCS) for preparation batch 200-149688 and analytical batch 200-149808 recovered outside control limits for the following analytes: Perfluorotetradecanoic acid (PFTeA). These analytes were biased high in the LCS and were not detected in the associated samples; therefore, the data have been reported.

Method 537 (modified): The Ion Ratio associated with PFOS and PFBS in sample SWW-5-110519 (480-162320-4) fails our in-house defined limits, however the result is being reported because the peaks observed for both mass transitions are within the expected retention time windows for the branched chain isomers in our calibration mix. Since many of these isomers are at very low levels in our mixed calibration source (many are less than 5% of the solution), it's difficult to project how the different isomer's responses differ at higher levels, so we don't feel comfortable rejecting the detect based solely upon the ratio failure: SWW-5-110519 (480-162320-4)

Method 537 (modified): The continuing calibration verification (CCV) associated with batch 200-149808 recovered above the upper control limit for Perfluorotetradecanoic acid (PFTeA). The samples associated with this CCV were non-detects for the affected analytes; therefore, the data have been reported. The following sample is impacted: (CCV 200-149808/29).

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

#### Organic Prep

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

# Detection Summary

Client: O'Brien & Gere Inc of North America  
Project/Site: PAS Osewgo EC Sampling

Job ID: 480-162320-1

## Client Sample ID: M-21-110519

## Lab Sample ID: 480-162320-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
1,4-Dioxane	630	E B *	0.19	0.095	ug/L	1		8270D SIM ID	Total/NA
Perfluorobutanoic acid (PFBA)	9.0		1.6	0.80	ng/L	1		537 (modified)	Total/NA
Perfluoropentanoic acid (PFPeA)	3.5		1.6	0.51	ng/L	1		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	5.3		1.6	0.61	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	1.8		1.6	0.73	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	19		1.6	0.65	ng/L	1		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	0.28	J	1.6	0.22	ng/L	1		537 (modified)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	0.85	J	1.6	0.39	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	2.5		1.6	0.64	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	3.5		1.6	0.49	ng/L	1		537 (modified)	Total/NA

## Client Sample ID: EB-110519

## Lab Sample ID: 480-162320-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
1,4-Dioxane	0.36	B *	0.19	0.096	ug/L	1		8270D SIM ID	Total/NA

## Client Sample ID: FB-110519

## Lab Sample ID: 480-162320-3

No Detections.

## Client Sample ID: SWW-5-110519

## Lab Sample ID: 480-162320-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
1,4-Dioxane	1000	E B *	0.19	0.095	ug/L	1		8270D SIM ID	Total/NA
Perfluorobutanoic acid (PFBA)	27		1.9	0.94	ng/L	1		537 (modified)	Total/NA
Perfluoropentanoic acid (PFPeA)	2.4		1.9	0.59	ng/L	1		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	4.8		1.9	0.72	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	1.9		1.9	0.86	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	6.4		1.9	0.76	ng/L	1		537 (modified)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	2.1	I	1.9	0.46	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	2.5		1.9	0.76	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	6.9	I	1.9	0.58	ng/L	1		537 (modified)	Total/NA
1H,1H,2H,2H-perfluorooctanesulfonic acid (6:2)	15	J	19	5.2	ng/L	1		537 (modified)	Total/NA

## Client Sample ID: LR-2-110519

## Lab Sample ID: 480-162320-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanoic acid (PFBA)	0.91	J	1.7	0.86	ng/L	1		537 (modified)	Total/NA

## Client Sample ID: FD-110519

## Lab Sample ID: 480-162320-6

No Detections.

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Buffalo

# Client Sample Results

Client: O'Brien & Gere Inc of North America  
Project/Site: PAS Osewgo EC Sampling

Job ID: 480-162320-1

**Client Sample ID: M-21-110519**

**Lab Sample ID: 480-162320-1**

Date Collected: 11/05/19 10:00

Matrix: Water

Date Received: 11/06/19 08:00

**Method: 8270D SIM ID - Semivolatile Organic Compounds (GC/MS SIM / Isotope Dilution)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dioxane	630	E B *	0.19	0.095	ug/L		11/09/19 08:36	11/14/19 01:32	1
<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
1,4-Dioxane-d8	32		15 - 110				11/09/19 08:36	11/14/19 01:32	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	9.0		1.6	0.80	ng/L		11/14/19 11:09	11/18/19 18:33	1
Perfluoropentanoic acid (PFPeA)	3.5		1.6	0.51	ng/L		11/14/19 11:09	11/18/19 18:33	1
Perfluorohexanoic acid (PFHxA)	5.3		1.6	0.61	ng/L		11/14/19 11:09	11/18/19 18:33	1
Perfluoroheptanoic acid (PFHpA)	1.8		1.6	0.73	ng/L		11/14/19 11:09	11/18/19 18:33	1
Perfluorooctanoic acid (PFOA)	19		1.6	0.65	ng/L		11/14/19 11:09	11/18/19 18:33	1
Perfluorononanoic acid (PFNA)	0.28	J	1.6	0.22	ng/L		11/14/19 11:09	11/18/19 18:33	1
Perfluorodecanoic acid (PFDA)	ND		1.6	0.62	ng/L		11/14/19 11:09	11/18/19 18:33	1
Perfluoroundecanoic acid (PFUnA)	ND		1.6	0.63	ng/L		11/14/19 11:09	11/18/19 18:33	1
Perfluorododecanoic acid (PFDoA)	ND		1.6	0.47	ng/L		11/14/19 11:09	11/18/19 18:33	1
Perfluorotridecanoic acid (PFTriA)	ND		1.6	0.48	ng/L		11/14/19 11:09	11/18/19 18:33	1
Perfluorotetradecanoic acid (PFTeA)	ND *		1.6	0.74	ng/L		11/14/19 11:09	11/18/19 18:33	1
Perfluorobutanesulfonic acid (PFBS)	0.85	J	1.6	0.39	ng/L		11/14/19 11:09	11/18/19 18:33	1
Perfluorohexanesulfonic acid (PFHxS)	2.5		1.6	0.64	ng/L		11/14/19 11:09	11/18/19 18:33	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		1.6	0.76	ng/L		11/14/19 11:09	11/18/19 18:33	1
Perfluorooctanesulfonic acid (PFOS)	3.5		1.6	0.49	ng/L		11/14/19 11:09	11/18/19 18:33	1
Perfluorodecanesulfonic acid (PFDS)	ND		1.6	0.72	ng/L		11/14/19 11:09	11/18/19 18:33	1
Perfluorooctanesulfonamide (PFOSA)	ND		8.0	8.0	ng/L		11/14/19 11:09	11/18/19 18:33	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		16	1.4	ng/L		11/14/19 11:09	11/18/19 18:33	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		16	1.2	ng/L		11/14/19 11:09	11/18/19 18:33	1
1H,1H,2H,2H-perfluorooctanesulfonic acid (6:2)	ND		16	4.4	ng/L		11/14/19 11:09	11/18/19 18:33	1
1H,1H,2H,2H-perfluorodecanesulfonic acid (8:2)	ND		16	2.3	ng/L		11/14/19 11:09	11/18/19 18:33	1
<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
13C2 PFDA	84		50 - 150				11/14/19 11:09	11/18/19 18:33	1
13C2 PFDoA	77		50 - 150				11/14/19 11:09	11/18/19 18:33	1
13C2 PFHxA	84		50 - 150				11/14/19 11:09	11/18/19 18:33	1
13C2 PFTeDA	63		50 - 150				11/14/19 11:09	11/18/19 18:33	1
13C2 PFUnA	89		50 - 150				11/14/19 11:09	11/18/19 18:33	1
13C4 PFBA	66		25 - 150				11/14/19 11:09	11/18/19 18:33	1
13C4 PFHpA	85		50 - 150				11/14/19 11:09	11/18/19 18:33	1
13C4 PFOA	85		50 - 150				11/14/19 11:09	11/18/19 18:33	1
13C4 PFOS	89		50 - 150				11/14/19 11:09	11/18/19 18:33	1
13C5 PFNA	85		50 - 150				11/14/19 11:09	11/18/19 18:33	1
13C5 PFPeA	80		25 - 150				11/14/19 11:09	11/18/19 18:33	1
13C8 FOSA	70		25 - 150				11/14/19 11:09	11/18/19 18:33	1
18O2 PFHxS	82		50 - 150				11/14/19 11:09	11/18/19 18:33	1
d3-NMeFOSAA	67		50 - 150				11/14/19 11:09	11/18/19 18:33	1
d5-NEtFOSAA	73		50 - 150				11/14/19 11:09	11/18/19 18:33	1

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# Client Sample Results

Client: O'Brien & Gere Inc of North America  
Project/Site: PAS Osewgo EC Sampling

Job ID: 480-162320-1

## Client Sample ID: M-21-110519

Date Collected: 11/05/19 10:00

Date Received: 11/06/19 08:00

## Lab Sample ID: 480-162320-1

Matrix: Water

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

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
M2-6:2 FTS	93		25 - 150	11/14/19 11:09	11/18/19 18:33	1
M2-8:2 FTS	98		25 - 150	11/14/19 11:09	11/18/19 18:33	1

## Client Sample ID: EB-110519

Date Collected: 11/05/19 10:45

Date Received: 11/06/19 08:00

## Lab Sample ID: 480-162320-2

Matrix: Water

### Method: 8270D SIM ID - Semivolatile Organic Compounds (GC/MS SIM / Isotope Dilution)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dioxane	0.36	B *	0.19	0.096	ug/L		11/09/19 08:36	11/14/19 03:53	1
Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac			
1,4-Dioxane-d8	32		15 - 110	11/09/19 08:36	11/14/19 03:53	1			

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	ND		1.7	0.86	ng/L		11/14/19 11:09	11/18/19 18:58	1
Perfluoropentanoic acid (PFPeA)	ND		1.7	0.54	ng/L		11/14/19 11:09	11/18/19 18:58	1
Perfluorohexanoic acid (PFHxA)	ND		1.7	0.65	ng/L		11/14/19 11:09	11/18/19 18:58	1
Perfluoroheptanoic acid (PFHpA)	ND		1.7	0.78	ng/L		11/14/19 11:09	11/18/19 18:58	1
Perfluorooctanoic acid (PFOA)	ND		1.7	0.69	ng/L		11/14/19 11:09	11/18/19 18:58	1
Perfluorononanoic acid (PFNA)	ND		1.7	0.23	ng/L		11/14/19 11:09	11/18/19 18:58	1
Perfluorodecanoic acid (PFDA)	ND		1.7	0.66	ng/L		11/14/19 11:09	11/18/19 18:58	1
Perfluoroundecanoic acid (PFUnA)	ND		1.7	0.67	ng/L		11/14/19 11:09	11/18/19 18:58	1
Perfluorododecanoic acid (PFDoA)	ND		1.7	0.51	ng/L		11/14/19 11:09	11/18/19 18:58	1
Perfluorotridecanoic acid (PFTriA)	ND		1.7	0.51	ng/L		11/14/19 11:09	11/18/19 18:58	1
Perfluorotetradecanoic acid (PFTeA)	ND *		1.7	0.79	ng/L		11/14/19 11:09	11/18/19 18:58	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.7	0.42	ng/L		11/14/19 11:09	11/18/19 18:58	1
Perfluorohexanesulfonic acid (PFHxS)	ND		1.7	0.69	ng/L		11/14/19 11:09	11/18/19 18:58	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		1.7	0.81	ng/L		11/14/19 11:09	11/18/19 18:58	1
Perfluorooctanesulfonic acid (PFOS)	ND		1.7	0.52	ng/L		11/14/19 11:09	11/18/19 18:58	1
Perfluorodecanesulfonic acid (PFDS)	ND		1.7	0.77	ng/L		11/14/19 11:09	11/18/19 18:58	1
Perfluorooctanesulfonamide (PFOSA)	ND		8.6	8.6	ng/L		11/14/19 11:09	11/18/19 18:58	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		17	1.5	ng/L		11/14/19 11:09	11/18/19 18:58	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		17	1.3	ng/L		11/14/19 11:09	11/18/19 18:58	1
1H,1H,2H,2H-perfluorooctanesulfonic acid (6:2)	ND		17	4.7	ng/L		11/14/19 11:09	11/18/19 18:58	1
1H,1H,2H,2H-perfluorodecanesulfonic acid (8:2)	ND		17	2.5	ng/L		11/14/19 11:09	11/18/19 18:58	1
Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac			
13C2 PFDA	96		50 - 150	11/14/19 11:09	11/18/19 18:58	1			
13C2 PFDoA	78		50 - 150	11/14/19 11:09	11/18/19 18:58	1			
13C2 PFHxA	95		50 - 150	11/14/19 11:09	11/18/19 18:58	1			
13C2 PFTeDA	68		50 - 150	11/14/19 11:09	11/18/19 18:58	1			
13C2 PFUnA	84		50 - 150	11/14/19 11:09	11/18/19 18:58	1			
13C4 PFBA	89		25 - 150	11/14/19 11:09	11/18/19 18:58	1			
13C4 PFHpA	95		50 - 150	11/14/19 11:09	11/18/19 18:58	1			
13C4 PFOA	91		50 - 150	11/14/19 11:09	11/18/19 18:58	1			
13C4 PFOS	93		50 - 150	11/14/19 11:09	11/18/19 18:58	1			

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# Client Sample Results

Client: O'Brien & Gere Inc of North America  
 Project/Site: PAS Osewgo EC Sampling

Job ID: 480-162320-1

**Client Sample ID: EB-110519**

**Lab Sample ID: 480-162320-2**

Date Collected: 11/05/19 10:45

Matrix: Water

Date Received: 11/06/19 08:00

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

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C5 PFNA	96		50 - 150	11/14/19 11:09	11/18/19 18:58	1
13C5 PFPeA	95		25 - 150	11/14/19 11:09	11/18/19 18:58	1
13C8 FOSA	71		25 - 150	11/14/19 11:09	11/18/19 18:58	1
18O2 PFHxS	90		50 - 150	11/14/19 11:09	11/18/19 18:58	1
d3-NMeFOSAA	75		50 - 150	11/14/19 11:09	11/18/19 18:58	1
d5-NEtFOSAA	66		50 - 150	11/14/19 11:09	11/18/19 18:58	1
M2-6:2 FTS	93		25 - 150	11/14/19 11:09	11/18/19 18:58	1
M2-8:2 FTS	104		25 - 150	11/14/19 11:09	11/18/19 18:58	1

**Client Sample ID: FB-110519**

**Lab Sample ID: 480-162320-3**

Date Collected: 11/05/19 09:35

Matrix: Water

Date Received: 11/06/19 08:00

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	ND		1.8	0.91	ng/L		11/14/19 11:09	11/18/19 19:06	1
Perfluoropentanoic acid (PFPeA)	ND		1.8	0.57	ng/L		11/14/19 11:09	11/18/19 19:06	1
Perfluorohexanoic acid (PFHxA)	ND		1.8	0.69	ng/L		11/14/19 11:09	11/18/19 19:06	1
Perfluoroheptanoic acid (PFHpA)	ND		1.8	0.83	ng/L		11/14/19 11:09	11/18/19 19:06	1
Perfluorooctanoic acid (PFOA)	ND		1.8	0.74	ng/L		11/14/19 11:09	11/18/19 19:06	1
Perfluorononanoic acid (PFNA)	ND		1.8	0.25	ng/L		11/14/19 11:09	11/18/19 19:06	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.70	ng/L		11/14/19 11:09	11/18/19 19:06	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.71	ng/L		11/14/19 11:09	11/18/19 19:06	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.54	ng/L		11/14/19 11:09	11/18/19 19:06	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	0.55	ng/L		11/14/19 11:09	11/18/19 19:06	1
Perfluorotetradecanoic acid (PFTeA)	ND *		1.8	0.84	ng/L		11/14/19 11:09	11/18/19 19:06	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.8	0.45	ng/L		11/14/19 11:09	11/18/19 19:06	1
Perfluorohexanesulfonic acid (PFHxS)	ND		1.8	0.73	ng/L		11/14/19 11:09	11/18/19 19:06	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		1.8	0.87	ng/L		11/14/19 11:09	11/18/19 19:06	1
Perfluorooctanesulfonic acid (PFOS)	ND		1.8	0.56	ng/L		11/14/19 11:09	11/18/19 19:06	1
Perfluorodecanesulfonic acid (PFDS)	ND		1.8	0.82	ng/L		11/14/19 11:09	11/18/19 19:06	1
Perfluorooctanesulfonamide (PFOSA)	ND		9.1	9.1	ng/L		11/14/19 11:09	11/18/19 19:06	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		18	1.5	ng/L		11/14/19 11:09	11/18/19 19:06	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		18	1.4	ng/L		11/14/19 11:09	11/18/19 19:06	1
1H,1H,2H,2H-perfluorooctanesulfonic acid (6:2)	ND		18	5.0	ng/L		11/14/19 11:09	11/18/19 19:06	1
1H,1H,2H,2H-perfluorodecanesulfonic acid (8:2)	ND		18	2.6	ng/L		11/14/19 11:09	11/18/19 19:06	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C2 PFDA	83		50 - 150	11/14/19 11:09	11/18/19 19:06	1
13C2 PFDoA	69		50 - 150	11/14/19 11:09	11/18/19 19:06	1
13C2 PFHxA	88		50 - 150	11/14/19 11:09	11/18/19 19:06	1
13C2 PFTeDA	58		50 - 150	11/14/19 11:09	11/18/19 19:06	1
13C2 PFUnA	76		50 - 150	11/14/19 11:09	11/18/19 19:06	1
13C4 PFBA	75		25 - 150	11/14/19 11:09	11/18/19 19:06	1
13C4 PFHpA	83		50 - 150	11/14/19 11:09	11/18/19 19:06	1
13C4 PFOA	82		50 - 150	11/14/19 11:09	11/18/19 19:06	1
13C4 PFOS	84		50 - 150	11/14/19 11:09	11/18/19 19:06	1

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# Client Sample Results

Client: O'Brien & Gere Inc of North America  
Project/Site: PAS Osewgo EC Sampling

Job ID: 480-162320-1

## Client Sample ID: FB-110519

Date Collected: 11/05/19 09:35

Date Received: 11/06/19 08:00

## Lab Sample ID: 480-162320-3

Matrix: Water

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

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C5 PFNA	83		50 - 150	11/14/19 11:09	11/18/19 19:06	1
13C5 PFPeA	84		25 - 150	11/14/19 11:09	11/18/19 19:06	1
13C8 FOSA	68		25 - 150	11/14/19 11:09	11/18/19 19:06	1
18O2 PFHxS	82		50 - 150	11/14/19 11:09	11/18/19 19:06	1
d3-NMeFOSAA	68		50 - 150	11/14/19 11:09	11/18/19 19:06	1
d5-NEtFOSAA	66		50 - 150	11/14/19 11:09	11/18/19 19:06	1
M2-6:2 FTS	80		25 - 150	11/14/19 11:09	11/18/19 19:06	1
M2-8:2 FTS	97		25 - 150	11/14/19 11:09	11/18/19 19:06	1

## Client Sample ID: SWW-5-110519

Date Collected: 11/05/19 13:30

Date Received: 11/06/19 08:00

## Lab Sample ID: 480-162320-4

Matrix: Water

### Method: 8270D SIM ID - Semivolatile Organic Compounds (GC/MS SIM / Isotope Dilution)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dioxane	1000	E B *	0.19	0.095	ug/L		11/09/19 08:36	11/14/19 04:16	1
Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac			
1,4-Dioxane-d8	30		15 - 110	11/09/19 08:36	11/14/19 04:16	1			

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	27		1.9	0.94	ng/L		11/14/19 11:09	11/18/19 19:22	1
Perfluoropentanoic acid (PFPeA)	2.4		1.9	0.59	ng/L		11/14/19 11:09	11/18/19 19:22	1
Perfluorohexanoic acid (PFHxA)	4.8		1.9	0.72	ng/L		11/14/19 11:09	11/18/19 19:22	1
Perfluoroheptanoic acid (PFHpA)	1.9		1.9	0.86	ng/L		11/14/19 11:09	11/18/19 19:22	1
Perfluorooctanoic acid (PFOA)	6.4		1.9	0.76	ng/L		11/14/19 11:09	11/18/19 19:22	1
Perfluorononanoic acid (PFNA)	ND		1.9	0.25	ng/L		11/14/19 11:09	11/18/19 19:22	1
Perfluorodecanoic acid (PFDA)	ND		1.9	0.73	ng/L		11/14/19 11:09	11/18/19 19:22	1
Perfluoroundecanoic acid (PFUnA)	ND		1.9	0.74	ng/L		11/14/19 11:09	11/18/19 19:22	1
Perfluorododecanoic acid (PFDoA)	ND		1.9	0.56	ng/L		11/14/19 11:09	11/18/19 19:22	1
Perfluorotridecanoic acid (PFTriA)	ND		1.9	0.57	ng/L		11/14/19 11:09	11/18/19 19:22	1
Perfluorotetradecanoic acid (PFTeA)	ND *		1.9	0.87	ng/L		11/14/19 11:09	11/18/19 19:22	1
Perfluorobutanesulfonic acid (PFBS)	2.1 I		1.9	0.46	ng/L		11/14/19 11:09	11/18/19 19:22	1
Perfluorohexanesulfonic acid (PFHxS)	2.5		1.9	0.76	ng/L		11/14/19 11:09	11/18/19 19:22	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		1.9	0.90	ng/L		11/14/19 11:09	11/18/19 19:22	1
Perfluorooctanesulfonic acid (PFOS)	6.9 I		1.9	0.58	ng/L		11/14/19 11:09	11/18/19 19:22	1
Perfluorodecanesulfonic acid (PFDS)	ND		1.9	0.85	ng/L		11/14/19 11:09	11/18/19 19:22	1
Perfluorooctanesulfonamide (PFOSA)	ND		9.4	9.4	ng/L		11/14/19 11:09	11/18/19 19:22	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		19	1.6	ng/L		11/14/19 11:09	11/18/19 19:22	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		19	1.4	ng/L		11/14/19 11:09	11/18/19 19:22	1
1H,1H,2H,2H-perfluorooctanesulfonic acid (6:2)	15 J		19	5.2	ng/L		11/14/19 11:09	11/18/19 19:22	1
1H,1H,2H,2H-perfluorodecanesulfonic acid (8:2)	ND		19	2.7	ng/L		11/14/19 11:09	11/18/19 19:22	1
Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac			
13C2 PFDA	92		50 - 150	11/14/19 11:09	11/18/19 19:22	1			

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# Client Sample Results

Client: O'Brien & Gere Inc of North America  
Project/Site: PAS Osewgo EC Sampling

Job ID: 480-162320-1

**Client Sample ID: SWW-5-110519**

**Lab Sample ID: 480-162320-4**

**Date Collected: 11/05/19 13:30**

**Matrix: Water**

**Date Received: 11/06/19 08:00**

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

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C2 PFDoA	104		50 - 150	11/14/19 11:09	11/18/19 19:22	1
13C2 PFHxA	84		50 - 150	11/14/19 11:09	11/18/19 19:22	1
13C2 PFTeDA	78		50 - 150	11/14/19 11:09	11/18/19 19:22	1
13C2 PFUnA	105		50 - 150	11/14/19 11:09	11/18/19 19:22	1
13C4 PFBA	56		25 - 150	11/14/19 11:09	11/18/19 19:22	1
13C4 PFHpA	87		50 - 150	11/14/19 11:09	11/18/19 19:22	1
13C4 PFOA	96		50 - 150	11/14/19 11:09	11/18/19 19:22	1
13C4 PFOS	92		50 - 150	11/14/19 11:09	11/18/19 19:22	1
13C5 PFNA	105		50 - 150	11/14/19 11:09	11/18/19 19:22	1
13C5 PFPeA	73		25 - 150	11/14/19 11:09	11/18/19 19:22	1
13C8 FOSA	78		25 - 150	11/14/19 11:09	11/18/19 19:22	1
18O2 PFHxS	93		50 - 150	11/14/19 11:09	11/18/19 19:22	1
d3-NMeFOSAA	82		50 - 150	11/14/19 11:09	11/18/19 19:22	1
d5-NEtFOSAA	101		50 - 150	11/14/19 11:09	11/18/19 19:22	1
M2-6:2 FTS	129		25 - 150	11/14/19 11:09	11/18/19 19:22	1
M2-8:2 FTS	121		25 - 150	11/14/19 11:09	11/18/19 19:22	1

**Client Sample ID: LR-2-110519**

**Lab Sample ID: 480-162320-5**

**Date Collected: 11/05/19 15:00**

**Matrix: Water**

**Date Received: 11/06/19 08:00**

**Method: 8270D SIM ID - Semivolatile Organic Compounds (GC/MS SIM / Isotope Dilution)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dioxane	ND	*	0.19	0.095	ug/L		11/09/19 08:36	11/14/19 04:39	1
Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac			
1,4-Dioxane-d8	36		15 - 110	11/09/19 08:36	11/14/19 04:39	1			

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Perfluorobutanoic acid (PFBA)</b>	<b>0.91</b>	<b>J</b>	1.7	0.86	ng/L		11/14/19 11:09	11/18/19 19:30	1
Perfluoropentanoic acid (PFPeA)	ND		1.7	0.54	ng/L		11/14/19 11:09	11/18/19 19:30	1
Perfluorohexanoic acid (PFHxA)	ND		1.7	0.65	ng/L		11/14/19 11:09	11/18/19 19:30	1
Perfluoroheptanoic acid (PFHpA)	ND		1.7	0.78	ng/L		11/14/19 11:09	11/18/19 19:30	1
Perfluorooctanoic acid (PFOA)	ND		1.7	0.69	ng/L		11/14/19 11:09	11/18/19 19:30	1
Perfluorononanoic acid (PFNA)	ND		1.7	0.23	ng/L		11/14/19 11:09	11/18/19 19:30	1
Perfluorodecanoic acid (PFDA)	ND		1.7	0.66	ng/L		11/14/19 11:09	11/18/19 19:30	1
Perfluoroundecanoic acid (PFUnA)	ND		1.7	0.67	ng/L		11/14/19 11:09	11/18/19 19:30	1
Perfluorododecanoic acid (PFDoA)	ND		1.7	0.50	ng/L		11/14/19 11:09	11/18/19 19:30	1
Perfluorotridecanoic acid (PFTriA)	ND		1.7	0.51	ng/L		11/14/19 11:09	11/18/19 19:30	1
Perfluorotetradecanoic acid (PFTeA)	ND	*	1.7	0.79	ng/L		11/14/19 11:09	11/18/19 19:30	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.7	0.42	ng/L		11/14/19 11:09	11/18/19 19:30	1
Perfluorohexanesulfonic acid (PFHxS)	ND		1.7	0.68	ng/L		11/14/19 11:09	11/18/19 19:30	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		1.7	0.81	ng/L		11/14/19 11:09	11/18/19 19:30	1
Perfluorooctanesulfonic acid (PFOS)	ND		1.7	0.52	ng/L		11/14/19 11:09	11/18/19 19:30	1
Perfluorodecanesulfonic acid (PFDS)	ND		1.7	0.77	ng/L		11/14/19 11:09	11/18/19 19:30	1
Perfluorooctanesulfonamide (PFOSA)	ND		8.6	8.6	ng/L		11/14/19 11:09	11/18/19 19:30	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		17	1.5	ng/L		11/14/19 11:09	11/18/19 19:30	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		17	1.3	ng/L		11/14/19 11:09	11/18/19 19:30	1

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# Client Sample Results

Client: O'Brien & Gere Inc of North America  
Project/Site: PAS Osewgo EC Sampling

Job ID: 480-162320-1

**Client Sample ID: LR-2-110519**

**Lab Sample ID: 480-162320-5**

**Date Collected: 11/05/19 15:00**

**Matrix: Water**

**Date Received: 11/06/19 08:00**

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1H,1H,2H,2H-perfluorooctanesulfonic acid (6:2)	ND		17	4.7	ng/L		11/14/19 11:09	11/18/19 19:30	1
1H,1H,2H,2H-perfluorodecanesulfonic acid (8:2)	ND		17	2.5	ng/L		11/14/19 11:09	11/18/19 19:30	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C2 PFDA	95		50 - 150				11/14/19 11:09	11/18/19 19:30	1
13C2 PFDoA	81		50 - 150				11/14/19 11:09	11/18/19 19:30	1
13C2 PFHxA	99		50 - 150				11/14/19 11:09	11/18/19 19:30	1
13C2 PFTeDA	77		50 - 150				11/14/19 11:09	11/18/19 19:30	1
13C2 PFUnA	88		50 - 150				11/14/19 11:09	11/18/19 19:30	1
13C4 PFBA	93		25 - 150				11/14/19 11:09	11/18/19 19:30	1
13C4 PFHpA	100		50 - 150				11/14/19 11:09	11/18/19 19:30	1
13C4 PFOA	97		50 - 150				11/14/19 11:09	11/18/19 19:30	1
13C4 PFOS	98		50 - 150				11/14/19 11:09	11/18/19 19:30	1
13C5 PFNA	90		50 - 150				11/14/19 11:09	11/18/19 19:30	1
13C5 PFPeA	98		25 - 150				11/14/19 11:09	11/18/19 19:30	1
13C8 FOSA	88		25 - 150				11/14/19 11:09	11/18/19 19:30	1
18O2 PFHxS	97		50 - 150				11/14/19 11:09	11/18/19 19:30	1
d3-NMeFOSAA	71		50 - 150				11/14/19 11:09	11/18/19 19:30	1
d5-NEtFOSAA	74		50 - 150				11/14/19 11:09	11/18/19 19:30	1
M2-6:2 FTS	100		25 - 150				11/14/19 11:09	11/18/19 19:30	1
M2-8:2 FTS	91		25 - 150				11/14/19 11:09	11/18/19 19:30	1

**Client Sample ID: FD-110519**

**Lab Sample ID: 480-162320-6**

**Date Collected: 11/05/19 00:00**

**Matrix: Water**

**Date Received: 11/06/19 08:00**

**Method: 8270D SIM ID - Semivolatile Organic Compounds (GC/MS SIM / Isotope Dilution)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dioxane	ND	*	0.19	0.095	ug/L		11/09/19 08:36	11/14/19 05:02	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
1,4-Dioxane-d8	33		15 - 110				11/09/19 08:36	11/14/19 05:02	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	ND		1.7	0.83	ng/L		11/14/19 11:09	11/18/19 19:39	1
Perfluoropentanoic acid (PFPeA)	ND		1.7	0.52	ng/L		11/14/19 11:09	11/18/19 19:39	1
Perfluorohexanoic acid (PFHxA)	ND		1.7	0.63	ng/L		11/14/19 11:09	11/18/19 19:39	1
Perfluoroheptanoic acid (PFHpA)	ND		1.7	0.75	ng/L		11/14/19 11:09	11/18/19 19:39	1
Perfluorooctanoic acid (PFOA)	ND		1.7	0.67	ng/L		11/14/19 11:09	11/18/19 19:39	1
Perfluorononanoic acid (PFNA)	ND		1.7	0.22	ng/L		11/14/19 11:09	11/18/19 19:39	1
Perfluorodecanoic acid (PFDA)	ND		1.7	0.64	ng/L		11/14/19 11:09	11/18/19 19:39	1
Perfluoroundecanoic acid (PFUnA)	ND		1.7	0.65	ng/L		11/14/19 11:09	11/18/19 19:39	1
Perfluorododecanoic acid (PFDoA)	ND		1.7	0.49	ng/L		11/14/19 11:09	11/18/19 19:39	1
Perfluorotridecanoic acid (PFTriA)	ND		1.7	0.50	ng/L		11/14/19 11:09	11/18/19 19:39	1
Perfluorotetradecanoic acid (PFTeA)	ND	*	1.7	0.76	ng/L		11/14/19 11:09	11/18/19 19:39	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.7	0.41	ng/L		11/14/19 11:09	11/18/19 19:39	1
Perfluorohexanesulfonic acid (PFHxS)	ND		1.7	0.66	ng/L		11/14/19 11:09	11/18/19 19:39	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		1.7	0.79	ng/L		11/14/19 11:09	11/18/19 19:39	1

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# Client Sample Results

Client: O'Brien & Gere Inc of North America  
 Project/Site: PAS Osewgo EC Sampling

Job ID: 480-162320-1

**Client Sample ID: FD-110519**

**Lab Sample ID: 480-162320-6**

**Date Collected: 11/05/19 00:00**

**Matrix: Water**

**Date Received: 11/06/19 08:00**

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	ND		1.7	0.50	ng/L		11/14/19 11:09	11/18/19 19:39	1
Perfluorodecanesulfonic acid (PFDS)	ND		1.7	0.74	ng/L		11/14/19 11:09	11/18/19 19:39	1
Perfluorooctanesulfonamide (PFOSA)	ND		8.3	8.3	ng/L		11/14/19 11:09	11/18/19 19:39	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		17	1.4	ng/L		11/14/19 11:09	11/18/19 19:39	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		17	1.2	ng/L		11/14/19 11:09	11/18/19 19:39	1
1H,1H,2H,2H-perfluorooctanesulfonic acid (6:2)	ND		17	4.5	ng/L		11/14/19 11:09	11/18/19 19:39	1
1H,1H,2H,2H-perfluorodecanesulfonic acid (8:2)	ND		17	2.4	ng/L		11/14/19 11:09	11/18/19 19:39	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C2 PFDA	82		50 - 150				11/14/19 11:09	11/18/19 19:39	1
13C2 PFDoA	82		50 - 150				11/14/19 11:09	11/18/19 19:39	1
13C2 PFHxA	101		50 - 150				11/14/19 11:09	11/18/19 19:39	1
13C2 PFTeDA	68		50 - 150				11/14/19 11:09	11/18/19 19:39	1
13C2 PFUnA	78		50 - 150				11/14/19 11:09	11/18/19 19:39	1
13C4 PFBA	92		25 - 150				11/14/19 11:09	11/18/19 19:39	1
13C4 PFHpA	92		50 - 150				11/14/19 11:09	11/18/19 19:39	1
13C4 PFOA	93		50 - 150				11/14/19 11:09	11/18/19 19:39	1
13C4 PFOS	93		50 - 150				11/14/19 11:09	11/18/19 19:39	1
13C5 PFNA	88		50 - 150				11/14/19 11:09	11/18/19 19:39	1
13C5 PFPeA	93		25 - 150				11/14/19 11:09	11/18/19 19:39	1
13C8 FOSA	81		25 - 150				11/14/19 11:09	11/18/19 19:39	1
18O2 PFHxS	88		50 - 150				11/14/19 11:09	11/18/19 19:39	1
d3-NMeFOSAA	70		50 - 150				11/14/19 11:09	11/18/19 19:39	1
d5-NEtFOSAA	78		50 - 150				11/14/19 11:09	11/18/19 19:39	1
M2-6:2 FTS	95		25 - 150				11/14/19 11:09	11/18/19 19:39	1
M2-8:2 FTS	91		25 - 150				11/14/19 11:09	11/18/19 19:39	1

# Isotope Dilution Summary

Client: O'Brien & Gere Inc of North America  
 Project/Site: PAS Osewgo EC Sampling

Job ID: 480-162320-1

## Method: 8270D SIM ID - Semivolatle Organic Compounds (GC/MS SIM / Isotope Dilution)

Matrix: Water

Prep Type: Total/NA

### Percent Isotope Dilution Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	DXE (15-110)
480-162320-1	M-21-110519	32
480-162320-1 MS	M-21-110519	26
480-162320-1 MSD	M-21-110519	29
480-162320-2	EB-110519	32
480-162320-4	SWW-5-110519	30
480-162320-5	LR-2-110519	36
480-162320-6	FD-110519	33
LCS 480-503365/2-A	Lab Control Sample	32
MB 480-503365/1-A	Method Blank	37

**Surrogate Legend**

DXE = 1,4-Dioxane-d8

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

Matrix: Water

Prep Type: Total/NA

### Percent Isotope Dilution Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	PFDA (50-150)	PFDoA (50-150)	PFHxA (50-150)	PFTDA (50-150)	PFUnA (50-150)	PFBA (25-150)	PFHpA (50-150)	PFOA (50-150)
480-162320-1	M-21-110519	84	77	84	63	89	66	85	85
480-162320-1 MS	M-21-110519	79	69	85	60	77	66	85	85
480-162320-1 MSD	M-21-110519	87	78	88	64	86	73	91	89
480-162320-2	EB-110519	96	78	95	68	84	89	95	91
480-162320-3	FB-110519	83	69	88	58	76	75	83	82
480-162320-4	SWW-5-110519	92	104	84	78	105	56	87	96
480-162320-5	LR-2-110519	95	81	99	77	88	93	100	97
480-162320-6	FD-110519	82	82	101	68	78	92	92	93
LCS 200-149688/2-A	Lab Control Sample	84	77	90	65	79	80	83	83
MB 200-149688/1-A	Method Blank	106	89	99	77	88	91	97	95

### Percent Isotope Dilution Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	PFOS (50-150)	PFNA (50-150)	PFPeA (25-150)	PFOSA (25-150)	PFHxS (50-150)	-NMeFOS <sub>i</sub> (50-150)	-NEtFOS <sub>i</sub> (50-150)	M262FTS (25-150)
480-162320-1	M-21-110519	89	85	80	70	82	67	73	93
480-162320-1 MS	M-21-110519	80	82	77	67	82	58	67	93
480-162320-1 MSD	M-21-110519	84	82	83	72	89	62	71	92
480-162320-2	EB-110519	93	96	95	71	90	75	66	93
480-162320-3	FB-110519	84	83	84	68	82	68	66	80
480-162320-4	SWW-5-110519	92	105	73	78	93	82	101	129
480-162320-5	LR-2-110519	98	90	98	88	97	71	74	100
480-162320-6	FD-110519	93	88	93	81	88	70	78	95
LCS 200-149688/2-A	Lab Control Sample	81	81	84	73	84	76	74	83
MB 200-149688/1-A	Method Blank	98	98	96	82	99	87	83	99

### Percent Isotope Dilution Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	M282FTS (25-150)
480-162320-1	M-21-110519	98
480-162320-1 MS	M-21-110519	89
480-162320-1 MSD	M-21-110519	91
480-162320-2	EB-110519	104
480-162320-3	FB-110519	97

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# Isotope Dilution Summary

Client: O'Brien & Gere Inc of North America  
Project/Site: PAS Osewgo EC Sampling

Job ID: 480-162320-1

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

**Matrix: Water**

**Prep Type: Total/NA**

## Percent Isotope Dilution Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	M282FTS (25-150)
480-162320-4	SWW-5-110519	121
480-162320-5	LR-2-110519	91
480-162320-6	FD-110519	91
LCS 200-149688/2-A	Lab Control Sample	95
MB 200-149688/1-A	Method Blank	119

### Surrogate Legend

PFDA = 13C2 PFDA  
PFDoA = 13C2 PFDoA  
PFHxA = 13C2 PFHxA  
PFTDA = 13C2 PFTeDA  
PFUnA = 13C2 PFUnA  
PFBA = 13C4 PFBA  
PFHpA = 13C4 PFHpA  
PFOA = 13C4 PFOA  
PFOS = 13C4 PFOS  
PFNA = 13C5 PFNA  
PFPeA = 13C5 PFPeA  
PFOSA = 13C8 FOSA  
PFHxS = 18O2 PFHxS  
d3-NMeFOSAA = d3-NMeFOSAA  
d5-NEtFOSAA = d5-NEtFOSAA  
M262FTS = M2-6:2 FTS  
M282FTS = M2-8:2 FTS



# QC Sample Results

Client: O'Brien & Gere Inc of North America  
 Project/Site: PAS Osewgo EC Sampling

Job ID: 480-162320-1

## Method: 8270D SIM ID - Semivolatle Organic Compounds (GC/MS SIM / Isotope Dilution)

**Lab Sample ID: MB 480-503365/1-A**  
**Matrix: Water**  
**Analysis Batch: 504158**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 503365**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dioxane	0.352		0.20	0.10	ug/L	-	11/09/19 08:36	11/13/19 23:57	1
Isotope Dilution	MB %Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
1,4-Dioxane-d8	37		15 - 110				11/09/19 08:36	11/13/19 23:57	1

**Lab Sample ID: LCS 480-503365/2-A**  
**Matrix: Water**  
**Analysis Batch: 504158**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 503365**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
1,4-Dioxane	1.00	1.81	E *	ug/L	-	181	40 - 140
Isotope Dilution	LCS %Recovery	LCS Qualifier	Limits				
1,4-Dioxane-d8	32		15 - 110				

**Lab Sample ID: 480-162320-1 MS**  
**Matrix: Water**  
**Analysis Batch: 504158**

**Client Sample ID: M-21-110519**  
**Prep Type: Total/NA**  
**Prep Batch: 503365**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
1,4-Dioxane	630	E B *	0.952	681	E 4	ug/L	-	4959	40 - 140
Isotope Dilution	MS %Recovery	MS Qualifier	Limits						
1,4-Dioxane-d8	26		15 - 110						

**Lab Sample ID: 480-162320-1 MSD**  
**Matrix: Water**  
**Analysis Batch: 504158**

**Client Sample ID: M-21-110519**  
**Prep Type: Total/NA**  
**Prep Batch: 503365**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
1,4-Dioxane	630	E B *	0.952	624	E 4	ug/L	-	-1092	40 - 140	9	20
Isotope Dilution	MSD %Recovery	MSD Qualifier	Limits								
1,4-Dioxane-d8	29		15 - 110								

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

**Lab Sample ID: MB 200-149688/1-A**  
**Matrix: Water**  
**Analysis Batch: 149808**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 149688**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	ND		2.0	1.0	ng/L	-	11/14/19 11:09	11/18/19 17:19	1
Perfluoropentanoic acid (PFPeA)	ND		2.0	0.63	ng/L	-	11/14/19 11:09	11/18/19 17:19	1
Perfluorohexanoic acid (PFHxA)	ND		2.0	0.76	ng/L	-	11/14/19 11:09	11/18/19 17:19	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.91	ng/L	-	11/14/19 11:09	11/18/19 17:19	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.81	ng/L	-	11/14/19 11:09	11/18/19 17:19	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.27	ng/L	-	11/14/19 11:09	11/18/19 17:19	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.77	ng/L	-	11/14/19 11:09	11/18/19 17:19	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	0.78	ng/L	-	11/14/19 11:09	11/18/19 17:19	1

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# QC Sample Results

Client: O'Brien & Gere Inc of North America  
 Project/Site: PAS Osewgo EC Sampling

Job ID: 480-162320-1

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

**Lab Sample ID: MB 200-149688/1-A**  
**Matrix: Water**  
**Analysis Batch: 149808**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 149688**

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.59	ng/L		11/14/19 11:09	11/18/19 17:19	1
Perfluorotridecanoic acid (PFTriA)	ND		2.0	0.60	ng/L		11/14/19 11:09	11/18/19 17:19	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.92	ng/L		11/14/19 11:09	11/18/19 17:19	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.49	ng/L		11/14/19 11:09	11/18/19 17:19	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.80	ng/L		11/14/19 11:09	11/18/19 17:19	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		2.0	0.95	ng/L		11/14/19 11:09	11/18/19 17:19	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	0.61	ng/L		11/14/19 11:09	11/18/19 17:19	1
Perfluorodecanesulfonic acid (PFDS)	ND		2.0	0.90	ng/L		11/14/19 11:09	11/18/19 17:19	1
Perfluorooctanesulfonamide (PFOSA)	ND		10	10	ng/L		11/14/19 11:09	11/18/19 17:19	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		20	1.7	ng/L		11/14/19 11:09	11/18/19 17:19	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		20	1.5	ng/L		11/14/19 11:09	11/18/19 17:19	1
1H,1H,2H,2H-perfluorooctanesulfonic acid (6:2)	ND		20	5.5	ng/L		11/14/19 11:09	11/18/19 17:19	1
1H,1H,2H,2H-perfluorodecanesulfonic acid (8:2)	ND		20	2.9	ng/L		11/14/19 11:09	11/18/19 17:19	1

Isotope Dilution	MB	MB	Limits	Prepared	Analyzed	Dil Fac
	%Recovery	Qualifier				
13C2 PFDA	106		50 - 150	11/14/19 11:09	11/18/19 17:19	1
13C2 PFDoA	89		50 - 150	11/14/19 11:09	11/18/19 17:19	1
13C2 PFHxA	99		50 - 150	11/14/19 11:09	11/18/19 17:19	1
13C2 PFTeDA	77		50 - 150	11/14/19 11:09	11/18/19 17:19	1
13C2 PFUnA	88		50 - 150	11/14/19 11:09	11/18/19 17:19	1
13C4 PFBA	91		25 - 150	11/14/19 11:09	11/18/19 17:19	1
13C4 PFHpA	97		50 - 150	11/14/19 11:09	11/18/19 17:19	1
13C4 PFOA	95		50 - 150	11/14/19 11:09	11/18/19 17:19	1
13C4 PFOS	98		50 - 150	11/14/19 11:09	11/18/19 17:19	1
13C5 PFNA	98		50 - 150	11/14/19 11:09	11/18/19 17:19	1
13C5 PFPeA	96		25 - 150	11/14/19 11:09	11/18/19 17:19	1
13C8 FOSA	82		25 - 150	11/14/19 11:09	11/18/19 17:19	1
18O2 PFHxS	99		50 - 150	11/14/19 11:09	11/18/19 17:19	1
d3-NMeFOSAA	87		50 - 150	11/14/19 11:09	11/18/19 17:19	1
d5-NEtFOSAA	83		50 - 150	11/14/19 11:09	11/18/19 17:19	1
M2-6:2 FTS	99		25 - 150	11/14/19 11:09	11/18/19 17:19	1
M2-8:2 FTS	119		25 - 150	11/14/19 11:09	11/18/19 17:19	1

**Lab Sample ID: LCS 200-149688/2-A**  
**Matrix: Water**  
**Analysis Batch: 149808**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 149688**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Perfluorobutanoic acid (PFBA)	40.0	42.7		ng/L		107	50 - 150
Perfluoropentanoic acid (PFPeA)	40.0	43.1		ng/L		108	50 - 150
Perfluorohexanoic acid (PFHxA)	40.0	40.6		ng/L		102	70 - 130
Perfluoroheptanoic acid (PFHpA)	40.0	44.7		ng/L		112	70 - 130
Perfluorooctanoic acid (PFOA)	40.0	41.7		ng/L		104	70 - 130
Perfluorononanoic acid (PFNA)	40.0	42.7		ng/L		107	70 - 130
Perfluorodecanoic acid (PFDA)	40.0	43.1		ng/L		108	70 - 130

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# QC Sample Results

Client: O'Brien & Gere Inc of North America  
 Project/Site: PAS Osewgo EC Sampling

Job ID: 480-162320-1

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

**Lab Sample ID: LCS 200-149688/2-A**  
**Matrix: Water**  
**Analysis Batch: 149808**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 149688**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluoroundecanoic acid (PFUnA)	40.0	40.5		ng/L		101	70 - 130
Perfluorododecanoic acid (PFDoA)	40.0	42.7		ng/L		107	70 - 130
Perfluorotridecanoic acid (PFTriA)	40.0	40.6		ng/L		101	70 - 130
Perfluorotetradecanoic acid (PFTeA)	40.0	58.9 *		ng/L		147	70 - 130
Perfluorobutanesulfonic acid (PFBS)	35.4	37.6		ng/L		106	70 - 130
Perfluorohexanesulfonic acid (PFHxS)	36.4	38.8		ng/L		106	70 - 130
Perfluoroheptanesulfonic Acid (PFHpS)	38.1	43.8		ng/L		115	50 - 150
Perfluorooctanesulfonic acid (PFOS)	37.1	42.2		ng/L		114	70 - 130
Perfluorodecanesulfonic acid (PFDS)	38.6	47.8		ng/L		124	50 - 150
Perfluorooctanesulfonamide (PFOSA)	40.0	45.9		ng/L		115	50 - 150
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	40.0	39.4		ng/L		99	70 - 130
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	40.0	38.6		ng/L		97	70 - 130
1H,1H,2H,2H-perfluorooctanesulfonic acid (6:2)	37.9	32.0		ng/L		84	50 - 150
1H,1H,2H,2H-perfluorodecanesulfonic acid (8:2)	38.3	27.4		ng/L		71	50 - 150

Isotope Dilution	LCS %Recovery	LCS Qualifier	Limits
13C2 PFDA	84		50 - 150
13C2 PFDoA	77		50 - 150
13C2 PFHxA	90		50 - 150
13C2 PFTeDA	65		50 - 150
13C2 PFUnA	79		50 - 150
13C4 PFBA	80		25 - 150
13C4 PFHpA	83		50 - 150
13C4 PFOA	83		50 - 150
13C4 PFOS	81		50 - 150
13C5 PFNA	81		50 - 150
13C5 PFPeA	84		25 - 150
13C8 FOSA	73		25 - 150
18O2 PFHxS	84		50 - 150
d3-NMeFOSAA	76		50 - 150
d5-NEtFOSAA	74		50 - 150
M2-6:2 FTS	83		25 - 150
M2-8:2 FTS	95		25 - 150

# QC Sample Results

Client: O'Brien & Gere Inc of North America  
 Project/Site: PAS Osewgo EC Sampling

Job ID: 480-162320-1

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

**Lab Sample ID: 480-162320-1 MS**

**Matrix: Water**

**Analysis Batch: 149808**

**Client Sample ID: M-21-110519**

**Prep Type: Total/NA**

**Prep Batch: 149688**

Analyte	Sample	Sample	Spike	MS	MS	Unit	D	%Rec	Limits
	Result	Qualifier	Added	Result	Qualifier				
Perfluorobutanoic acid (PFBA)	9.0		32.8	47.2		ng/L		116	40 - 160
Perfluoropentanoic acid (PFPeA)	3.5		32.8	39.1		ng/L		108	40 - 160
Perfluorohexanoic acid (PFHxA)	5.3		32.8	39.0		ng/L		103	40 - 160
Perfluoroheptanoic acid (PFHpA)	1.8		32.8	36.1		ng/L		104	40 - 160
Perfluorooctanoic acid (PFOA)	19		32.8	54.3		ng/L		107	40 - 160
Perfluorononanoic acid (PFNA)	0.28	J	32.8	35.1		ng/L		106	40 - 160
Perfluorodecanoic acid (PFDA)	ND		32.8	34.8		ng/L		106	40 - 160
Perfluoroundecanoic acid (PFUnA)	ND		32.8	30.7		ng/L		94	40 - 160
Perfluorododecanoic acid (PFDoA)	ND		32.8	34.2		ng/L		104	40 - 160
Perfluorotridecanoic acid (PFTriA)	ND		32.8	35.2		ng/L		107	40 - 160
Perfluorotetradecanoic acid (PFTeA)	ND	*	32.8	44.9		ng/L		137	40 - 160
Perfluorobutanesulfonic acid (PFBS)	0.85	J	29.0	29.6		ng/L		99	40 - 160
Perfluorohexanesulfonic acid (PFHxS)	2.5		29.9	33.8		ng/L		105	40 - 160
Perfluoroheptanesulfonic Acid (PFHpS)	ND		31.3	36.0		ng/L		115	40 - 160
Perfluorooctanesulfonic acid (PFOS)	3.5		30.5	35.0		ng/L		103	40 - 160
Perfluorodecanesulfonic acid (PFDS)	ND		31.6	34.2		ng/L		108	40 - 160
Perfluorooctanesulfonamide (PFOSA)	ND		32.8	37.2		ng/L		113	40 - 160
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		32.8	38.4		ng/L		117	40 - 160
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		32.8	30.9		ng/L		94	40 - 160
1H,1H,2H,2H-perfluorooctanesulfonic acid (6:2)	ND		31.1	28.9		ng/L		93	40 - 160
1H,1H,2H,2H-perfluorodecanesulfonic acid (8:2)	ND		31.5	22.7		ng/L		72	40 - 160

Isotope Dilution	MS MS		Limits
	%Recovery	Qualifier	
13C2 PFDA	79		50 - 150
13C2 PFDoA	69		50 - 150
13C2 PFHxA	85		50 - 150
13C2 PFTeDA	60		50 - 150
13C2 PFUnA	77		50 - 150
13C4 PFBA	66		25 - 150
13C4 PFHpA	85		50 - 150
13C4 PFOA	85		50 - 150
13C4 PFOS	80		50 - 150
13C5 PFNA	82		50 - 150
13C5 PFPeA	77		25 - 150
13C8 FOSA	67		25 - 150
18O2 PFHxS	82		50 - 150
d3-NMeFOSAA	58		50 - 150
d5-NEtFOSAA	67		50 - 150

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# QC Sample Results

Client: O'Brien & Gere Inc of North America  
 Project/Site: PAS Osewgo EC Sampling

Job ID: 480-162320-1

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

**Lab Sample ID: 480-162320-1 MS**  
**Matrix: Water**  
**Analysis Batch: 149808**

**Client Sample ID: M-21-110519**  
**Prep Type: Total/NA**  
**Prep Batch: 149688**

Isotope Dilution	MS MS		Limits
	%Recovery	Qualifier	
M2-6:2 FTS	93		25 - 150
M2-8:2 FTS	89		25 - 150

**Lab Sample ID: 480-162320-1 MSD**  
**Matrix: Water**  
**Analysis Batch: 149808**

**Client Sample ID: M-21-110519**  
**Prep Type: Total/NA**  
**Prep Batch: 149688**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD		Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
				Result	Qualifier						
Perfluorobutanoic acid (PFBA)	9.0		34.0	45.0		ng/L		106	40 - 160	5	30
Perfluoropentanoic acid (PFPeA)	3.5		34.0	41.3		ng/L		111	40 - 160	5	30
Perfluorohexanoic acid (PFHxA)	5.3		34.0	42.9		ng/L		111	40 - 160	10	20
Perfluoroheptanoic acid (PFHpA)	1.8		34.0	39.6		ng/L		111	40 - 160	9	20
Perfluorooctanoic acid (PFOA)	19		34.0	54.6		ng/L		104	40 - 160	1	20
Perfluorononanoic acid (PFNA)	0.28	J	34.0	37.1		ng/L		108	40 - 160	6	20
Perfluorodecanoic acid (PFDA)	ND		34.0	36.3		ng/L		107	40 - 160	4	20
Perfluoroundecanoic acid (PFUnA)	ND		34.0	32.9		ng/L		97	40 - 160	7	20
Perfluorododecanoic acid (PFDoA)	ND		34.0	34.0		ng/L		100	40 - 160	0	20
Perfluorotridecanoic acid (PFTriA)	ND		34.0	34.5		ng/L		101	40 - 160	2	20
Perfluorotetradecanoic acid (PFTeA)	ND	*	34.0	46.0		ng/L		135	40 - 160	2	20
Perfluorobutanesulfonic acid (PFBS)	0.85	J	30.1	30.2		ng/L		98	40 - 160	2	20
Perfluorohexanesulfonic acid (PFHxS)	2.5		31.0	33.9		ng/L		101	40 - 160	0	20
Perfluoroheptanesulfonic Acid (PFHpS)	ND		32.4	37.6		ng/L		116	40 - 160	4	30
Perfluorooctanesulfonic acid (PFOS)	3.5		31.6	38.4		ng/L		110	40 - 160	9	20
Perfluorodecanesulfonic acid (PFDS)	ND		32.8	33.4		ng/L		102	40 - 160	2	30
Perfluorooctanesulfonamide (PFOSA)	ND		34.0	39.5		ng/L		116	40 - 160	6	30
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		34.0	36.6		ng/L		107	40 - 160	5	20
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		34.0	37.1		ng/L		109	40 - 160	18	20
1H,1H,2H,2H-perfluorooctanesulfonic acid (6:2)	ND		32.3	31.9		ng/L		99	40 - 160	10	30
1H,1H,2H,2H-perfluorodecanesulfonic acid (8:2)	ND		32.6	23.9		ng/L		73	40 - 160	5	30

Isotope Dilution	MSD MSD		Limits
	%Recovery	Qualifier	
13C2 PFDA	87		50 - 150
13C2 PFDoA	78		50 - 150
13C2 PFHxA	88		50 - 150
13C2 PFTeDA	64		50 - 150
13C2 PFUnA	86		50 - 150
13C4 PFBA	73		25 - 150
13C4 PFHpA	91		50 - 150

# QC Sample Results

Client: O'Brien & Gere Inc of North America  
Project/Site: PAS Osewgo EC Sampling

Job ID: 480-162320-1

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

Lab Sample ID: 480-162320-1 MSD

Matrix: Water

Analysis Batch: 149808

Client Sample ID: M-21-110519

Prep Type: Total/NA

Prep Batch: 149688

<i>Isotope Dilution</i>	<i>MSD</i> <i>%Recovery</i>	<i>MSD</i> <i>Qualifier</i>	<i>Limits</i>
13C4 PFOA	89		50 - 150
13C4 PFOS	84		50 - 150
13C5 PFNA	82		50 - 150
13C5 PFPeA	83		25 - 150
13C8 FOSA	72		25 - 150
18O2 PFHxS	89		50 - 150
d3-NMeFOSAA	62		50 - 150
d5-NEtFOSAA	71		50 - 150
M2-6:2 FTS	92		25 - 150
M2-8:2 FTS	91		25 - 150

# QC Association Summary

Client: O'Brien & Gere Inc of North America  
 Project/Site: PAS Osewgo EC Sampling

Job ID: 480-162320-1

## GC/MS Semi VOA

### Prep Batch: 503365

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-162320-1	M-21-110519	Total/NA	Water	3510C	
480-162320-2	EB-110519	Total/NA	Water	3510C	
480-162320-4	SWW-5-110519	Total/NA	Water	3510C	
480-162320-5	LR-2-110519	Total/NA	Water	3510C	
480-162320-6	FD-110519	Total/NA	Water	3510C	
MB 480-503365/1-A	Method Blank	Total/NA	Water	3510C	
LCS 480-503365/2-A	Lab Control Sample	Total/NA	Water	3510C	
480-162320-1 MS	M-21-110519	Total/NA	Water	3510C	
480-162320-1 MSD	M-21-110519	Total/NA	Water	3510C	

### Analysis Batch: 504158

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-162320-1	M-21-110519	Total/NA	Water	8270D SIM ID	503365
480-162320-2	EB-110519	Total/NA	Water	8270D SIM ID	503365
480-162320-4	SWW-5-110519	Total/NA	Water	8270D SIM ID	503365
480-162320-5	LR-2-110519	Total/NA	Water	8270D SIM ID	503365
480-162320-6	FD-110519	Total/NA	Water	8270D SIM ID	503365
MB 480-503365/1-A	Method Blank	Total/NA	Water	8270D SIM ID	503365
LCS 480-503365/2-A	Lab Control Sample	Total/NA	Water	8270D SIM ID	503365
480-162320-1 MS	M-21-110519	Total/NA	Water	8270D SIM ID	503365
480-162320-1 MSD	M-21-110519	Total/NA	Water	8270D SIM ID	503365

## LCMS

### Prep Batch: 149688

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-162320-1	M-21-110519	Total/NA	Water	3535	
480-162320-2	EB-110519	Total/NA	Water	3535	
480-162320-3	FB-110519	Total/NA	Water	3535	
480-162320-4	SWW-5-110519	Total/NA	Water	3535	
480-162320-5	LR-2-110519	Total/NA	Water	3535	
480-162320-6	FD-110519	Total/NA	Water	3535	
MB 200-149688/1-A	Method Blank	Total/NA	Water	3535	
LCS 200-149688/2-A	Lab Control Sample	Total/NA	Water	3535	
480-162320-1 MS	M-21-110519	Total/NA	Water	3535	
480-162320-1 MSD	M-21-110519	Total/NA	Water	3535	

### Analysis Batch: 149808

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-162320-1	M-21-110519	Total/NA	Water	537 (modified)	149688
480-162320-2	EB-110519	Total/NA	Water	537 (modified)	149688
480-162320-3	FB-110519	Total/NA	Water	537 (modified)	149688
480-162320-4	SWW-5-110519	Total/NA	Water	537 (modified)	149688
480-162320-5	LR-2-110519	Total/NA	Water	537 (modified)	149688
480-162320-6	FD-110519	Total/NA	Water	537 (modified)	149688
MB 200-149688/1-A	Method Blank	Total/NA	Water	537 (modified)	149688
LCS 200-149688/2-A	Lab Control Sample	Total/NA	Water	537 (modified)	149688
480-162320-1 MS	M-21-110519	Total/NA	Water	537 (modified)	149688
480-162320-1 MSD	M-21-110519	Total/NA	Water	537 (modified)	149688

# Lab Chronicle

Client: O'Brien & Gere Inc of North America  
Project/Site: PAS Osewgo EC Sampling

Job ID: 480-162320-1

## Client Sample ID: M-21-110519

Lab Sample ID: 480-162320-1

Date Collected: 11/05/19 10:00

Matrix: Water

Date Received: 11/06/19 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3510C			503365	11/09/19 08:36	JMP	TAL BUF
Total/NA	Analysis	8270D SIM ID		1	504158	11/14/19 01:32	JMM	TAL BUF
Total/NA	Prep	3535			149688	11/14/19 11:09	MBM	TAL BUR
Total/NA	Analysis	537 (modified)		1	149808	11/18/19 18:33	BWC	TAL BUR

## Client Sample ID: EB-110519

Lab Sample ID: 480-162320-2

Date Collected: 11/05/19 10:45

Matrix: Water

Date Received: 11/06/19 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3510C			503365	11/09/19 08:36	JMP	TAL BUF
Total/NA	Analysis	8270D SIM ID		1	504158	11/14/19 03:53	JMM	TAL BUF
Total/NA	Prep	3535			149688	11/14/19 11:09	MBM	TAL BUR
Total/NA	Analysis	537 (modified)		1	149808	11/18/19 18:58	BWC	TAL BUR

## Client Sample ID: FB-110519

Lab Sample ID: 480-162320-3

Date Collected: 11/05/19 09:35

Matrix: Water

Date Received: 11/06/19 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			149688	11/14/19 11:09	MBM	TAL BUR
Total/NA	Analysis	537 (modified)		1	149808	11/18/19 19:06	BWC	TAL BUR

## Client Sample ID: SWW-5-110519

Lab Sample ID: 480-162320-4

Date Collected: 11/05/19 13:30

Matrix: Water

Date Received: 11/06/19 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3510C			503365	11/09/19 08:36	JMP	TAL BUF
Total/NA	Analysis	8270D SIM ID		1	504158	11/14/19 04:16	JMM	TAL BUF
Total/NA	Prep	3535			149688	11/14/19 11:09	MBM	TAL BUR
Total/NA	Analysis	537 (modified)		1	149808	11/18/19 19:22	BWC	TAL BUR

## Client Sample ID: LR-2-110519

Lab Sample ID: 480-162320-5

Date Collected: 11/05/19 15:00

Matrix: Water

Date Received: 11/06/19 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3510C			503365	11/09/19 08:36	JMP	TAL BUF
Total/NA	Analysis	8270D SIM ID		1	504158	11/14/19 04:39	JMM	TAL BUF
Total/NA	Prep	3535			149688	11/14/19 11:09	MBM	TAL BUR
Total/NA	Analysis	537 (modified)		1	149808	11/18/19 19:30	BWC	TAL BUR



# Lab Chronicle

Client: O'Brien & Gere Inc of North America  
Project/Site: PAS Osewgo EC Sampling

Job ID: 480-162320-1

**Client Sample ID: FD-110519**

**Lab Sample ID: 480-162320-6**

**Date Collected: 11/05/19 00:00**

**Matrix: Water**

**Date Received: 11/06/19 08:00**

<u>Prep Type</u>	<u>Batch Type</u>	<u>Batch Method</u>	<u>Run</u>	<u>Dilution Factor</u>	<u>Batch Number</u>	<u>Prepared or Analyzed</u>	<u>Analyst</u>	<u>Lab</u>
Total/NA	Prep	3510C			503365	11/09/19 08:36	JMP	TAL BUF
Total/NA	Analysis	8270D SIM ID		1	504158	11/14/19 05:02	JMM	TAL BUF
Total/NA	Prep	3535			149688	11/14/19 11:09	MBM	TAL BUR
Total/NA	Analysis	537 (modified)		1	149808	11/18/19 19:39	BWC	TAL BUR

## Laboratory References:

TAL BUF = Eurofins TestAmerica, Buffalo, 10 Hazelwood Drive, Amherst, NY 14228-2298, TEL (716)691-2600

TAL BUR = Eurofins TestAmerica, Burlington, 30 Community Drive, Suite 11, South Burlington, VT 05403, TEL (802)660-1990

# Accreditation/Certification Summary

Client: O'Brien & Gere Inc of North America  
 Project/Site: PAS Osewgo EC Sampling

Job ID: 480-162320-1

## Laboratory: Eurofins TestAmerica, Buffalo

The accreditations/certifications listed below are applicable to this report.

Authority	Program	Identification Number	Expiration Date
New York	NELAP	10026	03-31-20

## Laboratory: Eurofins TestAmerica, Burlington

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

Authority	Program	Identification Number	Expiration Date
New York	NELAP	10391	04-01-20

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
537 (modified)	3535	Water	1H,1H,2H,2H-perfluorodecanesulfonic acid (8:2)
537 (modified)	3535	Water	1H,1H,2H,2H-perfluorooctanesulfonic acid (6:2)
537 (modified)	3535	Water	N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)
537 (modified)	3535	Water	N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)
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	Perfluorooctanesulfonamide (PFOSA)
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: PAS Osewgo EC Sampling

Job ID: 480-162320-1

Method	Method Description	Protocol	Laboratory
8270D SIM ID	Semivolatile Organic Compounds (GC/MS SIM / Isotope Dilution)	SW846	TAL BUF
537 (modified)	Fluorinated Alkyl Substances	EPA	TAL BUR
3510C	Liquid-Liquid Extraction (Separatory Funnel)	SW846	TAL BUF
3535	Solid-Phase Extraction (SPE)	SW846	TAL BUR

#### Protocol References:

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

#### Laboratory References:

TAL BUF = Eurofins TestAmerica, Buffalo, 10 Hazelwood Drive, Amherst, NY 14228-2298, TEL (716)691-2600

TAL BUR = Eurofins TestAmerica, Burlington, 30 Community Drive, Suite 11, South Burlington, VT 05403, TEL (802)660-1990

# Sample Summary

Client: O'Brien & Gere Inc of North America  
Project/Site: PAS Osewgo EC Sampling

Job ID: 480-162320-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
480-162320-1	M-21-110519	Water	11/05/19 10:00	11/06/19 08:00	
480-162320-2	EB-110519	Water	11/05/19 10:45	11/06/19 08:00	
480-162320-3	FB-110519	Water	11/05/19 09:35	11/06/19 08:00	
480-162320-4	SWW-5-110519	Water	11/05/19 13:30	11/06/19 08:00	
480-162320-5	LR-2-110519	Water	11/05/19 15:00	11/06/19 08:00	
480-162320-6	FD-110519	Water	11/05/19 00:00	11/06/19 08:00	

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**Chain of Custody Record**

*From Syr; PFCs → BUT; Bal → BUT. - PC*

**Syracuse**  
**#225**

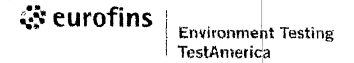
<b>Client Information</b>		Sampler: <b>Allie Berry</b>		Lab PM: <b>Schove, John R</b>		COC No: <b>480-137797-30986.1</b>																																																																																																																									
Client Contact: Ms. Deborah Wright		Phone: <b>315-256-5451</b>		E-Mail: <b>john.schove@testamericainc.com</b>		Page: Page 1 of 1																																																																																																																									
Company: O'Brien & Gere Inc of North America				<b>Analysis Requested</b>																																																																																																																											
Address: PO BOX 4873		Due Date Requested:		<table border="1"> <tr> <td>Field Filtered Sample (Yes or No)</td> <td>Perform MS/MSD (Yes or No)</td> <td>PFC_IDA - PFAS, Standard List (21 analytes)</td> <td>8270D_SIM_MS_ID - SIM List</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> </table>		Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	PFC_IDA - PFAS, Standard List (21 analytes)	8270D_SIM_MS_ID - SIM List					Job #:																																																																																																																	
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City: Syracuse		TAT Requested (days):				<table border="1"> <tr> <td colspan="2"><b>Preservation Codes:</b></td> </tr> <tr> <td>A - HCL</td> <td>M - Hexane</td> </tr> <tr> <td>B - NaOH</td> <td>N - None</td> </tr> <tr> <td>C - Zn Acetate</td> <td>O - AsNaO2</td> </tr> <tr> <td>D - Nitric Acid</td> <td>P - Na2O4S</td> </tr> <tr> <td>E - NaHSO4</td> <td>Q - Na2SO3</td> </tr> <tr> <td>F - MeOH</td> <td>R - Na2S2O3</td> </tr> <tr> <td>G - Amchlor</td> <td>S - H2SO4</td> </tr> <tr> <td>H - Ascorbic Acid</td> <td>T - TSP Dodecahydrate</td> </tr> <tr> <td>I - Ice</td> <td>U - Acetone</td> </tr> <tr> <td>J - DI Water</td> <td>V - MCAA</td> </tr> <tr> <td>K - EDTA</td> <td>W - pH 4-5</td> </tr> <tr> <td>L - EDA</td> <td>Z - other (specify)</td> </tr> </table>		<b>Preservation Codes:</b>		A - HCL	M - Hexane	B - NaOH	N - None	C - Zn Acetate	O - AsNaO2	D - Nitric Acid	P - Na2O4S	E - NaHSO4	Q - Na2SO3	F - MeOH	R - Na2S2O3	G - Amchlor	S - H2SO4	H - Ascorbic Acid	T - TSP Dodecahydrate	I - Ice	U - Acetone	J - DI Water	V - MCAA	K - EDTA	W - pH 4-5	L - EDA	Z - other (specify)																																																																																														
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State, Zip: NY, 13221		PO #: 181900212		Total Number of containers:																																																																																																																											
Phone: 315-437-6100(Tel)		WO #:		Other:																																																																																																																											
Email: deborah.wright@ramboll.com		Project #: 48021202		<table border="1"> <tr> <td>Sample Identification</td> <td>Sample Date</td> <td>Sample Time</td> <td>Sample Type (C=Comp, G=grab)</td> <td>Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)</td> <td>Field Filtered Sample (Yes or No)</td> <td>Perform MS/MSD (Yes or No)</td> <td>PFC_IDA - PFAS, Standard List (21 analytes)</td> <td>8270D_SIM_MS_ID - SIM List</td> <td>Special Instructions/Note:</td> </tr> <tr> <td colspan="10">Preservation Code:</td> </tr> </table>		Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	PFC_IDA - PFAS, Standard List (21 analytes)	8270D_SIM_MS_ID - SIM List	Special Instructions/Note:	Preservation Code:																																																																																																															
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<table border="1"> <tr> <td colspan="10">Possible Hazard Identification</td> </tr> <tr> <td colspan="10"> <input type="checkbox"/> Non-Hazard                       <input type="checkbox"/> Flammable                       <input type="checkbox"/> Skin Irritant                       <input type="checkbox"/> Poison B                       <input type="checkbox"/> Unknown                       <input type="checkbox"/> Radiological                 </td> </tr> <tr> <td colspan="10">Sample Disposal ( A fee may be assessed if samples are retained longer than 1 month)</td> </tr> <tr> <td colspan="10"> <input type="checkbox"/> Return To Client                       <input type="checkbox"/> Disposal By Lab                       <input type="checkbox"/> Archive For _____ Months                 </td> </tr> <tr> <td colspan="10">Deliverable Requested: I, II, III, IV, Other (specify)</td> </tr> <tr> <td colspan="10">Special Instructions/QC Requirements:</td> </tr> <tr> <td colspan="10">Empty Kit Relinquished by: _____ Date: _____ Time: _____ Method of Shipment: _____</td> </tr> <tr> <td colspan="2">Relinquished by: <i>amw my</i></td> <td colspan="2">Date/Time: <i>11/5/19 17:40</i></td> <td colspan="2">Company: <i>Ramboll</i></td> <td colspan="2">Received by: <i>REINGLUB</i></td> <td colspan="2">Date/Time: <i>11-5-19, 17:40</i></td> <td colspan="2">Company: <i>Syr</i></td> </tr> <tr> <td colspan="2">Relinquished by: <i>REINGLUB</i></td> <td colspan="2">Date/Time: <i>11-5-19, 19:00</i></td> <td colspan="2">Company: <i>Syr</i></td> <td colspan="2">Received by: <i>Amkwo Lkolp</i></td> <td colspan="2">Date/Time: <i>11/6/19 08:00</i></td> <td colspan="2">Company: <i>JA</i></td> </tr> <tr> <td colspan="2">Relinquished by: _____</td> <td colspan="2">Date/Time: _____</td> <td colspan="2">Company: _____</td> <td colspan="2">Received by: _____</td> <td colspan="2">Date/Time: _____</td> <td colspan="2">Company: _____</td> </tr> <tr> <td colspan="2">Custody Seals Intact: <input type="checkbox"/> Yes <input type="checkbox"/> No</td> <td colspan="2">Custody Seal No.:</td> <td colspan="2">Cooler Temperature(s) °C and Other Remarks: <i>3.3 #1 ICE</i></td> <td colspan="6"></td> </tr> </table>										Possible Hazard Identification										<input type="checkbox"/> Non-Hazard <input type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown <input type="checkbox"/> Radiological										Sample Disposal ( A fee may be assessed if samples are retained longer than 1 month)										<input type="checkbox"/> Return To Client <input type="checkbox"/> Disposal By Lab <input type="checkbox"/> Archive For _____ Months										Deliverable Requested: I, II, III, IV, Other (specify)										Special Instructions/QC Requirements:										Empty Kit Relinquished by: _____ Date: _____ Time: _____ Method of Shipment: _____										Relinquished by: <i>amw my</i>		Date/Time: <i>11/5/19 17:40</i>		Company: <i>Ramboll</i>		Received by: <i>REINGLUB</i>		Date/Time: <i>11-5-19, 17:40</i>		Company: <i>Syr</i>		Relinquished by: <i>REINGLUB</i>		Date/Time: <i>11-5-19, 19:00</i>		Company: <i>Syr</i>		Received by: <i>Amkwo Lkolp</i>		Date/Time: <i>11/6/19 08:00</i>		Company: <i>JA</i>		Relinquished by: _____		Date/Time: _____		Company: _____		Received by: _____		Date/Time: _____		Company: _____		Custody Seals Intact: <input type="checkbox"/> Yes <input type="checkbox"/> No		Custody Seal No.:		Cooler Temperature(s) °C and Other Remarks: <i>3.3 #1 ICE</i>							
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**Eurofins TestAmerica, Buffalo**

10 Hazelwood Drive  
Amherst, NY 14228-2298  
Phone: 716-691-2600 Fax: 716-691-7991

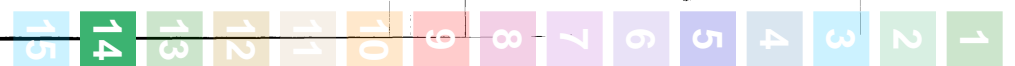
**Chain of Custody Record**



*From SYR: PFCs → BUT; BAL → BUF. - RE*

**Syracuse #225**

<b>Client Information</b>		Sampler: <b>Allie Berry</b>		Lab PM: <b>Schove, John R</b>		COC No: <b>480-137797-30986.1</b>	
Client Contact: <b>Ms. Deborah Wright</b>		Phone: <b>0315-256-5451</b>		E-Mail: <b>john.schove@testamericainc.com</b>		Page: <b>Page 1 of 1</b>	
Company: <b>O'Brien &amp; Gere Inc of North America</b>		Due Date Requested:		<b>Analysis Requested</b>		Job #:	
Address: <b>PO BOX 4873</b>		TAT Requested (days):		Field Filtered Sample (Yes or No) PFC_IDA - PFAS, Standard List (21 analytes) 8270D_SIM_MS_ID - SIM List		Total Number of Containers	
City: <b>Syracuse</b>		Project #:					
State, Zip: <b>NY, 13221</b>		Project #:					
Phone: <b>315-437-6100(Tel)</b>		SSOW#:					
Email: <b>deborah.wright@ramboll.com</b>							
Project Name: <b>PAS Osewgo EC Sampling</b>		Project #:		Preservation Codes:		Other:	
Site:		SSOW#:		A - HCL B - NaOH C - Zn Acetate D - Nitric Acid E - NaHSO4 F - MeOH G - Amchlor H - Ascorbic Acid I - Ice J - DI Water K - EDTA L - EDA M - Hexane N - None O - AsNaO2 P - Na2O4S Q - Na2SO3 R - Na2SO3 S - H2SO4 T - TSP Dodecahydrate U - Acetone V - MCAA W - pH 4-5 Z - other (specify)			
<b>Sample Identification</b>		<b>Sample Date</b>	<b>Sample Time</b>	<b>Sample Type (C=Comp, G=grab)</b>	<b>Matrix (W=water, S=solid, O=waste/soil, BT=Tissue, A=Air)</b>	<b>Special Instructions/Note:</b>	
				<b>Preservation Code:</b>			
<b>M-21-110519</b>		<b>11/5/19</b>	<b>1000</b>	<b>G</b>	<b>Water</b>	<b>Y</b>	<b>X X</b>
<b>EB-110519</b>		<b>11/5/19</b>	<b>1045</b>	<b>G</b>	<b>Water</b>	<b>X</b>	<b>Y</b>
<b>FB-110519</b>		<b>11/5/19</b>	<b>0935</b>	<b>G</b>	<b>Water</b>	<b>X</b>	<b>X</b>
<b>SNOW-5-110519</b>		<b>11/5/19</b>	<b>1330</b>	<b>G</b>	<b>Water</b>	<b>X</b>	<b>X</b>
<b>LR-2-110519</b>		<b>11/5/19</b>	<b>1500</b>	<b>G</b>	<b>Water</b>	<b>X</b>	<b>Y</b>
<b>FD-110519</b>		<b>11/5/19</b>	<b>-</b>	<b>G</b>	<b>Water</b>	<b>X</b>	<b>X</b>
<b>RE</b>				<b>Water</b>			
<b>11-5-19</b>				<b>Water</b>			
<b>Possible Hazard Identification</b>				<b>Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)</b>			
<input type="checkbox"/> Non-Hazard <input type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown <input type="checkbox"/> Radiological				<input type="checkbox"/> Return To Client <input type="checkbox"/> Disposal By Lab <input type="checkbox"/> Archive For _____ Months			
Deliverable Requested: I, II, III, IV, Other (specify)				Special Instructions/QC Requirements:			
Empty Kit Relinquished by:		Date:		Time:		Method of Shipment:	
Relinquished by: <b>Ann NY</b>		Date/Time: <b>11/5/19 17:40</b>		Company: <b>Kambell</b>		Received by: <b>REINGLICK</b>	
Relinquished by: <b>REINGLICK</b>		Date/Time: <b>11-5-19, 19:00</b>		Company: <b>Syr</b>		Received by: <b>Taylor John</b>	
Relinquished by:		Date/Time:		Company:		Received by:	
Custody Seals Intact: <input type="checkbox"/> Yes <input type="checkbox"/> No		Custody Seal No.: <b>1080022</b>		Cooler Temperature(s) °C and Other Remarks: <b>0.7</b>			



ORIGIN ID:SYRA (315) 431-0171  
SYR SERVICE CENTER  
EUROKINS TESTAMERICA  
118 BOSS RD  
SYRACUSE, NY 13211  
UNITED STATES US

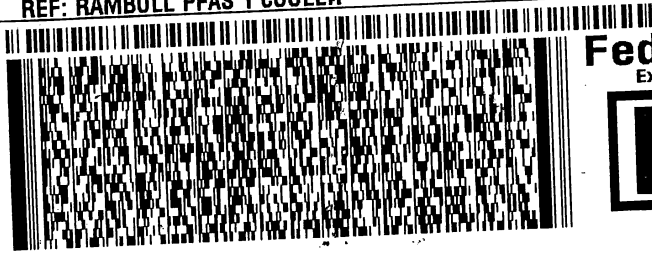
SHIP DATE: 05NOV19  
ACTWGT: 30.00 LB MAN  
CAD: 251798/CAFE3211  
BILL-RECIPIENT

TO **SAMPLE RECEIVING**  
**TESTAMERICA BURLINGTON**  
**30 COMMUNITY DRIVE SUITE 11**

**SOUTH BURLINGTON VT 05403**

(802) 860-1990

REF: RAMBOLL PFAS 1 COOLER



**FedEx**  
Express



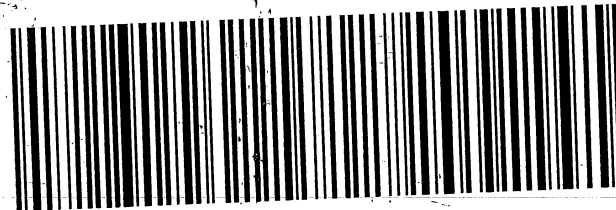
J181118060501NY

TRK# 1112 8550 1222  
0201

**WED - 06 NOV 10:30A**  
**PRIORITY OVERNIGHT**

**NL BTVA**

**05403**  
VT-US **BTV**



# Login Sample Receipt Checklist

Client: O'Brien & Gere Inc of North America

Job Number: 480-162320-1

**Login Number: 162320**

**List Number: 1**

**Creator: Kolb, Chris M**

**List Source: Eurofins TestAmerica, Buffalo**

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	True	
The cooler's custody seal, if present, is intact.	True	
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 sample IDs on the containers 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	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	N/A	
If necessary, staff have been informed of any short hold time or quick TAT needs	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Sampling Company provided.	True	ramboll
Samples received within 48 hours of sampling.	True	
Samples requiring field filtration have been filtered in the field.	True	
Chlorine Residual checked.	N/A	





## Login Sample Receipt Checklist

Client: O'Brien & Gere Inc of North America

Job Number: 480-162320-1

**Login Number: 162320**

**List Number: 2**

**Creator: McNabb, Robert W**

**List Source: Eurofins TestAmerica, Burlington**

**List Creation: 11/08/19 05:11 PM**

Question	Answer	Comment
Radioactivity wasn't checked or is <=/ background as measured by a survey meter.	N/A	Lab does not accept radioactive samples.
The cooler's custody seal, if present, is intact.	True	1080022
Sample custody seals, if present, are intact.	True	
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	0.7°C
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	AB
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.	N/A	
Sample Preservation Verified.	True	
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	



# ATTACHMENT III



**DATA VALIDATION**

**FOR**

**EMERGING CONTAMINANTS  
PAS Oswego  
OSWEGO, NEW YORK**

**ORGANIC ANALYSIS DATA  
1,4-Dioxane and Per- and Polyfluorinated Alkyl Substances (PFAS) in Water**

**Laboratory Job No. 480-162320-1**

**Analyses Performed By:**

**Eurofins TestAmerica Buffalo  
Amherst, New York**

**For:**

**de maximis, Inc.  
Knoxville, Tennessee 37919**

**Data Validation By:**

**ddms, inc.  
St. Paul, Minnesota 55108**

**February 21, 2020**

**1547-3131/ekd/psn  
PAS\480-162320-1 PFAS.docx**



## EXECUTIVE SUMMARY

Validation of the 1,4-dioxane and PFAS analysis data prepared by Eurofins TestAmerica Buffalo for four water samples, one equipment blank, and one field blank supporting the PAS Oswego (Site) Emerging Contaminants sampling event has been completed by de maximis Data Management Solutions, Inc. (ddms). The data were reported by the laboratory under Job No. 480-162320-1, which includes the following samples:

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M-21-110519	EB-110519	FB-110519
SWW-5-110519	LR-2-110519	FD-110519

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Based on the validation effort, the following data qualifiers were applied:

- The result for 1,4-dioxane in EB-110519 was qualified as estimated biased high (J+) due to the high recovery of this compound in the associated laboratory control sample (LCS) analysis.
- Results for 1,4-dioxane in M-21-110519 and SWW-5-110519 were qualified as estimated (J) because concentrations of this analyte exceeded the upper limit of the established instrument calibration range. These results were also qualified as estimated biased high due to a high LCS recovery; the "J" qualifier takes precedence.
- Results for 1H,1H,2H,2H-perfluorodecanesulfonic acid (8:2 FTS) in SWW-5-110519, LR-2-110519, and FD-110519 were qualified as estimated (UJ) due to the high percent difference (%D) for this analyte in an associated continuing calibration (CC) standard.
- Results for perfluorobutanoic acid (PFBA) in LR-2-110519 and FD-110519 were qualified as estimated (J, UJ) due to lack of confirmation at a low concentration in the field duplicate analysis.
- Results for perfluorobutanesulfonic acid (PFBS) in M-21-110519 and for PFBS and perfluorooctanesulfonic acid (PFOS) in SWW-5-1105 were qualified as tentatively identified and estimated (NJ) because ion ratios for these analytes were outside the laboratory limits.

All other results were determined to be valid as reported by the laboratory.

This report should be considered part of the data package for all future distributions of the data.



## 1.0 Introduction

This report presents the findings of the data validation assessment performed on the analyses of water samples collected on November 5, 2019, for the PAS Oswego emerging contaminants sampling event. Samples submitted to the laboratory in sample delivery group 480-162320-1 were reviewed in this report to identify quality issues which could affect the use of the sample data for decision-making purposes.

The 1,4-dioxane analyses were performed by Eurofins TestAmerica Buffalo in accordance with USEPA SW-846 Method 8270D with selective ion monitoring (SIM). The PFAS analyses were performed by Eurofins TestAmerica Burlington, under subcontract to Eurofins TestAmerica Buffalo, in accordance with USEPA Method 537 Modified. The laboratory provided a "CLP-type" data package for review.

The data validation was performed in accordance with the USEPA Region 2 Standard Operating Procedure (SOP) HW-22, "Validating Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry, SW-846 Method 8270D" (Revision 5, December 2010), the specifications of the analytical methods followed, and ddms' SOPs ECS-SOP-002, "Validation and Review of Semivolatile Organic Data," ESC-SOP-004, "Validation and Review of Organic Analyses Using Selective Ion Monitoring (SIM), and draft ECS-SOP-007, "Standard Operating Procedures (SOPs) Validation and Review of Per- and Polyfluorinated Alkyl Substances (PFAS)". Where there was a discrepancy between the QC criteria in the guidelines and the QC criterion established in the analytical methodology, professional judgement was applied.

The data validation process is intended to evaluate data on a technical basis rather than a contract compliance basis for chemical analyses conducted under the referenced method. An initial assumption is that the data package is presented in accordance with the CLP requirements (or "CLP-like," as in this case). It is also assumed that the data package represents the best efforts of the laboratory and has already been subjected to adequate quality review prior to submission for validation.

During the validation process, laboratory data are verified against all available supporting documentation. Based on the findings of the validation, qualifier codes may have been added by the data validator. Validated results are, therefore, either qualified or unqualified. Unqualified results mean that the reported values may be used without reservation. Final validated results are annotated with the following codes as defined by the Region 2 Guidelines:

- J The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
- J+ The result is an estimated quantity, but the result may be biased high.
- J- The result is an estimated quantity, but the result may be biased low.

- N The analysis indicates the presence of an analyte for which there is presumptive evidence to make a “tentative identification.”
- JN The analysis indicates the presence of an analyte that has been “tentatively identified” and the associated numerical value represents its approximate concentration.
- U The analyte was analyzed for but was not detected above the level of the reported sample quantitation limit.
- UJ The analyte was analyzed for but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
- R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

These codes are recorded on the Data Summary Forms contained in Attachment A of this validation report to indicate qualifications placed on the results based on the data review.

The data user is also cautioned that the validation effort is based on the raw data printouts as provided by the laboratory. Software manipulation cannot be routinely detected during validation; unless otherwise stated in the report, these kinds of issues are outside the scope of this review.

## **2.0 Holding Times, Preservation and Sample Integrity**

A copy of the applicable chain of custody (COC) record was included in the data package documenting a sample collection date of November 5, 2019. The samples were received at Eurofins TestAmerica Buffalo on November 6, 2019 and at Eurofins TestAmerica Burlington on November 7, 2019.

The temperatures of the cooler upon receipt at Eurofins TestAmerica Buffalo (3.3°C) and at Eurofins TestAmerica Burlington (0.7°C) were acceptable (QC <10°C).

The water samples were extracted on November 9, 2019, for 1,4-dioxane analyses, which is within the specified holding time of 14 days from collection. The 1,4-dioxane analyses were performed on November 14, 2019, which is within the specified holding time of 40 days from extraction.

The water samples were extracted on November 14, 2019, for PFAS analyses, which is within the specified holding time of 14 days from collection. PFAS analyses were performed on November 18, 2019, which is within the specified holding time of 28 days from extraction.

### 3.0 Documentation

No documentation issues were observed during the validation effort.

The remainder of this report discusses the review effort for each of the parameters. The tables below document the Quality Control (QC) parameters reviewed. Only those quality control excursions resulting in qualified data are discussed. Quality control excursions having no impact on sample results are not discussed. Where a result was qualified J+ or J- and J, the J qualifier takes precedence. Where a result was qualified biased high and low for differing data quality excursions, the final qualifier is J with an indeterminate bias.

### 4.0 1,4-Dioxane by SIM

Review Element	Acceptable?
Preservation and Technical Holding Times	Y
Calibration (Initial Calibration [IC], IC Verification, Continuing Calibration)	Y
Blanks	Y
GC/MS Instrument Tunes	Y
Surrogates	Y
Laboratory Control Samples (LCS)	N
Field Duplicates*	N/A
Matrix Spike (MS) and Matrix Spike Duplicate (MSD)	Y
Quantitation	N
Compound Identification	Y

Y=yes

N=no

N/A = Not applicable

#### 4.1 Laboratory Control Sample (LCS)

One LCS was prepared and analyzed with the field samples. The recovery of 1,4-dioxane in the LCS (181%) exceeded the validation limits (QC 70-130%). Results for 1,4-dioxane in M-21-110519, EB-110519, and SWW-5-110519 were qualified as estimated biased high (J+) due to the high recovery of this compound in the associated LCS analysis. Since 1,4-dioxane was not detected in the remaining site samples, no additional qualifiers were necessary on this basis.

#### 4.2 Compound Quantitation

1,4-Dioxane results and reporting limits were correctly calculated and accurately reported, including necessary adjustments for the sample preparation procedure.

Concentrations of 1,4-dioxane in M-21-110519 and SWW-5-110519 exceeded the upper limit of the established instrument calibration range and were qualified as estimated (J) on this basis. No diluted analyses of these samples were performed. Given the very high dilution factors that would have been required, the spiked concentration of the labeled analog would have been diluted out of both samples.

## 5.0 PFAS

Review Element	Acceptable?
Calibration - IC, ICV, CC	N
Laboratory and Field Blanks	Y
Labeled Analogs	Y
LCS/LCSD	Y
Field Duplicates	N
MS/MSD	Y
Internal Standard Responses	Y
Compound Identification	N
Compound Quantitation	Y

### 5.1 Calibration

An initial calibration (IC) run on October 28, 2019, was associated with the site sample analyses, and results for the IC were acceptable for all target analytes. A second-source initial calibration verification (ICV) standard was analyzed after the IC. Recoveries of the target analytes in the ICV standard were within the acceptance limits of 70-130%.

CC standards at 0.05 ng/mL, 1.0 ng/mL, and 2.5 ng/mL were analyzed at appropriate frequencies in the analysis series that included the site samples. The %Ds for the target compounds were less than 30% except for 8:2 FTS in the CC standard run on November 18, 2019, at 21:01 (31.8%D). The high %D represents a decrease in sensitivity. Results for 8:2 FTS in SWW-5-110519, LR-2-110519, and FD-110519 were qualified as estimated (UJ) due to the high %D for this compound in an associated CC standard. All other samples were bracketed by acceptable CC standards; therefore, no additional qualifiers were necessary on this basis.

### 5.2 Field Duplicate

Sample FD-110519 was submitted as a field duplicate of LR-2-110519. PFBA was reported at a low concentration in LR-2-110519 (0.91 J ng/L), but this analyte was not detected in FD-110519 (1.7 U ng/L). Results for PFBA in LR-2-110519 and FD-110519 were qualified as estimated (J, UJ) due to lack of confirmation at a low concentration in the field duplicate analysis.



### 5.3 Target Analyte Identification

Target compounds were detected in the field samples based on the presence of characteristic ions within the established retention time windows. Based on review of the data provided, sample results reflect accurate compound identification.

Ion ratios for some compounds, where secondary ions were used for identification and confirmation, were outside of the laboratory's established windows, as shown below

Sample	Analyte	Ion Ratio	Ion Ratio Window	Qualifier Applied
M-21-110519	PFBS	5.25	1.49-4.47	NJ
SWW-5-110519	PFBS	7.11	0.97-2.90	NJ
	PFOS	21.65	2.51-7.52	NJ

Results for PFBS in M-21-110519 and for PFBS and PFOS in SWW-5-1105 were qualified as tentatively identified and estimated (NJ) because ion ratios for these analytes were outside the laboratory limits.



**ATTACHMENT A**

**DATA SUMMARY FORMS  
Job No. 480-162320-1  
1,4-Dioxane and PFAS in Water**

Job No. 480-162320-1  
 Site Name: PAS

Data Summary Form for Emerging Contaminants Samples  
 PFAS and 1,4-Dioxane

ddms Project No. 1S473131  
 Sampling Date 11/5/2019

		EB-110519 480-162320-2			FB-110519 480-162320-3		
		1			1		
Parameter	Unit						
2-[N-Methylperfluorooctanesulfonamido] acetic acid (NMeFOSAA)	ng/L	17	U		18	U	
Glycine, N-ethyl-N-[(heptadecafluorooctyl)sulfonyl]- (NEtFOSAA)	ng/L	17	U		18	U	
Perfluorobutanesulfonic Acid (PFBS)	ng/L	1.7	U		1.8	U	
Perfluorobutyric Acid (PFBA)	ng/L	1.7	U		1.8	U	
Perfluorodecanesulfonic acid (PFDS)	ng/L	1.7	U		1.8	U	
Perfluorodecanoic Acid (PFDA)	ng/L	1.7	U		1.8	U	
Perfluorododecanoic Acid (PFDoA)	ng/L	1.7	U		1.8	U	
Perfluoroheptanesulfonic Acid (PFHpS)	ng/L	1.7	U		1.8	U	
Perfluoroheptanoic Acid (PFHpA)	ng/L	1.7	U		1.8	U	
Perfluorohexanesulfonic Acid (PFHxS)	ng/L	1.7	U		1.8	U	
Perfluorohexanoic Acid (PFHxA)	ng/L	1.7	U		1.8	U	
Perfluorononanoic Acid (PFNA)	ng/L	1.7	U		1.8	U	
Perfluorooctanesulfonamide (PFOSA)	ng/L	8.6	U		9.1	U	
Perfluorooctanesulfonic Acid (PFOS)	ng/L	1.7	U		1.8	U	
Perfluorooctanoic Acid (PFOA)	ng/L	1.7	U		1.8	U	
Perfluoropentanoic Acid (PFPeA)	ng/L	1.7	U		1.8	U	
Perfluorotetradecanoic Acid (PFTreA)	ng/L	1.7	U		1.8	U	
Perfluorotridecanoic Acid (PFTriA)	ng/L	1.7	U		1.8	U	
Perfluoroundecanoic Acid (PFUnA)	ng/L	1.7	U		1.8	U	
Sodium 1H,1H,2H,2H-perfluorodecane sulfonate (8:2)	ng/L	17	U		18	U	
Sodium 1H,1H,2H,2H-perfluorooctane sulfonate (6:2)	ng/L	17	U		18	U	
1,4-Dioxane	ug/L	0.36	J+	high LCS %R	--	--	

Job No. 480-162320-1  
 Site Name: PAS

Data Summary Form for Emerging Contaminants Samples  
 PFAS and 1,4-Dioxane

ddms Project No. 1S473131  
 Sampling Date 11/5/2019

		FD-110519 480-162320-6			LR-2-110519 480-162320-5		
		1			1		
Parameter	Unit						
2-[N-Methylperfluorooctanesulfonamido] acetic acid (NMeFOSAA)	ng/L	17	U		17	U	
Glycine, N-ethyl-N-[(heptadecafluorooctyl)sulfonyl]- (NEtFOSAA)	ng/L	17	U		17	U	
Perfluorobutanesulfonic Acid (PFBS)	ng/L	1.7	U		1.7	U	
Perfluorobutyric Acid (PFBA)	ng/L	1.7	UJ	lack of field dup confirmation	0.91	J	lack of field dup confirmation
Perfluorodecanesulfonic acid (PFDS)	ng/L	1.7	U		1.7	U	
Perfluorodecanoic Acid (PFDA)	ng/L	1.7	U		1.7	U	
Perfluorododecanoic Acid (PFDoA)	ng/L	1.7	U		1.7	U	
Perfluoroheptanesulfonic Acid (PFHpS)	ng/L	1.7	U		1.7	U	
Perfluoroheptanoic Acid (PFHpA)	ng/L	1.7	U		1.7	U	
Perfluorohexanesulfonic Acid (PFHxS)	ng/L	1.7	U		1.7	U	
Perfluorohexanoic Acid (PFHxA)	ng/L	1.7	U		1.7	U	
Perfluorononanoic Acid (PFNA)	ng/L	1.7	U		1.7	U	
Perfluorooctanesulfonamide (PFOSA)	ng/L	8.3	U		8.6	U	
Perfluorooctanesulfonic Acid (PFOS)	ng/L	1.7	U		1.7	U	
Perfluorooctanoic Acid (PFOA)	ng/L	1.7	U		1.7	U	
Perfluoropentanoic Acid (PFPeA)	ng/L	1.7	U		1.7	U	
Perfluorotetradecanoic Acid (PFTreA)	ng/L	1.7	U		1.7	U	
Perfluorotridecanoic Acid (PFTriA)	ng/L	1.7	U		1.7	U	
Perfluoroundecanoic Acid (PFUnA)	ng/L	1.7	U		1.7	U	
Sodium 1H,1H,2H,2H-perfluorodecane sulfonate (8:2)	ng/L	17	UJ	low CC standard response	17	UJ	low CC standard response
Sodium 1H,1H,2H,2H-perfluorooctane sulfonate (6:2)	ng/L	17	U		17	U	
1,4-Dioxane	ug/L	0.19	U		0.19	U	

Job No. 480-162320-1  
 Site Name: PAS

Data Summary Form for Emerging Contaminants Samples  
 PFAS and 1,4-Dioxane

ddms Project No. 15473131  
 Sampling Date 11/5/2019

		M-21-110519 480-162320-1			SWW-5-110519 480-162320-4		
		1			1		
Parameter	Unit						
2-[N-Methylperfluorooctanesulfonamido] acetic acid (NMeFOSAA)	ng/L	16	U		19	U	
Glycine, N-ethyl-N-[(heptadecafluorooctyl)sulfonyl]- (NEtFOSAA)	ng/L	16	U		19	U	
Perfluorobutanesulfonic Acid (PFBS)	ng/L	0.85	NJ	ion ratio outside limits	2.1	NJ	ion ratio outside limits
Perfluorobutyric Acid (PFBA)	ng/L	9.0			27		
Perfluorodecanesulfonic acid (PFDS)	ng/L	1.6	U		1.9	U	
Perfluorodecanoic Acid (PFDA)	ng/L	1.6	U		1.9	U	
Perfluorododecanoic Acid (PFDoA)	ng/L	1.6	U		1.9	U	
Perfluoroheptanesulfonic Acid (PFHpS)	ng/L	1.6	U		1.9	U	
Perfluoroheptanoic Acid (PFHpA)	ng/L	1.8			1.9		
Perfluorohexanesulfonic Acid (PFHxS)	ng/L	2.5			2.5		
Perfluorohexanoic Acid (PFHxA)	ng/L	5.3			4.8		
Perfluorononanoic Acid (PFNA)	ng/L	0.28	J		1.9	U	
Perfluorooctanesulfonamide (PFOSA)	ng/L	8.0	U		9.4	U	
Perfluorooctanesulfonic Acid (PFOS)	ng/L	3.5			6.9	NJ	ion ratio outside limits
Perfluorooctanoic Acid (PFOA)	ng/L	19			6.4		
Perfluoropentanoic Acid (PFPeA)	ng/L	3.5			2.4		
Perfluorotetradecanoic Acid (PFTreA)	ng/L	1.6	U		1.9	U	
Perfluorotridecanoic Acid (PFTriA)	ng/L	1.6	U		1.9	U	
Perfluoroundecanoic Acid (PFUnA)	ng/L	1.6	U		1.9	U	
Sodium 1H,1H,2H,2H-perfluorodecane sulfonate (8:2)	ng/L	16	U		19	UJ	low CC standard response
Sodium 1H,1H,2H,2H-perfluorooctane sulfonate (6:2)	ng/L	16	U		15	J	
1,4-Dioxane	ug/L	630	J	exceeds calibration range, high LCS %R	1000	J	exceeds calibration range, high LCS %R