



**Off-base Drinking Water Sample Results,
Level 2 Laboratory Report, Level 4 Laboratory Report,
Electronic Data Deliverable, Data Validation Report,
and the Sample Location Figure, SDG 1801773**

*Naval Research Laboratory – Chesapeake Bay
Detachment
Chesapeake Beach, Maryland*

February 2019

July 24, 2018

Vista Work Order No. 1801773

Ms. Tiffany Hill
CH2M Hill
1100 NE Circle Blvd. Suite 300
Corvallis, OR 97330

Dear Ms. Hill,

Enclosed are the results for the sample set received at Vista Analytical Laboratory on July 17, 2018. This sample set was analyzed on a rush turn-around time, under your Project Name 'CTO-08 PFAS DW Investigation NRL CBD'.

Vista Analytical Laboratory is committed to serving you effectively. If you require additional information, please contact me at 916-673-1520 or by email at mmaier@vista-analytical.com.

Thank you for choosing Vista as part of your analytical support team.

Sincerely,



Martha Maier
Laboratory Director



Vista Analytical Laboratory certifies that the report herein meets all the requirements set forth by NELAP for those applicable test methods. Results relate only to the samples as received by the laboratory. This report should not be reproduced except in full without the written approval of Vista.

Vista Work Order No. 1801773

Case Narrative

Sample Condition on Receipt:

Four drinking water samples were received in good condition and within the method temperature requirements. The samples were received and stored securely in accordance with Vista standard operating procedures and EPA methodology.

Analytical Notes:

EPA Method 537, Rev. 1.1

The samples were extracted and analyzed for a selected list of PFAS using EPA Method 537, Rev. 1.1.

Holding Times

The samples were extracted and analyzed within the method hold times.

Quality Control

The Initial Calibration and Continuing Calibration Verifications met the method acceptance criteria.

Two Laboratory Fortified Blanks (LFB/LFBD) and a Laboratory Reagent Blank (LRB) were extracted and analyzed with the preparation batch. No analytes were detected in the Laboratory Reagent Blank above 1/2 the LOQ. The LFB/LFBD recoveries were within the method acceptance criteria.

The surrogate recoveries for all QC and field samples were within the acceptance criteria.

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Sample Inventory Report

| Vista Sample ID | Client Sample ID | Sampled | Received | Components/Containers |
|----------------------------|-----------------------------|-----------------|-----------------|--|
| 1801773-01 | CBD-1RW21-0718 | 16-Jul-18 12:01 | 17-Jul-18 09:27 | HDPE Bottle, 250 mL HDPE Bottle, 250 mL |
| 1801773-02 | CBD-1FB21-0718 | 16-Jul-18 12:03 | 17-Jul-18 09:27 | HDPE Bottle, 250 mL HDPE Bottle, 250 mL |
| 1801773-03 | CBD-1RW22-0718 | 16-Jul-18 14:18 | 17-Jul-18 09:27 | HDPE Bottle, 250 mL HDPE Bottle, 250 mL |
| 1801773-04 | CBD-1FB22-0718 | 16-Jul-18 14:20 | 17-Jul-18 09:27 | HDPE Bottle, 250 mL HDPE Bottle, 250 mL |

ANALYTICAL RESULTS

Sample ID: LRB

EPA Method 537

| Client Data | | | | | Laboratory Data | | | | | | | |
|-------------|--------------------------------------|---------|---------|--|-----------------|--------------|---------|---------|--|--|--|--|
| Name: | CH2M Hill | Matrix: | Aqueous | | Lab Sample: | B8G0140-BLK1 | Column: | BEH C18 | | | | |
| Project: | CTO-08 PFAS DW Investigation NRL CBD | | | | | | | | | | | |

| Analyte | CAS Number | Conc. (ng/L) | DL | LOD | LOQ | Qualifiers | Batch | Extracted | Samp Size | Analyzed | Dilution |
|-------------------|------------|--------------|----------|------|------------|------------|-----------|-----------|-----------------|-----------------|----------|
| PFBS | 375-73-5 | ND | 3.04 | 5.00 | 10.0 | | B8G0140 | 18-Jul-18 | 0.250 L | 20-Jul-18 17:02 | 1 |
| PFHxA | 307-24-4 | ND | 3.04 | 5.00 | 10.0 | | B8G0140 | 18-Jul-18 | 0.250 L | 20-Jul-18 17:02 | 1 |
| PFHpA | 375-85-9 | ND | 3.04 | 5.00 | 10.0 | | B8G0140 | 18-Jul-18 | 0.250 L | 20-Jul-18 17:02 | 1 |
| PFHxS | 355-46-4 | ND | 3.04 | 5.00 | 10.0 | | B8G0140 | 18-Jul-18 | 0.250 L | 20-Jul-18 17:02 | 1 |
| PFOA | 335-67-1 | ND | 3.04 | 5.00 | 10.0 | | B8G0140 | 18-Jul-18 | 0.250 L | 20-Jul-18 17:02 | 1 |
| PFNA | 375-95-1 | ND | 3.04 | 5.00 | 10.0 | | B8G0140 | 18-Jul-18 | 0.250 L | 20-Jul-18 17:02 | 1 |
| PFOS | 1763-23-1 | ND | 3.04 | 5.00 | 10.0 | | B8G0140 | 18-Jul-18 | 0.250 L | 20-Jul-18 17:02 | 1 |
| PFDA | 335-76-2 | ND | 3.04 | 5.00 | 10.0 | | B8G0140 | 18-Jul-18 | 0.250 L | 20-Jul-18 17:02 | 1 |
| MeFOSAA | 2355-31-9 | ND | 3.04 | 5.00 | 10.0 | | B8G0140 | 18-Jul-18 | 0.250 L | 20-Jul-18 17:02 | 1 |
| EtFOSAA | 2991-50-6 | ND | 3.04 | 5.00 | 10.0 | | B8G0140 | 18-Jul-18 | 0.250 L | 20-Jul-18 17:02 | 1 |
| PFOA | 2058-94-8 | ND | 3.04 | 5.00 | 10.0 | | B8G0140 | 18-Jul-18 | 0.250 L | 20-Jul-18 17:02 | 1 |
| PFDoA | 307-55-1 | ND | 3.04 | 5.00 | 10.0 | | B8G0140 | 18-Jul-18 | 0.250 L | 20-Jul-18 17:02 | 1 |
| PFTTrDA | 72629-94-8 | ND | 3.04 | 5.00 | 10.0 | | B8G0140 | 18-Jul-18 | 0.250 L | 20-Jul-18 17:02 | 1 |
| PFTeDA | 376-06-7 | ND | 3.04 | 5.00 | 10.0 | | B8G0140 | 18-Jul-18 | 0.250 L | 20-Jul-18 17:02 | 1 |
| Labeled Standards | Type | % Recovery | Limits | | Qualifiers | Batch | Extracted | Samp Size | Analyzed | Dilution | |
| 13C2-PFHxA | SURR | 85.9 | 70 - 130 | | | B8G0140 | 18-Jul-18 | 0.250 L | 20-Jul-18 17:02 | 1 | |
| 13C2-PFDA | SURR | 79.1 | 70 - 130 | | | B8G0140 | 18-Jul-18 | 0.250 L | 20-Jul-18 17:02 | 1 | |
| d5-EtFOSAA | SURR | 82.2 | 70 - 130 | | | B8G0140 | 18-Jul-18 | 0.250 L | 20-Jul-18 17:02 | 1 | |

DL - Detection Limit

LOD - Limit of Detection
LOQ - Limit of quantitation

Results reported to the DL.

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: LFBD **EPA Method 537**

| | | | |
|---|--------------------------------------|---------------------------|-----------|
| Name: CH2M Hill | Lab Sample: B8G0140-BS1/B8G0140-BSD1 | Date Extracted: 18-Jul-18 | 18-Jul-18 |
| Project: CTO-08 PFAS DW Investigation NRL CBD | QC Batch: B8G0140 | Column: BEH C18 | |
| Matrix: Aqueous | Samp Size: 0.250/0.250 L | | |

| Analyte | CAS Number | LFB (ng/L) | LFB Spike Amt | LFB % Rec | LFB Quals | LFBD (ng/L) | LFBD Spike Amt | LFBD % Rec | RPD | LFBD Quals | %Rec Limits | RPD Limits | LFB Analyzed | LFB Dil | LFBD Analyzed | LFBD Dil |
|---------|------------|------------|---------------|-----------|-----------|-------------|----------------|------------|-------|------------|-------------|------------|-----------------|---------|-----------------|----------|
| PFBS | 375-73-5 | 34.1 | 35.4 | 96.3 | | 35.3 | 35.4 | 99.8 | 3.62 | | 70-130 | | 20-Jul-18 17:15 | 1 | 20-Jul-18 17:27 | 1 |
| PFHxA | 307-24-4 | 35.3 | 40.0 | 88.3 | | 33.4 | 40.0 | 83.5 | 5.51 | | 70-130 | | 20-Jul-18 17:15 | 1 | 20-Jul-18 17:27 | 1 |
| PFHpA | 375-85-9 | 37.4 | 40.0 | 93.5 | | 36.6 | 40.0 | 91.5 | 2.21 | | 70-130 | | 20-Jul-18 17:15 | 1 | 20-Jul-18 17:27 | 1 |
| PFHxS | 355-46-4 | 35.2 | 36.4 | 96.7 | | 33.9 | 36.4 | 93.1 | 3.72 | | 70-130 | | 20-Jul-18 17:15 | 1 | 20-Jul-18 17:27 | 1 |
| PFOA | 335-67-1 | 37.4 | 40.0 | 93.6 | | 35.0 | 40.0 | 87.5 | 6.79 | | 70-130 | | 20-Jul-18 17:15 | 1 | 20-Jul-18 17:27 | 1 |
| PFNA | 375-95-1 | 34.4 | 40.0 | 85.9 | | 33.8 | 40.0 | 84.4 | 1.73 | | 70-130 | | 20-Jul-18 17:15 | 1 | 20-Jul-18 17:27 | 1 |
| PFOS | 1763-23-1 | 37.2 | 37.0 | 100 | | 34.1 | 37.0 | 92.2 | 8.58 | | 70-130 | | 20-Jul-18 17:15 | 1 | 20-Jul-18 17:27 | 1 |
| PFDA | 335-76-2 | 33.9 | 40.0 | 84.8 | | 33.3 | 40.0 | 83.2 | 1.90 | | 70-130 | | 20-Jul-18 17:15 | 1 | 20-Jul-18 17:27 | 1 |
| MeFOSAA | 2355-31-9 | 38.2 | 40.0 | 95.4 | | 38.0 | 40.0 | 94.9 | 0.497 | | 70-130 | | 20-Jul-18 17:15 | 1 | 20-Jul-18 17:27 | 1 |
| EtFOSAA | 2991-50-6 | 37.8 | 40.0 | 94.5 | | 37.9 | 40.0 | 94.8 | 0.340 | | 70-130 | | 20-Jul-18 17:15 | 1 | 20-Jul-18 17:27 | 1 |
| PFUnA | 2058-94-8 | 32.6 | 40.0 | 81.6 | | 31.5 | 40.0 | 78.8 | 3.48 | | 70-130 | | 20-Jul-18 17:15 | 1 | 20-Jul-18 17:27 | 1 |
| PFDoA | 307-55-1 | 36.7 | 40.0 | 91.7 | | 32.5 | 40.0 | 81.2 | 12.1 | | 70-130 | | 20-Jul-18 17:15 | 1 | 20-Jul-18 17:27 | 1 |
| PFTTrDA | 72629-94-8 | 33.2 | 40.0 | 82.9 | | 32.5 | 40.0 | 81.2 | 2.10 | | 70-130 | | 20-Jul-18 17:15 | 1 | 20-Jul-18 17:27 | 1 |
| PFTeDA | 376-06-7 | 32.8 | 40.0 | 81.9 | | 32.7 | 40.0 | 81.7 | 0.258 | | 70-130 | | 20-Jul-18 17:15 | 1 | 20-Jul-18 17:27 | 1 |

| Labeled Standards | Type | LFB % Rec | LFB Quals | LFBD % Rec | LFBD Quals | Limits | LFB Analyzed | LFB Dil | LFBD Analyzed | LFBD Dil |
|-------------------|------|-----------|-----------|------------|------------|--------|-----------------|---------|-----------------|----------|
| 13C2-PFHxA | SURR | 83.4 | | 82.5 | | 70-130 | 20-Jul-18 17:15 | 1 | 20-Jul-18 17:27 | 1 |
| 13C2-PFDA | SURR | 81.8 | | 80.3 | | 70-130 | 20-Jul-18 17:15 | 1 | 20-Jul-18 17:27 | 1 |
| d5-EtFOSAA | SURR | 85.1 | | 75.8 | | 70-130 | 20-Jul-18 17:15 | 1 | 20-Jul-18 17:27 | 1 |

Sample ID: CBD-1RW21-0718

EPA Method 537

| Client Data | | | | Laboratory Data | | | |
|-------------|--------------------------------------|-----------------|-----------------|-----------------|-----------------|---------|---------|
| Name: | CH2M Hill | Matrix: | Drinking Water | Lab Sample: | 1801773-01 | Column: | BEH C18 |
| Project: | CTO-08 PFAS DW Investigation NRL CBD | Date Collected: | 16-Jul-18 12:01 | Date Received: | 17-Jul-18 09:27 | | |

| Analyte | CAS Number | Conc. (ng/L) | DL | LOD | LOQ | Qualifiers | Batch | Extracted | Samp Size | Analyzed | Dilution |
|-------------------|------------|--------------|----------|------|------------|------------|-----------|-----------|-----------------|-----------------|----------|
| PFBS | 375-73-5 | ND | 3.09 | 5.08 | 10.2 | | B8G0140 | 18-Jul-18 | 0.246 L | 20-Jul-18 23:39 | 1 |
| PFHxA | 307-24-4 | ND | 3.09 | 5.08 | 10.2 | | B8G0140 | 18-Jul-18 | 0.246 L | 20-Jul-18 23:39 | 1 |
| PFHpA | 375-85-9 | ND | 3.09 | 5.08 | 10.2 | | B8G0140 | 18-Jul-18 | 0.246 L | 20-Jul-18 23:39 | 1 |
| PFHxS | 355-46-4 | ND | 3.09 | 5.08 | 10.2 | | B8G0140 | 18-Jul-18 | 0.246 L | 20-Jul-18 23:39 | 1 |
| PFOA | 335-67-1 | ND | 3.09 | 5.08 | 10.2 | | B8G0140 | 18-Jul-18 | 0.246 L | 20-Jul-18 23:39 | 1 |
| PFNA | 375-95-1 | ND | 3.09 | 5.08 | 10.2 | | B8G0140 | 18-Jul-18 | 0.246 L | 20-Jul-18 23:39 | 1 |
| PFOS | 1763-23-1 | ND | 3.09 | 5.08 | 10.2 | | B8G0140 | 18-Jul-18 | 0.246 L | 20-Jul-18 23:39 | 1 |
| PFDA | 335-76-2 | ND | 3.09 | 5.08 | 10.2 | | B8G0140 | 18-Jul-18 | 0.246 L | 20-Jul-18 23:39 | 1 |
| MeFOSAA | 2355-31-9 | ND | 3.09 | 5.08 | 10.2 | | B8G0140 | 18-Jul-18 | 0.246 L | 20-Jul-18 23:39 | 1 |
| EtFOSAA | 2991-50-6 | ND | 3.09 | 5.08 | 10.2 | | B8G0140 | 18-Jul-18 | 0.246 L | 20-Jul-18 23:39 | 1 |
| PFOA | 2058-94-8 | ND | 3.09 | 5.08 | 10.2 | | B8G0140 | 18-Jul-18 | 0.246 L | 20-Jul-18 23:39 | 1 |
| PFDoA | 307-55-1 | ND | 3.09 | 5.08 | 10.2 | | B8G0140 | 18-Jul-18 | 0.246 L | 20-Jul-18 23:39 | 1 |
| PFTTrDA | 72629-94-8 | ND | 3.09 | 5.08 | 10.2 | | B8G0140 | 18-Jul-18 | 0.246 L | 20-Jul-18 23:39 | 1 |
| PFTeDA | 376-06-7 | ND | 3.09 | 5.08 | 10.2 | | B8G0140 | 18-Jul-18 | 0.246 L | 20-Jul-18 23:39 | 1 |
| Labeled Standards | Type | % Recovery | Limits | | Qualifiers | Batch | Extracted | Samp Size | Analyzed | Dilution | |
| 13C2-PFHxA | SURR | 83.9 | 70 - 130 | | | B8G0140 | 18-Jul-18 | 0.246 L | 20-Jul-18 23:39 | 1 | |
| 13C2-PFDA | SURR | 77.7 | 70 - 130 | | | B8G0140 | 18-Jul-18 | 0.246 L | 20-Jul-18 23:39 | 1 | |
| d5-EtFOSAA | SURR | 75.5 | 70 - 130 | | | B8G0140 | 18-Jul-18 | 0.246 L | 20-Jul-18 23:39 | 1 | |

DL - Detection Limit

LOD - Limit of Detection
LOQ - Limit of quantitation

Results reported to the DL.

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: CBD-1FB21-0718

EPA Method 537

| Client Data | | | | Laboratory Data | | | |
|-------------|--------------------------------------|-----------------|----------------|-----------------|-----------------|---------|---------|
| Name: | C2 HM 2 ill | Matrix: | Drinking Water | Lab Sample: | 1801773-0H | Column: | BE2 C18 |
| Project: | CTO-08 PFAS DW Investigation NRL CBD | Date Collected: | 16-Jul-18 1H03 | Date Received: | 17-Jul-18 09:H7 | | |

| Analyte | CAS Number | Conc. (ng/L) | DL | LOD | LOQ | Qualifiers | Batch | Extracted | Samp Size | Analyzed | Dilution |
|-------------------|------------|--------------|----------|-----|------------|------------|-----------|-----------|-----------------|-----------------|----------|
| PFBS | 37G-73-G | ND | 3.15 | G17 | 10.3 | | B84 0150 | 18-Jul-18 | 0.H5HL | H0-Jul-18 IB:GH | 1 |
| PF2 xA | 307-H5-5 | ND | 3.15 | G17 | 10.3 | | B84 0150 | 18-Jul-18 | 0.H5HL | H0-Jul-18 IB:GH | 1 |
| PF2 pA | 37G-8G-9 | ND | 3.15 | G17 | 10.3 | | B84 0150 | 18-Jul-18 | 0.H5HL | H0-Jul-18 IB:GH | 1 |
| PF2 xS | 3GG-56-5 | ND | 3.15 | G17 | 10.3 | | B84 0150 | 18-Jul-18 | 0.H5HL | H0-Jul-18 IB:GH | 1 |
| PFOA | 33G-67-1 | ND | 3.15 | G17 | 10.3 | | B84 0150 | 18-Jul-18 | 0.H5HL | H0-Jul-18 IB:GH | 1 |
| PFNA | 37G-9G-1 | ND | 3.15 | G17 | 10.3 | | B84 0150 | 18-Jul-18 | 0.H5HL | H0-Jul-18 IB:GH | 1 |
| PFOS | 1763-HB-1 | ND | 3.15 | G17 | 10.3 | | B84 0150 | 18-Jul-18 | 0.H5HL | H0-Jul-18 IB:GH | 1 |
| PFDA | 33G-76-H | ND | 3.15 | G17 | 10.3 | | B84 0150 | 18-Jul-18 | 0.H5HL | H0-Jul-18 IB:GH | 1 |
| MeFOSAA | HGG-31-9 | ND | 3.15 | G17 | 10.3 | | B84 0150 | 18-Jul-18 | 0.H5HL | H0-Jul-18 IB:GH | 1 |
| EtFOSAA | H91-G0-6 | ND | 3.15 | G17 | 10.3 | | B84 0150 | 18-Jul-18 | 0.H5HL | H0-Jul-18 IB:GH | 1 |
| PFUnA | HG8-95-8 | ND | 3.15 | G17 | 10.3 | | B84 0150 | 18-Jul-18 | 0.H5HL | H0-Jul-18 IB:GH | 1 |
| PFD0A | 307-GG-1 | ND | 3.15 | G17 | 10.3 | | B84 0150 | 18-Jul-18 | 0.H5HL | H0-Jul-18 IB:GH | 1 |
| PFTrDA | 7H6H-95-8 | ND | 3.15 | G17 | 10.3 | | B84 0150 | 18-Jul-18 | 0.H5HL | H0-Jul-18 IB:GH | 1 |
| PFTeDA | 376-06-7 | ND | 3.15 | G17 | 10.3 | | B84 0150 | 18-Jul-18 | 0.H5HL | H0-Jul-18 IB:GH | 1 |
| Labeled Standards | Type | % Recovery | Limits | | Qualifiers | Batch | Extracted | Samp Size | Analyzed | Dilution | |
| 13CHPF2 xA | SURR | 83.H | 70 - 130 | | | B84 0150 | 18-Jul-18 | 0.H5HL | H0-Jul-18 IB:GH | 1 | |
| 13CHPFDA | SURR | 77.6 | 70 - 130 | | | B84 0150 | 18-Jul-18 | 0.H5HL | H0-Jul-18 IB:GH | 1 | |
| dGEtFOSAA | SURR | 86.H | 70 - 130 | | | B84 0150 | 18-Jul-18 | 0.H5HL | H0-Jul-18 IB:GH | 1 | |

DL - Detection Limit

LOD - Limit of Detection
LOQ - Limit of quantitation

Results reported to the DL.

When reported, PF2 xS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: CBD-1RW22-0718

EPA Method 537

| Client Data | | | | | Laboratory Data | | | | | | |
|-------------|--------------------------------------|-----------------|-----------------|--|-----------------|------------------|---------|---------|--|--|--|
| Name: | CH2M Hill | Matrix: | Drinking Water | | Lab Sample: | 1801773-03 | Column: | BEH C18 | | | |
| Project: | CTO-08 PFAS DW Investigation NRL CBD | Date Collected: | 16-Jul-18 19:18 | | Date Received: | 17-Jul-18 0. :27 | | | | | |

| Analyte | CAS Number | Conc. (ng/L) | DL | LOD | LOQ | Qualifiers | Batch | Extracted | Samp Size | Analyzed | Dilution |
|-------------------|--------------|--------------|----------|-----|------------|------------|-----------|-----------|-----------------|-----------------|----------|
| PFBS | 37G-73-G | ND | 306 | 09 | 105 | | B84 0190 | 18-Jul-18 | 0298 L | 21-Jul-18 00:0G | 1 |
| PFHxA | 307-29-9 | ND | 306 | 09 | 105 | | B84 0190 | 18-Jul-18 | 0298 L | 21-Jul-18 00:0G | 1 |
| PFHpA | 37G-8G. | ND | 306 | 09 | 105 | | B84 0190 | 18-Jul-18 | 0298 L | 21-Jul-18 00:0G | 1 |
| PFHxS | 3GG-96-9 | ND | 306 | 09 | 105 | | B84 0190 | 18-Jul-18 | 0298 L | 21-Jul-18 00:0G | 1 |
| PFOA | 33G-67-1 | ND | 306 | 09 | 105 | | B84 0190 | 18-Jul-18 | 0298 L | 21-Jul-18 00:0G | 1 |
| PFNA | 37G. G-1 | ND | 306 | 09 | 105 | | B84 0190 | 18-Jul-18 | 0298 L | 21-Jul-18 00:0G | 1 |
| PFOS | 1763-23-1 | ND | 306 | 09 | 105 | | B84 0190 | 18-Jul-18 | 0298 L | 21-Jul-18 00:0G | 1 |
| PFDA | 33G-76-2 | ND | 306 | 09 | 105 | | B84 0190 | 18-Jul-18 | 0298 L | 21-Jul-18 00:0G | 1 |
| MeFOSAA | 23GG-31- | ND | 306 | 09 | 105 | | B84 0190 | 18-Jul-18 | 0298 L | 21-Jul-18 00:0G | 1 |
| EtFOSAA | 2. . 1-G-6 | ND | 306 | 09 | 105 | | B84 0190 | 18-Jul-18 | 0298 L | 21-Jul-18 00:0G | 1 |
| PFUnA | 20G8-. 9-8 | ND | 306 | 09 | 105 | | B84 0190 | 18-Jul-18 | 0298 L | 21-Jul-18 00:0G | 1 |
| PFDoA | 307-GG-1 | ND | 306 | 09 | 105 | | B84 0190 | 18-Jul-18 | 0298 L | 21-Jul-18 00:0G | 1 |
| PFTrDA | 7262. -. 9-8 | ND | 306 | 09 | 105 | | B84 0190 | 18-Jul-18 | 0298 L | 21-Jul-18 00:0G | 1 |
| PFTeDA | 376-06-7 | ND | 306 | 09 | 105 | | B84 0190 | 18-Jul-18 | 0298 L | 21-Jul-18 00:0G | 1 |
| Labeled Standards | Type | % Recovery | Limits | | Qualifiers | Batch | Extracted | Samp Size | Analyzed | Dilution | |
| 13C2-PFHxA | SURR | 775 | 70 - 130 | | | B84 0190 | 18-Jul-18 | 0298 L | 21-Jul-18 00:0G | 1 | |
| 13C2-PFDA | SURR | 785 | 70 - 130 | | | B84 0190 | 18-Jul-18 | 0298 L | 21-Jul-18 00:0G | 1 | |
| dGEtFOSAA | SURR | 7. 5 | 70 - 130 | | | B84 0190 | 18-Jul-18 | 0298 L | 21-Jul-18 00:0G | 1 | |

DL - Detection Limit

LOD - Limit of Detection
LOQ - Limit of quantitation

Results reported to the DL5

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers5 Only the linear isomer is reported for all other analytes5

Sample ID: CBD-1FB22-0718

EPA Method 537

| Client Data | | | | Laboratory Data | | | |
|-------------|--------------------------------------|-----------------|----------------|-----------------|------------------|---------|---------|
| Name: | C2 uM 2 ill | Matrix: | Drinking Water | Lab Sample: | 1801773-0H | ColEmn: | Bk2 C18 |
| Project: | CTO-08 PFAS DW Investigation NRL CBD | Date Collected: | 1J-9EI-18 1Hu0 | Date Received: | 17-9EI-18 0. :u7 | | |

| Analyte | CAS Number | Conc. (ng/L) | DL | LOD | LOQ | Qualifiers | Batch | Extracted | Samp Size | Analyzed | Dilution |
|-------------------|-------------|--------------|----------|-----|------------|------------|-----------|-----------|-----------------|-----------------|----------|
| PFBS | 37G73-G | ND | 3DH | GH | 105 | | B84 01H | 18-9EI-18 | 05uCL | u1-9EI-18 00:17 | 1 |
| PF2 xA | 307-uHH | ND | 3DH | GH | 105 | | B84 01H | 18-9EI-18 | 05uCL | u1-9EI-18 00:17 | 1 |
| PF2 pA | 37G8G. | ND | 3DH | GH | 105 | | B84 01H | 18-9EI-18 | 05uCL | u1-9EI-18 00:17 | 1 |
| PF2 xS | 3GGHJ-H | ND | 3DH | GH | 105 | | B84 01H | 18-9EI-18 | 05uCL | u1-9EI-18 00:17 | 1 |
| PFOA | 33GJ7-1 | ND | 3DH | GH | 105 | | B84 01H | 18-9EI-18 | 05uCL | u1-9EI-18 00:17 | 1 |
| PFNA | 37G. G1 | ND | 3DH | GH | 105 | | B84 01H | 18-9EI-18 | 05uCL | u1-9EI-18 00:17 | 1 |
| PFOS | 17J3-u3-1 | ND | 3DH | GH | 105 | | B84 01H | 18-9EI-18 | 05uCL | u1-9EI-18 00:17 | 1 |
| PFDA | 33G7J-u | ND | 3DH | GH | 105 | | B84 01H | 18-9EI-18 | 05uCL | u1-9EI-18 00:17 | 1 |
| MeFOSAA | u3GG31- | ND | 3DH | GH | 105 | | B84 01H | 18-9EI-18 | 05uCL | u1-9EI-18 00:17 | 1 |
| ktFOSAA | u. . 1-GJ | ND | 3DH | GH | 105 | | B84 01H | 18-9EI-18 | 05uCL | u1-9EI-18 00:17 | 1 |
| PFUnA | u0G8-. H8 | ND | 3DH | GH | 105 | | B84 01H | 18-9EI-18 | 05uCL | u1-9EI-18 00:17 | 1 |
| PFDoA | 307-GG1 | ND | 3DH | GH | 105 | | B84 01H | 18-9EI-18 | 05uCL | u1-9EI-18 00:17 | 1 |
| PFTrDA | 7uJu. -. H8 | ND | 3DH | GH | 105 | | B84 01H | 18-9EI-18 | 05uCL | u1-9EI-18 00:17 | 1 |
| PFTeDA | 37J-0J-7 | ND | 3DH | GH | 105 | | B84 01H | 18-9EI-18 | 05uCL | u1-9EI-18 00:17 | 1 |
| Labeled Standards | Type | % Recovery | Limits | | Qualifiers | Batch | Extracted | Samp Size | Analyzed | Dilution | |
| 13Cu-PF2 xA | SURR | 805 | 70 - 130 | | | B84 01H | 18-9EI-18 | 05uCL | u1-9EI-18 00:17 | 1 | |
| 13Cu-PFDA | SURR | 7H7 | 70 - 130 | | | B84 01H | 18-9EI-18 | 05uCL | u1-9EI-18 00:17 | 1 | |
| dGktFOSAA | SURR | . GH | 70 - 130 | | | B84 01H | 18-9EI-18 | 05uCL | u1-9EI-18 00:17 | 1 | |

DL - Detection Limit

LOD - Limit of Detection
LOQ - Limit of Quantitation

ResElts reported to the DL5

When reported, PF2 xS, PFOA, PFOS, MeFOSAA and ktFOSAA include both linear and branched isomers5 Only the linear isomer is reported for all other analytes5

DATA QUALIFIERS & ABBREVIATIONS

| | |
|--------------|---|
| B | This compound was also detected in the method blank |
| Conc. | Concentration |
| D | Dilution |
| DL | Detection limit |
| E | The associated compound concentration exceeded the calibration range of the instrument |
| H | Recovery and/or RPD was outside laboratory acceptance limits |
| I | Chemical Interference |
| J | The amount detected is below the Reporting Limit/LOQ |
| LOD | Limits of Detection |
| LOQ | Limits of Quantitation |
| M | Estimated Maximum Possible Concentration (CA Region 2 projects only) |
| NA | Not applicable |
| ND | Not Detected |
| Q | Ion ratio outside of 70-130% of Standard Ratio. (DOD PFAS projects only) |
| TEQ | Toxic Equivalency |
| U | Not Detected (specific projects only) |
| * | See Cover Letter |

Unless otherwise noted, solid sample results are reported in dry weight. Tissue samples are reported in wet weight.

CERTIFICATIONS

| Accrediting Authority | Certificate Number |
|---|--------------------|
| Alaska Department of Environmental Conservation | 17-013 |
| Arkansas Department of Environmental Quality | 17-015-0 |
| California Department of Health – ELAP | 2892 |
| DoD ELAP - A2LA Accredited - ISO/IEC 17025:2005 | 3091.01 |
| Florida Department of Health | E87777-18 |
| Hawaii Department of Health | N/A |
| Louisiana Department of Environmental Quality | 01977 |
| Maine Department of Health | 2016026 |
| Minnesota Department of Health | 1322288 |
| New Hampshire Environmental Accreditation Program | 207717 |
| New Jersey Department of Environmental Protection | CA003 |
| New York Department of Health | 11411 |
| Oregon Laboratory Accreditation Program | 4042-008 |
| Pennsylvania Department of Environmental Protection | 014 |
| Texas Commission on Environmental Quality | T104704189-17-8 |
| Virginia Department of General Services | 9077 |
| Washington Department of Ecology | C584 |
| Wisconsin Department of Natural Resources | 998036160 |

Current certificates and lists of licensed parameters are located in the Quality Assurance office and are available upon request.



CHAIN OF CUSTODY

For Laboratory Use Only
 Work Order #: 1801773 Temp: 16.3 °C
 Storage ID: WR-2 Storage Secured: Yes No

Project ID: PFAS DW INVESTIGATION PO#: 10100198Z Sampler: R. McElhinny
 (name)

TAT (check one): 21 days 14 days 7 days Specify: _____
 Standard: _____
 Rush (surcharge may apply): _____

Invoice to: Name Tiffany Hill Company CH2M Address 1100 NE Circle Blvd St 300 City Covallis State Oregon Ph# 541-768-3109 Fax# _____

Relinquished by (printed name and signature) Mike Wilmer Date 7/16/18 Time 1600 Received by (printed name and signature) Kim Eric Date 07/17/18 Time 0935

SHIP TO: Vista Analytical Laboratory
 1104 Windfield Way
 El Dorado Hills, CA 95762
 (916) 673-1520 * Fax (916) 673-0106
 ATTN: Martha Maier

Method of Shipment: FEDEX
 Tracking No.: _____

| Sample ID | Date | Time | Location/Sample Description | Add Analysis(es) Requested | | | | | | | | | | Comments | | | |
|----------------|---------|------|-----------------------------|----------------------------|------|--------|-----------|-------------------|--------------|-----------------|--------------------------|---------------------|--------------------------|----------|--|--|--|
| | | | | Quantity | Type | Matrix | PFOA/PFOS | UCMR3 PFAS List 6 | 537 List: 14 | Full List of 26 | Other: Please List Below | Mod. EPA Method 537 | EPA Method 537 (DW only) | | | | |
| CBD-1RW21-0718 | 7/16/18 | 1201 | | 2 | P | DW | | | | | | | | | | | |
| CBD-1FB21-0718 | | 1203 | | 2 | P | DW | | | | | | | | | | | |
| CBD-1RW22-0718 | | 1418 | | 2 | P | DW | | | | | | | | | | | |
| CBD-1FB22-0718 | | 1420 | | 2 | P | DW | | | | | | | | | | | |

Special Instructions/Comments: 7 DAY TAT
Analysis of DW samples for PFOA/PFOS/PFBS

SEND DOCUMENTATION AND RESULTS TO:

Name: Tiffany Hill
 Company: CH2M HILL INC
 Address: 1100 NE Circle Blvd St 300
 City: Covallis State: OR Zip: 97330
 Phone: 541-768-3109 Fax: _____
 Email: Tiffany.Hill@ch2m.com

Container Types: P= HDPE, PJ= HDPE Jar Bottle Preservation Type: T = Thiosulfate, O = Other: _____
 TZ = Trizma: _____ Matrix Types: AQ = Aqueous, DW = Drinking Water, EF = Effluent, PP = Pulp/Paper, SD = Sediment, SL = Sludge, SO = Soil, WW = Wastewater, B = Blood/Serum, O = Other: _____

Sample Log-in Checklist

 Vista Work Order #: 1801773 TAT 7 day

| | | | |
|-----------------------------------|--|---|----------------------------------|
| Samples Arrival: | Date/Time: 07/17/18 0927 | Initials: KE | Location: WR-2 |
| | | | Shelf/Rack: NA |
| Logged In: | Date/Time: 07/17/18 1101 | Initials: WWS | Location: WR-2 |
| | | | Shelf/Rack: E-3, F-6 |
| Delivered By: | <input checked="" type="checkbox"/> FedEx | <input type="checkbox"/> UPS | <input type="checkbox"/> On Trac |
| | | <input type="checkbox"/> GSO | <input type="checkbox"/> DHL |
| | | <input type="checkbox"/> Hand Delivered | <input type="checkbox"/> Other |
| Preservation: | <input checked="" type="checkbox"/> Ice | <input type="checkbox"/> Blue Ice | <input type="checkbox"/> Dry Ice |
| | <input type="checkbox"/> None | | |
| Temp °C: 1.3 (uncorrected) | Time: 0939 | Thermometer ID: IR-4 | |
| Temp °C: 1.3 (corrected) | Probe used: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> | DT-3 | |

 KE
 07/18
 01/17/18 KE

| | YES | NO | NA |
|--|---|--|-----------------------|
| Adequate Sample Volume Received? | WWS | | |
| Holding Time Acceptable? | WWS | | |
| Shipping Container(s) Intact? | KE | | |
| Shipping Custody Seals Intact? | KE | | |
| Shipping Documentation Present? | KE | | |
| Airbill <u>—</u> Trk # 7818 7523 0262 | KE | | |
| Sample Container Intact? | WWS | | |
| Sample Custody Seals Intact? | | | WWS |
| Chain of Custody / Sample Documentation Present? | KE | | |
| COC Anomaly/Sample Acceptance Form completed? | | WWS | WWS |
| If Chlorinated or Drinking Water Samples, Acceptable Preservation? | WWS | | 07/17/18 |
| Preservation Documented: | Na ₂ S ₂ O ₃ | <input checked="" type="checkbox"/> Trizma | None |
| | | <input checked="" type="checkbox"/> Yes | No NA |
| Shipping Container | Vista | <input checked="" type="checkbox"/> Client | Retain Return Dispose |

Comments:

July 24, 2018

Vista Work Order No. 1801773

Ms. Tiffany Hill
CH2M Hill
1100 NE Circle Blvd. Suite 300
Corvallis, OR 97330

Dear Ms. Hill,

Enclosed are the results for the sample set received at Vista Analytical Laboratory on July 17, 2018. This sample set was analyzed on a rush turn-around time, under your Project Name 'CTO-08 PFAS DW Investigation NRL CBD'.

Vista Analytical Laboratory is committed to serving you effectively. If you require additional information, please contact me at 916-673-1520 or by email at mmaier@vista-analytical.com.

Thank you for choosing Vista as part of your analytical support team.

Sincerely,



Martha Maier
Laboratory Director



Vista Analytical Laboratory certifies that the report herein meets all the requirements set forth by NELAP for those applicable test methods. Results relate only to the samples as received by the laboratory. This report should not be reproduced except in full without the written approval of Vista.

Vista Work Order No. 1801773

Case Narrative

Sample Condition on Receipt:

Four drinking water samples were received in good condition and within the method temperature requirements. The samples were received and stored securely in accordance with Vista standard operating procedures and EPA methodology.

Analytical Notes:

EPA Method 537, Rev. 1.1

The samples were extracted and analyzed for a selected list of PFAS using EPA Method 537, Rev. 1.1.

Holding Times

The samples were extracted and analyzed within the method hold times.

Quality Control

The Initial Calibration and Continuing Calibration Verifications met the method acceptance criteria.

Two Laboratory Fortified Blanks (LFB/LFBD) and a Laboratory Reagent Blank (LRB) were extracted and analyzed with the preparation batch. No analytes were detected in the Laboratory Reagent Blank above 1/2 the LOQ. The LFB/LFBD recoveries were within the method acceptance criteria.

The surrogate recoveries for all QC and field samples were within the acceptance criteria.

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Sample Inventory Report

| Vista Sample ID | Client Sample ID | Sampled | Received | Components/Containers |
|----------------------------|-----------------------------|-----------------|-----------------|--|
| 1801773-01 | CBD-1RW21-0718 | 16-Jul-18 12:01 | 17-Jul-18 09:27 | HDPE Bottle, 250 mL HDPE Bottle, 250 mL |
| 1801773-02 | CBD-1FB21-0718 | 16-Jul-18 12:03 | 17-Jul-18 09:27 | HDPE Bottle, 250 mL HDPE Bottle, 250 mL |
| 1801773-03 | CBD-1RW22-0718 | 16-Jul-18 14:18 | 17-Jul-18 09:27 | HDPE Bottle, 250 mL HDPE Bottle, 250 mL |
| 1801773-04 | CBD-1FB22-0718 | 16-Jul-18 14:20 | 17-Jul-18 09:27 | HDPE Bottle, 250 mL HDPE Bottle, 250 mL |

ANALYTICAL RESULTS

Sample ID: LRB

EPA Method 537

| | | | | | | | | | | | |
|--------------------|--------------------------------------|---------|---------|-------------|--------------|------------------------|---------|--|--|--|--|
| Client Data | | | | | | Laboratory Data | | | | | |
| Name: | CH2M Hill | Matrix: | Aqueous | Lab Sample: | B8G0140-BLK1 | Column: | BEH C18 | | | | |
| Project: | CTO-08 PFAS DW Investigation NRL CBD | | | | | | | | | | |

| Analyte | CAS Number | Conc. (ng/L) | DL | LOD | LOQ | Qualifiers | Batch | Extracted | Samp Size | Analyzed | Dilution |
|-------------------|------------|--------------|----------|------|------------|------------|-----------|-----------|-----------------|-----------------|----------|
| PFBS | 375-73-5 | ND | 3.04 | 5.00 | 10.0 | | B8G0140 | 18-Jul-18 | 0.250 L | 20-Jul-18 17:02 | 1 |
| PFHxA | 307-24-4 | ND | 3.04 | 5.00 | 10.0 | | B8G0140 | 18-Jul-18 | 0.250 L | 20-Jul-18 17:02 | 1 |
| PFHpA | 375-85-9 | ND | 3.04 | 5.00 | 10.0 | | B8G0140 | 18-Jul-18 | 0.250 L | 20-Jul-18 17:02 | 1 |
| PFHxS | 355-46-4 | ND | 3.04 | 5.00 | 10.0 | | B8G0140 | 18-Jul-18 | 0.250 L | 20-Jul-18 17:02 | 1 |
| PFOA | 335-67-1 | ND | 3.04 | 5.00 | 10.0 | | B8G0140 | 18-Jul-18 | 0.250 L | 20-Jul-18 17:02 | 1 |
| PFNA | 375-95-1 | ND | 3.04 | 5.00 | 10.0 | | B8G0140 | 18-Jul-18 | 0.250 L | 20-Jul-18 17:02 | 1 |
| PFOS | 1763-23-1 | ND | 3.04 | 5.00 | 10.0 | | B8G0140 | 18-Jul-18 | 0.250 L | 20-Jul-18 17:02 | 1 |
| PFDA | 335-76-2 | ND | 3.04 | 5.00 | 10.0 | | B8G0140 | 18-Jul-18 | 0.250 L | 20-Jul-18 17:02 | 1 |
| MeFOSAA | 2355-31-9 | ND | 3.04 | 5.00 | 10.0 | | B8G0140 | 18-Jul-18 | 0.250 L | 20-Jul-18 17:02 | 1 |
| EtFOSAA | 2991-50-6 | ND | 3.04 | 5.00 | 10.0 | | B8G0140 | 18-Jul-18 | 0.250 L | 20-Jul-18 17:02 | 1 |
| PFOA | 2058-94-8 | ND | 3.04 | 5.00 | 10.0 | | B8G0140 | 18-Jul-18 | 0.250 L | 20-Jul-18 17:02 | 1 |
| PFDoA | 307-55-1 | ND | 3.04 | 5.00 | 10.0 | | B8G0140 | 18-Jul-18 | 0.250 L | 20-Jul-18 17:02 | 1 |
| PFTTrDA | 72629-94-8 | ND | 3.04 | 5.00 | 10.0 | | B8G0140 | 18-Jul-18 | 0.250 L | 20-Jul-18 17:02 | 1 |
| PFTeDA | 376-06-7 | ND | 3.04 | 5.00 | 10.0 | | B8G0140 | 18-Jul-18 | 0.250 L | 20-Jul-18 17:02 | 1 |
| Labeled Standards | Type | % Recovery | Limits | | Qualifiers | Batch | Extracted | Samp Size | Analyzed | Dilution | |
| 13C2-PFHxA | SURR | 85.9 | 70 - 130 | | | B8G0140 | 18-Jul-18 | 0.250 L | 20-Jul-18 17:02 | 1 | |
| 13C2-PFDA | SURR | 79.1 | 70 - 130 | | | B8G0140 | 18-Jul-18 | 0.250 L | 20-Jul-18 17:02 | 1 | |
| d5-EtFOSAA | SURR | 82.2 | 70 - 130 | | | B8G0140 | 18-Jul-18 | 0.250 L | 20-Jul-18 17:02 | 1 | |

DL - Detection Limit

LOD - Limit of Detection
LOQ - Limit of quantitation

Results reported to the DL.

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: LFBD **EPA Method 537**

| | | | |
|---|--------------------------------------|---------------------------|-----------|
| Name: CH2M Hill | Lab Sample: B8G0140-BS1/B8G0140-BSD1 | Date Extracted: 18-Jul-18 | 18-Jul-18 |
| Project: CTO-08 PFAS DW Investigation NRL CBD | QC Batch: B8G0140 | Column: BEH C18 | |
| Matrix: Aqueous | Samp Size: 0.250/0.250 L | | |

| Analyte | CAS Number | LFB (ng/L) | LFB Spike Amt | LFB % Rec | LFB Quals | LFBD (ng/L) | LFBD Spike Amt | LFBD % Rec | RPD | LFBD Quals | %Rec Limits | RPD Limits | LFB Analyzed | LFB Dil | LFBD Analyzed | LFBD Dil |
|---------|------------|------------|---------------|-----------|-----------|-------------|----------------|------------|-------|------------|-------------|------------|-----------------|---------|-----------------|----------|
| PFBS | 375-73-5 | 34.1 | 35.4 | 96.3 | | 35.3 | 35.4 | 99.8 | 3.62 | | 70-130 | | 20-Jul-18 17:15 | 1 | 20-Jul-18 17:27 | 1 |
| PFHxA | 307-24-4 | 35.3 | 40.0 | 88.3 | | 33.4 | 40.0 | 83.5 | 5.51 | | 70-130 | | 20-Jul-18 17:15 | 1 | 20-Jul-18 17:27 | 1 |
| PFHpA | 375-85-9 | 37.4 | 40.0 | 93.5 | | 36.6 | 40.0 | 91.5 | 2.21 | | 70-130 | | 20-Jul-18 17:15 | 1 | 20-Jul-18 17:27 | 1 |
| PFHxS | 355-46-4 | 35.2 | 36.4 | 96.7 | | 33.9 | 36.4 | 93.1 | 3.72 | | 70-130 | | 20-Jul-18 17:15 | 1 | 20-Jul-18 17:27 | 1 |
| PFOA | 335-67-1 | 37.4 | 40.0 | 93.6 | | 35.0 | 40.0 | 87.5 | 6.79 | | 70-130 | | 20-Jul-18 17:15 | 1 | 20-Jul-18 17:27 | 1 |
| PFNA | 375-95-1 | 34.4 | 40.0 | 85.9 | | 33.8 | 40.0 | 84.4 | 1.73 | | 70-130 | | 20-Jul-18 17:15 | 1 | 20-Jul-18 17:27 | 1 |
| PFOS | 1763-23-1 | 37.2 | 37.0 | 100 | | 34.1 | 37.0 | 92.2 | 8.58 | | 70-130 | | 20-Jul-18 17:15 | 1 | 20-Jul-18 17:27 | 1 |
| PFDA | 335-76-2 | 33.9 | 40.0 | 84.8 | | 33.3 | 40.0 | 83.2 | 1.90 | | 70-130 | | 20-Jul-18 17:15 | 1 | 20-Jul-18 17:27 | 1 |
| MeFOSAA | 2355-31-9 | 38.2 | 40.0 | 95.4 | | 38.0 | 40.0 | 94.9 | 0.497 | | 70-130 | | 20-Jul-18 17:15 | 1 | 20-Jul-18 17:27 | 1 |
| EtFOSAA | 2991-50-6 | 37.8 | 40.0 | 94.5 | | 37.9 | 40.0 | 94.8 | 0.340 | | 70-130 | | 20-Jul-18 17:15 | 1 | 20-Jul-18 17:27 | 1 |
| PFUnA | 2058-94-8 | 32.6 | 40.0 | 81.6 | | 31.5 | 40.0 | 78.8 | 3.48 | | 70-130 | | 20-Jul-18 17:15 | 1 | 20-Jul-18 17:27 | 1 |
| PFDaA | 307-55-1 | 36.7 | 40.0 | 91.7 | | 32.5 | 40.0 | 81.2 | 12.1 | | 70-130 | | 20-Jul-18 17:15 | 1 | 20-Jul-18 17:27 | 1 |
| PFTTrDA | 72629-94-8 | 33.2 | 40.0 | 82.9 | | 32.5 | 40.0 | 81.2 | 2.10 | | 70-130 | | 20-Jul-18 17:15 | 1 | 20-Jul-18 17:27 | 1 |
| PFTeDA | 376-06-7 | 32.8 | 40.0 | 81.9 | | 32.7 | 40.0 | 81.7 | 0.258 | | 70-130 | | 20-Jul-18 17:15 | 1 | 20-Jul-18 17:27 | 1 |

| Labeled Standards | Type | LFB % Rec | LFB Quals | LFBD % Rec | LFBD Quals | Limits | LFB Analyzed | LFB Dil | LFBD Analyzed | LFBD Dil |
|-------------------|------|-----------|-----------|------------|------------|--------|-----------------|---------|-----------------|----------|
| 13C2-PFHxA | SURR | 83.4 | | 82.5 | | 70-130 | 20-Jul-18 17:15 | 1 | 20-Jul-18 17:27 | 1 |
| 13C2-PFDA | SURR | 81.8 | | 80.3 | | 70-130 | 20-Jul-18 17:15 | 1 | 20-Jul-18 17:27 | 1 |
| d5-EtFOSAA | SURR | 85.1 | | 75.8 | | 70-130 | 20-Jul-18 17:15 | 1 | 20-Jul-18 17:27 | 1 |

Sample ID: CBD-1RW21-0718

EPA Method 537

| Client Data | | | | | Laboratory Data | | | | | | |
|-------------|--------------------------------------|-----------------|-----------------|--|-----------------|-----------------|---------|---------|--|--|--|
| Name: | CH2M Hill | Matrix: | Drinking Water | | Lab Sample: | 1801773-01 | Column: | BEH C18 | | | |
| Project: | CTO-08 PFAS DW Investigation NRL CBD | Date Collected: | 16-Jul-18 12:01 | | Date Received: | 17-Jul-18 09:27 | | | | | |

| Analyte | CAS Number | Conc. (ng/L) | DL | LOD | LOQ | Qualifiers | Batch | Extracted | Samp Size | Analyzed | Dilution |
|-------------------|------------|--------------|----------|------|------------|------------|-----------|-----------|-----------------|-----------------|----------|
| PFBS | 375-73-5 | ND | 3.09 | 5.08 | 10.2 | | B8G0140 | 18-Jul-18 | 0.246 L | 20-Jul-18 23:39 | 1 |
| PFHxA | 307-24-4 | ND | 3.09 | 5.08 | 10.2 | | B8G0140 | 18-Jul-18 | 0.246 L | 20-Jul-18 23:39 | 1 |
| PFHpA | 375-85-9 | ND | 3.09 | 5.08 | 10.2 | | B8G0140 | 18-Jul-18 | 0.246 L | 20-Jul-18 23:39 | 1 |
| PFHxS | 355-46-4 | ND | 3.09 | 5.08 | 10.2 | | B8G0140 | 18-Jul-18 | 0.246 L | 20-Jul-18 23:39 | 1 |
| PFOA | 335-67-1 | ND | 3.09 | 5.08 | 10.2 | | B8G0140 | 18-Jul-18 | 0.246 L | 20-Jul-18 23:39 | 1 |
| PFNA | 375-95-1 | ND | 3.09 | 5.08 | 10.2 | | B8G0140 | 18-Jul-18 | 0.246 L | 20-Jul-18 23:39 | 1 |
| PFOS | 1763-23-1 | ND | 3.09 | 5.08 | 10.2 | | B8G0140 | 18-Jul-18 | 0.246 L | 20-Jul-18 23:39 | 1 |
| PFDA | 335-76-2 | ND | 3.09 | 5.08 | 10.2 | | B8G0140 | 18-Jul-18 | 0.246 L | 20-Jul-18 23:39 | 1 |
| MeFOSAA | 2355-31-9 | ND | 3.09 | 5.08 | 10.2 | | B8G0140 | 18-Jul-18 | 0.246 L | 20-Jul-18 23:39 | 1 |
| EtFOSAA | 2991-50-6 | ND | 3.09 | 5.08 | 10.2 | | B8G0140 | 18-Jul-18 | 0.246 L | 20-Jul-18 23:39 | 1 |
| PFOA | 2058-94-8 | ND | 3.09 | 5.08 | 10.2 | | B8G0140 | 18-Jul-18 | 0.246 L | 20-Jul-18 23:39 | 1 |
| PFDoA | 307-55-1 | ND | 3.09 | 5.08 | 10.2 | | B8G0140 | 18-Jul-18 | 0.246 L | 20-Jul-18 23:39 | 1 |
| PFTTrDA | 72629-94-8 | ND | 3.09 | 5.08 | 10.2 | | B8G0140 | 18-Jul-18 | 0.246 L | 20-Jul-18 23:39 | 1 |
| PFTeDA | 376-06-7 | ND | 3.09 | 5.08 | 10.2 | | B8G0140 | 18-Jul-18 | 0.246 L | 20-Jul-18 23:39 | 1 |
| Labeled Standards | Type | % Recovery | Limits | | Qualifiers | Batch | Extracted | Samp Size | Analyzed | Dilution | |
| 13C2-PFHxA | SURR | 83.9 | 70 - 130 | | | B8G0140 | 18-Jul-18 | 0.246 L | 20-Jul-18 23:39 | 1 | |
| 13C2-PFDA | SURR | 77.7 | 70 - 130 | | | B8G0140 | 18-Jul-18 | 0.246 L | 20-Jul-18 23:39 | 1 | |
| d5-EtFOSAA | SURR | 75.5 | 70 - 130 | | | B8G0140 | 18-Jul-18 | 0.246 L | 20-Jul-18 23:39 | 1 | |

DL - Detection Limit

LOD - Limit of Detection
LOQ - Limit of quantitation

Results reported to the DL.

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: CBD-1FB21-0718

EPA Method 537

| Client Data | | | | Laboratory Data | | | |
|-------------|--------------------------------------|-----------------|----------------|-----------------|-----------------|---------|---------|
| Name: | C2 HM 2 ill | Matrix: | Drinking Water | Lab Sample: | 1801773-0H | Column: | BE2 C18 |
| Project: | CTO-08 PFAS DW Investigation NRL CBD | Date Collected: | 16-Jul-18 1H03 | Date Received: | 17-Jul-18 09:H7 | | |

| Analyte | CAS Number | Conc. (ng/L) | DL | LOD | LOQ | Qualifiers | Batch | Extracted | Samp Size | Analyzed | Dilution |
|-------------------|------------|--------------|----------|-----|------------|------------|-----------|-----------|-----------------|-----------------|----------|
| PFBS | 37G-73-G | ND | 3.15 | G17 | 10.3 | | B84 0150 | 18-Jul-18 | 0.H5HL | H0-Jul-18 IB:GH | 1 |
| PF2 xA | 307-H5-5 | ND | 3.15 | G17 | 10.3 | | B84 0150 | 18-Jul-18 | 0.H5HL | H0-Jul-18 IB:GH | 1 |
| PF2 pA | 37G-8G-9 | ND | 3.15 | G17 | 10.3 | | B84 0150 | 18-Jul-18 | 0.H5HL | H0-Jul-18 IB:GH | 1 |
| PF2 xS | 3GG-56-5 | ND | 3.15 | G17 | 10.3 | | B84 0150 | 18-Jul-18 | 0.H5HL | H0-Jul-18 IB:GH | 1 |
| PFOA | 33G-67-1 | ND | 3.15 | G17 | 10.3 | | B84 0150 | 18-Jul-18 | 0.H5HL | H0-Jul-18 IB:GH | 1 |
| PFNA | 37G-9G-1 | ND | 3.15 | G17 | 10.3 | | B84 0150 | 18-Jul-18 | 0.H5HL | H0-Jul-18 IB:GH | 1 |
| PFOS | 1763-HB-1 | ND | 3.15 | G17 | 10.3 | | B84 0150 | 18-Jul-18 | 0.H5HL | H0-Jul-18 IB:GH | 1 |
| PFDA | 33G-76-H | ND | 3.15 | G17 | 10.3 | | B84 0150 | 18-Jul-18 | 0.H5HL | H0-Jul-18 IB:GH | 1 |
| MeFOSAA | HGG-31-9 | ND | 3.15 | G17 | 10.3 | | B84 0150 | 18-Jul-18 | 0.H5HL | H0-Jul-18 IB:GH | 1 |
| EtFOSAA | H91-G0-6 | ND | 3.15 | G17 | 10.3 | | B84 0150 | 18-Jul-18 | 0.H5HL | H0-Jul-18 IB:GH | 1 |
| PFUnA | HG8-95-8 | ND | 3.15 | G17 | 10.3 | | B84 0150 | 18-Jul-18 | 0.H5HL | H0-Jul-18 IB:GH | 1 |
| PFD0A | 307-GG-1 | ND | 3.15 | G17 | 10.3 | | B84 0150 | 18-Jul-18 | 0.H5HL | H0-Jul-18 IB:GH | 1 |
| PFTrDA | 7H6H-95-8 | ND | 3.15 | G17 | 10.3 | | B84 0150 | 18-Jul-18 | 0.H5HL | H0-Jul-18 IB:GH | 1 |
| PFTeDA | 376-06-7 | ND | 3.15 | G17 | 10.3 | | B84 0150 | 18-Jul-18 | 0.H5HL | H0-Jul-18 IB:GH | 1 |
| Labeled Standards | Type | % Recovery | Limits | | Qualifiers | Batch | Extracted | Samp Size | Analyzed | Dilution | |
| 13CHPF2 xA | SURR | 83.H | 70 - 130 | | | B84 0150 | 18-Jul-18 | 0.H5HL | H0-Jul-18 IB:GH | 1 | |
| 13CHPFDA | SURR | 77.6 | 70 - 130 | | | B84 0150 | 18-Jul-18 | 0.H5HL | H0-Jul-18 IB:GH | 1 | |
| dGEtFOSAA | SURR | 86.H | 70 - 130 | | | B84 0150 | 18-Jul-18 | 0.H5HL | H0-Jul-18 IB:GH | 1 | |

DL - Detection Limit

LOD - Limit of Detection
LOQ - Limit of quantitation

Results reported to the DL.

When reported, PF2 xS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: CBD-1RW22-0718

EPA Method 537

| Client Data | | | | | Laboratory Data | | | | | | |
|-------------|--------------------------------------|-----------------|-----------------|--|-----------------|------------------|---------|---------|--|--|--|
| Name: | CH2M Hill | Matrix: | Drinking Water | | Lab Sample: | 1801773-03 | Column: | BEH C18 | | | |
| Project: | CTO-08 PFAS DW Investigation NRL CBD | Date Collected: | 16-Jul-18 19:18 | | Date Received: | 17-Jul-18 0. :27 | | | | | |

| Analyte | CAS Number | Conc. (ng/L) | DL | LOD | LOQ | Qualifiers | Batch | Extracted | Samp Size | Analyzed | Dilution |
|-------------------|--------------|--------------|----------|-----|------------|------------|-----------|-----------|-----------------|-----------------|----------|
| PFBS | 37G-73-G | ND | 306 | 09 | 105 | | B84 0190 | 18-Jul-18 | 0298 L | 21-Jul-18 00:0G | 1 |
| PFHxA | 307-29-9 | ND | 306 | 09 | 105 | | B84 0190 | 18-Jul-18 | 0298 L | 21-Jul-18 00:0G | 1 |
| PFHpA | 37G-8G. | ND | 306 | 09 | 105 | | B84 0190 | 18-Jul-18 | 0298 L | 21-Jul-18 00:0G | 1 |
| PFHxS | 3GG-96-9 | ND | 306 | 09 | 105 | | B84 0190 | 18-Jul-18 | 0298 L | 21-Jul-18 00:0G | 1 |
| PFOA | 33G-67-1 | ND | 306 | 09 | 105 | | B84 0190 | 18-Jul-18 | 0298 L | 21-Jul-18 00:0G | 1 |
| PFNA | 37G. G-1 | ND | 306 | 09 | 105 | | B84 0190 | 18-Jul-18 | 0298 L | 21-Jul-18 00:0G | 1 |
| PFOS | 1763-23-1 | ND | 306 | 09 | 105 | | B84 0190 | 18-Jul-18 | 0298 L | 21-Jul-18 00:0G | 1 |
| PFDA | 33G-76-2 | ND | 306 | 09 | 105 | | B84 0190 | 18-Jul-18 | 0298 L | 21-Jul-18 00:0G | 1 |
| MeFOSAA | 23GG-31- | ND | 306 | 09 | 105 | | B84 0190 | 18-Jul-18 | 0298 L | 21-Jul-18 00:0G | 1 |
| EtFOSAA | 2. . 1-G-6 | ND | 306 | 09 | 105 | | B84 0190 | 18-Jul-18 | 0298 L | 21-Jul-18 00:0G | 1 |
| PFUnA | 20G8-. 9-8 | ND | 306 | 09 | 105 | | B84 0190 | 18-Jul-18 | 0298 L | 21-Jul-18 00:0G | 1 |
| PFDoA | 307-GG-1 | ND | 306 | 09 | 105 | | B84 0190 | 18-Jul-18 | 0298 L | 21-Jul-18 00:0G | 1 |
| PFTrDA | 7262. -. 9-8 | ND | 306 | 09 | 105 | | B84 0190 | 18-Jul-18 | 0298 L | 21-Jul-18 00:0G | 1 |
| PFTeDA | 376-06-7 | ND | 306 | 09 | 105 | | B84 0190 | 18-Jul-18 | 0298 L | 21-Jul-18 00:0G | 1 |
| Labeled Standards | Type | % Recovery | Limits | | Qualifiers | Batch | Extracted | Samp Size | Analyzed | Dilution | |
| 13C2-PFHxA | SURR | 775 | 70 - 130 | | | B84 0190 | 18-Jul-18 | 0298 L | 21-Jul-18 00:0G | 1 | |
| 13C2-PFDA | SURR | 785 | 70 - 130 | | | B84 0190 | 18-Jul-18 | 0298 L | 21-Jul-18 00:0G | 1 | |
| dGEtFOSAA | SURR | 7. 5 | 70 - 130 | | | B84 0190 | 18-Jul-18 | 0298 L | 21-Jul-18 00:0G | 1 | |

DL - Detection Limit

LOD - Limit of Detection
LOQ - Limit of quantitation

Results reported to the DL5

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers5 Only the linear isomer is reported for all other analytes5

Sample ID: CBD-1FB22-0718

EPA Method 537

| Client Data | | | | Laboratory Data | | | |
|-------------|--------------------------------------|-----------------|----------------|-----------------|------------------|---------|---------|
| Name: | C2 uM 2 ill | Matrix: | Drinking Water | Lab Sample: | 1801773-0H | ColEmn: | Bk2 C18 |
| Project: | CTO-08 PFAS DW Investigation NRL CBD | Date Collected: | 1J-9EI-18 1Hu0 | Date Received: | 17-9EI-18 0. :u7 | | |

| Analyte | CAS Number | Conc. (ng/L) | DL | LOD | LOQ | Qualifiers | Batch | Extracted | Samp Size | Analyzed | Dilution |
|-------------------|-------------|--------------|----------|-----|------------|------------|-----------|-----------|-----------------|-----------------|----------|
| PFBS | 37G73-G | ND | 3DH | GH | 105 | | B84 01H | 18-9EI-18 | 05uCL | u1-9EI-18 00:17 | 1 |
| PF2 xA | 307-uHH | ND | 3DH | GH | 105 | | B84 01H | 18-9EI-18 | 05uCL | u1-9EI-18 00:17 | 1 |
| PF2 pA | 37G8G. | ND | 3DH | GH | 105 | | B84 01H | 18-9EI-18 | 05uCL | u1-9EI-18 00:17 | 1 |
| PF2 xS | 3GGHJ-H | ND | 3DH | GH | 105 | | B84 01H | 18-9EI-18 | 05uCL | u1-9EI-18 00:17 | 1 |
| PFOA | 33GJ7-1 | ND | 3DH | GH | 105 | | B84 01H | 18-9EI-18 | 05uCL | u1-9EI-18 00:17 | 1 |
| PFNA | 37G. G1 | ND | 3DH | GH | 105 | | B84 01H | 18-9EI-18 | 05uCL | u1-9EI-18 00:17 | 1 |
| PFOS | 17J3-u3-1 | ND | 3DH | GH | 105 | | B84 01H | 18-9EI-18 | 05uCL | u1-9EI-18 00:17 | 1 |
| PFDA | 33G7J-u | ND | 3DH | GH | 105 | | B84 01H | 18-9EI-18 | 05uCL | u1-9EI-18 00:17 | 1 |
| MeFOSAA | u3GG31- | ND | 3DH | GH | 105 | | B84 01H | 18-9EI-18 | 05uCL | u1-9EI-18 00:17 | 1 |
| ktFOSAA | u. . 1-GJ | ND | 3DH | GH | 105 | | B84 01H | 18-9EI-18 | 05uCL | u1-9EI-18 00:17 | 1 |
| PFUnA | u0G8-. H8 | ND | 3DH | GH | 105 | | B84 01H | 18-9EI-18 | 05uCL | u1-9EI-18 00:17 | 1 |
| PFDoA | 307-GG1 | ND | 3DH | GH | 105 | | B84 01H | 18-9EI-18 | 05uCL | u1-9EI-18 00:17 | 1 |
| PFTrDA | 7uJu. -. H8 | ND | 3DH | GH | 105 | | B84 01H | 18-9EI-18 | 05uCL | u1-9EI-18 00:17 | 1 |
| PFTeDA | 37J-0J-7 | ND | 3DH | GH | 105 | | B84 01H | 18-9EI-18 | 05uCL | u1-9EI-18 00:17 | 1 |
| Labeled Standards | Type | % Recovery | Limits | | Qualifiers | Batch | Extracted | Samp Size | Analyzed | Dilution | |
| 13Cu-PF2 xA | SURR | 805 | 70 - 130 | | | B84 01H | 18-9EI-18 | 05uCL | u1-9EI-18 00:17 | 1 | |
| 13Cu-PFDA | SURR | 7H7 | 70 - 130 | | | B84 01H | 18-9EI-18 | 05uCL | u1-9EI-18 00:17 | 1 | |
| dGktFOSAA | SURR | . GH | 70 - 130 | | | B84 01H | 18-9EI-18 | 05uCL | u1-9EI-18 00:17 | 1 | |

DL - Detection Limit

LOD - Limit of Detection
LOQ - Limit of Quantitation

ResElts reported to the DL5

When reported, PF2 xS, PFOA, PFOS, MeFOSAA and ktFOSAA include both linear and branched isomers5 Only the linear isomer is reported for all other analytes5

DATA QUALIFIERS & ABBREVIATIONS

| | |
|--------------|---|
| B | This compound was also detected in the method blank |
| Conc. | Concentration |
| D | Dilution |
| DL | Detection limit |
| E | The associated compound concentration exceeded the calibration range of the instrument |
| H | Recovery and/or RPD was outside laboratory acceptance limits |
| I | Chemical Interference |
| J | The amount detected is below the Reporting Limit/LOQ |
| LOD | Limits of Detection |
| LOQ | Limits of Quantitation |
| M | Estimated Maximum Possible Concentration (CA Region 2 projects only) |
| NA | Not applicable |
| ND | Not Detected |
| Q | Ion ratio outside of 70-130% of Standard Ratio. (DOD PFAS projects only) |
| TEQ | Toxic Equivalency |
| U | Not Detected (specific projects only) |
| * | See Cover Letter |

Unless otherwise noted, solid sample results are reported in dry weight. Tissue samples are reported in wet weight.

CERTIFICATIONS

| Accrediting Authority | Certificate Number |
|---|---------------------------|
| Alaska Department of Environmental Conservation | 17-013 |
| Arkansas Department of Environmental Quality | 17-015-0 |
| California Department of Health – ELAP | 2892 |
| DoD ELAP - A2LA Accredited - ISO/IEC 17025:2005 | 3091.01 |
| Florida Department of Health | E87777-18 |
| Hawaii Department of Health | N/A |
| Louisiana Department of Environmental Quality | 01977 |
| Maine Department of Health | 2016026 |
| Minnesota Department of Health | 1322288 |
| New Hampshire Environmental Accreditation Program | 207717 |
| New Jersey Department of Environmental Protection | CA003 |
| New York Department of Health | 11411 |
| Oregon Laboratory Accreditation Program | 4042-008 |
| Pennsylvania Department of Environmental Protection | 014 |
| Texas Commission on Environmental Quality | T104704189-17-8 |
| Virginia Department of General Services | 9077 |
| Washington Department of Ecology | C584 |
| Wisconsin Department of Natural Resources | 998036160 |

Current certificates and lists of licensed parameters are located in the Quality Assurance office and are available upon request.

CTO-08 679580.14.F1.F5-----



CHAIN OF CUSTODY

For Laboratory Use Only
 Work Order #: 1801773 Temp: 16.3 °C
 Storage ID: WR-2 Storage Secured: Yes No

Project ID: PFAS DW INVESTIGATION PO#: 10100198Z Sampler: R. McElhinny
 (name)

TAT Standard: 21 days
 (check one): Rush (surcharge may apply)
 14 days 7 days Specify: _____

Invoice to: Name Tiffany Hill Company CH2M Address 1100 NE Circle Blvd St 300 City Covallis State Oregon Ph# 541-768-3109 Fax# _____

Relinquished by (printed name and signature) Mike Wilmer Date 7/16/18 Time 1600 Received by (printed name and signature) Kim Eric Date 07/17/18 Time 0935

| Sample ID | Date | Time | Location/Sample Description | Add Analysis(es) Requested | | | | | | | | | | Comments | | | | |
|----------------|---------|------|-----------------------------|----------------------------|------|--------|-----------|-------------------|--------------|-----------------|--------------------------|-----------|-------------------|----------|---------------|--|--|--|
| | | | | Quantity | Type | Matrix | PFOA/PFOS | UCMR3 PFAS List 6 | 537 List: 14 | Full List of 26 | Other: Please List Below | PFOA/PFOS | UCMR3 PFAS List 6 | | PFAS List: 14 | | | |
| CBD-1RW21-0718 | 7/16/18 | 1201 | | 2 | P | DW | | | | | | | | | | | | |
| CBD-1FB21-0718 | | 1203 | | 2 | P | DW | | | | | | | | | | | | |
| CBD-1RW22-0718 | | 1418 | | 2 | P | DW | | | | | | | | | | | | |
| CBD-1FB22-0718 | | 1420 | | 2 | P | DW | | | | | | | | | | | | |

Special Instructions/Comments: 7 DAY TAT
Analysis of DW samples for PFOA/PFOS/PFBS

SEND DOCUMENTATION AND RESULTS TO:

Name: Tiffany Hill
 Company: CH2M HILL INC
 Address: 1100 NE Circle Blvd St 300
 City: Covallis State: OR Zip: 97330
 Phone: 541-768-3109 Fax: _____
 Email: Tiffany.Hill@ch2m.com

Container Types: P= HDPE, PJ= HDPE Jar Bottle Preservation Type: T = Thiosulfate, O = Other: _____
 TZ = Trizma: _____ Matrix Types: AQ = Aqueous, DW = Drinking Water, EF = Effluent, PP = Pulp/Paper, SD = Sediment, SL = Sludge, SO = Soil, WW = Wastewater, B = Blood/Serum, O = Other: _____

Sample Log-in Checklist

 Vista Work Order #: 1801773 TAT 7 day

| | | | |
|-----------------------------------|--|---|----------------------------------|
| Samples Arrival: | Date/Time: 07/17/18 0927 | Initials: KE | Location: WR-2 |
| | | | Shelf/Rack: NA |
| Logged In: | Date/Time: 07/17/18 1101 | Initials: WWS | Location: WR-2 |
| | | | Shelf/Rack: E-3, F-6 |
| Delivered By: | <input checked="" type="checkbox"/> FedEx | <input type="checkbox"/> UPS | <input type="checkbox"/> On Trac |
| | | <input type="checkbox"/> GSO | <input type="checkbox"/> DHL |
| | | <input type="checkbox"/> Hand Delivered | <input type="checkbox"/> Other |
| Preservation: | <input checked="" type="checkbox"/> Ice | <input type="checkbox"/> Blue Ice | <input type="checkbox"/> Dry Ice |
| | <input type="checkbox"/> None | | |
| Temp °C: 1.3 (uncorrected) | Time: 0939 | Thermometer ID: IR-4 | |
| Temp °C: 1.3 (corrected) | Probe used: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> | DT-3 | |

 KE
 07/18
 01/17/18 KE

| | YES | NO | NA |
|--|---|--|-----------------------|
| Adequate Sample Volume Received? | WWS | | |
| Holding Time Acceptable? | WWS | | |
| Shipping Container(s) Intact? | KE | | |
| Shipping Custody Seals Intact? | KE | | |
| Shipping Documentation Present? | KE | | |
| Airbill <input checked="" type="checkbox"/> | Trk # 7818 7523 0262 | KE | |
| Sample Container Intact? | WWS | | |
| Sample Custody Seals Intact? | | | WWS |
| Chain of Custody / Sample Documentation Present? | KE | | |
| COC Anomaly/Sample Acceptance Form completed? | | WWS | WWS |
| If Chlorinated or Drinking Water Samples, Acceptable Preservation? | WWS | | 07/17/18 |
| Preservation Documented: | Na ₂ S ₂ O ₃ | <input checked="" type="checkbox"/> Trizma | None |
| | | <input checked="" type="checkbox"/> Yes | No NA |
| Shipping Container | Vista | <input checked="" type="checkbox"/> Client | Retain Return Dispose |

Comments:

EXTRACTION INFORMATION



Process Sheet

Workorder: 1801773

7-DAY TAT

Prep Expiration: 2018-Jul-30

Client: CH2M Hill

Workorder Due: 24-Jul-18 00:00

TAT: 7

Method: 537 PFAS DW DoD Unmodified
Matrix: Aqueous

Prep Batch: B8G0140

Version: 537 (14 Analytes)
DoD: DoD QSM 5.1

Prep Data Entered: WJ 7/19/18
Date and Initials

Initial Sequence: S8G10002

| LabSampID | A/B | Prep Rec | Spike Rec | ClientSampleID | Comments | Location | Container |
|------------|-----|-------------------------------------|-------------------------------------|----------------|----------|----------|---------------------|
| 1801773-01 | "A" | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | CBD-1RW21-0718 | | WR-2 E-3 | HDPE Bottle, 250 mL |
| 1801773-02 | ↓ | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | CBD-1FB21-0718 | | WR-2 E-3 | HDPE Bottle, 250 mL |
| 1801773-03 | ↓ | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | CBD-1RW22-0718 | | WR-2 E-3 | HDPE Bottle, 250 mL |
| 1801773-04 | ↓ | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | CBD-1FB22-0718 | | WR-2 E-3 | HDPE Bottle, 250 mL |

Pre-Prep Check Out: 7/18/18 SJ
Pre-Prep Check In: NA

Prep Check Out: NA
Prep Check In: NA

Prep Reconciled Initials/Date: 7/18/18 SJ
Spike Reconciled Initials/Date: KC 7/18/18
VialBoxID: 64020

PREPARATION BENCH SHEET

Matrix: Aqueous

Method: 537 PFAS DW DoD Unmodified

B8G0140

Chemist: KC

Prep Date: 7/18/18

Prep Time: 1015

Prepared using: LCMS - SPE Extraction-LCMS

Balance ID: HRMS-8

| Cen | VISTA Sample ID | Bottle + Sample (g) | Bottle Only (g) | Sample Amt. (L) | SS/NS CHEM/WIT DATE | SPE | IS CHEM/WIT DATE |
|--------------------------|------------------|---------------------|-----------------|-----------------|---------------------|------------|------------------|
| <input type="checkbox"/> | B8G0140-BLK1 (A) | N/A | N/A | (0.250) ✓ | KL mg 7/18/18 | KC 7/18/18 | HN FR 7/19/18 |
| <input type="checkbox"/> | B8G0140-BS1 | ↓ | ↓ | (0.250) ✓ | ↓ | ↓ | ↓ |
| <input type="checkbox"/> | B8G0140-BSD1 | ↓ | ↓ | (0.250) ✓ | ↓ | ↓ | ↓ |
| <input type="checkbox"/> | 1801773-01 | 283.44 | 37.61 | 0.24583 ✓ | ↓ | ↓ | ↓ |
| <input type="checkbox"/> | 1801773-02 | 279.44 | 37.31 | 0.24213 ✓ | ↓ | ↓ | ↓ |
| <input type="checkbox"/> | 1801773-03 | 285.64 | 37.47 | 0.24817 ✓ | ↓ | ↓ | ↓ |
| <input type="checkbox"/> | 1801773-04 | 287.53 | 37.44 | 0.25069 ✓ | ↓ | ↓ | ↓ |

| | | |
|--|---|--|
| SS/IS: <u>18G0301, 20 µL (V4)</u> NS: <u>18F2206, 10 µL (V2)</u> IS/RS: <u>18G0302, 20 µL (V6)</u> | SPE Chem: <u>Strata-X 33 µm 500mg/mL</u> Lot#: <u>SF-005760</u> Ele SOLV: <u>MeOH</u> Lot#: <u>10897109 731</u> Final Volume(s) <u>1 mL</u> | Notes: (A) <u>1.25g of trizma added to QC - 7/16/18 ST</u> |
|--|---|--|

Comments: Assume 1 g = 1 mL
Cen = Centrifuged

Batch: B8G0140

Matrix: Aqueous

| LabNumber | WetWeight (Initial) | % Solids (Extraction Solids) | DryWeight | Final | Extracted | Ext By | Spike | SpikeAmount | ClientMatrix | Analysis |
|--------------|---------------------|------------------------------|-----------|-------|-----------------|--------|-----------|-------------|----------------|-----------------------|
| 1801773-01 | 0.24583 ✓ | NA | NA | 1000 | 18-Jul-18 10:15 | KC | | | Drinking Water | 537 PFAS DW DoD Unmod |
| 1801773-02 | 0.24213 ✓ | ↓ | ↓ | 1000 | 18-Jul-18 10:15 | KC | | | Drinking Water | 537 PFAS DW DoD Unmod |
| 1801773-03 | 0.24817 ✓ | ↓ | ↓ | 1000 | 18-Jul-18 10:15 | KC | | | Drinking Water | 537 PFAS DW DoD Unmod |
| 1801773-04 | 0.25009 ✓ | ↓ | ↓ | 1000 | 18-Jul-18 10:15 | KC | | | Drinking Water | 537 PFAS DW DoD Unmod |
| B8G0140-BLK1 | 0.25 ✓ | | | 1000 | 18-Jul-18 10:15 | KC | | | | QC |
| B8G0140-BS1 | 0.25 ✓ | | | 1000 | 18-Jul-18 10:15 | KC | 18F2206 ✓ | 10 ✓ | | QC |
| B8G0140-BSD1 | 0.25 ✓ | | | 1000 | 18-Jul-18 10:15 | KC | 18F2206 ✓ | 10 ✓ | | QC |

WJ 7/19/18

| Contract_ID | DO_CTO_Number | Phase | Installation_ID | Sample_Name | Extraction_Date | Extraction_Time | Analysis_Date | Analysis_Time | Lab_Sample_ID | Dilution | Run_Number | Percent_Moisture | Percent_Lipid | Chem_Name | Analyte_ID | Analyte_Value | Original_Analyte_Value | Result_Units | Lab_Qualifier |
|---------------|---------------|-------|-----------------|-------------|-----------------|-----------------|---------------|---------------|---------------|----------|------------|------------------|---------------|--|------------|---------------|------------------------|--------------|---------------|
| N6247016D9000 | 0008 | | CHESAPEAKE_NSGA | Blank | 20180718 | 10:15:00 | 20180720 | 17:02:00 | B8G0140-BLK1 | 1 | -999 | | | Perfluoroheptanoic acid (PFHpA) | 375-85-9 | | 5.00 | NG_L | U |
| N6247016D9000 | 0008 | | CHESAPEAKE_NSGA | Blank | 20180718 | 10:15:00 | 20180720 | 17:02:00 | B8G0140-BLK1 | 1 | -999 | | | Perfluorohexanesulfonic acid (PFHxS) | 355-46-4 | | 5.00 | NG_L | U |
| N6247016D9000 | 0008 | | CHESAPEAKE_NSGA | Blank | 20180718 | 10:15:00 | 20180720 | 17:02:00 | B8G0140-BLK1 | 1 | -999 | | | Perfluorooctanoic acid (PFOA) | 335-67-1 | | 5.00 | NG_L | U |
| N6247016D9000 | 0008 | | CHESAPEAKE_NSGA | Blank | 20180718 | 10:15:00 | 20180720 | 17:02:00 | B8G0140-BLK1 | 1 | -999 | | | Perfluorononanoic acid (PFNA) | 375-95-1 | | 5.00 | NG_L | U |
| N6247016D9000 | 0008 | | CHESAPEAKE_NSGA | Blank | 20180718 | 10:15:00 | 20180720 | 17:02:00 | B8G0140-BLK1 | 1 | -999 | | | Perfluorooctane Sulfonate (PFOS) | 1763-23-1 | | 5.00 | NG_L | U |
| N6247016D9000 | 0008 | | CHESAPEAKE_NSGA | Blank | 20180718 | 10:15:00 | 20180720 | 17:02:00 | B8G0140-BLK1 | 1 | -999 | | | Perfluorodecanoic Acid (PFDA) | 335-76-2 | | 5.00 | NG_L | U |
| N6247016D9000 | 0008 | | CHESAPEAKE_NSGA | Blank | 20180718 | 10:15:00 | 20180720 | 17:02:00 | B8G0140-BLK1 | 1 | -999 | | | N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA) | 2355-31-9 | | 5.00 | NG_L | U |
| N6247016D9000 | 0008 | | CHESAPEAKE_NSGA | Blank | 20180718 | 10:15:00 | 20180720 | 17:02:00 | B8G0140-BLK1 | 1 | -999 | | | N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA) | 2991-50-6 | | 5.00 | NG_L | U |
| N6247016D9000 | 0008 | | CHESAPEAKE_NSGA | Blank | 20180718 | 10:15:00 | 20180720 | 17:02:00 | B8G0140-BLK1 | 1 | -999 | | | Perfluoroundecanoic Acid (PFUnA) | 2058-94-8 | | 5.00 | NG_L | U |
| N6247016D9000 | 0008 | | CHESAPEAKE_NSGA | Blank | 20180718 | 10:15:00 | 20180720 | 17:02:00 | B8G0140-BLK1 | 1 | -999 | | | Perfluorododecanoic Acid (PFDoA) | 307-55-1 | | 5.00 | NG_L | U |
| N6247016D9000 | 0008 | | CHESAPEAKE_NSGA | Blank | 20180718 | 10:15:00 | 20180720 | 17:02:00 | B8G0140-BLK1 | 1 | -999 | | | Perfluorotridecanoic Acid (PFTTrDA) | 72629-94-8 | | 5.00 | NG_L | U |
| N6247016D9000 | 0008 | | CHESAPEAKE_NSGA | Blank | 20180718 | 10:15:00 | 20180720 | 17:02:00 | B8G0140-BLK1 | 1 | -999 | | | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | | 5.00 | NG_L | U |
| N6247016D9000 | 0008 | | CHESAPEAKE_NSGA | Blank | 20180718 | 10:15:00 | 20180720 | 17:02:00 | B8G0140-BLK1 | 1 | -999 | | | 13C2-PFHxA | 13C2-PFHxA | | 85.9 | PCT_REC | |
| N6247016D9000 | 0008 | | CHESAPEAKE_NSGA | Blank | 20180718 | 10:15:00 | 20180720 | 17:02:00 | B8G0140-BLK1 | 1 | -999 | | | 13C2-PFDA | 13C2-PFDA | | 79.1 | PCT_REC | |
| N6247016D9000 | 0008 | | CHESAPEAKE_NSGA | Blank | 20180718 | 10:15:00 | 20180720 | 17:02:00 | B8G0140-BLK1 | 1 | -999 | | | d5-EtFOSAA | d5-EtFOSAA | | 82.2 | PCT_REC | |
| N6247016D9000 | 0008 | | CHESAPEAKE_NSGA | LCS | 20180718 | 10:15:00 | 20180720 | 17:15:00 | B8G0140-BS1 | 1 | -999 | | | Perfluorobutanesulfonic acid (PFBS) | 375-73-5 | | 34.1 | NG_L | |
| N6247016D9000 | 0008 | | CHESAPEAKE_NSGA | LCS | 20180718 | 10:15:00 | 20180720 | 17:15:00 | B8G0140-BS1 | 1 | -999 | | | Perfluorohexanoic Acid (PFHxA) | 307-24-4 | | 35.3 | NG_L | |
| N6247016D9000 | 0008 | | CHESAPEAKE_NSGA | LCS | 20180718 | 10:15:00 | 20180720 | 17:15:00 | B8G0140-BS1 | 1 | -999 | | | Perfluoroheptanoic acid (PFHpA) | 375-85-9 | | 37.4 | NG_L | |
| N6247016D9000 | 0008 | | CHESAPEAKE_NSGA | LCS | 20180718 | 10:15:00 | 20180720 | 17:15:00 | B8G0140-BS1 | 1 | -999 | | | Perfluorohexanesulfonic acid (PFHxS) | 355-46-4 | | 35.2 | NG_L | |
| N6247016D9000 | 0008 | | CHESAPEAKE_NSGA | LCS | 20180718 | 10:15:00 | 20180720 | 17:15:00 | B8G0140-BS1 | 1 | -999 | | | Perfluorooctanoic acid (PFOA) | 335-67-1 | | 37.4 | NG_L | |
| N6247016D9000 | 0008 | | CHESAPEAKE_NSGA | LCS | 20180718 | 10:15:00 | 20180720 | 17:15:00 | B8G0140-BS1 | 1 | -999 | | | Perfluorononanoic acid (PFNA) | 375-95-1 | | 34.4 | NG_L | |
| N6247016D9000 | 0008 | | CHESAPEAKE_NSGA | LCS | 20180718 | 10:15:00 | 20180720 | 17:15:00 | B8G0140-BS1 | 1 | -999 | | | Perfluorooctane Sulfonate (PFOS) | 1763-23-1 | | 37.2 | NG_L | |
| N6247016D9000 | 0008 | | CHESAPEAKE_NSGA | LCS | 20180718 | 10:15:00 | 20180720 | 17:15:00 | B8G0140-BS1 | 1 | -999 | | | Perfluorodecanoic Acid (PFDA) | 335-76-2 | | 33.9 | NG_L | |
| N6247016D9000 | 0008 | | CHESAPEAKE_NSGA | LCS | 20180718 | 10:15:00 | 20180720 | 17:15:00 | B8G0140-BS1 | 1 | -999 | | | N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA) | 2355-31-9 | | 38.2 | NG_L | |
| N6247016D9000 | 0008 | | CHESAPEAKE_NSGA | LCS | 20180718 | 10:15:00 | 20180720 | 17:15:00 | B8G0140-BS1 | 1 | -999 | | | N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA) | 2991-50-6 | | 37.8 | NG_L | |
| N6247016D9000 | 0008 | | CHESAPEAKE_NSGA | LCS | 20180718 | 10:15:00 | 20180720 | 17:15:00 | B8G0140-BS1 | 1 | -999 | | | Perfluoroundecanoic Acid (PFUnA) | 2058-94-8 | | 32.6 | NG_L | |
| N6247016D9000 | 0008 | | CHESAPEAKE_NSGA | LCS | 20180718 | 10:15:00 | 20180720 | 17:15:00 | B8G0140-BS1 | 1 | -999 | | | Perfluorododecanoic Acid (PFDoA) | 307-55-1 | | 36.7 | NG_L | |
| N6247016D9000 | 0008 | | CHESAPEAKE_NSGA | LCS | 20180718 | 10:15:00 | 20180720 | 17:15:00 | B8G0140-BS1 | 1 | -999 | | | Perfluorotridecanoic Acid (PFTTrDA) | 72629-94-8 | | 33.2 | NG_L | |
| N6247016D9000 | 0008 | | CHESAPEAKE_NSGA | LCS | 20180718 | 10:15:00 | 20180720 | 17:15:00 | B8G0140-BS1 | 1 | -999 | | | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | | 32.8 | NG_L | |
| N6247016D9000 | 0008 | | CHESAPEAKE_NSGA | LCS | 20180718 | 10:15:00 | 20180720 | 17:15:00 | B8G0140-BS1 | 1 | -999 | | | 13C2-PFHxA | 13C2-PFHxA | | 83.4 | PCT_REC | |
| N6247016D9000 | 0008 | | CHESAPEAKE_NSGA | LCS | 20180718 | 10:15:00 | 20180720 | 17:15:00 | B8G0140-BS1 | 1 | -999 | | | 13C2-PFDA | 13C2-PFDA | | 81.8 | PCT_REC | |
| N6247016D9000 | 0008 | | CHESAPEAKE_NSGA | LCS | 20180718 | 10:15:00 | 20180720 | 17:15:00 | B8G0140-BS1 | 1 | -999 | | | d5-EtFOSAA | d5-EtFOSAA | | 85.1 | PCT_REC | |
| N6247016D9000 | 0008 | | CHESAPEAKE_NSGA | LCS Dup | 20180718 | 10:15:00 | 20180720 | 17:27:00 | B8G0140-BSD1 | 1 | -999 | | | Perfluorobutanesulfonic acid (PFBS) | 375-73-5 | | 35.3 | NG_L | |
| N6247016D9000 | 0008 | | CHESAPEAKE_NSGA | LCS Dup | 20180718 | 10:15:00 | 20180720 | 17:27:00 | B8G0140-BSD1 | 1 | -999 | | | Perfluorohexanoic Acid (PFHxA) | 307-24-4 | | 33.4 | NG_L | |
| N6247016D9000 | 0008 | | CHESAPEAKE_NSGA | LCS Dup | 20180718 | 10:15:00 | 20180720 | 17:27:00 | B8G0140-BSD1 | 1 | -999 | | | Perfluoroheptanoic acid (PFHpA) | 375-85-9 | | 36.6 | NG_L | |
| N6247016D9000 | 0008 | | CHESAPEAKE_NSGA | LCS Dup | 20180718 | 10:15:00 | 20180720 | 17:27:00 | B8G0140-BSD1 | 1 | -999 | | | Perfluorohexanesulfonic acid (PFHxS) | 355-46-4 | | 33.9 | NG_L | |
| N6247016D9000 | 0008 | | CHESAPEAKE_NSGA | LCS Dup | 20180718 | 10:15:00 | 20180720 | 17:27:00 | B8G0140-BSD1 | 1 | -999 | | | Perfluorooctanoic acid (PFOA) | 335-67-1 | | 35.0 | NG_L | |
| N6247016D9000 | 0008 | | CHESAPEAKE_NSGA | LCS Dup | 20180718 | 10:15:00 | 20180720 | 17:27:00 | B8G0140-BSD1 | 1 | -999 | | | Perfluorononanoic acid (PFNA) | 375-95-1 | | 33.8 | NG_L | |
| N6247016D9000 | 0008 | | CHESAPEAKE_NSGA | LCS Dup | 20180718 | 10:15:00 | 20180720 | 17:27:00 | B8G0140-BSD1 | 1 | -999 | | | Perfluorooctane Sulfonate (PFOS) | 1763-23-1 | | 34.1 | NG_L | |
| N6247016D9000 | 0008 | | CHESAPEAKE_NSGA | LCS Dup | 20180718 | 10:15:00 | 20180720 | 17:27:00 | B8G0140-BSD1 | 1 | -999 | | | Perfluorodecanoic Acid (PFDA) | 335-76-2 | | 33.3 | NG_L | |
| N6247016D9000 | 0008 | | CHESAPEAKE_NSGA | LCS Dup | 20180718 | 10:15:00 | 20180720 | 17:27:00 | B8G0140-BSD1 | 1 | -999 | | | N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA) | 2355-31-9 | | 38.0 | NG_L | |
| N6247016D9000 | 0008 | | CHESAPEAKE_NSGA | LCS Dup | 20180718 | 10:15:00 | 20180720 | 17:27:00 | B8G0140-BSD1 | 1 | -999 | | | N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA) | 2991-50-6 | | 37.9 | NG_L | |
| N6247016D9000 | 0008 | | CHESAPEAKE_NSGA | LCS Dup | 20180718 | 10:15:00 | 20180720 | 17:27:00 | B8G0140-BSD1 | 1 | -999 | | | Perfluoroundecanoic Acid (PFUnA) | 2058-94-8 | | 31.5 | NG_L | |
| N6247016D9000 | 0008 | | CHESAPEAKE_NSGA | LCS Dup | 20180718 | 10:15:00 | 20180720 | 17:27:00 | B8G0140-BSD1 | 1 | -999 | | | Perfluorododecanoic Acid (PFDoA) | 307-55-1 | | 32.5 | NG_L | |
| N6247016D9000 | 0008 | | CHESAPEAKE_NSGA | LCS Dup | 20180718 | 10:15:00 | 20180720 | 17:27:00 | B8G0140-BSD1 | 1 | -999 | | | Perfluorotridecanoic Acid (PFTTrDA) | 72629-94-8 | | 32.5 | NG_L | |
| N6247016D9000 | 0008 | | CHESAPEAKE_NSGA | LCS Dup | 20180718 | 10:15:00 | 20180720 | 17:27:00 | B8G0140-BSD1 | 1 | -999 | | | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | | 32.7 | NG_L | |
| N6247016D9000 | 0008 | | CHESAPEAKE_NSGA | LCS Dup | 20180718 | 10:15:00 | 20180720 | 17:27:00 | B8G0140-BSD1 | 1 | -999 | | | 13C2-PFHxA | 13C2-PFHxA | | 82.5 | PCT_REC | |
| N6247016D9000 | 0008 | | CHESAPEAKE_NSGA | LCS Dup | 20180718 | 10:15:00 | 20180720 | 17:27:00 | B8G0140-BSD1 | 1 | -999 | | | 13C2-PFDA | 13C2-PFDA | | 80.3 | PCT_REC | |
| N6247016D9000 | 0008 | | CHESAPEAKE_NSGA | LCS Dup | 20180718 | 10:15:00 | 20180720 | 17:27:00 | B8G0140-BSD1 | 1 | -999 | | | d5-EtFOSAA | d5-EtFOSAA | | 75.8 | PCT_REC | |

**DATA VALIDATION SUMMARY REPORT
NRL-CBD, MARYLAND**

Client: CH2M HILL, Inc., Corvallis, Oregon
SDG: 1801773
Laboratory: Vista Analytical Laboratory, El Dorado Hills, California
Site: NRL-CBD, CTO-0008, Maryland
Date: August 13, 2018

| PFCs | | | |
|--------|------------------|----------------------|--------|
| EDS ID | Client Sample ID | Laboratory Sample ID | Matrix |
| 1 | CBD-1RW21-0718 | 1801773-01 | Water |
| 2 | CBD-1FB21-0718 | 1801773-02 | Water |
| 3 | CBD-1RW22-0718 | 1801773-03 | Water |
| 4 | CBD-1FB22-0718 | 1801773-04 | Water |

A full data validation was performed on the analytical data for two water samples and two aqueous field blank samples collected on July 16, 2018 by CH2M HILL at the NRL-CBD site in Maryland. The samples were analyzed under the EPA Method "Determination of Selected Perfluorinated Alkyl Acids in Drinking Water by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS)".

Specific method references are as follows:

Analysis
PFCs

Method References
USEPA Method 537, Rev 1.1

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, and the U.S. Department of Defense (DoD) Quality Systems Manual (QSM), Version 5.1 (2017) and the USEPA National Functional Guidelines for Organic Data Review as follows:

- The USEPA "Contract Laboratories Program National Functional Guidelines for Organic Superfund Methods Data Review," January 2017;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

Organics

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning

- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A full (Level IV) data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

Data Usability Assessment

There were no rejections of data.

Overall the data is acceptable for the intended purposes. There were no qualifications.

Perfluorinated Compounds (PFCs)

Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

Holding Times

- All samples were extracted within 14 days for water samples and analyzed within 28 days.

LC/MS Tuning

- All criteria were met.

Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

Continuing Calibration

- All percent recovery (%R) and RRF criteria were met.

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- Field QC samples were free of contamination.

| Blank ID | Compound | Conc. ng/L | Qualifier | Affected Samples |
|----------------|-----------|------------|-----------|------------------|
| CBD-1FB21-0718 | None - ND | - | - | - |
| CBD-1FB22-0718 | None - ND | - | - | - |

Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate %R values.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- MS/MSD samples were not analyzed.

Laboratory Control Samples/Laboratory Control Sample Duplicates

- The LCS/LCSD samples exhibited acceptable percent recoveries (%R) and RPD values.

Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

Target Compound Identification

- All mass spectra and quantitation criteria were met.

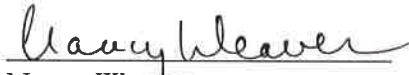
Compound Quantitation

- All criteria were met.

Field Duplicate Sample Precision

- Field duplicate samples were not collected.

Please contact the undersigned at (757) 564-0090 if you have any questions or need further information.

Signed:  Dated: 8/3/18
Nancy Weaver
Senior Chemist

| Data Qualifier | Definition |
|----------------|--|
| U | The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit. |
| J | The analyte is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample. |
| NJ | The analysis has been "tentatively identified" or "presumptively" as present and the associated numerical value is the estimated concentration in the samples. |
| UJ | The analyte was analyzed for but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise. |
| R | The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the samples. |

Sample ID: CBD-1RW21-0718

EPA Method 537

| Client Data | | | | Laboratory Data | | | |
|-------------|--------------------------------------|-----------------|-----------------|-----------------|-----------------|---------|---------|
| Name: | CH2M Hill | Matrix: | Drinking Water | Lab Sample: | 1801773-01 | Column: | BEH C18 |
| Project: | CTO-08 PFAS DW Investigation NRL CBD | Date Collected: | 16-Jul-18 12:01 | Date Received: | 17-Jul-18 09:27 | | |

| Analyte | CAS Number | Conc. (ng/L) | DL | LOD | LOQ | Qualifiers | Batch | Extracted | Samp Size | Analyzed | Dilution |
|-------------------|------------|--------------|----------|------|------------|------------|-----------|-----------|-----------------|-----------------|----------|
| PFBS | 375-73-5 | ND | 3.09 | 5.08 | 10.2 | | B8G0140 | 18-Jul-18 | 0.246 L | 20-Jul-18 23:39 | 1 |
| PFHxA | 307-24-4 | ND | 3.09 | 5.08 | 10.2 | | B8G0140 | 18-Jul-18 | 0.246 L | 20-Jul-18 23:39 | 1 |
| PFHpA | 375-85-9 | ND | 3.09 | 5.08 | 10.2 | | B8G0140 | 18-Jul-18 | 0.246 L | 20-Jul-18 23:39 | 1 |
| PFHxS | 355-46-4 | ND | 3.09 | 5.08 | 10.2 | | B8G0140 | 18-Jul-18 | 0.246 L | 20-Jul-18 23:39 | 1 |
| PFOA | 335-67-1 | ND | 3.09 | 5.08 | 10.2 | | B8G0140 | 18-Jul-18 | 0.246 L | 20-Jul-18 23:39 | 1 |
| PFNA | 375-95-1 | ND | 3.09 | 5.08 | 10.2 | | B8G0140 | 18-Jul-18 | 0.246 L | 20-Jul-18 23:39 | 1 |
| PFOS | 1763-23-1 | ND | 3.09 | 5.08 | 10.2 | | B8G0140 | 18-Jul-18 | 0.246 L | 20-Jul-18 23:39 | 1 |
| PFDA | 335-76-2 | ND | 3.09 | 5.08 | 10.2 | | B8G0140 | 18-Jul-18 | 0.246 L | 20-Jul-18 23:39 | 1 |
| MeFOSAA | 2355-31-9 | ND | 3.09 | 5.08 | 10.2 | | B8G0140 | 18-Jul-18 | 0.246 L | 20-Jul-18 23:39 | 1 |
| EtFOSAA | 2991-50-6 | ND | 3.09 | 5.08 | 10.2 | | B8G0140 | 18-Jul-18 | 0.246 L | 20-Jul-18 23:39 | 1 |
| PFUnA | 2058-94-8 | ND | 3.09 | 5.08 | 10.2 | | B8G0140 | 18-Jul-18 | 0.246 L | 20-Jul-18 23:39 | 1 |
| PFDoA | 307-55-1 | ND | 3.09 | 5.08 | 10.2 | | B8G0140 | 18-Jul-18 | 0.246 L | 20-Jul-18 23:39 | 1 |
| PFTTrDA | 72629-94-8 | ND | 3.09 | 5.08 | 10.2 | | B8G0140 | 18-Jul-18 | 0.246 L | 20-Jul-18 23:39 | 1 |
| PFTeDA | 376-06-7 | ND | 3.09 | 5.08 | 10.2 | | B8G0140 | 18-Jul-18 | 0.246 L | 20-Jul-18 23:39 | 1 |
| Labeled Standards | Type | % Recovery | Limits | | Qualifiers | Batch | Extracted | Samp Size | Analyzed | Dilution | |
| 13C2-PFHxA | SURR | 83.9 | 70 - 130 | | | B8G0140 | 18-Jul-18 | 0.246 L | 20-Jul-18 23:39 | 1 | |
| 13C2-PFDA | SURR | 77.7 | 70 - 130 | | | B8G0140 | 18-Jul-18 | 0.246 L | 20-Jul-18 23:39 | 1 | |
| d5-EtFOSAA | SURR | 75.5 | 70 - 130 | | | B8G0140 | 18-Jul-18 | 0.246 L | 20-Jul-18 23:39 | 1 | |

DL - Detection Limit

LOD - Limit of Detection

Results reported to the DL.

LOQ - Limit of quantitation

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

rw 8/13/18

Sample ID: CBD-1FB21-0718 **EPA Method 537**

| Client Data | | | | Laboratory Data | | | |
|-------------|--------------------------------------|-----------------|-----------------|-----------------|-----------------|---------|---------|
| Name: | CH2M Hill | Matrix: | Drinking Water | Lab Sample: | 1801773-02 | Column: | BEH C18 |
| Project: | CTO-08 PFAS DW Investigation NRL CBD | Date Collected: | 16-Jul-18 12:03 | Date Received: | 17-Jul-18 09:27 | | |

2

| Analyte | CAS Number | Conc. (ng/L) | DL | LOD | LOQ | Qualifiers | Batch | Extracted | Samp Size | Analyzed | Dilution |
|-------------------|------------|--------------|----------|------|------------|------------|-----------|-----------|-----------------|-----------------|----------|
| PFBS | 375-73-5 | ND | 3.14 | 5.17 | 10.3 | | B8G0140 | 18-Jul-18 | 0.242 L | 20-Jul-18 23:52 | 1 |
| PFHxA | 307-24-4 | ND | 3.14 | 5.17 | 10.3 | | B8G0140 | 18-Jul-18 | 0.242 L | 20-Jul-18 23:52 | 1 |
| PFHpA | 375-85-9 | ND | 3.14 | 5.17 | 10.3 | | B8G0140 | 18-Jul-18 | 0.242 L | 20-Jul-18 23:52 | 1 |
| PFHxS | 355-46-4 | ND | 3.14 | 5.17 | 10.3 | | B8G0140 | 18-Jul-18 | 0.242 L | 20-Jul-18 23:52 | 1 |
| PFOA | 335-67-1 | ND | 3.14 | 5.17 | 10.3 | | B8G0140 | 18-Jul-18 | 0.242 L | 20-Jul-18 23:52 | 1 |
| PFNA | 375-95-1 | ND | 3.14 | 5.17 | 10.3 | | B8G0140 | 18-Jul-18 | 0.242 L | 20-Jul-18 23:52 | 1 |
| PFOS | 1763-23-1 | ND | 3.14 | 5.17 | 10.3 | | B8G0140 | 18-Jul-18 | 0.242 L | 20-Jul-18 23:52 | 1 |
| PFDA | 335-76-2 | ND | 3.14 | 5.17 | 10.3 | | B8G0140 | 18-Jul-18 | 0.242 L | 20-Jul-18 23:52 | 1 |
| MeFOSAA | 2355-31-9 | ND | 3.14 | 5.17 | 10.3 | | B8G0140 | 18-Jul-18 | 0.242 L | 20-Jul-18 23:52 | 1 |
| EtFOSAA | 2991-50-6 | ND | 3.14 | 5.17 | 10.3 | | B8G0140 | 18-Jul-18 | 0.242 L | 20-Jul-18 23:52 | 1 |
| PFUnA | 2058-94-8 | ND | 3.14 | 5.17 | 10.3 | | B8G0140 | 18-Jul-18 | 0.242 L | 20-Jul-18 23:52 | 1 |
| PFDoA | 307-55-1 | ND | 3.14 | 5.17 | 10.3 | | B8G0140 | 18-Jul-18 | 0.242 L | 20-Jul-18 23:52 | 1 |
| PFTTrDA | 72629-94-8 | ND | 3.14 | 5.17 | 10.3 | | B8G0140 | 18-Jul-18 | 0.242 L | 20-Jul-18 23:52 | 1 |
| PFTeDA | 376-06-7 | ND | 3.14 | 5.17 | 10.3 | | B8G0140 | 18-Jul-18 | 0.242 L | 20-Jul-18 23:52 | 1 |
| Labeled Standards | Type | % Recovery | Limits | | Qualifiers | Batch | Extracted | Samp Size | Analyzed | Dilution | |
| 13C2-PFHxA | SURR | 83.2 | 70 - 130 | | | B8G0140 | 18-Jul-18 | 0.242 L | 20-Jul-18 23:52 | 1 | |
| 13C2-PFDA | SURR | 77.6 | 70 - 130 | | | B8G0140 | 18-Jul-18 | 0.242 L | 20-Jul-18 23:52 | 1 | |
| d5-EtFOSAA | SURR | 86.2 | 70 - 130 | | | B8G0140 | 18-Jul-18 | 0.242 L | 20-Jul-18 23:52 | 1 | |

DL - Detection Limit

LOD - Limit of Detection

Results reported to the DL

LOQ - Limit of quantitation

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

81318

Sample ID: CBD-1RW22-0718

EPA Method 537

| Client Data | | | | Laboratory Data | | | |
|-------------|--------------------------------------|-----------------|-----------------|-----------------|-----------------|---------|---------|
| Name: | CH2M Hill | Matrix: | Drinking Water | Lab Sample: | 1801773-03 | Column: | BEH C18 |
| Project: | CTO-08 PFAS DW Investigation NRL CBD | Date Collected: | 16-Jul-18 14:18 | Date Received: | 17-Jul-18 09:27 | | |

| Analyte | CAS Number | Conc. (ng/L) | DL | LOD | LOQ | Qualifiers | Batch | Extracted | Samp Size | Analyzed | Dilution |
|-------------------|------------|--------------|----------|------|------------|------------|-----------|-----------|-----------------|-----------------|----------|
| PFBS | 375-73-5 | ND | 3.06 | 5.04 | 10.1 | | B8G0140 | 18-Jul-18 | 0.248 L | 21-Jul-18 00:05 | 1 |
| PFHxA | 307-24-4 | ND | 3.06 | 5.04 | 10.1 | | B8G0140 | 18-Jul-18 | 0.248 L | 21-Jul-18 00:05 | 1 |
| PFHpA | 375-85-9 | ND | 3.06 | 5.04 | 10.1 | | B8G0140 | 18-Jul-18 | 0.248 L | 21-Jul-18 00:05 | 1 |
| PFHxS | 355-46-4 | ND | 3.06 | 5.04 | 10.1 | | B8G0140 | 18-Jul-18 | 0.248 L | 21-Jul-18 00:05 | 1 |
| PFOA | 335-67-1 | ND | 3.06 | 5.04 | 10.1 | | B8G0140 | 18-Jul-18 | 0.248 L | 21-Jul-18 00:05 | 1 |
| PFNA | 375-95-1 | ND | 3.06 | 5.04 | 10.1 | | B8G0140 | 18-Jul-18 | 0.248 L | 21-Jul-18 00:05 | 1 |
| PFOS | 1763-23-1 | ND | 3.06 | 5.04 | 10.1 | | B8G0140 | 18-Jul-18 | 0.248 L | 21-Jul-18 00:05 | 1 |
| PFDA | 335-76-2 | ND | 3.06 | 5.04 | 10.1 | | B8G0140 | 18-Jul-18 | 0.248 L | 21-Jul-18 00:05 | 1 |
| MeFOSAA | 2355-31-9 | ND | 3.06 | 5.04 | 10.1 | | B8G0140 | 18-Jul-18 | 0.248 L | 21-Jul-18 00:05 | 1 |
| EtFOSAA | 2991-50-6 | ND | 3.06 | 5.04 | 10.1 | | B8G0140 | 18-Jul-18 | 0.248 L | 21-Jul-18 00:05 | 1 |
| PFUnA | 2058-94-8 | ND | 3.06 | 5.04 | 10.1 | | B8G0140 | 18-Jul-18 | 0.248 L | 21-Jul-18 00:05 | 1 |
| PFDoA | 307-55-1 | ND | 3.06 | 5.04 | 10.1 | | B8G0140 | 18-Jul-18 | 0.248 L | 21-Jul-18 00:05 | 1 |
| PFTTrDA | 72629-94-8 | ND | 3.06 | 5.04 | 10.1 | | B8G0140 | 18-Jul-18 | 0.248 L | 21-Jul-18 00:05 | 1 |
| PFTeDA | 376-06-7 | ND | 3.06 | 5.04 | 10.1 | | B8G0140 | 18-Jul-18 | 0.248 L | 21-Jul-18 00:05 | 1 |
| Labeled Standards | Type | % Recovery | Limits | | Qualifiers | Batch | Extracted | Samp Size | Analyzed | Dilution | |
| 13C2-PFHxA | SURR | 77.7 | 70 - 130 | | | B8G0140 | 18-Jul-18 | 0.248 L | 21-Jul-18 00:05 | 1 | |
| 13C2-PFDA | SURR | 78.1 | 70 - 130 | | | B8G0140 | 18-Jul-18 | 0.248 L | 21-Jul-18 00:05 | 1 | |
| d5-EtFOSAA | SURR | 79.9 | 70 - 130 | | | B8G0140 | 18-Jul-18 | 0.248 L | 21-Jul-18 00:05 | 1 | |

DL - Detection Limit

LOD - Limit of Detection

Results reported to the DL

LOQ - Limit of quantitation

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

rev 8/13/18

Sample ID: CBD-1FB22-0718

EPA Method 537

| Client Data | | | | Laboratory Data | | | |
|-------------|--------------------------------------|-----------------|-----------------|-----------------|-----------------|---------|---------|
| Name: | CH2M Hill | Matrix: | Drinking Water | Lab Sample: | 1801773-04 | Column: | BEH C18 |
| Project: | CTO-08 PFAS DW Investigation NRL CBD | Date Collected: | 16-Jul-18 14:20 | Date Received: | 17-Jul-18 09:27 | | |

4

| Analyte | CAS Number | Conc. (ng/L) | DL | LOD | LOQ | Qualifiers | Batch | Extracted | Samp Size | Analyzed | Dilution |
|-------------------|------------|--------------|----------|------|------------|------------|-----------|-----------|-----------------|-----------------|----------|
| PFBS | 375-73-5 | ND | 3.04 | 5.00 | 10.0 | | B8G0140 | 18-Jul-18 | 0.250 L | 21-Jul-18 00:17 | 1 |
| PFHxA | 307-24-4 | ND | 3.04 | 5.00 | 10.0 | | B8G0140 | 18-Jul-18 | 0.250 L | 21-Jul-18 00:17 | 1 |
| PFHpA | 375-85-9 | ND | 3.04 | 5.00 | 10.0 | | B8G0140 | 18-Jul-18 | 0.250 L | 21-Jul-18 00:17 | 1 |
| PFHxS | 355-46-4 | ND | 3.04 | 5.00 | 10.0 | | B8G0140 | 18-Jul-18 | 0.250 L | 21-Jul-18 00:17 | 1 |
| PFOA | 335-67-1 | ND | 3.04 | 5.00 | 10.0 | | B8G0140 | 18-Jul-18 | 0.250 L | 21-Jul-18 00:17 | 1 |
| PFNA | 375-95-1 | ND | 3.04 | 5.00 | 10.0 | | B8G0140 | 18-Jul-18 | 0.250 L | 21-Jul-18 00:17 | 1 |
| PFOS | 1763-23-1 | ND | 3.04 | 5.00 | 10.0 | | B8G0140 | 18-Jul-18 | 0.250 L | 21-Jul-18 00:17 | 1 |
| PFDA | 335-76-2 | ND | 3.04 | 5.00 | 10.0 | | B8G0140 | 18-Jul-18 | 0.250 L | 21-Jul-18 00:17 | 1 |
| MeFOSAA | 2355-31-9 | ND | 3.04 | 5.00 | 10.0 | | B8G0140 | 18-Jul-18 | 0.250 L | 21-Jul-18 00:17 | 1 |
| EtFOSAA | 2991-50-6 | ND | 3.04 | 5.00 | 10.0 | | B8G0140 | 18-Jul-18 | 0.250 L | 21-Jul-18 00:17 | 1 |
| PFUnA | 2058-94-8 | ND | 3.04 | 5.00 | 10.0 | | B8G0140 | 18-Jul-18 | 0.250 L | 21-Jul-18 00:17 | 1 |
| PFDoA | 307-55-1 | ND | 3.04 | 5.00 | 10.0 | | B8G0140 | 18-Jul-18 | 0.250 L | 21-Jul-18 00:17 | 1 |
| PFTTrDA | 72629-94-8 | ND | 3.04 | 5.00 | 10.0 | | B8G0140 | 18-Jul-18 | 0.250 L | 21-Jul-18 00:17 | 1 |
| PFTeDA | 376-06-7 | ND | 3.04 | 5.00 | 10.0 | | B8G0140 | 18-Jul-18 | 0.250 L | 21-Jul-18 00:17 | 1 |
| Labeled Standards | Type | % Recovery | Limits | | Qualifiers | Batch | Extracted | Samp Size | Analyzed | Dilution | |
| 13C2-PFHxA | SURR | 80.6 | 70 - 130 | | | B8G0140 | 18-Jul-18 | 0.250 L | 21-Jul-18 00:17 | 1 | |
| 13C2-PFDA | SURR | 74.7 | 70 - 130 | | | B8G0140 | 18-Jul-18 | 0.250 L | 21-Jul-18 00:17 | 1 | |
| d5-EtFOSAA | SURR | 95.4 | 70 - 130 | | | B8G0140 | 18-Jul-18 | 0.250 L | 21-Jul-18 00:17 | 1 | |

DL - Detection Limit

LOD - Limit of Detection

Results reported to the DL

LOQ - Limit of quantitation

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

new 8/13/18



Basemap Data: Esri

- Legend**
- Sampling Area
 - Sampling Area
 - Site 10 Boundary
 - Base Boundary
 - Surface Water
 - 5-foot Contour Interval (dashed where inferred)
 - Direction of Shallow Groundwater Flow
 - Assumed Stream Channel
 - Stream

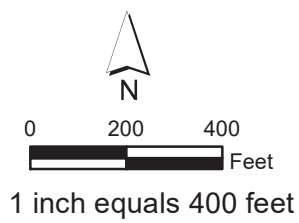


Figure 1
Off-Base Drinking Water Sampling Results through November 2018
NRL - Chesapeake Bay Detachment
Chesapeake Beach, Maryland