

26 November 2019  
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Williamtown Sand Syndicate  
PO Box 898  
Newcastle, NSW 2300

**Attention: Darren Williams**

Delivered by email: [darren@arbus.com.au](mailto:darren@arbus.com.au)

**Subject:** **Quarterly water quality monitoring results at Cabbage Tree Road Sand Quarry – November 2019 monitoring**

Please find enclosed the Quarterly water quality monitoring results at Cabbage Tree Road Sand Quarry for the November 2019 monitoring.

## **1. SCOPE OF SERVICE**

The scope of work includes the monthly surface and groundwater monitoring as part of the monthly monitoring requirements. **Figure 1** (attached) presents the surface water and groundwater sampling locations.

The November monitoring round was a quarterly monitoring event and included gauging of all available monitoring wells (a total of 14 wells) and sampling from 10 monitoring wells (Noting that MW239D, BH3, BH5 and BH12 were not required to be sampled) including additional analytical parameters and sampling at four surface water locations.

## **2. SITE WORK**

The quarterly monitoring round was conducted on 18 November 2019. A summary of these results are presented in **Table 3.4**. The results suggest that since quarry operations began in August 2019 there has been no immediate change in trends as outlined in **Appendix B**.

Each well location was gauged using a water level meter to determine groundwater depth (relative to the top of the well casing) and the total depth of the well, in order to calculate the volume of water in the well. Following the gauging a HydraSleeve was then placed into the well ensuring the top of the sleeve was located under the water and left in place while all remaining wells were gauged. Following gauging, each of the HydraSleeves were removed and samples taken.

The November 2019 monitoring round included:

- Gauging of all available monitoring wells (a total of 13 wells), note that BH3 has now been decommissioned;
- Groundwater sampling from a total of 8 monitoring wells (note MW239D, BH3, BH5 and BH12 did not require sampling, BH9 and BH10 were dry); and
- Surface water sampling from 3 locations (SW2 was dry on the day of sampling).

Water samples were collected in laboratory supplied containers and placed in an ice chilled esky. The samples were then submitted to a NATA accredited laboratory under a chain of custody (COC) for the analytical schedule as per **Table 2-1**.

**Table 2-1: Summary of Quarterly Water Quality Analysis**

Analysis	Number of Samples				
	Primary	Intra-lab (Duplicate)	Inter-lab (Triplicate)	Transport Blank	Rinsate Blank
Extended Water Suite*	11	0	0	0	0
Hydrocarbons**	11	1	1	1	1
Metals***	11	1	1	1	1
Iron (dissolved)	11	1	1	1	1
Total Dissolved Solids (TDS)	11	0	0	0	0
Total Suspended Solids (TSS)	11	0	0	0	0
PFAS (28 analytes, standard level)	7	1	1	1	1

\* Extended Water Suite B: Ca, Mg, Na, K, pH, EC, Cl, SO<sub>4</sub>, Alkalinity, Hardness & TDS (Calc'), Nitrite, Nitrate, Ammonia, Reactive Phosphorus, Total Phosphorus, Total Nitrogen, TKN

\*\* TRH (C6 – C40), BTEXN (Silica Gel)

\*\*\* NEPM Metals Suite (dissolved) - Arsenic (As), Boron (B), Barium (Ba), Beryllium (Be), Cadmium (Cd), Chromium (Cr), Cobalt (Co), Copper (Cu), Iron (Fe), Lead (Pb), Manganese (Mn), Mercury (Hg), Nickel (Ni), Selenium (Se), Vanadium (V), Zinc (Zn).

### 3. SAMPLING RESULTS

**Table 3-2** provides a summary of the gauging data and **Table 3-3** provides a summary of the field parameters taken during sampling. The full set of gauging data and field parameters for each monitoring location are provided in the **Tables** section.

**Table 3-2: Summary of gauging data**

Borehole	Top of Casing (mAHD)	Depth to Water (mBTOP)	Groundwater Elevation (mAHD)	Well Total Depth (mBTOP)	Comment
BH1	8.64	6.432	2.208	8.28	Cloudy brown, sulfur odour
BH2	7.79	5.721	2.069	9.03	Dark brown, slight sulfur odour
BH3	-	-	-	-	Well Decommissioned
BH4	3.06	1.624	1.436	6.11	Cloudy brown, slight sulfur odour
BH5	7.36	5.792	1.568	8.8	No odour - No sample taken.

Borehole	Top of Casing (mAHD)	Depth to Water (mBTOC)	Groundwater Elevation (mAHD)	Well Total Depth (mBTOC)	Comment
BH6	3.62	1.657	1.963	4.62	Cloudy brown, slight sulfur odour
BH7	2.98	1.588	1.392	4.61	Cloudy brown, slight sulfur odour.
BH8	3.88	2.312	1.568	6.28	Cloudy brown, sulfur odour
BH9	17.75	Dry	-	16.01	Well was dry.
BH10	6.69	Dry	-	3.58	Well was dry.
BH11	6.63	3.621	3.009	5.39	Cloudy light brown, sulfur odour
BH12	8.67	6.89	1.78	8.2	No sample taken.
MW239S	3.04	1.256	1.784	4.06	Cloudy brown, sulfur odour
MW239D	3.04	1.238	1.802	20.32	Slight Sulfur odour, no sample taken
SW01*	N/A	0.02	2.52	N/A	Significant reduction in water level, tannins stained brown, sulfur odour
SW02*	N/A	Dry		N/A	Location was dry.
SW03*	N/A	0.02	1.02	N/A	Mostly clear (red algae present), no odour
SW04*	N/A	0.15	2.15	N/A	Clear, no odour.

\* Surface water levels measured from measuring tape installed (When dry number is ground elevation AHD).

**Table 3-3: Summary of field parameters**

Sample ID	Time	Temp (°C)	EC (us/cm)	pH	Redox (mV)
BH01	1350	21.56	182	5.43	67.3
BH02	1330	21.76	133	4.61	230
BH04	1010	21.07	95	4.53	290
BH06	1230	23.12	335	4.8	6.4
BH07	1210	21.79	391	4.6	13.1
BH08	1450	22.5	545	4.51	-28.8
BH11	1400	22.65	324	4.62	34
MW239S	1300	21.18	718	4.58	-17.6
SW01	1145	23.75	1964	4.53	230
SW03	0945	19.54	470	5.04	97.7
SW04	1045	18.46	538	4.56	219

**Table 3.4** presents a summary of the water monitoring results and comparison with identified trigger values. Full results tables are provided in the **Tables** Section. Full Laboratory results, including copies for the COC are provided in **Attachment A**.

**Attachment B** provides a graphical representation of trends in data acquired during field sampling and laboratory analysis. Data trends include; monthly rainfall totals versus mean

rainfall totals, groundwater elevation (mAHD), field electrical conductivity ( $\mu\text{s}/\text{cm}$ ), concentrations (mg/L) of chromium, copper, iron, nickel, zinc total nitrogen, total hardness, manganese, total phosphorus, total dissolved solids, sodium, calcium, magnesium, potassium, sulphate, chloride and fluoride. Where relevant, the Australian Drinking Water Guideline (Aesthetic values) and ANZECC 2000 Guideline have been included to provide a benchmark for any exceedances recorded.

**Table 3.4 Water screening levels**

Analytical Groupings	Analyte	Limit of reporting (mg/L)	Number of Samples	Minimum (mg/L)	Maximum (mg/L)	Criteria Exceeded	Relative to previous monitoring (Refer to Trend Data Attachment B)
Physical and Chemical Stressors	Sodium	1	11	11	142	No	Slight increase across all sample locations
	Sulphate	1	11	<1	165	No	Similar
	Chloride	1	11	18	230	No	Slight increase across most sample locations
	Fluoride	0.1	11	<0.1	0.5	No	Similar
	Reactive <sup>3</sup> Phosphorous	0.01	11	<0.1	<0.1	No	Similar
	Total Phosphorous <sup>3</sup>	0.01	11	<0.1	2.11	7 above ANZECC 2000 Trigger range <sup>1</sup> (BH11, BH2, BH4, BH6, BH8, MW239S & SW3)	Significant increase for BH11. Similar results for all other sample locations.
	Nitrite <sup>3</sup>	0.01	11	<0.01	<0.01	No	Similar
	Nitrate <sup>3</sup>	0.01	11	<0.01	1.01	1 above ANZECC 2000 Trigger range <sup>1</sup> (BH2)	Similar
	Ammonia <sup>3</sup>	0.01	11	<0.01	0.23	No	Similar
	Total Nitrogen <sup>3</sup>	0.1	11	0.2	5.9	8 above ANZECC 2000 Trigger range <sup>1</sup> (BH2, BH11, BH6, BH7, BH8, MW239S, SW1 & SW3)	Significant increase for BH11. Similar results for other sample locations.
	Total Hardness	1	11	7.0	158	No	Slight decrease across all sample locations
	Total Dissolved Solids	1	11	56	708	1 above NHMRC ADWG 6 aesthetics (SW1)	Similar
	pH	0.01	11	4.48	6.29	All outside ANZECC 2000 Trigger range <sup>1</sup> and drinking water guidelines	pH values increased at BH1. All other sample locations similar.

Analytical Groupings	Analyte	Limit of reporting (mg/L)	Number of Samples	Minimum (mg/L)	Maximum (mg/L)	Criteria Exceeded	Relative to previous monitoring (Refer to Trend Data Attachment B)
Dissolved Metals	As	0.001	11	<0.001	<0.001	No	Similar
	B	0.05	11	<0.005	0.11	No	Similar
	Ba	0.001	11	0.001	0.042	No	Similar
	Be	0.001	11	<0.001	<0.001	No	Similar
	Cd	0.005-0.1	11	<0.0001	<0.0001	No	Similar
	Cr	0.005-0.1	11	<0.001	0.004	5 above ANZECC 2000 Trigger Values <sup>2</sup> (BH1, BH7, BH8, BH11 & MW239S)	Similar
	Co	0.001	11	<0.001	0.003	No	Similar
	Cu	0.001	11	<0.001	0.013	3 above ANZECC 2000 Trigger Values <sup>2</sup> (BH2, BH4 & BH8)	General decrease in concentrations following a spike in September 2019 with the exception of BH2 indicating an increase in concentrations.
	Fe	0.05	11	<0.05	11.3	9 above NHMRC ADWG 6 aesthetics (BH1, BH6, BH7, BH8, BH11, MW239S, SW1, SW3 & SW4)	Significant increases in concentrations at BH1 and SW4.
	Mn	0.001	11	0.001	0.366	No	Similar
	Ni	0.001	11	<0.001	0.013	2 above ANZECC 2000 Trigger Values <sup>2</sup> (BH7 & BH8)	Similar or slight decrease in concentrations at surface water locations. General increase at groundwater locations.
	Pb	0.005-0.1	11	<0.001	<0.001	No	Similar
	Se	0.005-0.1	11	<0.01	<0.01	No	Similar
	V	0.005-0.1	11	<0.01	<0.01	No	Similar

Analytical Groupings	Analyte	Limit of reporting (mg/L)	Number of Samples	Minimum (mg/L)	Maximum (mg/L)	Criteria Exceeded	Relative to previous monitoring (Refer to Trend Data Attachment B)
	Zn	0.005-0.1	11	0.006	0.055	7 above ANZECC 2000 Trigger Values <sup>2</sup> (BH1, BH2, BH6, BH7, BH8, MW239S, & SW1)	Similar
	Hg	0.0001	11	<0.0001	<0.0001	No	Similar
TRH – Silica Clean up	C <sub>6</sub> -C <sub>10</sub>	0.02	11	<0.02	<0.02	No	Similar
	>C <sub>10</sub> -C <sub>16</sub>	0.1	11	<0.1	<0.1	No	Similar
	>C <sub>16</sub> -C <sub>34</sub>	0.1	11	<0.1	<0.1	No	Similar
	>C <sub>34</sub> -C <sub>40</sub>	0.1	11	<0.1	<0.1	No	Similar
	Total >C <sub>10</sub> -C <sub>40</sub>	0.1	11	<0.1	<0.1	No	Similar
	C <sub>6</sub> -C <sub>10</sub> minus BTEX (F1)	0.02	11	<0.02	<0.02	No	Similar
	>C <sub>10</sub> -C <sub>16</sub> minus Naphthalene (F2)	0.1	11	<0.1	<0.1	No	Similar
BTEX	Benzene	0.001-0.005	11	<0.001	<0.001	No	Similar
	Toluene	0.001-0.005	11	<0.002	<0.002	No	Similar
	Ethylbenzene	0.001-0.005	11	<0.002	<0.002	No	Similar
	Total Xylene	0.001-0.005	11	<0.002	<0.002	No	Similar
	Naphthalene	0.001	11	<0.005	<0.005	No	Similar
PFAS	PFOS	0.00001-0.0001	7	<0.00001	<0.00001	No	Similar

Analytical Groupings	Analyte	Limit of reporting (mg/L)	Number of Samples	Minimum (mg/L)	Maximum (mg/L)	Criteria Exceeded	Relative to previous monitoring (Refer to Trend Data Attachment B)
	PFOA	0.00001-0.0001	7	<0.00001	<0.00001	No	Similar
	PFOS/PFHxS	0.00001-0.0001	7	<0.00001	<0.00001	No	Similar
	PFDS	0.00001-0.0001	7	<0.00001	<0.00001	No	Similar

\* The LOR is above the Heads of EPA Australia and New Zealand – National Environmental Management Plan (HEPA NEMP) 2018 99% Level of protection in freshwater.  
No concentrations were found to be above the LOR.

<sup>1</sup>Australian and New Zealand Environmental Conservation Council (ANZECC) 2000 Trigger Values – Default trigger values for physical and chemical stressors, for slightly disturbed ecosystems in lowland rivers, Southeast Australia (value is for base flow and not storm event)

<sup>2</sup>ANZECC 2000 Trigger Values – 95% Level of protection in freshwater

National Health and Medical Research Council Australian Drinking Water Guidelines (NHMRC ADWG) 6 2011 Version 3.5 Updated August 2018

<sup>3</sup>Analysis only undertaken during Quarterly Sampling Event.

#### 4. RAINWATER DATA

**Table 4.5** presents the rainfall data from Williamtown RAAF base (Station Number: 061078, Latitude: 32.79°S; Longitude: 151.84°E; Elevation: 8 m). The mean monthly rainfall indicates that there was less rainfall in October than the mean leading up to the November monitoring event. November rainfall is trending towards below average rainfall. Based on current rainfall data (mean and monthly totals) for November 2019 it is expected that surface and groundwater levels will continue to decrease.

**Table 4.5 2019 Rainfall data**

2019	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>1st</b>	2.0	0.8	0	0	0	0	0	9.6	7.4	0	0	
<b>2nd</b>	0	12.8	0	23.8	0	21.2	0	0	0.2	0	0	
<b>3rd</b>	0	0.4		0.6	0	0.6	0	0.2	0	0	0	
<b>4th</b>	0	0	0	0	20.8	0.4	5.2	0	0	0		17.6
<b>5th</b>	0	0	0	0	0.2	25	1.8	0.2	0	0	0.4	
<b>6th</b>	0	0	0	0	23.2	2.6	1.2	0	0	6.8	0	
<b>7th</b>	5.0	0	8.2	0	0.2	1	0.6	0	1	0	0	
<b>8th</b>	0	0	0	0	0	0	1.6	0	0	0	0	
<b>9th</b>	0	6.6	0	0	0	0	0.4	0	0	0.8	0	
<b>10th</b>	0.2	0	12.0	2.2	0	0	0	0	0.6	1.4	0	
<b>11th</b>	0	0	0	0	0.6	0	0	0	2.8	4	0	
<b>12th</b>	3.0	0	0	0	0	0	0	0	0	23	0	
<b>13th</b>	0	0	0	0	1.4	0	0	0	0	8.8	0	
<b>14th</b>	0	0	0	0.2	0	0	0	0	0	0	0	
<b>15th</b>	0	0	0	1.4	0	0	0	0	0	0	0	
<b>16th</b>	0	0	4.8	3.6	0	0	0	0	0	0.2	0	
<b>17th</b>	0	0	59.4	1.4	0	0	0	0	16.8	0		
<b>18th</b>	0	0	2.6	0.2	0	17.8	0	0	39.4	0		
<b>19th</b>	0	0	2.2	0.2	0	0	0	0	7.2	0		
<b>20th</b>	2.4		0	2.0	0	0	0	0	0	0		
<b>21st</b>	1.0	1.4	0	0.2	0	0	0	0	0	0		
<b>22nd</b>	0	1.0	1.2	0.2	0	0.2	0	0	0	0		
<b>23rd</b>	0	1.4	0	0	0	20	0	0		0		
<b>24th</b>	0	9.2	5.4	0	0	50.6	0	0	0	0		
<b>25th</b>	0	0	5.2	0	0	15.2	2.0	0	0	0		
<b>26th</b>	0	0	0	0	0	1.8	0	0	0	0		
<b>27th</b>	0	0	0	0	0	0.8	0	0	0	0		
<b>28th</b>	1.0	0	0	0	0.8	0	0	0	0	0		
<b>29th</b>	0		0	0	0	0	0	0	0	0		
<b>30th</b>	0		38.2	0	0	0	0.6	21.2	0	0		
<b>31st</b>	0		6.6		0		10	67.4				
<b>Total</b>	<b>14.6</b>	<b>33.6</b>	<b>145.8</b>	<b>36.0</b>	<b>47.2</b>	<b>157.2</b>	<b>23.4</b>	<b>98.6</b>	<b>75.4</b>	<b>44.8</b>	<b>18</b>	
<b>Mean</b>	<b>98.7</b>	<b>117.0</b>	<b>120.5</b>	<b>111.6</b>	<b>109.6</b>	<b>124.7</b>	<b>70.3</b>	<b>73.2</b>	<b>60.6</b>	<b>73.5</b>	<b>82.3</b>	<b>78.6</b>

## 5. THANKYOU

We trust the information presented is acceptable. If you have any questions, please do not hesitate in contacting the undersigned.

Sincerely,

**Kleinfelder Australia Pty Ltd**



**Daniel Kousbroek** B.Env.Sc (Hons)

Environmental Consultant

**Contaminated Land Management**

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Mobile: 0458 197 676

**Attached:**

**Figure 1**

**Data Tables**

**Attachment A – Laboratory reports**

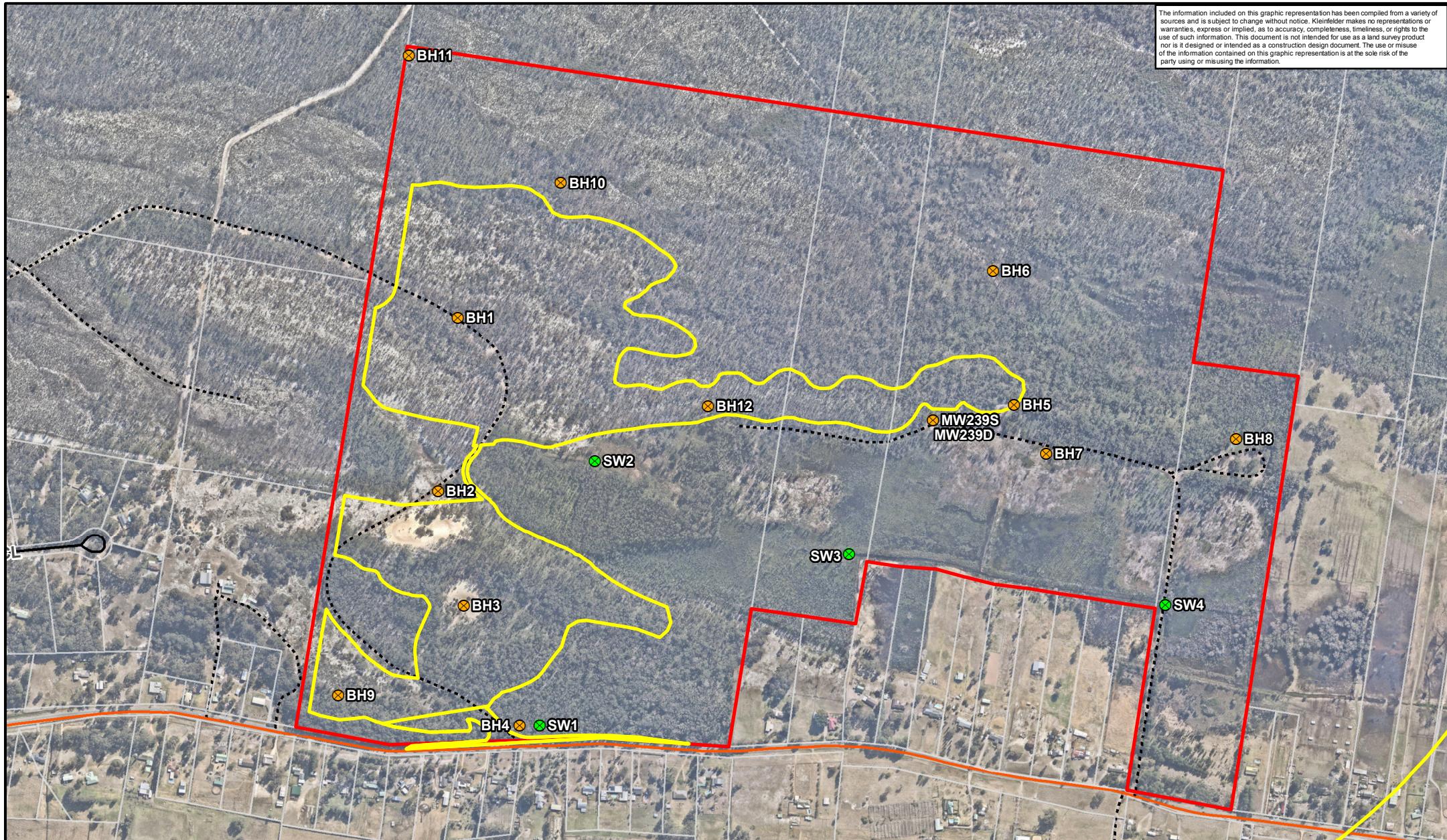
**Attachment B – Data Trends**



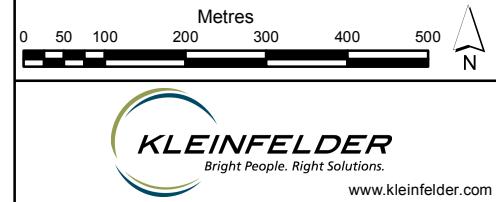
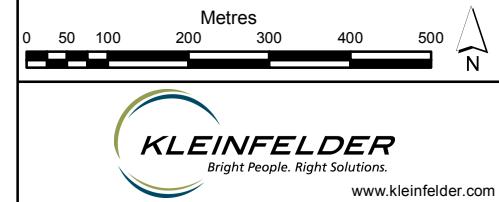
## **FIGURE 1**

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The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfelder makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the information contained on this graphic representation. This graphic representation is not a product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information.



- Groundwater Sample Site
- Surface Water Sample Site
- Arterial Road
- Local Road
- Track
- Subject Land Boundary
- Quarry Project Area



## Water monitoring locations November 2019 Monitoring

FIGURE:  
**1**

Williamtown Sand Syndicate  
Proposed Sand Quarry  
Cabbage Tree Road, Williamtown



## DATA TABLES

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Table 3  
Groundwater Analytical Data - PFAS  
Willamtown Sand Syndicate



Sum of PFAS		
Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS
0.01 µg/L	0.01 µg/L	0.01 µg/L
0.07		
0.7		
< 0.01	< 0.01	< 0.01
< 0.01	< 0.01	< 0.01
< 0.01	< 0.01	< 0.01
< 0.01	< 0.01	< 0.01
< 0.01	< 0.01	< 0.01
< 0.01	< 0.01	< 0.01
< 0.01	< 0.01	< 0.01
< 0.01	< 0.01	< 0.01
< 0.01	< 0.01	< 0.01
< 0.01	< 0.01	< 0.01
< 0.01	< 0.01	< 0.01
< 0.01	< 0.01	< 0.01
< 0.01	< 0.01	< 0.01
< 0.01	< 0.01	< 0.01
< 0.01	< 0.01	< 0.01
< 0.01	< 0.01	< 0.01
< 0.01	< 0.01	< 0.01
< 0.01	< 0.01	< 0.01
< 0.01	< 0.01	< 0.01
< 0.01	< 0.01	< 0.01
< 0.01	< 0.01	< 0.01
< 0.01	< 0.01	< 0.01
< 0.01	< 0.01	< 0.01
< 0.01	< 0.01	< 0.01
< 0.01	< 0.01	< 0.01
< 0.01	< 0.01	< 0.01
< 0.01	< 0.01	< 0.01
< 0.01	< 0.01	< 0.01
< 0.01	< 0.01	< 0.01
< 0.01	< 0.01	< 0.01
< 0.01	< 0.01	< 0.01
< 0.01	< 0.01	< 0.01
< 0.01	< 0.01	< 0.01
< 0.01	< 0.01	< 0.01
< 0.01	< 0.01	< 0.01
< 0.01	< 0.01	< 0.01
< 0.01	< 0.01	< 0.01
< 0.01	< 0.01	< 0.01
< 0.01	< 0.01	< 0.01
< 0.01	< 0.01	< 0.01
< 0.01	< 0.01	< 0.01
0.03 *	0.01	0.01
0.05	0.05	0.05
< 0.01	< 0.01	< 0.01







Table 5  
Quality Control Sample Analysis - BTEXN  
Williamtown Sand Syndicate



Silica Clean up	
>C <sub>34</sub> -C <sub>40</sub> - Silica Cleanup	>C <sub>10</sub> -C <sub>40</sub> - Silica Cleanup
µg/L	µg/L
< 100	< 100
< 100	< 100
< 100	< 100
< 100	< 100
NC	NC
< 100	< 100
< 100	< 100
NC	NC
-	-
< 100	< 100
< 100	< 100
< 100	< 100
NC	NC
< 100	< 100
< 100	< 100
< 100	< 100
NC	NC
< 100	< 100
< 100	< 100
< 100	< 100
NC	NC
< 100	< 100
< 100	< 100
-	-
< 100	< 100
< 100	< 100
< 100	< 100
NC	NC
< 100	< 100
< 100	-
NC	NC
< 100	< 100
< 100	< 100
< 100	< 100
< 100	< 100
NC	NC
< 100	< 100
< 100	-
NC	NC









Table 7  
Quality Control Sample Analysis - PFAS  
Williamtown Sand Syndicate



Sum of PFAS	
Sum of PFAS (WA DER List)	Sum of PFAS
µg/L	µg/L
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
NC	NC
< 0.01	< 0.01
< 0.05	< 0.1
NC	NC
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
NC	NC
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
NC	NC
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
NC	NC
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
0.01	0.01
0.01	0.01
0%	0%
0.01	0.01
< 0.05	< 0.1
<b>86%</b>	<b>133%</b>
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
NC	NC
< 0.01	< 0.01
< 0.05	< 0.1
NC	NC



## **ATTACHMENT A: LABORATORY REPORTS**

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## CERTIFICATE OF ANALYSIS

Work Order	<b>: ES1938033</b>	Page	<b>: 1 of 22</b>
Amendment	<b>: 3</b>		
Client	<b>: KLEINFELDER AUSTRALIA PTY LTD</b>	Laboratory	<b>: Environmental Division Sydney</b>
Contact	<b>: DANIEL KOUSBROEK</b>	Contact	<b>: Shirley LeCornu</b>
Address	<b>: 95 MITCHELL ROAD CARDIFF NSW 2285</b>	Address	<b>: 277-289 Woodpark Road Smithfield NSW Australia 2164</b>
Telephone	<b>: ----</b>	Telephone	<b>: +6138549 9630</b>
Project	<b>: Williamtown SS</b>	Date Samples Received	<b>: 18-Nov-2019 16:05</b>
Order number	<b>: 20193820</b>	Date Analysis Commenced	<b>: 19-Nov-2019</b>
C-O-C number	<b>: 5958</b>	Issue Date	<b>: 27-Nov-2019 17:55</b>
Sampler	<b>: DANIEL KOUSBROEK</b>		
Site	<b>: Williamtown SS</b>		
Quote number	<b>: ME/114/19 ALS Compass</b>		
No. of samples received	<b>: 14</b>		
No. of samples analysed	<b>: 14</b>		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

### Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW



Accreditation No. 825  
Accredited for compliance with  
ISO/IEC 17025 - Testing

## General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

∅ = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- EN055: Ionic Balance out of acceptable limits for sample ES1938033-#001 due to analytes not quantified in this report.
- Amendment (26/11/2019): This report has been amended and re-released to allow the reporting of additional analytical data.
- Amendment (27/11/2019): This report has been amended as a result of changes to the contacts for the distribution of the report. All analysis results are as per the previous report.
- Amendment (27/11/2019): This report has been amended to allow the distribution of an Electronic Data Deliverable (EDD) not previously provided. All analysis results are as per the previous report.
- EA016: Calculated TDS is determined from Electrical conductivity using a conversion factor of 0.65.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.





## **Analytical Results**

## Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH-1	BH-2	BH-4	BH-6	BH-7
Compound	CAS Number	LOR	Unit	Client sampling date / time	18-Nov-2019 13:35	18-Nov-2019 13:15	18-Nov-2019 11:28	18-Nov-2019 12:29	18-Nov-2019 12:09
				Result	Result	Result	Result	Result	Result
<b>EP231B: Perfluoroalkyl Carboxylic Acids - Continued</b>									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	---	---	---	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	---	---	---	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	---	---	---	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	---	---	---	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	---	---	---	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	---	---	---	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	---	---	---	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	---	---	---	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	---	---	---	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	---	---	---	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	---	---	---	<0.05	<0.05	<0.05
<b>EP231C: Perfluoroalkyl Sulfonamides</b>									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	---	---	---	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	---	---	---	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	---	---	---	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	---	---	---	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	---	---	---	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	---	---	---	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	---	---	---	<0.02	<0.02	<0.02
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids</b>									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	---	---	---	<0.05	<0.05	<0.05

## Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)			Client sample ID	BH-1	BH-2	BH-4	BH-6	BH-7
			Client sampling date / time	18-Nov-2019 13:35	18-Nov-2019 13:15	18-Nov-2019 11:28	18-Nov-2019 12:29	18-Nov-2019 12:09
Compound	CAS Number	LOR	Unit	ES1938033-001	ES1938033-002	ES1938033-004	ES1938033-006	ES1938033-007
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued</b>								
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	---	---	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	---	---	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	---	---	<0.05	<0.05	<0.05
<b>EP231P: PFAS Sums</b>								
Sum of PFAS	---	0.01	µg/L	---	---	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	---	---	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	---	0.01	µg/L	---	---	<0.01	<0.01	<0.01
<b>EP080S: TPH(V)/BTEX Surrogates</b>								
1,2-Dichloroethane-D4	17060-07-0	2	%	120	115	123	118	118
Toluene-D8	2037-26-5	2	%	120	115	124	121	121
4-Bromofluorobenzene	460-00-4	2	%	111	111	115	115	113
<b>EP231S: PFAS Surrogate</b>								
13C4-PFOS	---	0.02	%	---	---	99.4	96.5	101
13C8-PFOA	---	0.02	%	---	---	106	107	108

## Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)		Client sample ID		BH-8	BH-11	MW239S	---	---
Compound	CAS Number	LOR	Unit	18-Nov-2019 14:45	18-Nov-2019 14:00	18-Nov-2019 12:47	---	---
				Result	Result	Result	---	---
<b>EA005P: pH by PC Titrator</b>								
pH Value	---	0.01	pH Unit	5.12	5.12	4.76	---	---
<b>EA006: Sodium Adsorption Ratio (SAR)</b>								
^ Sodium Adsorption Ratio	---	0.01	-	5.06	3.30	5.38	---	---
<b>EA010P: Conductivity by PC Titrator</b>								
Electrical Conductivity @ 25°C	---	1	µS/cm	316	193	419	---	---
<b>EA016: Calculated TDS (from Electrical Conductivity)</b>								
Total Dissolved Solids (Calc.)	---	1	mg/L	205	125	272	---	---
<b>EA065: Total Hardness as CaCO<sub>3</sub></b>								
Total Hardness as CaCO <sub>3</sub>	---	1	mg/L	16	12	25	---	---
<b>ED037P: Alkalinity by PC Titrator</b>								
Hydroxide Alkalinity as CaCO <sub>3</sub>	DMO-210-001	1	mg/L	<1	<1	<1	---	---
Carbonate Alkalinity as CaCO <sub>3</sub>	3812-32-6	1	mg/L	<1	<1	<1	---	---
Bicarbonate Alkalinity as CaCO <sub>3</sub>	71-52-3	1	mg/L	<1	<1	<1	---	---
Total Alkalinity as CaCO <sub>3</sub>	---	1	mg/L	<1	<1	<1	---	---
<b>ED041G: Sulfate (Turbidimetric) as SO<sub>4</sub> 2- by DA</b>								
Sulfate as SO <sub>4</sub> - Turbidimetric	14808-79-8	1	mg/L	8	<1	8	---	---
<b>ED045G: Chloride by Discrete Analyser</b>								
Chloride	16887-00-6	1	mg/L	80	53	118	---	---
<b>ED093F: Dissolved Major Cations</b>								
Calcium	7440-70-2	1	mg/L	<1	<1	<1	---	---
Magnesium	7439-95-4	1	mg/L	4	3	6	---	---
Sodium	7440-23-5	1	mg/L	49	28	63	---	---
Potassium	7440-09-7	1	mg/L	<1	<1	1	---	---
<b>EG020F: Dissolved Metals by ICP-MS</b>								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	---	---
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	---	---
Barium	7440-39-3	0.001	mg/L	0.012	0.004	0.010	---	---
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	---	---
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	---	---
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	<0.001	---	---
Chromium	7440-47-3	0.001	mg/L	0.002	0.002	0.002	---	---
Copper	7440-50-8	0.001	mg/L	0.002	<0.001	<0.001	---	---
Manganese	7439-96-5	0.001	mg/L	0.010	0.008	0.004	---	---
Nickel	7440-02-0	0.001	mg/L	0.013	0.002	0.008	---	---

## Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)		Client sample ID		BH-8	BH-11	MW239S	---	---
		Client sampling date / time		18-Nov-2019 14:45	18-Nov-2019 14:00	18-Nov-2019 12:47	---	---
Compound	CAS Number	LOR	Unit	ES1938033-008	ES1938033-011	ES1938033-014	-----	-----
				Result	Result	Result	---	---
<b>EG020F: Dissolved Metals by ICP-MS - Continued</b>								
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	---	---
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	---	---
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	---	---
Zinc	7440-66-6	0.005	mg/L	0.053	<0.005	0.030	---	---
Iron	7439-89-6	0.05	mg/L	2.49	0.95	1.10	---	---
<b>EG035F: Dissolved Mercury by FIMS</b>								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	---	---
<b>EK040P: Fluoride by PC Titrator</b>								
Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	<0.1	---	---
<b>EK055G: Ammonia as N by Discrete Analyser</b>								
Ammonia as N	7664-41-7	0.01	mg/L	0.17	0.18	0.17	---	---
<b>EK057G: Nitrite as N by Discrete Analyser</b>								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	---	---
<b>EK058G: Nitrate as N by Discrete Analyser</b>								
Nitrate as N	14797-55-8	0.01	mg/L	0.01	0.06	<0.01	---	---
<b>EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser</b>								
Nitrite + Nitrate as N	---	0.01	mg/L	0.01	0.06	<0.01	---	---
<b>EK061G: Total Kjeldahl Nitrogen By Discrete Analyser</b>								
Total Kjeldahl Nitrogen as N	---	0.1	mg/L	1.3	5.8	1.2	---	---
<b>EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser</b>								
^ Total Nitrogen as N	---	0.1	mg/L	1.3	5.9	1.2	---	---
<b>EK067G: Total Phosphorus as P by Discrete Analyser</b>								
Total Phosphorus as P	---	0.01	mg/L	0.58	2.11	0.23	---	---
<b>EK071G: Reactive Phosphorus as P by discrete analyser</b>								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	<0.01	---	---
<b>EN055: Ionic Balance</b>								
ø Total Anions	---	0.01	meq/L	2.42	1.50	3.50	---	---
ø Total Cations	---	0.01	meq/L	2.46	1.46	3.26	---	---
ø Ionic Balance	---	0.01	%	---	---	3.48	---	---
<b>EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup</b>								
C10 - C14 Fraction	---	50	µg/L	<50	<50	<50	---	---
C15 - C28 Fraction	---	100	µg/L	<100	<100	<100	---	---
C29 - C36 Fraction	---	50	µg/L	<50	<50	<50	---	---

## Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)	Client sample ID		BH-8	BH-11	MW239S	---	---	
	Client sampling date / time		18-Nov-2019 14:45	18-Nov-2019 14:00	18-Nov-2019 12:47	---	---	
Compound	CAS Number	LOR	Unit	ES1938033-008	ES1938033-011	ES1938033-014	-----	-----
Result								
<b>EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup - Continued</b>								
^ C10 - C36 Fraction (sum)	---	50	µg/L	<50	<50	<50	---	---
<b>EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup</b>								
>C10 - C16 Fraction	---	100	µg/L	<100	<100	<100	---	---
>C16 - C34 Fraction	---	100	µg/L	<100	<100	<100	---	---
>C34 - C40 Fraction	---	100	µg/L	<100	<100	<100	---	---
^ >C10 - C40 Fraction (sum)	---	100	µg/L	<100	<100	<100	---	---
>C10 - C16 Fraction minus Naphthalene (F2)	---	100	µg/L	<100	<100	<100	---	---
<b>EP080/071: Total Petroleum Hydrocarbons</b>								
C6 - C9 Fraction	---	20	µg/L	<20	<20	<20	---	---
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b>								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	---	---
^ C6 - C10 Fraction minus BTEX	C6_C10-BTEX	20	µg/L	<20	<20	<20	---	---
<b>EP080: BTEXN</b>								
Benzene	71-43-2	1	µg/L	<1	<1	<1	---	---
Toluene	108-88-3	2	µg/L	<2	<2	<2	---	---
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	---	---
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	---	---
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	---	---
^ Total Xylenes	---	2	µg/L	<2	<2	<2	---	---
^ Sum of BTEX	---	1	µg/L	<1	<1	<1	---	---
Naphthalene	91-20-3	5	µg/L	<5	<5	<5	---	---
<b>EP231A: Perfluoroalkyl Sulfonic Acids</b>								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	---	---	---	---
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	---	---	---	---
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	---	---	---	---
Perfluoroheptane sulfonic acid (PFHps)	375-92-8	0.02	µg/L	<0.02	---	---	---	---
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	---	---	---	---



## Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)			Client sample ID	BH-8	BH-11	MW239S	---	---
			Client sampling date / time	18-Nov-2019 14:45	18-Nov-2019 14:00	18-Nov-2019 12:47	---	---
Compound	CAS Number	LOR	Unit	ES1938033-008	ES1938033-011	ES1938033-014	-----	-----
				Result	Result	Result	---	---
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued</b>								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	---	---	---	---
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	---	---	---	---
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	---	---	---	---
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	---	---	---	---
<b>EP231P: PFAS Sums</b>								
Sum of PFAS	---	0.01	µg/L	<0.01	---	---	---	---
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	---	---	---	---
Sum of PFAS (WA DER List)	---	0.01	µg/L	<0.01	---	---	---	---
<b>EP080S: TPH(V)/BTEX Surrogates</b>								
1,2-Dichloroethane-D4	17060-07-0	2	%	127	115	122	---	---
Toluene-D8	2037-26-5	2	%	131	114	125	---	---
4-Bromofluorobenzene	460-00-4	2	%	122	106	121	---	---
<b>EP231S: PFAS Surrogate</b>								
13C4-PFOS	---	0.02	%	98.3	---	---	---	---
13C8-PFOA	---	0.02	%	101	---	---	---	---





## Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)		Client sample ID		SW-1	SW-3	SW-4	---	---
Compound	CAS Number	LOR	Unit	18-Nov-2019 11:45	18-Nov-2019 10:27	18-Nov-2019 10:46	---	---
				Result	Result	Result	---	---
<b>EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup - Continued</b>								
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	---	---
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	---	---
<b>EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup</b>								
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	---	---
>C16 - C34 Fraction	----	100	µg/L	<100	<100	<100	---	---
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	---	---
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100	<100	---	---
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	<100	<100	---	---
<b>EP080/071: Total Petroleum Hydrocarbons</b>								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	---	---
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b>								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	---	---
^ C6 - C10 Fraction minus BTEX	C6_C10-BTEX	20	µg/L	<20	<20	<20	---	---
<b>EP080: BTEXN</b>								
Benzene	71-43-2	1	µg/L	<1	<1	<1	---	---
Toluene	108-88-3	2	µg/L	<2	<2	<2	---	---
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	---	---
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	---	---
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	---	---
^ Total Xylenes	----	2	µg/L	<2	<2	<2	---	---
^ Sum of BTEX	----	1	µg/L	<1	<1	<1	---	---
Naphthalene	91-20-3	5	µg/L	<5	<5	<5	---	---
<b>EP231A: Perfluoroalkyl Sulfonic Acids</b>								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	---	---
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	---	---
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	<0.02	---	---
Perfluoroheptane sulfonic acid (PFHps)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	---	---
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	---	---

## **Analytical Results**

## Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)		Client sample ID		SW-1	SW-3	SW-4	---	---
		Client sampling date / time		18-Nov-2019 11:45	18-Nov-2019 10:27	18-Nov-2019 10:46	---	---
Compound	CAS Number	LOR	Unit	ES1938033-003	ES1938033-012	ES1938033-013	-----	-----
				Result	Result	Result	---	---
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued</b>								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	---	---
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	---	---
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	---	---
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	---	---
<b>EP231P: PFAS Sums</b>								
Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	<0.01	---	---
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	---	---
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	<0.01	---	---
<b>EP080S: TPH(V)/BTEX Surrogates</b>								
1,2-Dichloroethane-D4	17060-07-0	2	%	121	120	115	---	---
Toluene-D8	2037-26-5	2	%	118	108	111	---	---
4-Bromofluorobenzene	460-00-4	2	%	114	110	108	---	---
<b>EP231S: PFAS Surrogate</b>								
13C4-PFOS	----	0.02	%	95.6	98.8	97.4	---	---
13C8-PFOA	----	0.02	%	103	99.9	101	---	---

## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	Dup09	Rinsate09	Tripblank09	---	---
Compound	CAS Number	LOR	Unit	18-Nov-2019 11:03	18-Nov-2019 14:58	18-Nov-2019 15:00	---	---
				Result	Result	Result	---	---
<b>EG020F: Dissolved Metals by ICP-MS</b>								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	---	---
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	---	---
Barium	7440-39-3	0.001	mg/L	<b>0.034</b>	<0.001	<0.001	---	---
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	---	---
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	---	---
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	<0.001	---	---
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	---	---
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	---	---
Manganese	7439-96-5	0.001	mg/L	<b>0.036</b>	<0.001	<0.001	---	---
Nickel	7440-02-0	0.001	mg/L	<b>0.002</b>	<0.001	<0.001	---	---
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	---	---
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	---	---
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	---	---
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	<0.005	---	---
Iron	7439-89-6	0.05	mg/L	<b>5.90</b>	<0.05	<0.05	---	---
<b>EG035F: Dissolved Mercury by FIMS</b>								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	---	---
<b>EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup</b>								
C10 - C14 Fraction	---	50	µg/L	<50	<50	<50	---	---
C15 - C28 Fraction	---	100	µg/L	<100	<100	<100	---	---
C29 - C36 Fraction	---	50	µg/L	<50	<50	<50	---	---
<sup>^</sup> C10 - C36 Fraction (sum)	---	50	µg/L	<50	<50	<50	---	---
<b>EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup</b>								
>C10 - C16 Fraction	---	100	µg/L	<100	<100	<100	---	---
>C16 - C34 Fraction	---	100	µg/L	<100	<100	<100	---	---
>C34 - C40 Fraction	---	100	µg/L	<100	<100	<100	---	---
<sup>^</sup> >C10 - C40 Fraction (sum)	---	100	µg/L	<100	<100	<100	---	---
>C10 - C16 Fraction minus Naphthalene (F2)	---	100	µg/L	<100	<100	<100	---	---
<b>EP080/071: Total Petroleum Hydrocarbons</b>								
C6 - C9 Fraction	---	20	µg/L	<20	<20	<20	---	---
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b>								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	---	---

## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID		Dup09	Rinsate09	Tripblank09	---	---
		Client sampling date / time		18-Nov-2019 11:03	18-Nov-2019 14:58	18-Nov-2019 15:00	---	---
Compound	CAS Number	LOR	Unit	ES1938033-016	ES1938033-017	ES1938033-018	-----	-----
				Result	Result	Result	---	---
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued</b>								
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	---	---
<b>EP080: BTEXN</b>								
Benzene	71-43-2	1	µg/L	<1	<1	<1	---	---
Toluene	108-88-3	2	µg/L	<2	<2	<2	---	---
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	---	---
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	---	---
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	---	---
^ Total Xylenes	----	2	µg/L	<2	<2	<2	---	---
^ Sum of BTEX	----	1	µg/L	<1	<1	<1	---	---
Naphthalene	91-20-3	5	µg/L	<5	<5	<5	---	---
<b>EP231A: Perfluoroalkyl Sulfonic Acids</b>								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	---	---
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	---	---
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	<0.02	---	---
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	---	---
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	---	---
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	---	---
<b>EP231B: Perfluoroalkyl Carboxylic Acids</b>								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	---	---
Perfluoropentanoic acid (PPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	<0.02	---	---
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	<0.02	---	---
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	---	---
Perfluoroctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	<0.01	---	---
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	---	---
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	---	---
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	---	---

## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID		Dup09	Rinsate09	Tripblank09	---	---
		Client sampling date / time		18-Nov-2019 11:03	18-Nov-2019 14:58	18-Nov-2019 15:00	---	---
Compound	CAS Number	LOR	Unit	ES1938033-016	ES1938033-017	ES1938033-018	-----	-----
				Result	Result	Result	---	---
<b>EP231B: Perfluoroalkyl Carboxylic Acids - Continued</b>								
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	---	---
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	---	---
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	---	---
<b>EP231C: Perfluoroalkyl Sulfonamides</b>								
Perfluorooctane sulfonamide (FOUSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	---	---
N-Methyl perfluorooctane sulfonamide (MeFOUSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	---	---
N-Ethyl perfluorooctane sulfonamide (EtFOUSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	---	---
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	---	---
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	---	---
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	---	---
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	---	---
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids</b>								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	---	---
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	---	---
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	---	---
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	---	---
<b>EP231P: PFAS Sums</b>								
Sum of PFAS	---	0.01	µg/L	<0.01	<0.01	<0.01	---	---
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	---	---

## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID		Dup09	Rinsate09	Tripblank09	----	----
		Client sampling date / time		18-Nov-2019 11:03	18-Nov-2019 14:58	18-Nov-2019 15:00	----	----
Compound	CAS Number	LOR	Unit	ES1938033-016	ES1938033-017	ES1938033-018	-----	-----
				Result	Result	Result	---	---
<b>EP231P: PFAS Sums - Continued</b>								
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	<0.01	----	----
<b>EP080S: TPH(V)/BTEX Surrogates</b>								
1,2-Dichloroethane-D4	17060-07-0	2	%	110	113	112	----	----
Toluene-D8	2037-26-5	2	%	111	107	114	----	----
4-Bromofluorobenzene	460-00-4	2	%	103	105	108	----	----
<b>EP231S: PFAS Surrogate</b>								
13C4-PFOS	----	0.02	%	95.5	93.2	101	----	----
13C8-PFOA	----	0.02	%	101	97.4	97.5	----	----

## Surrogate Control Limits

Sub-Matrix: GROUNDWATER

Compound	CAS Number	Recovery Limits (%)	
		Low	High
<b>EP080S: TPH(V)/BTEX Surrogates</b>			
1,2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128
<b>EP231S: PFAS Surrogate</b>			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: SURFACE WATER

Compound	CAS Number	Recovery Limits (%)	
		Low	High
<b>EP080S: TPH(V)/BTEX Surrogates</b>			
1,2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128
<b>EP231S: PFAS Surrogate</b>			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: WATER

Compound	CAS Number	Recovery Limits (%)	
		Low	High
<b>EP080S: TPH(V)/BTEX Surrogates</b>			
1,2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128
<b>EP231S: PFAS Surrogate</b>			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

## Environment Testing

**Kleinfelder Australia Pty Ltd (NEWC)**  
**95 Mitchell Rd**  
**Cardiff**  
**NSW 2285**



NATA Accredited  
 Accreditation Number 1261  
 Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing  
 The results of the tests, calibrations and/or  
 measurements included in this document are traceable  
 to Australian/national standards.

Attention: Dan Kousbroek

Report 688778-W-V2  
 Project name WILLIAMS SS  
 Project ID 20193820  
 Received Date Nov 19, 2019

<b>Client Sample ID</b>			<b>TRIP09</b>
<b>Sample Matrix</b>			<b>Water</b>
<b>Eurofins Sample No.</b>			<b>S19-No25594</b>
<b>Date Sampled</b>	LOR	Unit	<b>Nov 18, 2019</b>
Test/Reference			
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>			
TRH C6-C9	0.02	mg/L	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05
TRH C15-C28	0.1	mg/L	< 0.1
TRH C29-C36	0.1	mg/L	< 0.1
TRH C10-C36 (Total)	0.1	mg/L	< 0.1
<b>BTEX</b>			
Benzene	0.001	mg/L	< 0.001
Toluene	0.001	mg/L	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002
o-Xylene	0.001	mg/L	< 0.001
Xylenes - Total	0.003	mg/L	< 0.003
4-Bromofluorobenzene (surr.)	1	%	107
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>			
Naphthalene <sup>N02</sup>	0.01	mg/L	< 0.01
TRH C6-C10	0.02	mg/L	< 0.02
TRH C6-C10 less BTEX (F1) <sup>N04</sup>	0.02	mg/L	< 0.02
TRH >C10-C16	0.05	mg/L	< 0.05
TRH >C10-C16 less Naphthalene (F2) <sup>N01</sup>	0.05	mg/L	< 0.05
TRH >C16-C34	0.1	mg/L	< 0.1
TRH >C34-C40	0.1	mg/L	< 0.1
TRH >C10-C40 (total)*	0.1	mg/L	< 0.1
<b>TRH - 2013 NEPM Fractions (after silica gel clean-up)</b>			
TRH >C10-C16 (after silica gel clean-up)	0.05	mg/L	< 0.05
TRH >C16-C34 (after silica gel clean-up)	0.1	mg/L	< 0.1
TRH >C34-C40 (after silica gel clean-up)	0.1	mg/L	< 0.1
<b>TRH - 1999 NEPM Fractions (after silica gel clean-up)</b>			
TRH C10-C36 (Total) (after silica gel clean-up)	0.1	mg/L	< 0.1
TRH C10-C14 (after silica gel clean-up)	0.05	mg/L	< 0.05
TRH C15-C28 (after silica gel clean-up)	0.1	mg/L	< 0.1
TRH C29-C36 (after silica gel clean-up)	0.1	mg/L	< 0.1
Chromium (hexavalent)	0.005	mg/L	< 0.005
Chromium (trivalent filtered)	0.005	mg/L	< 0.005

<b>Client Sample ID</b>			<b>TRIP09</b>
<b>Sample Matrix</b>			<b>Water</b>
<b>Eurofins Sample No.</b>			<b>S19-No25594</b>
<b>Date Sampled</b>			<b>Nov 18, 2019</b>
Test/Reference	LOR	Unit	
<b>Heavy Metals</b>			
Arsenic (filtered)	0.001	mg/L	< 0.001
Barium (filtered)	0.02	mg/L	0.04
Beryllium (filtered)	0.001	mg/L	< 0.001
Boron (filtered)	0.05	mg/L	< 0.05
Cadmium (filtered)	0.0002	mg/L	< 0.0002
Chromium (filtered)	0.001	mg/L	< 0.001
Cobalt (filtered)	0.001	mg/L	< 0.001
Copper (filtered)	0.001	mg/L	0.010
Lead (filtered)	0.001	mg/L	< 0.001
Manganese (filtered)	0.005	mg/L	0.035
Mercury (filtered)	0.0001	mg/L	< 0.0001
Nickel (filtered)	0.001	mg/L	0.007
Vanadium (filtered)	0.005	mg/L	< 0.005
Zinc (filtered)	0.005	mg/L	0.033
<b>Perfluoroalkyl carboxylic acids (PFCAs)</b>			
Perfluorobutanoic acid (PFBA) <sup>N11</sup>	0.05	ug/L	< 0.05
Perfluoropentanoic acid (PFPeA) <sup>N11</sup>	0.01	ug/L	< 0.01
Perfluorohexanoic acid (PFHxA) <sup>N11</sup>	0.01	ug/L	< 0.01
Perfluoroheptanoic acid (PFHpA) <sup>N11</sup>	0.01	ug/L	< 0.01
Perfluorooctanoic acid (PFOA) <sup>N11</sup>	0.01	ug/L	< 0.01
Perfluorononanoic acid (PFNA) <sup>N11</sup>	0.01	ug/L	< 0.01
Perfluorodecanoic acid (PFDA) <sup>N11</sup>	0.01	ug/L	< 0.01
Perfluoroundecanoic acid (PFDuDA) <sup>N11</sup>	0.01	ug/L	< 0.01
Perfluorododecanoic acid (PFDoDA) <sup>N11</sup>	0.01	ug/L	< 0.01
Perfluorotridecanoic acid (PFTrDA) <sup>N15</sup>	0.01	ug/L	< 0.01
Perfluorotetradecanoic acid (PFTeDA) <sup>N11</sup>	0.01	ug/L	< 0.01
13C4-PFBA (surr.)	1	%	81
13C5-PFPeA (surr.)	1	%	77
13C5-PFHxA (surr.)	1	%	92
13C4-PFHxA (surr.)	1	%	126
13C8-PFOA (surr.)	1	%	128
13C5-PFNA (surr.)	1	%	149
13C6-PFDA (surr.)	1	%	138
13C2-PFUnDA (surr.)	1	%	127
13C2-PFDoDA (surr.)	1	%	100
13C2-PFTeDA (surr.)	1	%	42
<b>Perfluoroalkyl sulfonamido substances</b>			
Perfluorooctane sulfonamide (FOSA) <sup>N11</sup>	0.05	ug/L	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) <sup>N11</sup>	0.05	ug/L	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) <sup>N11</sup>	0.05	ug/L	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE) <sup>N11</sup>	0.05	ug/L	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE) <sup>N11</sup>	0.05	ug/L	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) <sup>N11</sup>	0.05	ug/L	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) <sup>N11</sup>	0.05	ug/L	< 0.05
13C8-FOSA (surr.)	1	%	97
D3-N-MeFOSA (surr.)	1	%	54

<b>Client Sample ID</b>			<b>TRIP09</b>
<b>Sample Matrix</b>			<b>Water</b>
<b>Eurofins Sample No.</b>			<b>S19-No25594</b>
<b>Date Sampled</b>			<b>Nov 18, 2019</b>
Test/Reference	LOR	Unit	
<b>Perfluoroalkyl sulfonamido substances</b>			
D5-N-EtFOSA (surr.)	1	%	72
D7-N-MeFOSE (surr.)	1	%	83
D9-N-EtFOSE (surr.)	1	%	66
D5-N-EtFOSAA (surr.)	1	%	50
D3-N-MeFOSAA (surr.)	1	%	43
<b>Perfluoroalkyl sulfonic acids (PFASs)</b>			
Perfluorobutanesulfonic acid (PFBS) <sup>N11</sup>	0.01	ug/L	< 0.01
Perfluorononanesulfonic acid (PFNS) <sup>N15</sup>	0.01	ug/L	< 0.01
Perfluoropropanesulfonic acid (PFPrS) <sup>N15</sup>	0.01	ug/L	< 0.01
Perfluoropentanesulfonic acid (PFPeS) <sup>N15</sup>	0.01	ug/L	< 0.01
Perfluorohexanesulfonic acid (PFHxS) <sup>N11</sup>	0.01	ug/L	< 0.01
Perfluoroheptanesulfonic acid (PFHpS) <sup>N15</sup>	0.01	ug/L	< 0.01
Perfluoroctanesulfonic acid (PFOS) <sup>N11</sup>	0.01	ug/L	< 0.01
Perfluorodecanesulfonic acid (PFDS) <sup>N15</sup>	0.01	ug/L	< 0.01
13C3-PFBS (surr.)	1	%	103
18O2-PFHxS (surr.)	1	%	149
13C8-PFOS (surr.)	1	%	138
<b>n:2 Fluorotelomer sulfonic acids (n:2 FTASs)</b>			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA) <sup>N11</sup>	0.01	ug/L	< 0.01
1H.1H.2H.2H-perfluoroctanesulfonic acid (6:2 FTSA) <sup>N11</sup>	0.05	ug/L	< 0.05
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA) <sup>N11</sup>	0.01	ug/L	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA) <sup>N15</sup>	0.01	ug/L	< 0.01
13C2-4:2 FTSA (surr.)	1	%	62
13C2-6:2 FTSA (surr.)	1	%	95
13C2-8:2 FTSA (surr.)	1	%	82
<b>PFASs Summations</b>			
Sum (PFHxS + PFOS)*	0.01	ug/L	< 0.01
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	< 0.01
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	< 0.01
Sum of WA DWER PFAS (n=10)*	0.05	ug/L	< 0.05
Sum of PFASs (n=30)*	0.1	ug/L	< 0.1

**Sample History**

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.  
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Eurofins   mgt Suite B1			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Melbourne	Nov 20, 2019	7 Days
BTEX - Method: LTM-ORG-2010 TRH C6-C40	Melbourne	Nov 20, 2019	14 Days
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Melbourne	Nov 20, 2019	7 Days
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Melbourne	Nov 20, 2019	
TRH - 2013 NEPM Fractions (after silica gel clean-up) - Method: LTM-ORG-2010 TRH C6-C40	Melbourne	Nov 20, 2019	7 Days
TRH - 1999 NEPM Fractions (after silica gel clean-up) - Method: TRH C6-C36 (Silica Gel Cleanup) - MGT 100A	Melbourne	Nov 20, 2019	7 Days
Chromium (hexavalent) - Method: Cr (VI) by MGT 1170A	Melbourne	Nov 20, 2019	28 Days
Metals M8 filtered - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Melbourne	Nov 20, 2019	28 Days
Heavy Metals (filtered) - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Melbourne	Nov 20, 2019	180 Days
Per- and Polyfluoroalkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs) - Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)	Brisbane	Nov 20, 2019	14 Days
Perfluoroalkyl sulfonamido substances - Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)	Brisbane	Nov 20, 2019	14 Days
Perfluoroalkyl sulfonic acids (PFSAs) - Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)	Brisbane	Nov 20, 2019	14 Days
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs) - Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)	Brisbane	Nov 20, 2019	14 Days

<b>Company Name:</b>	Kleinfelder Aust Pty Ltd (NEWCASTLE)	<b>Order No.:</b>		<b>Received:</b>	Nov 19, 2019 1:47 PM
<b>Address:</b>	95 Mitchell Rd Cardiff NSW 2285	<b>Report #:</b>	688778	<b>Due:</b>	Nov 26, 2019
<b>Project Name:</b>	WILLIAMTOWN SS	<b>Phone:</b>	02 4949 5200	<b>Priority:</b>	5 Day
<b>Project ID:</b>	20193820	<b>Fax:</b>		<b>Contact Name:</b>	Dan Kousbroek
<b>Eurofins Analytical Services Manager : Andrew Black</b>					

**Sample Detail**
**Melbourne Laboratory - NATA Site # 1254 & 14271**
**Sydney Laboratory - NATA Site # 18217**
**Brisbane Laboratory - NATA Site # 20794**
**Perth Laboratory - NATA Site # 23736**
**External Laboratory**

No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID	Per- and Polyfluoroalkyl Substances (PFASs)	NEPM 1999 Metals : Metals M15 (Filtered)	Eurofins   ngt Suite B1	TRH (after Silica Gel cleanup)	Metals MB filtered
1	TRIP09	Nov 18, 2019		Water	S19-No25594	X	X	X	X	X
<b>Test Counts</b>						1	1	1	1	1

## Internal Quality Control Review and Glossary

### General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

### Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

**\*\*NOTE:** pH duplicates are reported as a range NOT as RPD

### Units

**mg/kg:** milligrams per kilogram

**mg/L:** milligrams per litre

**ug/L:** micrograms per litre

**ppm:** Parts per million

**ppb:** Parts per billion

**%:** Percentage

**org/100mL:** Organisms per 100 millilitres

**NTU:** Nephelometric Turbidity Units

**MPN/100mL:** Most Probable Number of organisms per 100 millilitres

### Terms

<b>Dry</b>	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
<b>LOR</b>	Limit of Reporting.
<b>SPIKE</b>	Addition of the analyte to the sample and reported as percentage recovery.
<b>RPD</b>	Relative Percent Difference between two Duplicate pieces of analysis.
<b>LCS</b>	Laboratory Control Sample - reported as percent recovery.
<b>CRM</b>	Certified Reference Material - reported as percent recovery.
<b>Method Blank</b>	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
<b>Surr - Surrogate</b>	The addition of a like compound to the analyte target and reported as percentage recovery.
<b>Duplicate</b>	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
<b>USEPA</b>	United States Environmental Protection Agency
<b>APHA</b>	American Public Health Association
<b>TCLP</b>	Toxicity Characteristic Leaching Procedure
<b>COC</b>	Chain of Custody
<b>SRA</b>	Sample Receipt Advice
<b>QSM</b>	US Department of Defense Quality Systems Manual Version 5.3
<b>CP</b>	Client Parent - QC was performed on samples pertaining to this report
<b>NCP</b>	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
<b>TEQ</b>	Toxic Equivalency Quotient

### QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

### QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash "-" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

**Quality Control Results**

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
<b>Method Blank</b>							
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>							
TRH C6-C9	mg/L	< 0.02			0.02	Pass	
TRH C10-C14	mg/L	< 0.05			0.05	Pass	
TRH C15-C28	mg/L	< 0.1			0.1	Pass	
TRH C29-C36	mg/L	< 0.1			0.1	Pass	
<b>Method Blank</b>							
<b>BTEX</b>							
Benzene	mg/L	< 0.001			0.001	Pass	
Toluene	mg/L	< 0.001			0.001	Pass	
Ethylbenzene	mg/L	< 0.001			0.001	Pass	
m&p-Xylenes	mg/L	< 0.002			0.002	Pass	
o-Xylene	mg/L	< 0.001			0.001	Pass	
Xylenes - Total	mg/L	< 0.003			0.003	Pass	
<b>Method Blank</b>							
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>							
Naphthalene	mg/L	< 0.01			0.01	Pass	
TRH C6-C10	mg/L	< 0.02			0.02	Pass	
TRH >C10-C16	mg/L	< 0.05			0.05	Pass	
TRH >C16-C34	mg/L	< 0.1			0.1	Pass	
TRH >C34-C40	mg/L	< 0.1			0.1	Pass	
<b>Method Blank</b>							
<b>TRH - 2013 NEPM Fractions (after silica gel clean-up)</b>							
TRH >C10-C16 (after silica gel clean-up)	mg/L	< 0.05			0.05	Pass	
TRH >C16-C34 (after silica gel clean-up)	mg/L	< 0.1			0.1	Pass	
TRH >C34-C40 (after silica gel clean-up)	mg/L	< 0.1			0.1	Pass	
<b>Method Blank</b>							
<b>TRH - 1999 NEPM Fractions (after silica gel clean-up)</b>							
TRH C10-C14 (after silica gel clean-up)	mg/L	< 0.05			0.05	Pass	
TRH C15-C28 (after silica gel clean-up)	mg/L	< 0.1			0.1	Pass	
TRH C29-C36 (after silica gel clean-up)	mg/L	< 0.1			0.1	Pass	
<b>Method Blank</b>							
Chromium (hexavalent)	mg/L	< 0.005			0.005	Pass	
<b>Method Blank</b>							
<b>Heavy Metals</b>							
Arsenic (filtered)	mg/L	< 0.001			0.001	Pass	
Barium (filtered)	mg/L	< 0.02			0.02	Pass	
Beryllium (filtered)	mg/L	< 0.001			0.001	Pass	
Boron (filtered)	mg/L	< 0.05			0.05	Pass	
Cadmium (filtered)	mg/L	< 0.0002			0.0002	Pass	
Chromium (filtered)	mg/L	< 0.001			0.001	Pass	
Cobalt (filtered)	mg/L	< 0.001			0.001	Pass	
Copper (filtered)	mg/L	< 0.001			0.001	Pass	
Lead (filtered)	mg/L	< 0.001			0.001	Pass	
Manganese (filtered)	mg/L	< 0.005			0.005	Pass	
Mercury (filtered)	mg/L	< 0.0001			0.0001	Pass	
Nickel (filtered)	mg/L	< 0.001			0.001	Pass	
Vanadium (filtered)	mg/L	< 0.005			0.005	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
<b>Method Blank</b>							
<b>Perfluoroalkyl carboxylic acids (PFCAs)</b>							
Perfluorobutanoic acid (PFBA)	ug/L	< 0.05			0.05	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluoropentanoic acid (PFPeA)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanoic acid (PFHxA)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanoic acid (PFOA)	ug/L	< 0.01			0.01	Pass	
Perfluorononanoic acid (PFNA)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanoic acid (PFDA)	ug/L	< 0.01			0.01	Pass	
Perfluoroundecanoic acid (PFUnDA)	ug/L	< 0.01			0.01	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotridecanoic acid (PFTrDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/L	< 0.01			0.01	Pass	
<b>Method Blank</b>							
<b>Perfluoroalkyl sulfonamido substances</b>							
Perfluorooctane sulfonamide (FOSA)	ug/L	< 0.05			0.05	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/L	< 0.05			0.05	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/L	< 0.05			0.05	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	ug/L	< 0.05			0.05	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	ug/L	< 0.05			0.05	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/L	< 0.05			0.05	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/L	< 0.05			0.05	Pass	
<b>Method Blank</b>							
<b>Perfluoroalkyl sulfonic acids (PFSAs)</b>							
Perfluorobutanesulfonic acid (PFBS)	ug/L	< 0.01			0.01	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/L	< 0.01			0.01	Pass	
Perfluoropropanesulfonic acid (PPrS)	ug/L	< 0.01			0.01	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/L	< 0.01			0.01	Pass	
Perfluoroctanesulfonic acid (PFOS)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/L	< 0.01			0.01	Pass	
<b>Method Blank</b>							
<b>n:2 Fluorotelomer sulfonic acids (n:2 FTSA)</b>							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluoroctanesulfonic acid (6:2 FTSA)	ug/L	< 0.05			0.05	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/L	< 0.01			0.01	Pass	
<b>LCS - % Recovery</b>							
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>							
TRH C6-C9	%	117			70-130	Pass	
TRH C10-C14	%	116			70-130	Pass	
<b>LCS - % Recovery</b>							
<b>BTEX</b>							
Benzene	%	105			70-130	Pass	
Toluene	%	110			70-130	Pass	
Ethylbenzene	%	113			70-130	Pass	
m&p-Xylenes	%	111			70-130	Pass	
Xylenes - Total	%	112			70-130	Pass	
<b>LCS - % Recovery</b>							
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>							
Naphthalene	%	87			70-130	Pass	
TRH C6-C10	%	121			70-130	Pass	
TRH >C10-C16	%	109			70-130	Pass	
<b>LCS - % Recovery</b>							
<b>TRH - 2013 NEPM Fractions (after silica gel clean-up)</b>							
TRH >C10-C16 (after silica gel clean-up)	%	121			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code	
<b>LCS - % Recovery</b>								
<b>TRH - 1999 NEPM Fractions (after silica gel clean-up)</b>								
TRH C10-C14 (after silica gel clean-up)	%	129			70-130	Pass		
<b>LCS - % Recovery</b>								
Chromium (hexavalent)	%	94			70-130	Pass		
<b>LCS - % Recovery</b>								
<b>Perfluoroalkyl carboxylic acids (PFCAs)</b>								
Perfluorobutanoic acid (PFBA)	%	106			50-150	Pass		
Perfluoropentanoic acid (PFPeA)	%	117			50-150	Pass		
Perfluorohexanoic acid (PFHxA)	%	136			50-150	Pass		
Perfluoroheptanoic acid (PFHpA)	%	92			50-150	Pass		
Perfluoroctanoic acid (PFOA)	%	91			50-150	Pass		
Perfluorononanoic acid (PFNA)	%	106			50-150	Pass		
Perfluorodecanoic acid (PFDA)	%	104			50-150	Pass		
Perfluoroundecanoic acid (PFUnDA)	%	99			50-150	Pass		
Perfluorododecanoic acid (PFDDoDA)	%	100			50-150	Pass		
Perfluorotridecanoic acid (PFTrDA)	%	76			50-150	Pass		
Perfluorotetradecanoic acid (PFTeDA)	%	111			50-150	Pass		
<b>LCS - % Recovery</b>								
<b>Perfluoroalkyl sulfonamido substances</b>								
Perfluoroctane sulfonamide (FOSA)	%	85			50-150	Pass		
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	81			50-150	Pass		
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	81			50-150	Pass		
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	%	85			50-150	Pass		
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	%	100			50-150	Pass		
N-ethyl-perfluoroctanesulfonamidoacetic acid (N-EtFOSAA)	%	77			50-150	Pass		
N-methyl-perfluoroctanesulfonamidoacetic acid (N-MeFOSAA)	%	106			50-150	Pass		
<b>LCS - % Recovery</b>								
<b>Perfluoroalkyl sulfonic acids (PFSAs)</b>								
Perfluorobutanesulfonic acid (PFBS)	%	87			50-150	Pass		
Perfluoronananesulfonic acid (PFNS)	%	87			50-150	Pass		
Perfluoropropanesulfonic acid (PFPrS)	%	93			50-150	Pass		
Perfluoropentanesulfonic acid (PFPeS)	%	106			50-150	Pass		
Perfluorohexanesulfonic acid (PFHxS)	%	87			50-150	Pass		
Perfluoroheptanesulfonic acid (PFHpS)	%	70			50-150	Pass		
Perfluoroctanesulfonic acid (PFOS)	%	91			50-150	Pass		
Perfluorodecanesulfonic acid (PFDS)	%	78			50-150	Pass		
<b>LCS - % Recovery</b>								
<b>n:2 Fluorotelomer sulfonic acids (n:2 FTSA)</b>								
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	%	108			50-150	Pass		
1H.1H.2H.2H-perfluoroctanesulfonic acid (6:2 FTSA)	%	105			50-150	Pass		
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	%	144			50-150	Pass		
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	%	78			50-150	Pass		
Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
<b>Spike - % Recovery</b>								
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>			Result 1					
TRH C10-C14	M19-No30667	NCP	%	96		70-130	Pass	
<b>Spike - % Recovery</b>								
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>			Result 1					
TRH >C10-C16	M19-No30667	NCP	%	92		70-130	Pass	
<b>Spike - % Recovery</b>								
Chromium (hexavalent)	S19-No25594	CP	%	77		70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
<b>Spike - % Recovery</b>									
<b>Heavy Metals</b>									
Arsenic (filtered)	S19-No25942	NCP	%	88			70-130	Pass	
Barium (filtered)	S19-No25942	NCP	%	75			75-125	Pass	
Beryllium (filtered)	S19-No25942	NCP	%	86			75-125	Pass	
Boron (filtered)	S19-No25942	NCP	%	83			75-125	Pass	
Cadmium (filtered)	S19-No25942	NCP	%	96			70-130	Pass	
Chromium (filtered)	S19-No25942	NCP	%	91			70-130	Pass	
Cobalt (filtered)	S19-No25942	NCP	%	93			75-125	Pass	
Copper (filtered)	S19-No25942	NCP	%	94			70-130	Pass	
Lead (filtered)	S19-No25942	NCP	%	93			70-130	Pass	
Manganese (filtered)	S19-No25942	NCP	%	92			70-130	Pass	
Mercury (filtered)	S19-No25942	NCP	%	83			70-130	Pass	
Nickel (filtered)	S19-No25942	NCP	%	92			70-130	Pass	
Vanadium (filtered)	S19-No25942	NCP	%	93			75-125	Pass	
Zinc (filtered)	S19-No25942	NCP	%	87			70-130	Pass	
<b>Spike - % Recovery</b>									
<b>Perfluoroalkyl carboxylic acids (PFCAs)</b>									
Perfluorobutanoic acid (PFBA)	M19-No22937	NCP	%	122			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	M19-No22937	NCP	%	110			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	M19-No22937	NCP	%	132			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	M19-No22937	NCP	%	91			50-150	Pass	
Perfluoroctanoic acid (PFOA)	M19-No22937	NCP	%	89			50-150	Pass	
Perfluorononanoic acid (PFNA)	M19-No22937	NCP	%	106			50-150	Pass	
Perfluorodecanoic acid (PFDA)	M19-No22937	NCP	%	102			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	M19-No22937	NCP	%	95			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	M19-No22937	NCP	%	92			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	M19-No22937	NCP	%	53			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M19-No22937	NCP	%	108			50-150	Pass	
<b>Spike - % Recovery</b>									
<b>Perfluoroalkyl sulfonamido substances</b>									
Perfluoroctane sulfonamide (FOSA)	M19-No22937	NCP	%	87			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M19-No22937	NCP	%	79			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M19-No22937	NCP	%	64			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	M19-No22937	NCP	%	83			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	M19-No22937	NCP	%	92			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M19-No22937	NCP	%	82			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M19-No22937	NCP	%	98			50-150	Pass	
<b>Spike - % Recovery</b>									
<b>Perfluoroalkyl sulfonic acids (PFSAs)</b>									
Perfluorobutanesulfonic acid (PFBS)	M19-No22937	NCP	%	100			50-150	Pass	
Perfluoronananesulfonic acid (PFNS)	M19-No22937	NCP	%	83			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	M19-No22937	NCP	%	93			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluoropentanesulfonic acid (PFPeS)	M19-No22937	NCP	%	108			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	M19-No22937	NCP	%	94			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHps)	M19-No22937	NCP	%	73			50-150	Pass	
Perfluoroctanesulfonic acid (PFOS)	M19-No22937	NCP	%	77			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	M19-No22937	NCP	%	60			50-150	Pass	
<b>Spike - % Recovery</b>									
<b>n:2 Fluorotelomer sulfonic acids (n:2 FTSA)</b>					Result 1				
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	M19-No22937	NCP	%	106			50-150	Pass	
1H.1H.2H.2H-perfluoroctanesulfonic acid (6:2 FTSA)	M19-No22937	NCP	%	101			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	M19-No22937	NCP	%	141			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	M19-No22937	NCP	%	55			50-150	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
<b>Duplicate</b>									
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>					Result 1	Result 2	RPD		
TRH C6-C9	S19-No27160	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH C10-C14	B19-No30370	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH C15-C28	B19-No30370	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH C29-C36	B19-No30370	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
<b>Duplicate</b>									
<b>BTEX</b>					Result 1	Result 2	RPD		
Benzene	S19-No27160	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Toluene	S19-No27160	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Ethylbenzene	S19-No27160	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
m&p-Xylenes	S19-No27160	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
o-Xylene	S19-No27160	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Xylenes - Total	S19-No27160	NCP	mg/L	< 0.003	< 0.003	<1	30%	Pass	
<b>Duplicate</b>									
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>					Result 1	Result 2	RPD		
Naphthalene	S19-No27160	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
TRH C6-C10	S19-No27160	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH >C10-C16	B19-No30370	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH >C16-C34	B19-No30370	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH >C34-C40	B19-No30370	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
<b>Duplicate</b>									
					Result 1	Result 2	RPD		
Chromium (hexavalent)	M19-No28046	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
<b>Duplicate</b>									
<b>Heavy Metals</b>					Result 1	Result 2	RPD		
Arsenic (filtered)	S19-No25942	NCP	mg/L	0.003	0.003	1.0	30%	Pass	
Barium (filtered)	S19-No25942	NCP	mg/L	0.10	0.12	10	30%	Pass	
Beryllium (filtered)	S19-No25942	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Boron (filtered)	S19-No25942	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Cadmium (filtered)	S19-No25942	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium (filtered)	S19-No25942	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cobalt (filtered)	S19-No25942	NCP	mg/L	0.004	0.004	11	30%	Pass	

Duplicate								
<b>Heavy Metals</b>								
Copper (filtered)	S19-No25942	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Lead (filtered)	S19-No25942	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Manganese (filtered)	S19-No25942	NCP	mg/L	0.012	0.013	10	30%	Pass
Mercury (filtered)	S19-No25942	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass
Nickel (filtered)	S19-No25942	NCP	mg/L	0.005	0.005	12	30%	Pass
Vanadium (filtered)	S19-No25942	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Zinc (filtered)	S19-No25942	NCP	mg/L	0.029	0.031	7.0	30%	Pass
<b>Duplicate</b>								
<b>Perfluoroalkyl carboxylic acids (PFCAs)</b>								
Perfluorobutanoic acid (PFBA)	M19-No22673	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
Perfluoropentanoic acid (PFPeA)	M19-No22673	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorohexanoic acid (PFHxA)	M19-No22673	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoroheptanoic acid (PFHpA)	M19-No22673	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoroctanoic acid (PFOA)	M19-No22673	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorononanoic acid (PFNA)	M19-No22673	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorodecanoic acid (PFDA)	M19-No22673	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoroundecanoic acid (PFUnDA)	M19-No22673	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorododecanoic acid (PFDoDA)	M19-No22673	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorotridecanoic acid (PFTrDA)	M19-No22673	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorotetradecanoic acid (PFTeDA)	M19-No22673	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
<b>Duplicate</b>								
<b>Perfluoroalkyl sulfonamido substances</b>								
Perfluoroctane sulfonamide (FOSA)	M19-No22673	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M19-No22673	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M19-No22673	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	M19-No22673	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	M19-No22673	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-ethyl-perfluoroctanesulfonamidoacetic acid (N-EtFOSAA)	M19-No22673	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-methyl-perfluoroctanesulfonamidoacetic acid (N-MeFOSAA)	M19-No22673	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
<b>Duplicate</b>								
<b>Perfluoroalkyl sulfonic acids (PFSAs)</b>								
Perfluorobutanesulfonic acid (PFBS)	M19-No22673	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoronananesulfonic acid (PFNS)	M19-No22673	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoropropanesulfonic acid (PFPrS)	M19-No22673	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoropentanesulfonic acid (PFPeS)	M19-No22673	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorohexanesulfonic acid (PFHxS)	M19-No22673	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoroheptanesulfonic acid (PFHpS)	M19-No22673	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoroctanesulfonic acid (PFOS)	M19-No22673	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorodecanesulfonic acid (PFDS)	M19-No22673	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass

Duplicate								
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1	Result 2	RPD		
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	M19-No22673	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
1H.1H.2H.2H-perfluoroctanesulfonic acid (6:2 FTSA)	M19-No22673	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	M19-No22673	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	M19-No22673	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass

**Comments**

New version with amendments to fix the matrix type.

**Sample Integrity**

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

**Qualifier Codes/Comments**

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.
N15	Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).

**Authorised By**

Andrew Black	Analytical Services Manager
Bryan Wilson	Senior Analyst-PFAS (QLD)
Emily Rosenberg	Senior Analyst-Metal (VIC)
Harry Bacalis	Senior Analyst-Volatile (VIC)
Joseph Edouard	Senior Analyst-Organic (VIC)
Julie Kay	Senior Analyst-Inorganic (VIC)



**Glenn Jackson**  
**General Manager**

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

\* Indicates NATA accreditation does not cover the performance of this service

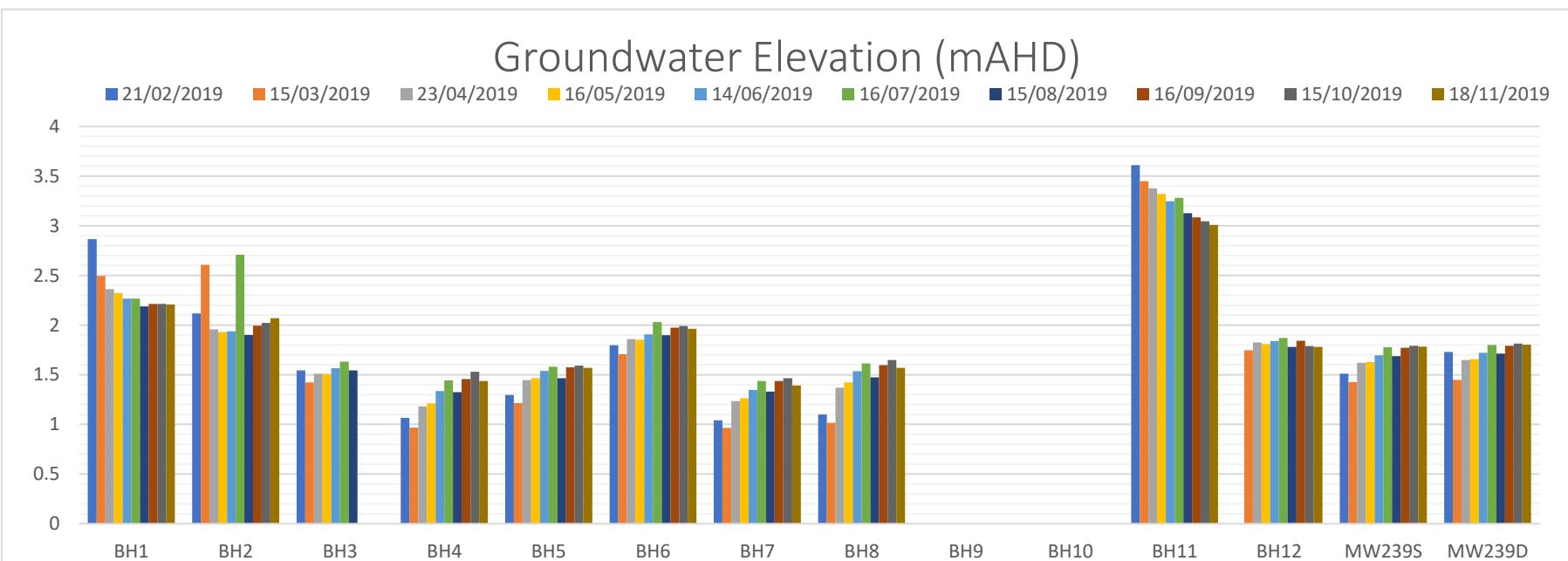
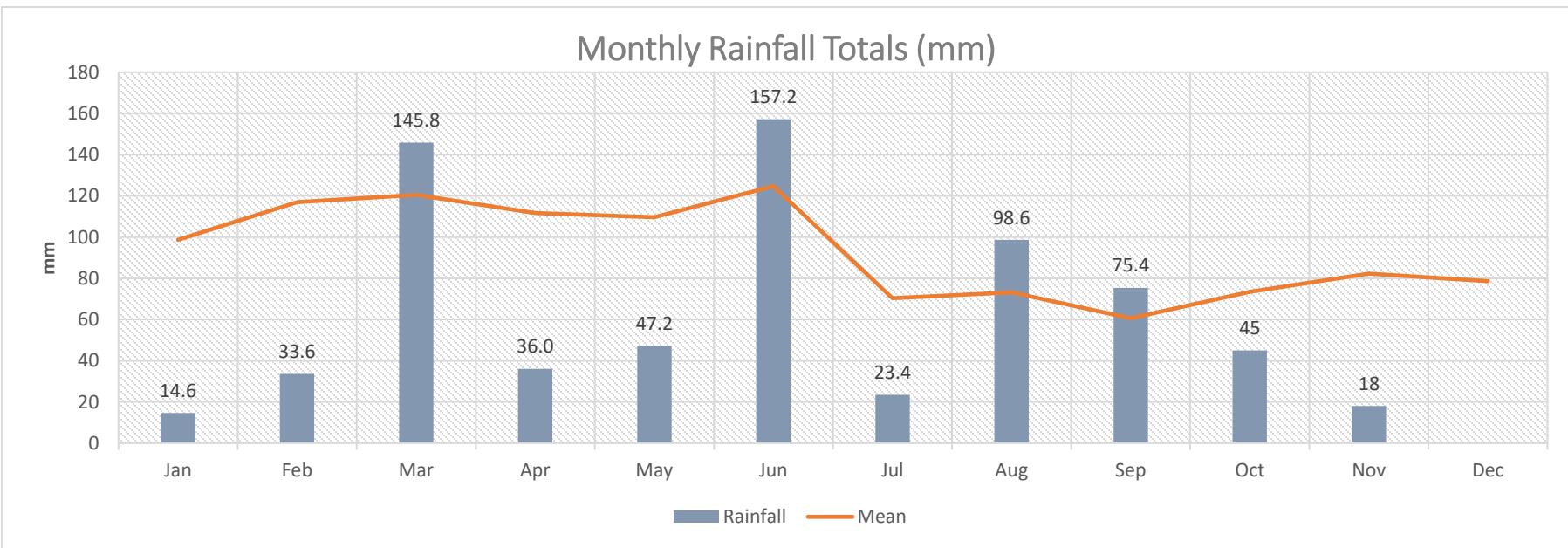
Measurement uncertainty of test data is available on request or please [click here](#).

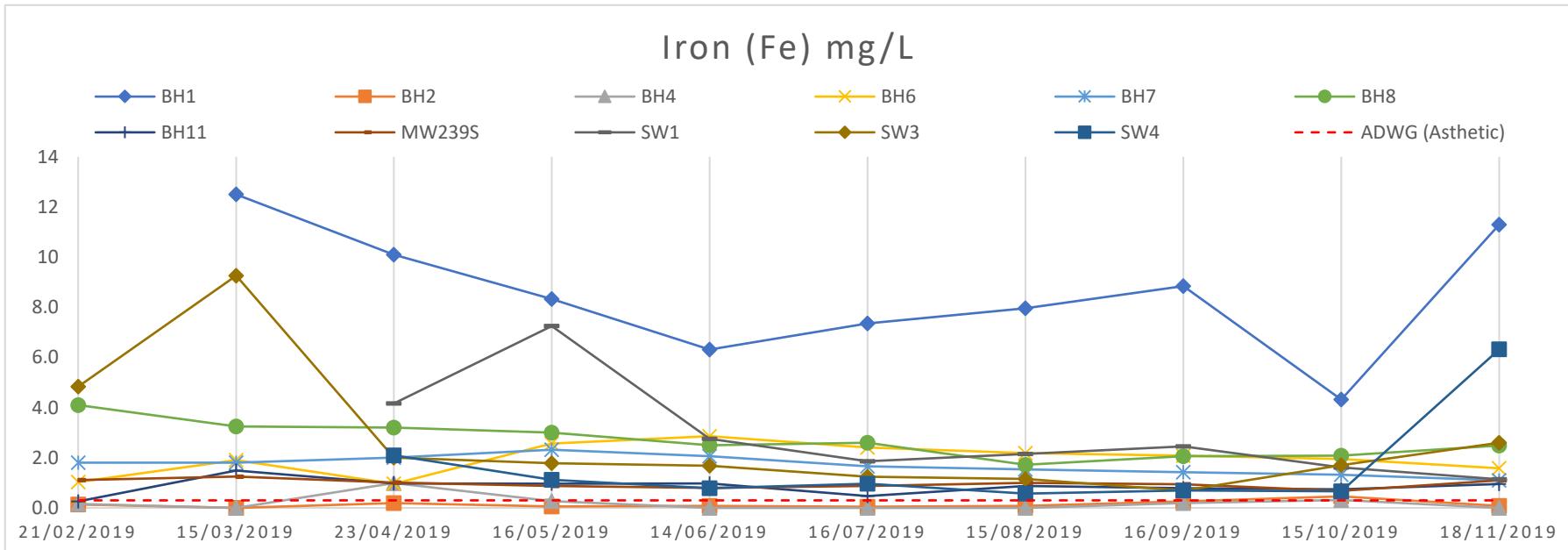
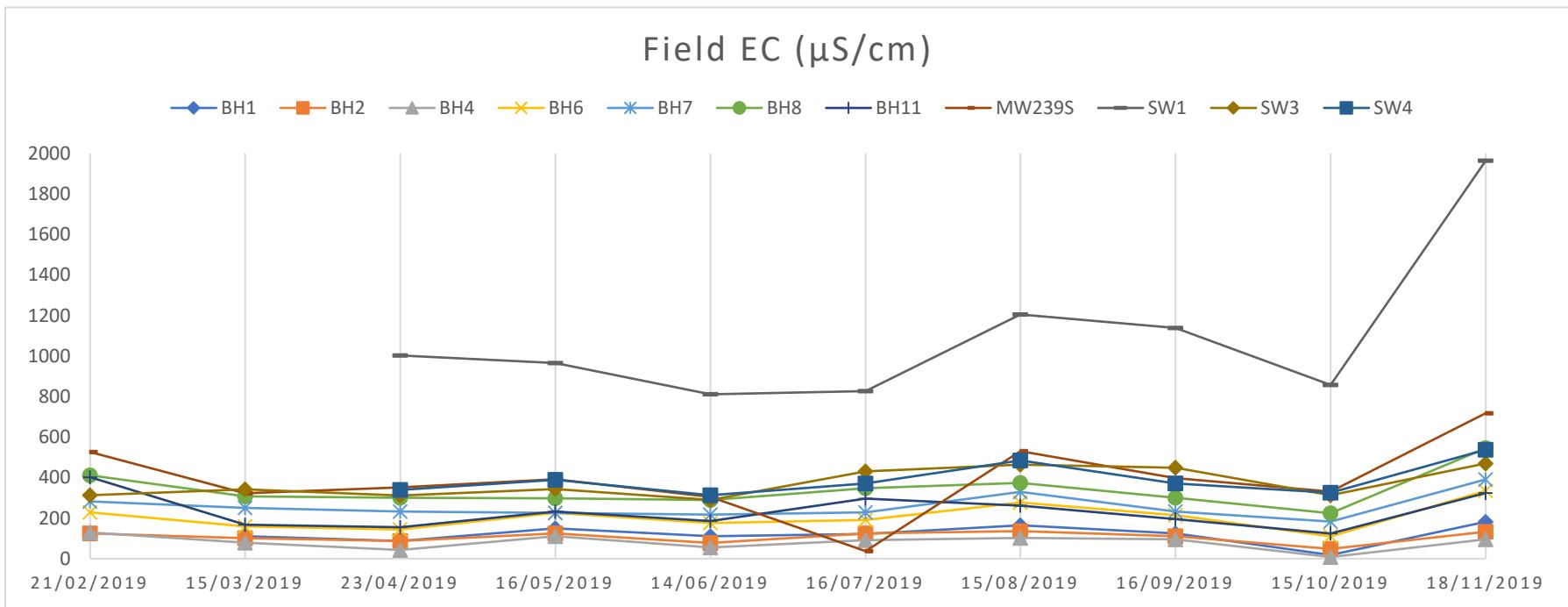
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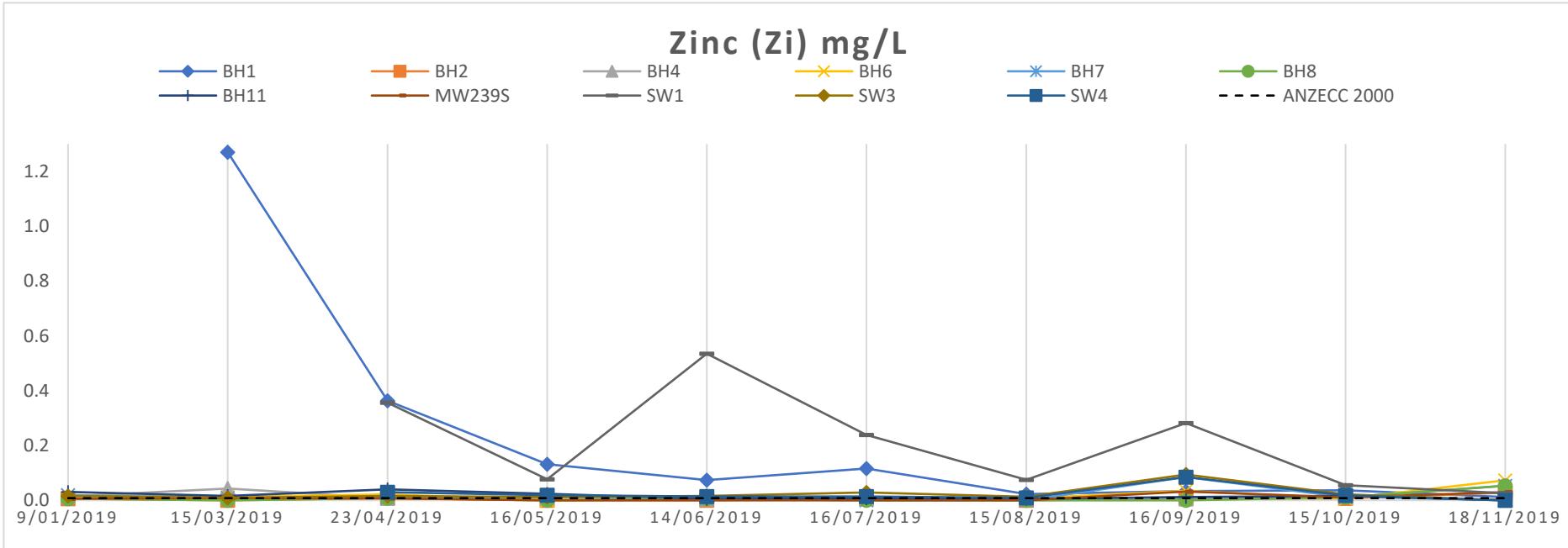
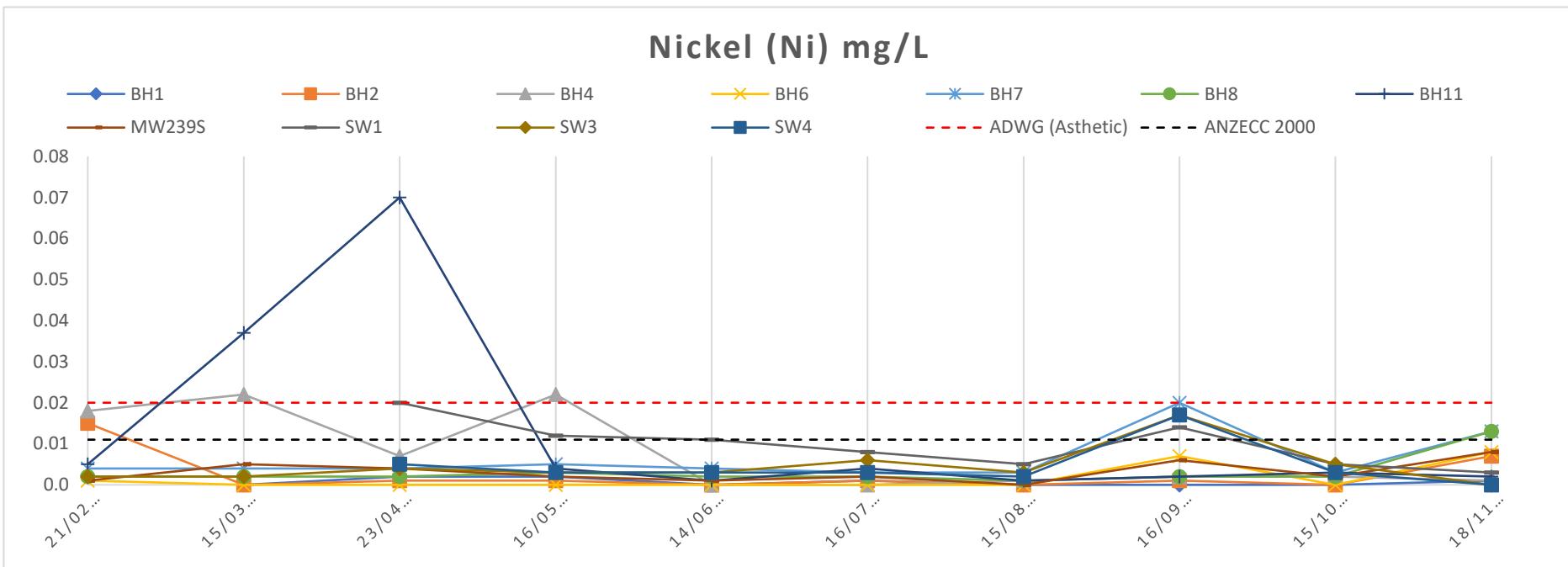


## ATTACHMENT B: TREND DATA

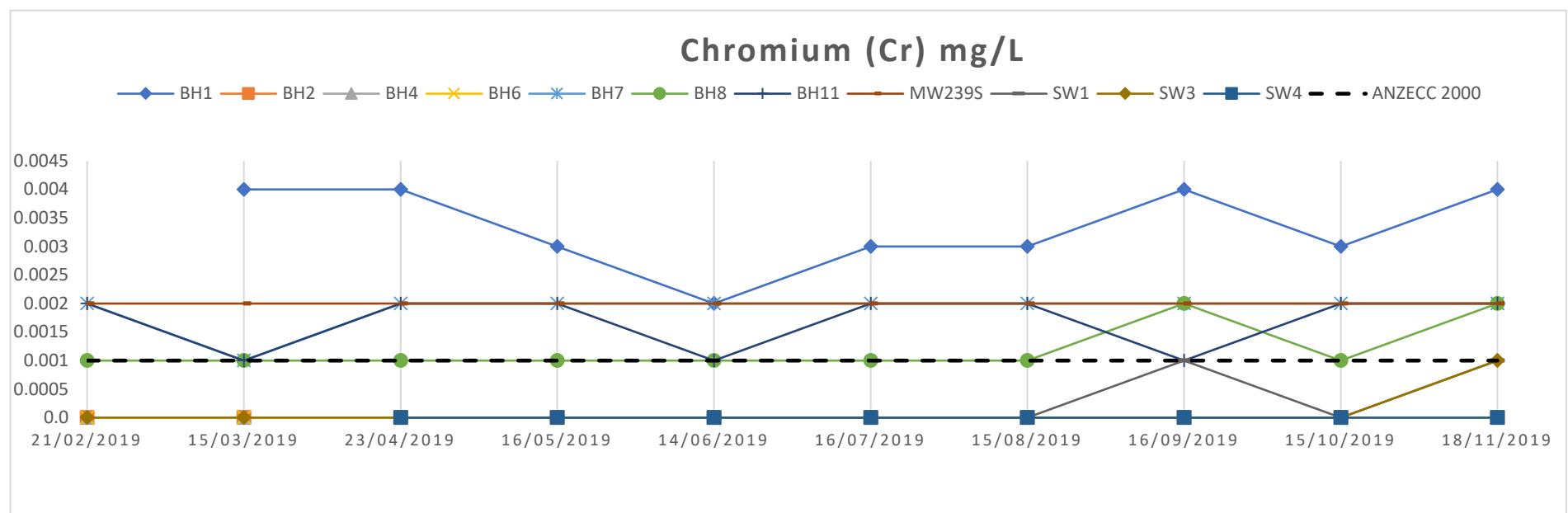
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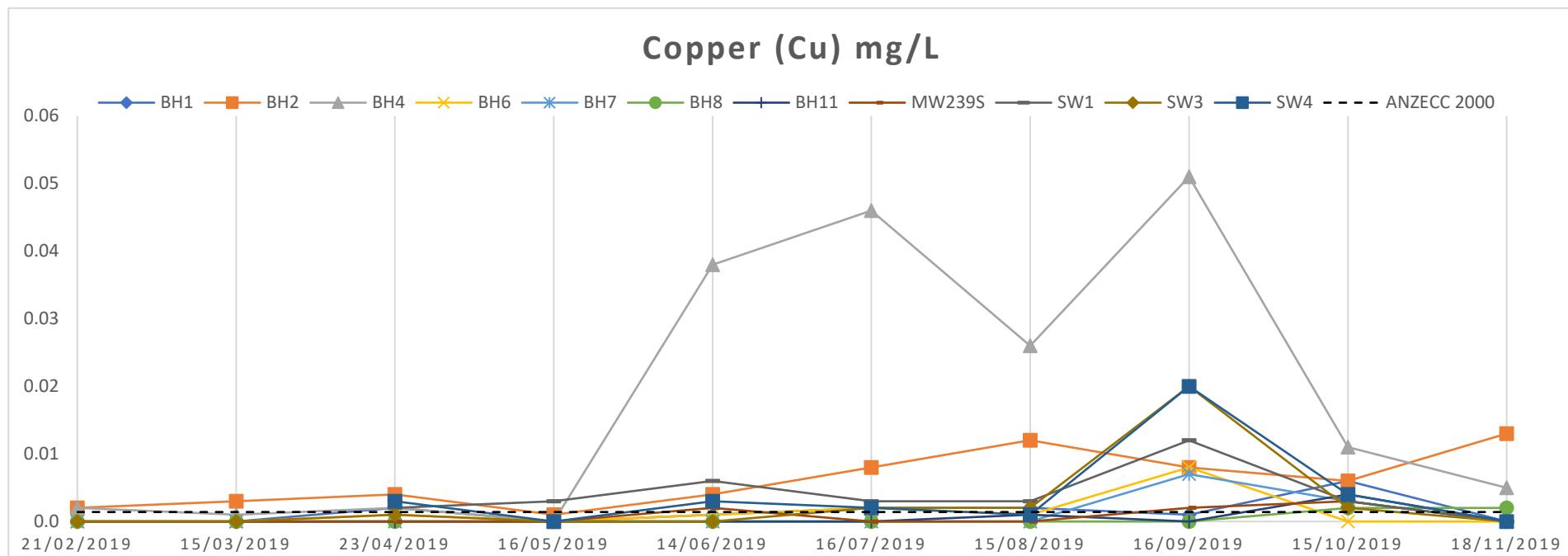




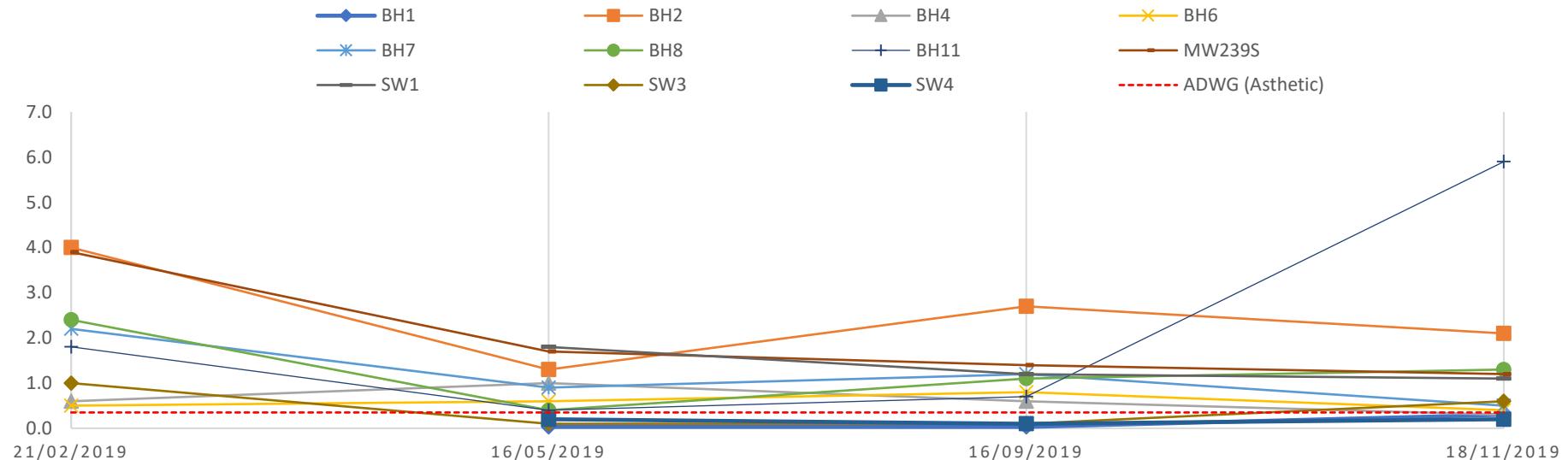
## Chromium (Cr) mg/L



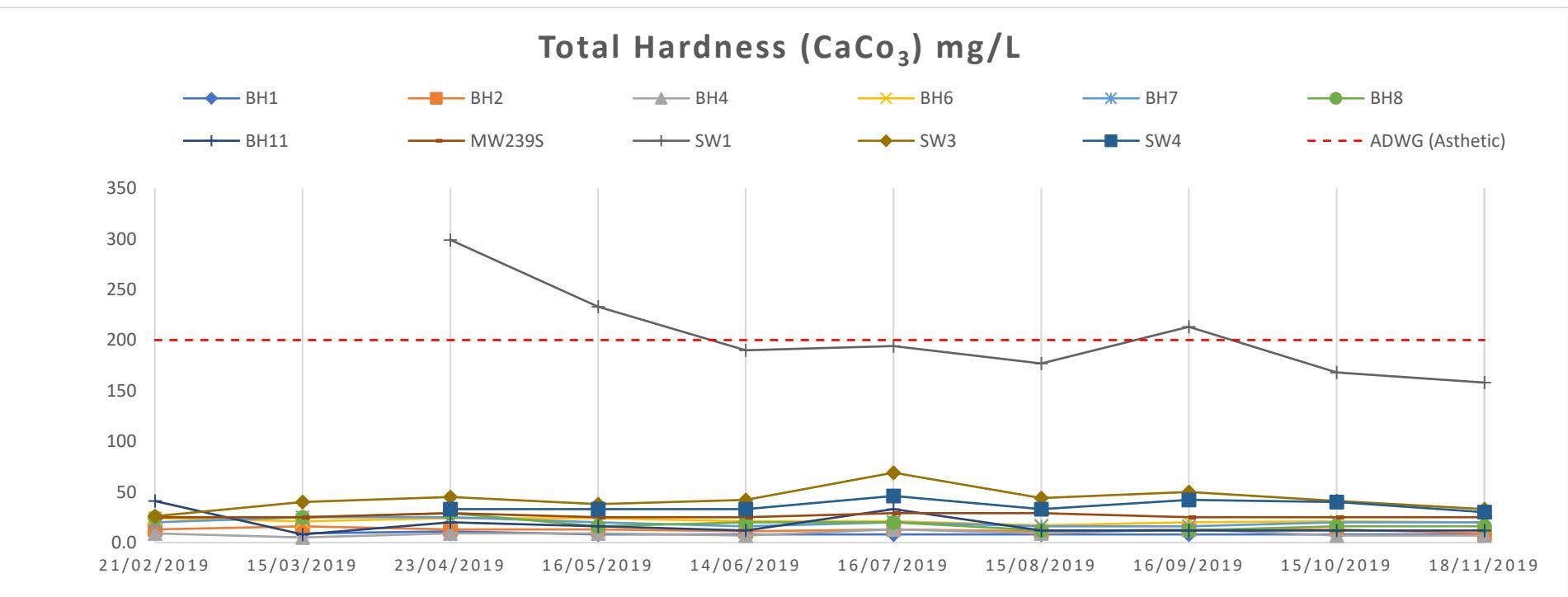
## Copper (Cu) mg/L



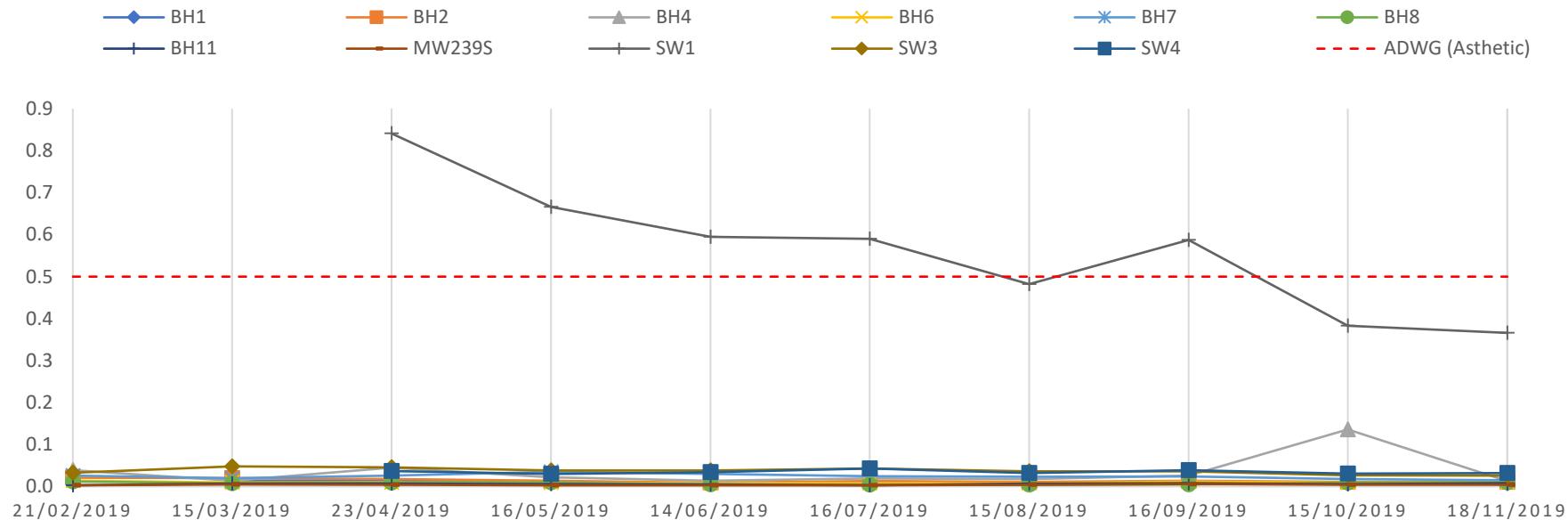
## Total Nitrogen (N) mg/L



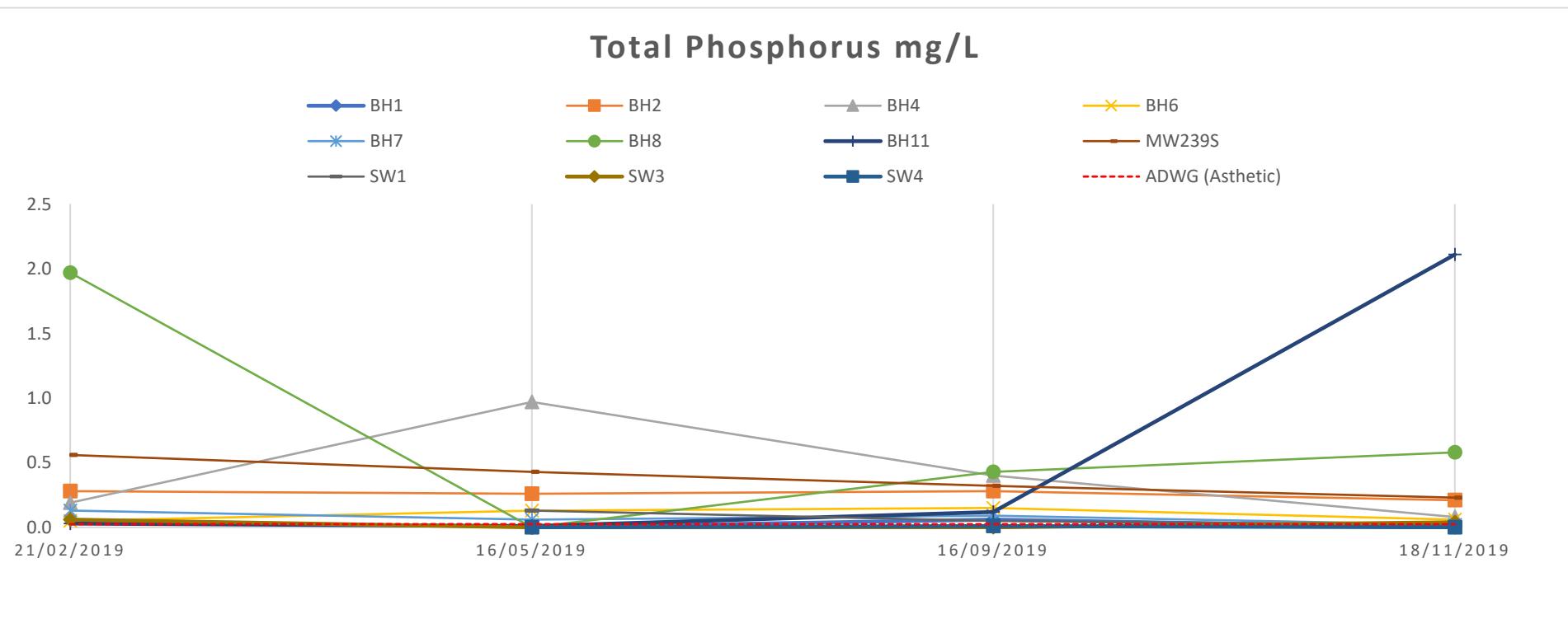
## Total Hardness ( $\text{CaCO}_3$ ) mg/L



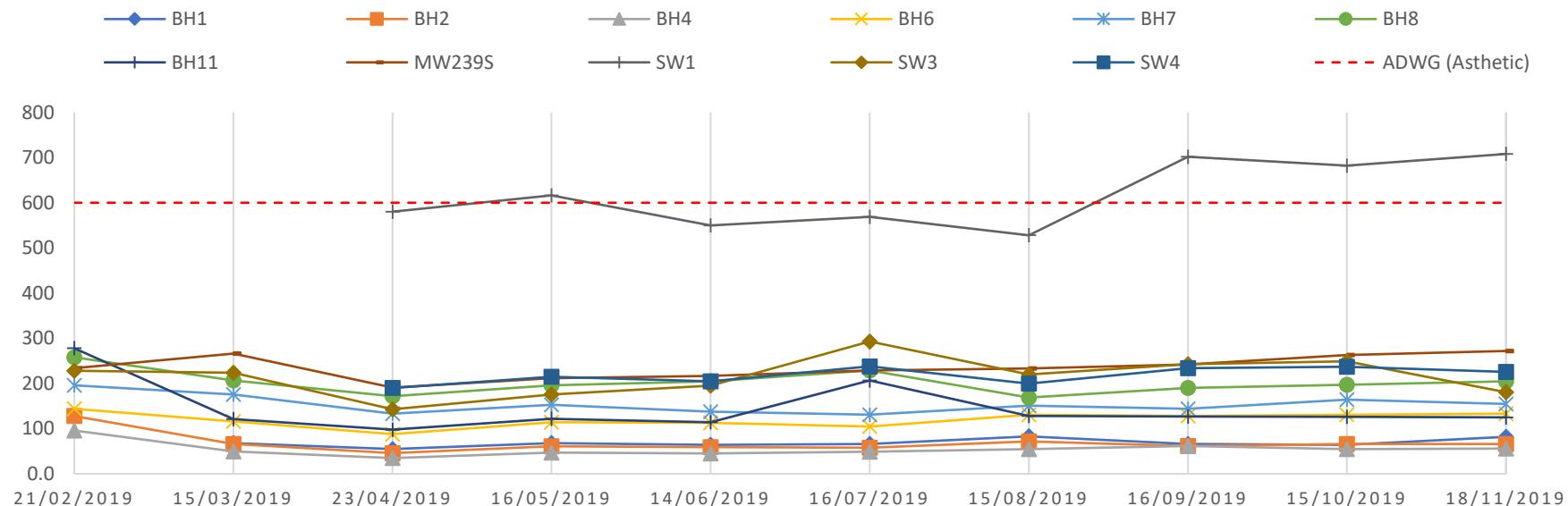
## Manganese (Mn) mg/L



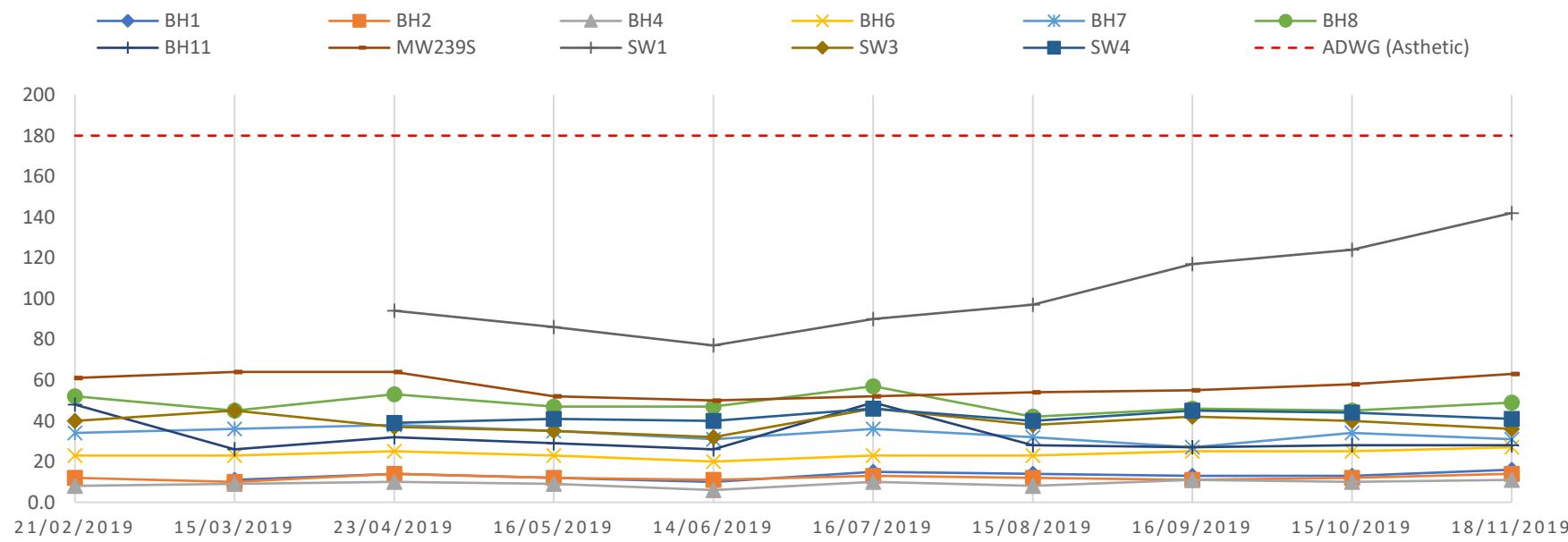
## Total Phosphorus mg/L



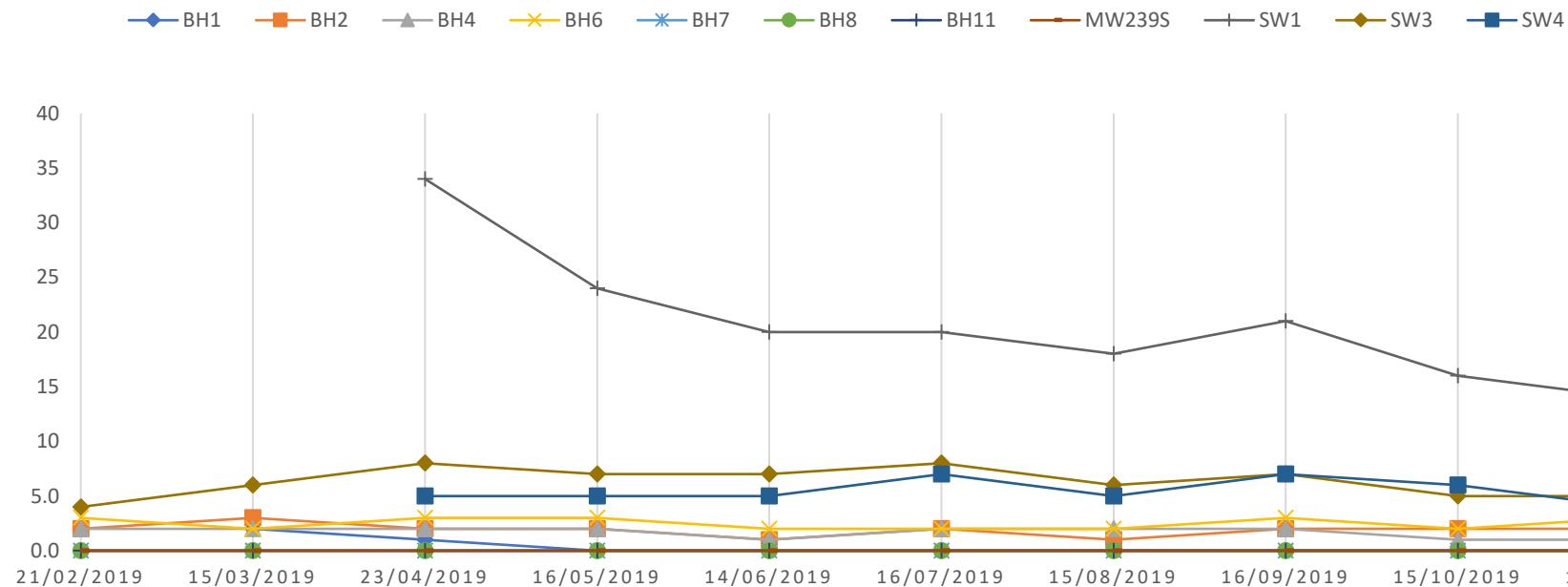
## Total Dissolved Solids (TDS) mg/L



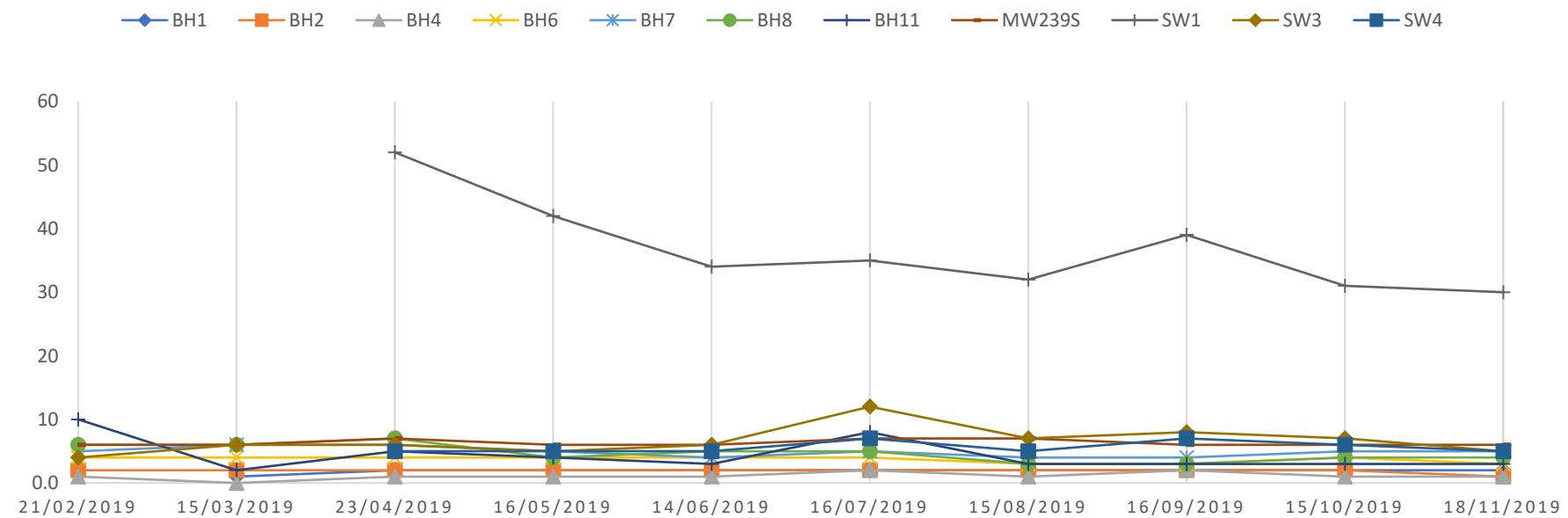
## Sodium(Na) mg/L



## Calcium(Ca) mg/L

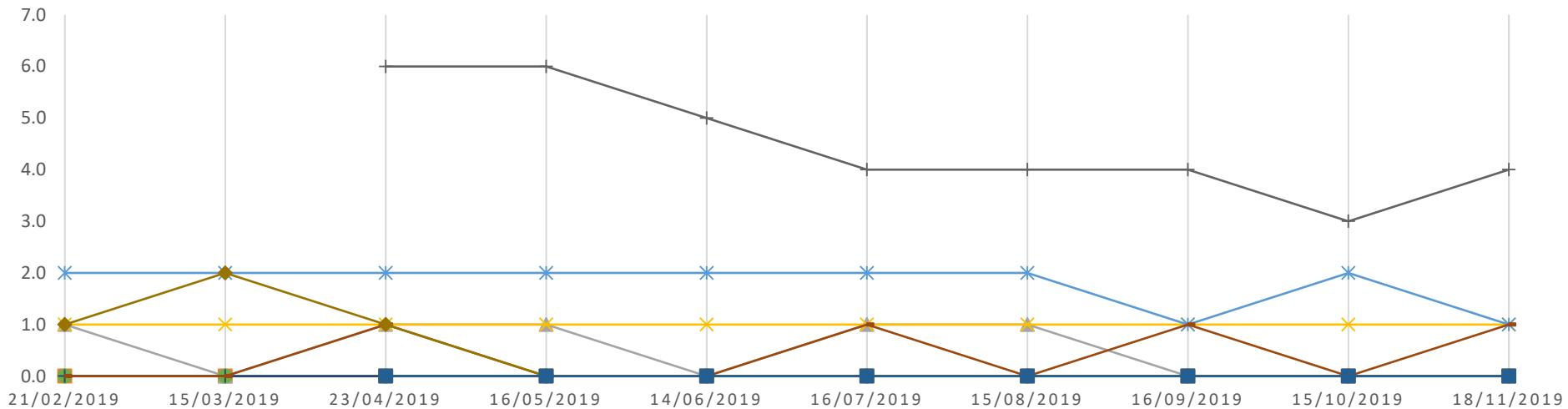


## Magnesium(Mg) mg/L



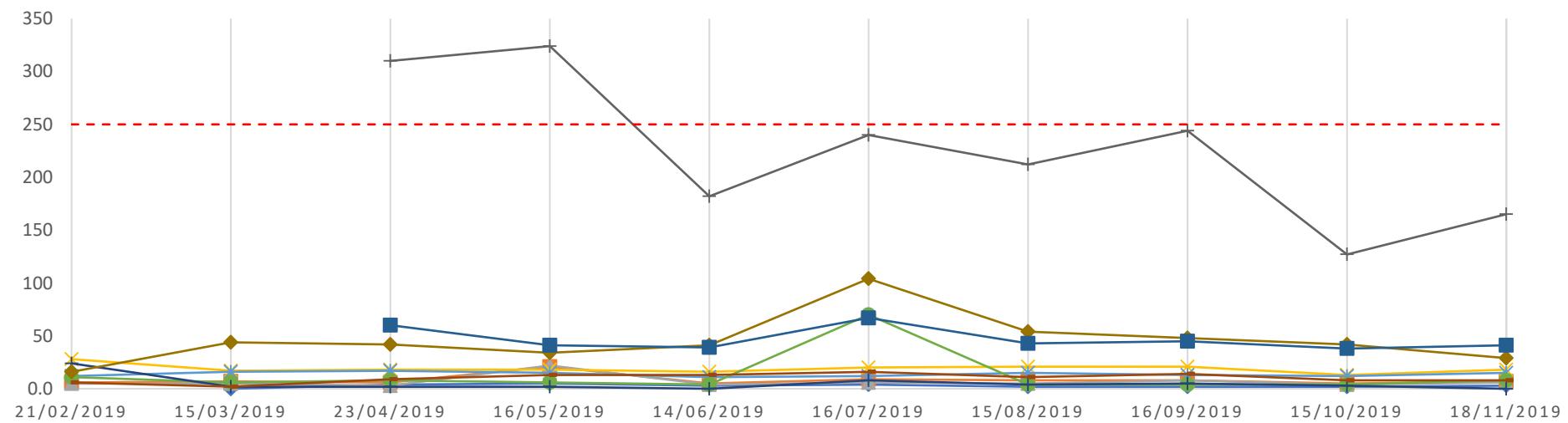
## Potassium(K) mg/L

BH1 BH2 BH4 BH6 BH7 BH8 BH11 MW239S SW1 SW3 SW4



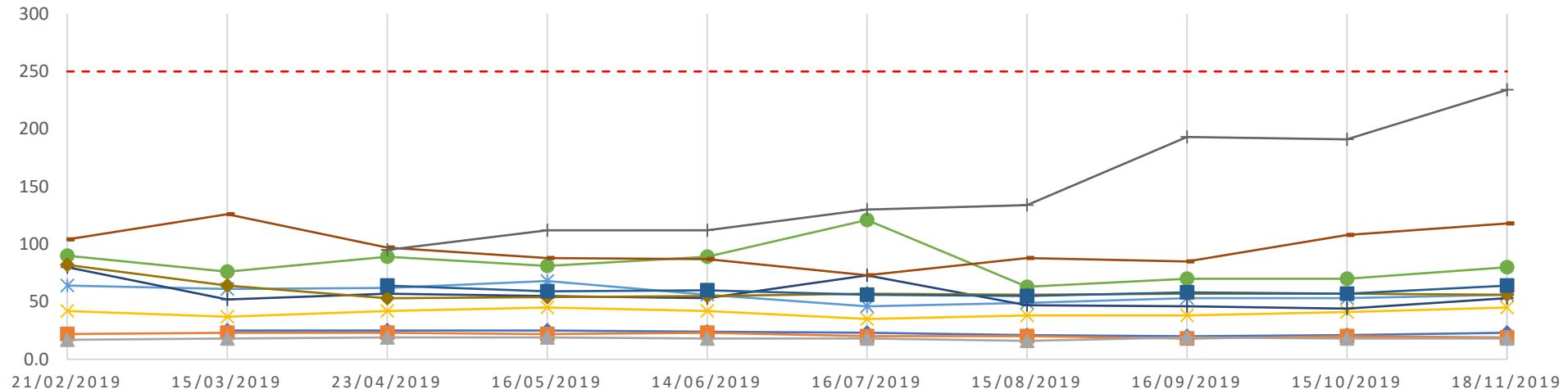
## Sulphate(SO<sub>4</sub><sup>2-</sup>) mg/L

BH1 BH2 BH4 BH6 BH7 BH8 BH11 MW239S SW1 SW3 SW4 ADWG (Aesthetic)



## Chloride (Cl) mg/L

Legend: BH1 (blue diamond), BH2 (orange square), BH4 (grey triangle), BH6 (yellow cross), BH7 (blue asterisk), BH8 (green circle), BH11 (dark blue plus), MW239S (brown line), SW1 (black line with plus), SW3 (brown diamond), SW4 (dark blue square), ADWG (Aesthetic) (red dashed line)



## Fluoride (F⁻) mg/L

Legend: BH1 (blue diamond), BH2 (orange square), BH4 (grey triangle), BH6 (yellow cross), BH7 (blue asterisk), BH8 (green circle), BH11 (dark blue plus), MW239S (brown line), SW1 (black line with plus), SW3 (brown diamond), SW4 (dark blue square), ADWG (Aesthetic) (red dashed line)

