

ATTACHMENT A: LABORATORY REPORTS

CERTIFICATE OF ANALYSIS

Work Order : **ES1905499**
Client : **KLEINFELDER AUSTRALIA PTY LTD**
Contact : DANIEL KOUSBROEK
Address : 95 MITCHELL ROAD
 CARDIFF NSW 2285
Telephone : ----
Project : 20190803
Order number :
C-O-C number : ----
Sampler : DANIEL KOUSBROEK
Site : WILLIAM TOWN SANDS SINDICATE
Quote number : ME/114/19
No. of samples received : 14
No. of samples analysed : 13

Page : 1 of 18
Laboratory : Environmental Division Sydney
Contact : Shirley LeCornu
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +6138549 9630
Date Samples Received : 21-Feb-2019 16:43
Date Analysis Commenced : 22-Feb-2019
Issue Date : 28-Feb-2019 17:39



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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini		Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Sanjeshni Jyoti	Senior Chemist Volatiles	Sydney Organics, Smithfield, NSW



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

Ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- EK059G: LOR raised for NOx on sample 2 due to sample matrix.
- EK058G: LOR raised for Nitrate on sample 2 due to sample matrix.
- TDS by method EA-015 may bias high for various samples due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- 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

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH4	BH8	BH3	BH11	TRIP BLANK
Client sampling date / time					21-Feb-2019 00:00	21-Feb-2019 00:00	21-Feb-2019 00:00	21-Feb-2019 00:00	13-Feb-2019 00:00
Compound	CAS Number	LOR	Unit		ES1905499-001	ES1905499-002	ES1905499-004	ES1905499-005	ES1905499-006
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		5.40	4.46	5.55	4.67	----
EA006: Sodium Adsorption Ratio (SAR)									
^ Sodium Adsorption Ratio	----	0.01	-		1.15	4.44	0.46	3.21	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		73	352	60	346	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		96	258	438	278	----
EA016: Calculated TDS (from Electrical Conductivity)									
Total Dissolved Solids (Calc.)	----	1	mg/L		47	229	39	225	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		122	438	3800	144	----
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		9	25	14	41	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		6	<1	9	<1	----
Total Alkalinity as CaCO3	----	1	mg/L		6	<1	9	<1	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		5	11	4	24	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		17	90	10	80	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		2	<1	4	<1	----
Magnesium	7439-95-4	1	mg/L		1	6	1	10	----
Sodium	7440-23-5	1	mg/L		8	52	4	48	----
Potassium	7440-09-7	1	mg/L		1	<1	<1	<1	----
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	<0.05	<0.05	----
Barium	7440-39-3	0.001	mg/L		0.014	0.011	0.003	0.008	----
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH4	BH8	BH3	BH11	TRIP BLANK
Client sampling date / time					21-Feb-2019 00:00	21-Feb-2019 00:00	21-Feb-2019 00:00	21-Feb-2019 00:00	13-Feb-2019 00:00
Compound	CAS Number	LOR	Unit		ES1905499-001	ES1905499-002	ES1905499-004	ES1905499-005	ES1905499-006
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued									
Cobalt	7440-48-4	0.001	mg/L		<0.001	<0.001	<0.001	0.001	----
Chromium	7440-47-3	0.001	mg/L		<0.001	0.001	0.002	0.002	----
Copper	7440-50-8	0.001	mg/L		0.002	<0.001	<0.001	<0.001	----
Manganese	7439-96-5	0.001	mg/L		0.039	0.012	0.005	0.003	----
Nickel	7440-02-0	0.001	mg/L		0.018	0.002	0.053	0.005	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	----
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	----
Zinc	7440-66-6	0.005	mg/L		0.014	0.005	<0.005	0.031	----
Iron	7439-89-6	0.05	mg/L		0.16	4.10	0.06	0.26	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	----
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		<0.1	<0.1	<0.1	0.1	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		0.04	0.50	0.30	0.06	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		0.35	<0.10	0.78	0.04	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		0.35	<0.10	0.78	0.04	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		0.3	2.4	5.1	1.8	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		0.6	2.4	5.9	1.8	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		0.19	1.97	2.76	0.03	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	----
EN055: Ionic Balance									
Total Anions	----	0.01	meq/L		0.70	2.77	0.54	2.76	----
Total Cations	----	0.01	meq/L		0.56	2.76	0.46	2.91	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH4	BH8	BH3	BH11	TRIP BLANK
Client sampling date / time					21-Feb-2019 00:00	21-Feb-2019 00:00	21-Feb-2019 00:00	21-Feb-2019 00:00	13-Feb-2019 00:00
Compound	CAS Number	LOR	Unit		ES1905499-001	ES1905499-002	ES1905499-004	ES1905499-005	ES1905499-006
					Result	Result	Result	Result	Result
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	----
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	----
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	----
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	----
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	----
^ Total Xylenes	----	2	µg/L		<2	<2	<2	<2	----
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	----
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				BH4	BH8	BH3	BH11	TRIP BLANK
Client sampling date / time				21-Feb-2019 00:00	21-Feb-2019 00:00	21-Feb-2019 00:00	21-Feb-2019 00:00	13-Feb-2019 00:00
Compound	CAS Number	LOR	Unit	ES1905499-001	ES1905499-002	ES1905499-004	ES1905499-005	ES1905499-006
				Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued								
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<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	<0.02	<0.02



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH4	BH8	BH3	BH11	TRIP BLANK
Client sampling date / time					21-Feb-2019 00:00	21-Feb-2019 00:00	21-Feb-2019 00:00	21-Feb-2019 00:00	13-Feb-2019 00:00
Compound	CAS Number	LOR	Unit		ES1905499-001	ES1905499-002	ES1905499-004	ES1905499-005	ES1905499-006
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<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	<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	<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	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<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	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		87.5	86.6	106	95.4	----
Toluene-D8	2037-26-5	2	%		98.2	86.3	103	102	----
4-Bromofluorobenzene	460-00-4	2	%		92.8	84.0	96.1	95.6	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		95.7	93.7	99.4	96.6	95.0
13C8-PFOA	----	0.02	%		97.2	98.2	97.5	103	98.9



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	DUP01	RINSATE01	BH2	BH5	MW2395
Client sampling date / time					21-Feb-2019 00:00	21-Feb-2019 00:00	22-Feb-2019 00:00	22-Feb-2019 00:00	22-Feb-2019 00:00
Compound	CAS Number	LOR	Unit		ES1905499-007	ES1905499-008	ES1905499-009	ES1905499-010	ES1905499-011
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		----	----	4.87	4.87	4.89
EA006: Sodium Adsorption Ratio (SAR)									
^ Sodium Adsorption Ratio	----	0.01	-		----	----	1.44	3.59	5.21
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		----	----	91	250	329
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		----	----	128	211	234
EA016: Calculated TDS (from Electrical Conductivity)									
Total Dissolved Solids (Calc.)	----	1	mg/L		----	----	59	162	214
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		----	----	376	458	149
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		----	----	13	25	25
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		----	----	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		----	----	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		----	----	<1	<1	<1
Total Alkalinity as CaCO3	----	1	mg/L		----	----	<1	<1	<1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		----	----	6	19	6
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		----	----	22	69	104
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		----	----	2	<1	<1
Magnesium	7439-95-4	1	mg/L		----	----	2	6	6
Sodium	7440-23-5	1	mg/L		----	----	12	42	61
Potassium	7440-09-7	1	mg/L		----	----	<1	1	<1
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		0.001	<0.001	<0.001	<0.001	<0.001
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	<0.05	<0.05	<0.05
Barium	7440-39-3	0.001	mg/L		0.014	<0.001	0.005	0.010	0.007
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	DUP01	RINSATE01	BH2	BH5	MW2395
Client sampling date / time					21-Feb-2019 00:00	21-Feb-2019 00:00	22-Feb-2019 00:00	22-Feb-2019 00:00	22-Feb-2019 00:00
Compound	CAS Number	LOR	Unit		ES1905499-007	ES1905499-008	ES1905499-009	ES1905499-010	ES1905499-011
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued									
Cobalt	7440-48-4	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Chromium	7440-47-3	0.001	mg/L		0.001	<0.001	<0.001	0.001	0.002
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	0.002	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L		0.012	<0.001	0.021	0.005	0.003
Nickel	7440-02-0	0.001	mg/L		0.003	<0.001	0.015	0.003	0.001
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L		0.015	<0.005	0.006	0.008	0.006
Iron	7439-89-6	0.05	mg/L		4.09	<0.05	0.14	1.40	1.11
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		----	----	0.1	0.2	<0.1
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		----	----	0.05	0.09	0.18
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		----	----	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		----	----	2.76	<0.01	<0.01
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		----	----	2.76	<0.01	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		----	----	1.2	3.0	3.9
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		----	----	4.0	3.0	3.9
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		----	----	0.28	0.34	0.56
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		----	----	<0.01	<0.01	<0.01
EN055: Ionic Balance									
Total Anions	----	0.01	meq/L		----	----	0.74	2.34	3.06
Total Cations	----	0.01	meq/L		----	----	0.79	2.35	3.15



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	DUP01	RINSATE01	BH2	BH5	MW2395
Client sampling date / time					21-Feb-2019 00:00	21-Feb-2019 00:00	22-Feb-2019 00:00	22-Feb-2019 00:00	22-Feb-2019 00:00
Compound	CAS Number	LOR	Unit		ES1905499-007	ES1905499-008	ES1905499-009	ES1905499-010	ES1905499-011
					Result	Result	Result	Result	Result
EN055: Ionic Balance - Continued									
Ionic Balance	----	0.01	%		----	----	----	----	1.43
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	<50
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	DUP01	RINSATE01	BH2	BH5	MW2395
Client sampling date / time					21-Feb-2019 00:00	21-Feb-2019 00:00	22-Feb-2019 00:00	22-Feb-2019 00:00	22-Feb-2019 00:00
Compound	CAS Number	LOR	Unit		ES1905499-007	ES1905499-008	ES1905499-009	ES1905499-010	ES1905499-011
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	DUP01	RINSATE01	BH2	BH5	MW2395
Client sampling date / time					21-Feb-2019 00:00	21-Feb-2019 00:00	22-Feb-2019 00:00	22-Feb-2019 00:00	22-Feb-2019 00:00
Compound	CAS Number	LOR	Unit		ES1905499-007	ES1905499-008	ES1905499-009	ES1905499-010	ES1905499-011
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<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	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<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	<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	<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	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<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	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		88.4	107	113	108	106
Toluene-D8	2037-26-5	2	%		102	99.4	113	101	99.5
4-Bromofluorobenzene	460-00-4	2	%		102	96.4	109	97.9	97.1
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		97.5	96.2	93.1	92.2	99.4
13C8-PFOA	----	0.02	%		106	94.0	94.8	101	101



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH7	BH6	TRIP BLANK	----	----
Client sampling date / time					22-Feb-2019 00:00	22-Feb-2019 00:00	22-Feb-2019 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1905499-012	ES1905499-013	ES1905499-014	-----	-----
					Result	Result	Result	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		4.76	4.37	----	----	----
EA006: Sodium Adsorption Ratio (SAR)									
^ Sodium Adsorption Ratio	----	0.01	-		3.16	2.49	----	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		213	177	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		196	144	----	----	----
EA016: Calculated TDS (from Electrical Conductivity)									
Total Dissolved Solids (Calc.)	----	1	mg/L		138	115	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		152	41	----	----	----
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		20	24	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		<1	<1	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		<1	<1	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		12	28	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		64	42	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		<1	3	----	----	----
Magnesium	7439-95-4	1	mg/L		5	4	----	----	----
Sodium	7440-23-5	1	mg/L		34	28	----	----	----
Potassium	7440-09-7	1	mg/L		2	1	----	----	----
EG020F: Dissolved Metals by ICP-MS									
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		0.004	0.030	<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	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH7	BH6	TRIP BLANK	----	----
Client sampling date / time					22-Feb-2019 00:00	22-Feb-2019 00:00	22-Feb-2019 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1905499-012	ES1905499-013	ES1905499-014	-----	-----
					Result	Result	Result	----	----
EG020F: Dissolved Metals by ICP-MS - Continued									
Cobalt	7440-48-4	0.001	mg/L		0.003	<0.001	<0.001	----	----
Chromium	7440-47-3	0.001	mg/L		0.002	<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		0.026	0.014	<0.001	----	----
Nickel	7440-02-0	0.001	mg/L		0.004	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		0.019	0.019	<0.005	----	----
Iron	7439-89-6	0.05	mg/L		1.80	1.03	<0.05	----	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	----	----
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		0.2	<0.1	----	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		0.34	0.14	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		0.02	0.09	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		0.02	0.09	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		2.2	0.4	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		2.2	0.5	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		0.13	0.05	----	----	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	<0.01	----	----	----
EN055: Ionic Balance									
Total Anions	----	0.01	meq/L		2.06	1.77	----	----	----
Total Cations	----	0.01	meq/L		1.94	1.72	----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH7	BH6	TRIP BLANK	----	----
Client sampling date / time					22-Feb-2019 00:00	22-Feb-2019 00:00	22-Feb-2019 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1905499-012	ES1905499-013	ES1905499-014	-----	-----
					Result	Result	Result	----	----
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
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	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	----	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>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	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	----	----
EP080: BTEXN									
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	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
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	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH7	BH6	TRIP BLANK	----	----
Client sampling date / time					22-Feb-2019 00:00	22-Feb-2019 00:00	22-Feb-2019 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1905499-012	ES1905499-013	ES1905499-014	-----	-----
					Result	Result	Result	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
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	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
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 (PFTTrDA)	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	----	----
EP231C: Perfluoroalkyl Sulfonamides									
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	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH7	BH6	TRIP BLANK	----	----
Client sampling date / time					22-Feb-2019 00:00	22-Feb-2019 00:00	22-Feb-2019 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1905499-012	ES1905499-013	ES1905499-014	-----	-----
					Result	Result	Result	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
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	----	----
EP231P: PFAS Sums									
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	----	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		105	110	110	----	----
Toluene-D8	2037-26-5	2	%		99.5	110	108	----	----
4-Bromofluorobenzene	460-00-4	2	%		97.7	108	106	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		96.5	120	99.4	----	----
13C8-PFOA	----	0.02	%		101	119	98.7	----	----



Surrogate Control Limits

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

QUALITY CONTROL REPORT

Work Order	: ES1905499	Page	: 1 of 20
Client	: KLEINFELDER AUSTRALIA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Contact	: Shirley LeCornu
Address	: 95 MITCHELL ROAD CARDIFF NSW 2285	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +6138549 9630
Project	: 20190803	Date Samples Received	: 21-Feb-2019
Order number	:	Date Analysis Commenced	: 22-Feb-2019
C-O-C number	: ----	Issue Date	: 28-Feb-2019
Sampler	: DANIEL KOUSBROEK		
Site	: WILLIAM TOWN SANDS SINDICATE		
Quote number	: ME/114/19		
No. of samples received	: 14		
No. of samples analysed	: 13		



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 Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini		Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Sanjeshni Jyoti	Senior Chemist Volatiles	Sydney Organics, Smithfield, NSW



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

Key :
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 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
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 2201054)									
ES1905464-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.56	7.57	0.132	0% - 20%
ES1905583-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.34	7.52	2.42	0% - 20%
EA005P: pH by PC Titrator (QC Lot: 2203622)									
ES1905628-003	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.79	7.78	0.128	0% - 20%
ES1905499-009	BH2	EA005-P: pH Value	----	0.01	pH Unit	4.87	4.86	0.206	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 2201055)									
ES1905478-012	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	232	234	0.851	0% - 20%
ES1905583-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	4640	4620	0.236	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 2203625)									
ES1905625-005	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	152	153	0.00	0% - 20%
ES1905499-009	BH2	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	91	90	0.00	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 2204245)									
ES1905489-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	28200	28900	2.35	0% - 20%
ES1905501-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	2150	2000	6.98	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2 °C (QC Lot: 2204246)									
ES1905489-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	<5	<5	0.00	No Limit
ES1905501-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	189	180	4.88	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 2201051)									
ES1905217-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	31	30	4.41	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	31	30	4.41	0% - 20%
ES1905464-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 2201051) - continued									
ES1905464-001	Anonymous	ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	216	196	9.83	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	216	196	9.83	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 2203624)									
ES1905625-005	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	42	42	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	42	42	0.00	0% - 20%
ES1905499-009	BH2	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	0.00	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2200015)									
ES1905499-001	BH4	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	5	5	0.00	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2201525)									
ES1905499-009	BH2	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	6	7	0.00	No Limit
ES1905625-005	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	4	4	0.00	No Limit
ED045G: Chloride by Discrete Analyser (QC Lot: 2200012)									
ES1905463-006	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	128	129	0.00	0% - 20%
ES1905423-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	423	425	0.513	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 2200016)									
ES1905499-005	BH11	ED045G: Chloride	16887-00-6	1	mg/L	80	80	0.00	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 2201524)									
ES1905499-009	BH2	ED045G: Chloride	16887-00-6	1	mg/L	22	22	0.00	0% - 20%
ES1905625-005	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	37	37	0.00	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 2200621)									
ES1905393-003	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	3	3	0.00	No Limit
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.00	No Limit
ES1905463-011	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.00	No Limit
ED093F: Dissolved Major Cations (QC Lot: 2202352)									
ES1905464-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	49	49	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	32	33	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	82	81	1.77	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	32	32	0.00	0% - 20%
ES1904951-004	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	56	57	0.00	0% - 20%



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ED093F: Dissolved Major Cations (QC Lot: 2202352) - continued									
ES1904951-004	Anonymous	ED093F: Magnesium	7439-95-4	1	mg/L	48	48	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	72	72	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	6	6	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2200620)									
ES1905393-003	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.006	0.007	23.4	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.005	0.004	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
ES1905463-011	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2202355)									
ES1905499-013	BH6	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.030	0.029	0.00	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2202355) - continued									
ES1905499-013	BH6	EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.014	0.014	0.00	0% - 50%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.019	0.019	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	1.03	1.02	0.00	0% - 20%
ES1905464-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.010	0.010	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.098	0.095	3.15	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.020	0.019	0.00	0% - 50%
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.138	0.138	0.00	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.072	0.069	4.38	0% - 20%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.050	0.049	2.27	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.23	0.22	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.33	0.33	0.00	No Limit
		EG035F: Dissolved Mercury by FIMS (QC Lot: 2200619)							
ES1905463-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES1905463-011	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 2202354)									
ES1904952-002	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	0.0001	0.0001	0.00	No Limit
ES1905461-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 2202356)									
ES1905499-012	BH7	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 2201053)									
ES1905464-001	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.5	0.5	0.00	No Limit
ES1905583-001	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.2	0.2	0.00	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 2203623)									
ES1905499-009	BH2	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.1	<0.1	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 2199613)									

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 2199613) - continued									
ES1905230-003	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.04	0.08	70.5	No Limit
ES1905499-005	BH11	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.06	0.04	49.6	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 2201623)									
ES1905444-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.01	0.01	0.00	No Limit
ES1905499-012	BH7	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.34	0.34	0.00	0% - 20%
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 2200010)									
ES1905499-001	BH4	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
ES1905423-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 2201527)									
ES1905499-009	BH2	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
ES1905625-005	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	0.02	0.02	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 2199615)									
ES1905463-007	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
ES1905499-005	BH11	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.04	0.03	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 2201624)									
ES1905451-029	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.44	0.44	0.00	0% - 20%
ES1905499-012	BH7	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.02	0.02	0.00	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 2199618)									
ES1905463-009	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	4.2	3.8	9.88	0% - 20%
ES1905499-005	BH11	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.8	1.6	10.1	0% - 50%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 2201621)									
ES1905451-029	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.5	0.5	0.00	No Limit
ES1905625-003	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.5	0.5	0.00	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 2199619)									
ES1905517-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	31.0	31.3	1.11	0% - 20%
ES1905499-005	BH11	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.03	0.08	87.2	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 2201620)									
ES1905451-029	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.02	0.02	0.00	No Limit
ES1905625-003	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.12	0.12	0.00	0% - 50%
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 2200011)									
ES1905463-006	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
ES1905423-001	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 2200017)									
ES1905499-005	BH11	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 2201526)									
ES1905499-009	BH2	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
ES1905625-005	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.12	0.12	0.00	0% - 50%
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2199795)									



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2199795) - continued									
ES1905215-006	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
ES1905560-002	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2202280)									
ES1905444-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
ES1905499-013	BH6	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2199795)									
ES1905215-006	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES1905560-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2202280)									
ES1905444-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES1905499-013	BH6	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 2199795)									
ES1905215-006	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.00	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
ES1905560-002	Anonymous	EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
		EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.00	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP080: BTEXN (QC Lot: 2202280)									
ES1905444-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.00	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
ES1905499-013	BH6	EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
		EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.00	No Limit
			106-42-3						



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report							
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)		
EP080: BTEXN (QC Lot: 2202280) - continued											
ES1905499-013	BH6	EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit		
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit		
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 2204280)											
EB1904270-002	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.05	0.05	0.00	No Limit		
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit		
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit		
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit		
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit		
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit		
ES1905499-006	TRIP BLANK	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit		
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit		
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit		
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit		
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit		
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit		
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2204280)											
EB1904270-002	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	1.21	1.21	0.00	0% - 20%		
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.03	0.03	0.00	No Limit		
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.10	0.10	0.00	No Limit		
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.22	0.22	0.00	0% - 50%		
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	0.02	0.02	0.00	No Limit		
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit		
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit		
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit		
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit		
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit		
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit		
		ES1905499-006	TRIP BLANK	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
				EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4			0.02	µg/L	<0.02	<0.02	0.00	No Limit		
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9			0.02	µg/L	<0.02	<0.02	0.00	No Limit		
EP231X: Perfluorononanoic acid (PFNA)	375-95-1			0.02	µg/L	<0.02	<0.02	0.00	No Limit		
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2			0.02	µg/L	<0.02	<0.02	0.00	No Limit		
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8			0.02	µg/L	<0.02	<0.02	0.00	No Limit		
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1			0.02	µg/L	<0.02	<0.02	0.00	No Limit		
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8			0.02	µg/L	<0.02	<0.02	0.00	No Limit		
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7			0.05	µg/L	<0.05	<0.05	0.00	No Limit		
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2204280)											
EB1904270-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit		



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2204280) - continued									
EB1904270-002	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1905499-006	TRIP BLANK	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2204280)									
EB1904270-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1905499-006	TRIP BLANK	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2204280) - continued									
ES1905499-006	TRIP BLANK	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 2204280)									
EB1904270-002	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	1.63	1.63	0.00	0% - 20%
ES1905499-006	TRIP BLANK	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.00	No Limit

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) LowHigh	
Method: Compound	CAS Number	LOR	Unit	Result				
EA005P: pH by PC Titrator (QCLot: 2201054)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	101	98	102
				----	7 pH Unit	100	98	102
EA005P: pH by PC Titrator (QCLot: 2203622)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	99.5	98	102
				----	7 pH Unit	99.6	98	102
EA010P: Conductivity by PC Titrator (QCLot: 2201055)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2100 µS/cm	104	95	113
EA010P: Conductivity by PC Titrator (QCLot: 2203625)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2100 µS/cm	97.6	95	113
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 2204245)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	100	87	109
				<10	293 mg/L	118	66	126
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 2204246)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	99.0	83	129
				<5	1000 mg/L	104	82	110
ED037P: Alkalinity by PC Titrator (QCLot: 2201051)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	106	81	111
				----	50 mg/L	116	70	130
ED037P: Alkalinity by PC Titrator (QCLot: 2203624)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	103	81	111
				----	50 mg/L	119	70	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2200015)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	104	82	122
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2201525)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	105	82	122
ED045G: Chloride by Discrete Analyser (QCLot: 2200012)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	103	81	127
				<1	1000 mg/L	96.2	81	127
ED045G: Chloride by Discrete Analyser (QCLot: 2200016)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	102	81	127
				<1	1000 mg/L	96.2	81	127
ED045G: Chloride by Discrete Analyser (QCLot: 2201524)								



Sub-Matrix: **WATER**

Method Blank (MB) Report				Laboratory Control Spike (LCS) Report				
				Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
					LCS	Low	High	
Method: Compound	CAS Number	LOR	Unit	Result				
ED045G: Chloride by Discrete Analyser (QCLot: 2201524) - continued								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	116	81	127
				<1	1000 mg/L	108	81	127
ED093F: Dissolved Major Cations (QCLot: 2200621)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	93.7	80	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	98.5	90	116
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	96.5	82	120
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	97.8	85	113
ED093F: Dissolved Major Cations (QCLot: 2202352)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	95.8	80	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	99.0	90	116
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	94.4	82	120
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	96.9	85	113
EG020F: Dissolved Metals by ICP-MS (QCLot: 2200620)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	96.9	85	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	93.6	85	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	97.4	82	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	97.0	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	94.8	85	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	93.2	82	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	95.3	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	93.6	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	98.2	82	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	91.2	82	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	98.8	85	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	96.0	83	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	102	81	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	93.7	85	115
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	93.1	82	112
EG020F: Dissolved Metals by ICP-MS (QCLot: 2202355)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	93.1	85	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	87.0	85	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	91.5	82	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	93.9	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	92.5	85	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	92.6	82	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	91.9	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	90.1	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	90.1	82	110

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result		LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 2202355) - continued								
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	93.1	82	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	92.9	85	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	92.8	83	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	93.2	81	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	89.3	85	115
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	91.8	82	112
EG035F: Dissolved Mercury by FIMS (QCLot: 2200619)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	86.4	83	105
EG035F: Dissolved Mercury by FIMS (QCLot: 2202354)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	89.6	83	105
EG035F: Dissolved Mercury by FIMS (QCLot: 2202356)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	91.9	83	105
EK040P: Fluoride by PC Titrator (QCLot: 2201053)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	94.2	82	116
EK040P: Fluoride by PC Titrator (QCLot: 2203623)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	91.8	82	116
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2199613)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	96.9	90	114
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2201623)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	99.2	90	114
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2200010)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	104	82	114
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2201527)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	100	82	114
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2199615)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	99.8	91	113
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2201624)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	97.0	91	113
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2199618)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	70.4	69	101
				<0.1	1 mg/L	76.7	70	118
				<0.1	5 mg/L	78.6	74	118
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2201621)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	92.5	69	101
				<0.1	1 mg/L	90.4	70	118
				<0.1	5 mg/L	102	74	118
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2199619)								



Sub-Matrix: **WATER**

Method Blank (MB) Report				Laboratory Control Spike (LCS) Report				
				Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
					LCS	Low	High	
Method: Compound	CAS Number	LOR	Unit	Result				
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2199619) - continued								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	74.4	71	101
				<0.01	0.442 mg/L	78.1	72	108
				<0.01	1 mg/L	80.3	78	118
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2201620)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	95.6	71	101
				<0.01	0.442 mg/L	93.8	72	108
				<0.01	1 mg/L	97.0	78	118
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2200011)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	99.5	85	117
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2200017)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	98.2	85	117
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2201526)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	88.5	85	117
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QCLot: 2199869)								
EP071SG: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	87.4	75	117
EP071SG: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	95.6	81	113
EP071SG: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	90.5	71	117
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QCLot: 2201957)								
EP071SG: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	84.0	75	117
EP071SG: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	93.6	81	113
EP071SG: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	82.0	71	117
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 2199869)								
EP071SG: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	83.3	73	119
EP071SG: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	87.0	81	113
EP071SG: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	99.8	65	127
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 2201957)								
EP071SG: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	93.0	73	119
EP071SG: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	99.0	81	113
EP071SG: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	108	65	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2199795)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	82.3	75	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2202280)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	88.7	75	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2199795)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	86.6	75	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2202280)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	89.9	75	127



Sub-Matrix: **WATER**

Method: Compound				Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
						LCS	Low	High
CAS Number	LOR	Unit						
EP080: BTEXN (QCLot: 2199795)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	88.5	70	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	80.8	69	123
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	93.7	70	120
EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	10 µg/L	92.8	69	121
	106-42-3							
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	93.9	72	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	94.7	70	120
EP080: BTEXN (QCLot: 2202280)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	96.0	70	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	92.2	69	123
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	90.2	70	120
EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	10 µg/L	88.8	69	121
	106-42-3							
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	93.2	72	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	96.6	70	120
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2204280)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	90.8	70	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	89.8	70	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	90.4	70	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	97.6	70	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	95.4	70	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.5 µg/L	82.4	70	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2204280)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	97.3	70	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	104	70	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	99.6	70	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	100	70	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	98.6	70	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	98.4	70	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	102	70	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	99.2	70	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	98.0	70	130
EP231X: Perfluorotridecanoic acid (PFTriDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	105	70	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	103	70	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2204280)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	98.2	70	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	103	70	150
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	96.6	70	150



Sub-Matrix: **WATER**

Method: Compound				Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
						LCS	Low	High
CAS Number	LOR	Unit						
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2204280) - continued								
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	1.25 µg/L	98.0	70	150
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	98.9	70	150
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	123	70	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	94.2	70	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2204280)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	106	70	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	96.0	70	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	119	70	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	91.4	70	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID				Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery(%)	Recovery Limits (%)	
					MS	Low	High
Client sample ID	Method: Compound	CAS Number					
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2200015)							
ES1905499-001	BH4	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	104	70	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2201525)							
ES1905499-009	BH2	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	113	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 2200012)							
ES1905423-001	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	79.8	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 2200016)							
ES1905499-005	BH11	ED045G: Chloride	16887-00-6	250 mg/L	104	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 2201524)							
ES1905499-009	BH2	ED045G: Chloride	16887-00-6	250 mg/L	107	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2200620)							
ES1905463-002	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	101	70	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	96.2	70	130
		EG020A-F: Barium	7440-39-3	1 mg/L	101	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	101	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	96.1	70	130



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 2200620) - continued							
ES1905463-002	Anonymous	EG020A-F: Cobalt	7440-48-4	1 mg/L	97.7	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	101	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	99.3	70	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	97.4	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	93.4	70	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	98.6	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	99.0	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2202355)							
ES1905464-001	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	97.0	70	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	93.8	70	130
		EG020A-F: Barium	7440-39-3	1 mg/L	96.6	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	96.6	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	95.3	70	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	97.8	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	98.9	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	95.1	70	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	93.9	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	96.3	70	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	94.3	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	97.7	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 2200619)							
ES1905269-001	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	110	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 2202354)							
ES1904952-001	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	107	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 2202356)							
ES1905499-011	MW2395	EG035F: Mercury	7439-97-6	0.01 mg/L	126	70	130
EK040P: Fluoride by PC Titrator (QCLot: 2201053)							
ES1905423-001	Anonymous	EK040P: Fluoride	16984-48-8	5 mg/L	114	70	130
EK040P: Fluoride by PC Titrator (QCLot: 2203623)							
ES1905499-009	BH2	EK040P: Fluoride	16984-48-8	5 mg/L	101	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2199613)							
ES1905230-003	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	92.4	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2201623)							
ES1905444-001	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	122	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2200010)							
ES1905423-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	102	70	130



Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2201527)							
ES1905499-009	BH2	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	100	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2199615)							
ES1905463-007	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	102	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2201624)							
ES1905451-029	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	112	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2199618)							
ES1905463-011	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	99.1	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2201621)							
ES1905451-030	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	100	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2199619)							
ES1905463-011	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	72.9	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2201620)							
ES1905451-030	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	96.8	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2200011)							
ES1905423-001	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	100	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2200017)							
ES1905499-005	BH11	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	100	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2201526)							
ES1905499-009	BH2	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	88.7	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2199795)							
ES1905215-006	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	102	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2202280)							
ES1905444-001	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	84.5	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2199795)							
ES1905215-006	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	98.0	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2202280)							
ES1905444-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	88.0	70	130
EP080: BTEXN (QCLot: 2199795)							
ES1905215-006	Anonymous	EP080: Benzene	71-43-2	25 µg/L	93.7	70	130
		EP080: Toluene	108-88-3	25 µg/L	105	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	104	70	130
		EP080: meta- & para-Xylene	108-38-3	25 µg/L	109	70	130
		EP080: ortho-Xylene	106-42-3	25 µg/L	109	70	130



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080: BTEXN (QCLot: 2199795) - continued							
ES1905215-006	Anonymous	EP080: Naphthalene	91-20-3	25 µg/L	101	70	130
EP080: BTEXN (QCLot: 2202280)							
ES1905444-001	Anonymous	EP080: Benzene	71-43-2	25 µg/L	89.2	70	130
		EP080: Toluene	108-88-3	25 µg/L	92.6	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	88.0	70	130
		EP080: meta- & para-Xylene	108-38-3	25 µg/L	86.4	70	130
			106-42-3				
		EP080: ortho-Xylene	95-47-6	25 µg/L	89.8	70	130
		EP080: Naphthalene	91-20-3	25 µg/L	95.3	70	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2204280)							
EB1904270-002	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	80.6	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.5 µg/L	77.6	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	70.2	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	71.2	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	75.8	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.5 µg/L	74.6	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2204280)							
EB1904270-002	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	69.3	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	80.2	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	92.4	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	82.8	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	80.8	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	93.6	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	90.6	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	94.2	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	98.2	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5 µg/L	84.6	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	76.2	50	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2204280)							
EB1904270-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	61.4	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	93.5	50	150
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	87.5	50	150
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	1.25 µg/L	86.3	50	150
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	75.1	50	150

Page : 20 of 20
 Work Order : ES1905499
 Client : KLEINFELDER AUSTRALIA PTY LTD
 Project : 20190803



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2204280) - continued							
EB1904270-002	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	95.6	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	75.6	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2204280)							
EB1904270-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	101	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	99.6	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	97.8	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	101	50	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES1905499	Page	: 1 of 14
Client	: KLEINFELDER AUSTRALIA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Telephone	: +6138549 9630
Project	: 20190803	Date Samples Received	: 21-Feb-2019
Site	: WILLIAM TOWN SANDS SINDICATE	Issue Date	: 28-Feb-2019
Sampler	: DANIEL KOUSBROEK	No. of samples received	: 14
Order number	:	No. of samples analysed	: 13

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- **NO** Matrix Spike outliers occur.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers exist - please see following pages for full details.



Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method		Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
BH4, BH3,	BH8, BH11	----	----	----	22-Feb-2019	21-Feb-2019	1
Clear Plastic Bottle - Natural							
BH2, MW2395, BH6	BH5, BH7,	----	----	----	25-Feb-2019	22-Feb-2019	3

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
TRH - Total Recoverable Hydrocarbons - Silica Gel C	0	15	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Total Recoverable Hydrocarbons - Silica Gel C	0	15	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural (EA005-P)		21-Feb-2019	----	----	----	22-Feb-2019	21-Feb-2019	✘
BH4, BH3,	BH8, BH11							
Clear Plastic Bottle - Natural (EA005-P)		22-Feb-2019	----	----	----	25-Feb-2019	22-Feb-2019	✘
BH2, MW2395, BH6	BH5, BH7,							



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA006: Sodium Adsorption Ratio (SAR)								
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH4, BH3,	BH8, BH11	21-Feb-2019	----	----	----	22-Feb-2019	21-Mar-2019	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2, MW2395, BH6	BH5, BH7,	22-Feb-2019	----	----	----	25-Feb-2019	22-Mar-2019	✓
EA010P: Conductivity by PC Titrator								
Clear Plastic Bottle - Natural (EA010-P) BH4, BH3,	BH8, BH11	21-Feb-2019	----	----	----	22-Feb-2019	21-Mar-2019	✓
Clear Plastic Bottle - Natural (EA010-P) BH2, MW2395, BH6	BH5, BH7,	22-Feb-2019	----	----	----	25-Feb-2019	22-Mar-2019	✓
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Clear Plastic Bottle - Natural (EA015H) BH4, BH3,	BH8, BH11	21-Feb-2019	----	----	----	26-Feb-2019	28-Feb-2019	✓
Clear Plastic Bottle - Natural (EA015H) BH2, MW2395, BH6	BH5, BH7,	22-Feb-2019	----	----	----	26-Feb-2019	01-Mar-2019	✓
EA025: Total Suspended Solids dried at 104 ± 2 °C								
Clear Plastic Bottle - Natural (EA025H) BH4, BH3,	BH8, BH11	21-Feb-2019	----	----	----	26-Feb-2019	28-Feb-2019	✓
Clear Plastic Bottle - Natural (EA025H) BH2, MW2395, BH6	BH5, BH7,	22-Feb-2019	----	----	----	26-Feb-2019	01-Mar-2019	✓
EA065: Total Hardness as CaCO3								
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH4, BH3,	BH8, BH11	21-Feb-2019	----	----	----	22-Feb-2019	21-Mar-2019	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2, MW2395, BH6	BH5, BH7,	22-Feb-2019	----	----	----	25-Feb-2019	22-Mar-2019	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P) BH4, BH3,	BH8, BH11	21-Feb-2019	----	----	----	22-Feb-2019	07-Mar-2019	✓
Clear Plastic Bottle - Natural (ED037-P) BH2, MW2395, BH6	BH5, BH7,	22-Feb-2019	----	----	----	25-Feb-2019	08-Mar-2019	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G) BH4, BH3,	BH8, BH11	21-Feb-2019	----	----	----	22-Feb-2019	21-Mar-2019	✓
Clear Plastic Bottle - Natural (ED041G) BH2, MW2395, BH6	BH5, BH7,	22-Feb-2019	----	----	----	22-Feb-2019	22-Mar-2019	✓
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G) BH4, BH3,	BH8, BH11	21-Feb-2019	----	----	----	22-Feb-2019	21-Mar-2019	✓
Clear Plastic Bottle - Natural (ED045G) BH2, MW2395, BH6	BH5, BH7,	22-Feb-2019	----	----	----	22-Feb-2019	22-Mar-2019	✓
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH4, BH3,	BH8, BH11	21-Feb-2019	----	----	----	22-Feb-2019	21-Mar-2019	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2, MW2395, BH6	BH5, BH7,	22-Feb-2019	----	----	----	25-Feb-2019	22-Mar-2019	✓



Matrix: **WATER**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) BH4, BH3,	BH8, BH11	21-Feb-2019	----	----	----	22-Feb-2019	20-Aug-2019	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) DUP01,	RINSATE01	21-Feb-2019	----	----	----	25-Feb-2019	20-Aug-2019	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) BH2, MW2395, BH6	BH5, BH7,	22-Feb-2019	----	----	----	25-Feb-2019	21-Aug-2019	✓
Clear Plastic Bottle - Nitric Acid; Unspecified (EG020A-F) TRIP BLANK		22-Feb-2019	----	----	----	25-Feb-2019	21-Aug-2019	✓
EG035F: Dissolved Mercury by FIMS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) BH4, BH3, DUP01,	BH8, BH11, RINSATE01	21-Feb-2019	----	----	----	26-Feb-2019	21-Mar-2019	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) BH2, MW2395, BH6	BH5, BH7,	22-Feb-2019	----	----	----	26-Feb-2019	22-Mar-2019	✓
Clear Plastic Bottle - Nitric Acid; Unspecified (EG035F) TRIP BLANK		22-Feb-2019	----	----	----	26-Feb-2019	08-Mar-2019	✓
EK040P: Fluoride by PC Titrator								
Clear Plastic Bottle - Natural (EK040P) BH4, BH3,	BH8, BH11	21-Feb-2019	----	----	----	22-Feb-2019	21-Mar-2019	✓
Clear Plastic Bottle - Natural (EK040P) BH2, MW2395, BH6	BH5, BH7,	22-Feb-2019	----	----	----	25-Feb-2019	22-Mar-2019	✓
EK055G: Ammonia as N by Discrete Analyser								
Clear Plastic Bottle - Natural (EK055G) BH8		21-Feb-2019	----	----	----	22-Feb-2019	22-Feb-2019	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G) BH4, BH11	BH3,	21-Feb-2019	----	----	----	22-Feb-2019	21-Mar-2019	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G) BH2, MW2395, BH6	BH5, BH7,	22-Feb-2019	----	----	----	23-Feb-2019	22-Mar-2019	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK057G: Nitrite as N by Discrete Analyser								
Clear Plastic Bottle - Natural (EK057G) BH4, BH3,	BH8, BH11	21-Feb-2019	----	----	----	22-Feb-2019	23-Feb-2019	✔
Clear Plastic Bottle - Natural (EK057G) BH2, MW2395, BH6	BH5, BH7,	22-Feb-2019	----	----	----	22-Feb-2019	24-Feb-2019	✔
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Clear Plastic Bottle - Natural (EK059G) BH8		21-Feb-2019	----	----	----	22-Feb-2019	23-Feb-2019	✔
Clear Plastic Bottle - Sulfuric Acid (EK059G) BH4, BH11	BH3,	21-Feb-2019	----	----	----	22-Feb-2019	21-Mar-2019	✔
Clear Plastic Bottle - Sulfuric Acid (EK059G) BH2, MW2395, BH6	BH5, BH7,	22-Feb-2019	----	----	----	23-Feb-2019	22-Mar-2019	✔
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Clear Plastic Bottle - Natural (EK061G) BH8		21-Feb-2019	22-Feb-2019	22-Feb-2019	✔	22-Feb-2019	22-Mar-2019	✔
Clear Plastic Bottle - Sulfuric Acid (EK061G) BH4, BH11	BH3,	21-Feb-2019	22-Feb-2019	21-Mar-2019	✔	22-Feb-2019	21-Mar-2019	✔
Clear Plastic Bottle - Sulfuric Acid (EK061G) BH2, MW2395, BH6	BH5, BH7,	22-Feb-2019	23-Feb-2019	22-Mar-2019	✔	23-Feb-2019	22-Mar-2019	✔
EK067G: Total Phosphorus as P by Discrete Analyser								
Clear Plastic Bottle - Natural (EK067G) BH8		21-Feb-2019	22-Feb-2019	23-Feb-2019	✔	22-Feb-2019	22-Mar-2019	✔
Clear Plastic Bottle - Sulfuric Acid (EK067G) BH4, BH11	BH3,	21-Feb-2019	22-Feb-2019	21-Mar-2019	✔	22-Feb-2019	21-Mar-2019	✔
Clear Plastic Bottle - Sulfuric Acid (EK067G) BH2, MW2395, BH6	BH5, BH7,	22-Feb-2019	23-Feb-2019	22-Mar-2019	✔	23-Feb-2019	22-Mar-2019	✔



Matrix: **WATER**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK071G: Reactive Phosphorus as P by discrete analyser								
Clear Plastic Bottle - Natural (EK071G) BH4, BH3,	BH8, BH11	21-Feb-2019	----	----	----	22-Feb-2019	23-Feb-2019	✓
Clear Plastic Bottle - Natural (EK071G) BH2, MW2395, BH6	BH5, BH7,	22-Feb-2019	----	----	----	22-Feb-2019	24-Feb-2019	✓
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup								
Amber Glass Bottle - Unpreserved (EP071SG) BH4, BH3, DUP01,	BH8, BH11, RINSATE01	21-Feb-2019	22-Feb-2019	28-Feb-2019	✓	25-Feb-2019	03-Apr-2019	✓
Amber Glass Bottle - Unpreserved (EP071SG) BH2, MW2395, BH6,	BH5, BH7, TRIP BLANK	22-Feb-2019	26-Feb-2019	01-Mar-2019	✓	28-Feb-2019	07-Apr-2019	✓
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
Amber Glass Bottle - Unpreserved (EP071SG) BH4, BH3, DUP01,	BH8, BH11, RINSATE01	21-Feb-2019	22-Feb-2019	28-Feb-2019	✓	25-Feb-2019	03-Apr-2019	✓
Amber Glass Bottle - Unpreserved (EP071SG) BH2, MW2395, BH6,	BH5, BH7, TRIP BLANK	22-Feb-2019	26-Feb-2019	01-Mar-2019	✓	28-Feb-2019	07-Apr-2019	✓
EP080/071: Total Petroleum Hydrocarbons								
Amber VOC Vial - Sulfuric Acid (EP080) BH4, BH3, DUP01,	BH8, BH11, RINSATE01	21-Feb-2019	25-Feb-2019	07-Mar-2019	✓	25-Feb-2019	07-Mar-2019	✓
Amber VOC Vial - Sulfuric Acid (EP080) BH2, MW2395, BH6,	BH5, BH7, TRIP BLANK	22-Feb-2019	25-Feb-2019	08-Mar-2019	✓	25-Feb-2019	08-Mar-2019	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Amber VOC Vial - Sulfuric Acid (EP080)								
BH4, BH3, DUP01,	BH8, BH11, RINSATE01	21-Feb-2019	25-Feb-2019	07-Mar-2019	✔	25-Feb-2019	07-Mar-2019	✔
Amber VOC Vial - Sulfuric Acid (EP080)								
BH2, MW2395, BH6,	BH5, BH7, TRIP BLANK	22-Feb-2019	25-Feb-2019	08-Mar-2019	✔	25-Feb-2019	08-Mar-2019	✔
EP080: BTEXN								
Amber VOC Vial - Sulfuric Acid (EP080)								
BH4, BH3, DUP01,	BH8, BH11, RINSATE01	21-Feb-2019	25-Feb-2019	07-Mar-2019	✔	25-Feb-2019	07-Mar-2019	✔
Amber VOC Vial - Sulfuric Acid (EP080)								
BH2, MW2395, BH6,	BH5, BH7, TRIP BLANK	22-Feb-2019	25-Feb-2019	08-Mar-2019	✔	25-Feb-2019	08-Mar-2019	✔
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X)								
TRIP BLANK		13-Feb-2019	26-Feb-2019	12-Aug-2019	✔	26-Feb-2019	12-Aug-2019	✔
HDPE (no PTFE) (EP231X)								
BH4, BH3, DUP01,	BH8, BH11, RINSATE01	21-Feb-2019	26-Feb-2019	20-Aug-2019	✔	26-Feb-2019	20-Aug-2019	✔
HDPE (no PTFE) (EP231X)								
BH2, MW2395, BH6,	BH5, BH7, TRIP BLANK	22-Feb-2019	26-Feb-2019	21-Aug-2019	✔	26-Feb-2019	21-Aug-2019	✔
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X)								
TRIP BLANK		13-Feb-2019	26-Feb-2019	12-Aug-2019	✔	26-Feb-2019	12-Aug-2019	✔
HDPE (no PTFE) (EP231X)								
BH4, BH3, DUP01,	BH8, BH11, RINSATE01	21-Feb-2019	26-Feb-2019	20-Aug-2019	✔	26-Feb-2019	20-Aug-2019	✔
HDPE (no PTFE) (EP231X)								
BH2, MW2395, BH6,	BH5, BH7, TRIP BLANK	22-Feb-2019	26-Feb-2019	21-Aug-2019	✔	26-Feb-2019	21-Aug-2019	✔



Matrix: **WATER**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X) TRIP BLANK		13-Feb-2019	26-Feb-2019	12-Aug-2019	✓	26-Feb-2019	12-Aug-2019	✓
HDPE (no PTFE) (EP231X) BH4, BH3, DUP01,	BH8, BH11, RINSATE01	21-Feb-2019	26-Feb-2019	20-Aug-2019	✓	26-Feb-2019	20-Aug-2019	✓
HDPE (no PTFE) (EP231X) BH2, MW2395, BH6,	BH5, BH7, TRIP BLANK	22-Feb-2019	26-Feb-2019	21-Aug-2019	✓	26-Feb-2019	21-Aug-2019	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X) TRIP BLANK		13-Feb-2019	26-Feb-2019	12-Aug-2019	✓	26-Feb-2019	12-Aug-2019	✓
HDPE (no PTFE) (EP231X) BH4, BH3, DUP01,	BH8, BH11, RINSATE01	21-Feb-2019	26-Feb-2019	20-Aug-2019	✓	26-Feb-2019	20-Aug-2019	✓
HDPE (no PTFE) (EP231X) BH2, MW2395, BH6,	BH5, BH7, TRIP BLANK	22-Feb-2019	26-Feb-2019	21-Aug-2019	✓	26-Feb-2019	21-Aug-2019	✓
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X) TRIP BLANK		13-Feb-2019	26-Feb-2019	12-Aug-2019	✓	26-Feb-2019	12-Aug-2019	✓
HDPE (no PTFE) (EP231X) BH4, BH3, DUP01,	BH8, BH11, RINSATE01	21-Feb-2019	26-Feb-2019	20-Aug-2019	✓	26-Feb-2019	20-Aug-2019	✓
HDPE (no PTFE) (EP231X) BH2, MW2395, BH6,	BH5, BH7, TRIP BLANK	22-Feb-2019	26-Feb-2019	21-Aug-2019	✓	26-Feb-2019	21-Aug-2019	✓



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	4	40	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	4	28	14.29	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	5	48	10.42	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	4	39	10.26	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	5	41	12.20	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	4	35	11.43	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	3	20	15.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	4	35	11.43	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	4	33	12.12	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	4	38	10.53	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	39	10.26	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	5	41	12.20	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	3	27	11.11	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	4	32	12.50	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	4	32	12.50	10.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	0	15	0.00	10.00	✖	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	4	40	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	4	40	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	2	28	7.14	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	6	48	12.50	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	39	5.13	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	3	41	7.32	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	35	5.71	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	20	10.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	35	5.71	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	33	6.06	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	38	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	39	10.26	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	3	41	7.32	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	27	7.41	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard



Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Control Samples (LCS) - Continued							
Total Dissolved Solids (High Level)	EA015H	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	6	32	18.75	15.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	6	32	18.75	15.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	2	15	13.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	2	28	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	3	48	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	39	5.13	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	3	41	7.32	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	35	5.71	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	20	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	35	5.71	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	33	6.06	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	38	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	3	41	7.32	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	27	7.41	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	32	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	32	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	2	15	13.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	2	28	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	3	48	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	3	41	7.32	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	35	5.71	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	20	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	33	6.06	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	38	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	3	41	7.32	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	27	7.41	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	32	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	32	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	0	15	0.00	5.00	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (2013) Schedule B(3)
Calculated TDS (from Electrical Conductivity)	EA016	WATER	In house: Calculation from Electrical Conductivity (APHA 2510 B) using a conversion factor specified in the analytical report. This method is compliant with NEPM (2013) Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of 'non-filterable' residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C. This method is compliant with NEPM (2013) Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM (2013) Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (2013) Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.



Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Fluoride by PC Titrator	EK040P	WATER	In house: Referenced to APHA 4500-F C: CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH ₃ G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO ₂ - B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO ₃ - F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined separately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NO _x) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO ₃ - F. Combined oxidised Nitrogen (NO ₂ +NO ₃) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO ₃ -. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with orthophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Ionic Balance by PCT DA and Turbi SO ₄ DA	EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	WATER	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C36. This method is compliant with NEPM (2013) Schedule B(3) (Method 506.1)



Analytical Methods	Method	Matrix	Method Descriptions
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In house: Direct injection analysis of fresh waters after dilution (1:1) with methanol. Analysis by LC-Electrospray-MS-MS, Negative Mode using MRM. Where commercially available, isotopically labelled analogues of the target analytes are used as internal standards for quantification. Where a labelled analogue is not commercially available, the internal standard with similar chemistry and the closest retention time to the target is used for quantification. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. This method complies with the quality control definitions as stated in QSM 5.1. Data is reviewed in line with the DQOs as stated in QSM5.1
Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Preparation for PFAS in water.	EP231-PR	WATER	Method presumes direct injection without workup. Preparation includes addition of internal standard and surrogate, and filtration prior to analysis.
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : ES1905499

Client : KLEINFELDER AUSTRALIA PTY LTD Contact : DANIEL KOUSBROEK Address : 95 MITCHELL ROAD CARDIFF NSW 2285 E-mail : dkousbroek@kleinfelder.com Telephone : ---- Facsimile : ---- Project : 20190803 Order number : C-O-C number : ---- Site : WILLIAM TOWN SANDS SINDICATE Sampler : DANIEL KOUSBROEK	Laboratory : Environmental Division Sydney Contact : Shirley LeCornu Address : 277-289 Woodpark Road Smithfield NSW Australia 2164 E-mail : shirley.lecornu@Alsglobal.com Telephone : +6138549 9630 Facsimile : +61-2-8784 8500 Page : 1 of 3 Quote number : EM2019ALLENVENG0010 (ME/114/19) QC Level : NEPM 2013 B3 & ALS QC Standard

Dates

Date Samples Received : 21-Feb-2019 16:43	Issue Date : 22-Feb-2019
Client Requested Due : 28-Feb-2019	Scheduled Reporting Date : 28-Feb-2019
Date	

Delivery Details

Mode of Delivery : Undefined	Security Seal : Not Available
No. of coolers/boxes : 1	Temperature : 6.8°C - Ice present
Receipt Detail :	No. of samples received / analysed : 14 / 13

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- 22/02/19: This is an updated SRN which indicates the new scheduled release date for this work order.
- **Sample TRIP01 to be forwarded to Eurofins as per COC's.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- **Sample(s) requiring volatile organic compound analysis received in airtight containers (ZHE).**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

Method	Sample Container Received	Preferred Sample Container for Analysis
Client sample ID		
Dissolved Mercury by FIMS : EG035F		
TRIP BLANK	- Clear Plastic Bottle - Nitric Acid; Unspecified	- Clear Plastic Bottle - Nitric Acid; Filtered
Dissolved Metals by ICP-MS - Suite A : EG020A-F		
TRIP BLANK	- Clear Plastic Bottle - Nitric Acid; Unspecified	- Clear Plastic Bottle - Nitric Acid; Filtered

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EG020F Dissolved Metals by ICP/MS	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-14 Extended Water Suite B	WATER - W-03 15 Metals (NEPM Suite)	WATER - W-05 SG TRH/B TEXN/8 Metals inc Silica Gel Clean Up
ES1905499-001	21-Feb-2019 00:00	BH4	✓	✓	✓	✓	✓	✓	✓
ES1905499-002	21-Feb-2019 00:00	BH8	✓	✓	✓	✓	✓	✓	✓
ES1905499-004	21-Feb-2019 00:00	BH3	✓	✓	✓	✓	✓	✓	✓
ES1905499-005	21-Feb-2019 00:00	BH11	✓	✓	✓	✓	✓	✓	✓
ES1905499-006	13-Feb-2019 00:00	TRIP BLANK				✓			
ES1905499-007	21-Feb-2019 00:00	DUP01			✓	✓		✓	✓
ES1905499-008	21-Feb-2019 00:00	RINSATE01			✓	✓		✓	✓
ES1905499-009	22-Feb-2019 00:00	BH2	✓	✓	✓	✓	✓	✓	✓
ES1905499-010	22-Feb-2019 00:00	BH5	✓	✓	✓	✓	✓	✓	✓
ES1905499-011	22-Feb-2019 00:00	MW2395	✓	✓	✓	✓	✓	✓	✓
ES1905499-012	22-Feb-2019 00:00	BH7	✓	✓	✓	✓	✓	✓	✓
ES1905499-013	22-Feb-2019 00:00	BH6	✓	✓	✓	✓	✓	✓	✓
ES1905499-014	22-Feb-2019 00:00	TRIP BLANK			✓	✓		✓	✓

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	(On Hold) WATER No analysis requested
ES1905499-003	21-Feb-2019 00:00	BH2	✓



Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

DANIEL KOUSBROEK

- *AU Certificate of Analysis - NATA (COA)	Email	dkousbroek@kleinfelder.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	dkousbroek@kleinfelder.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	dkousbroek@kleinfelder.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	dkousbroek@kleinfelder.com
- A4 - AU Tax Invoice (INV)	Email	dkousbroek@kleinfelder.com
- Chain of Custody (CoC) (COC)	Email	dkousbroek@kleinfelder.com
- EDI Format - ENMRG (ENMRG)	Email	dkousbroek@kleinfelder.com
- EDI Format - EQUIS V5 for KLEINFELDER (KLEINFELDER)	Email	dkousbroek@kleinfelder.com
- EDI Format - ESDAT (ESDAT)	Email	dkousbroek@kleinfelder.com

INVOICES

- A4 - AU Tax Invoice (INV)	Email	Aus_Accounts@kleinfelder.com

Newcastle

- *AU Certificate of Analysis - NATA (COA)	Email	newcastle@kleinfelder.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	newcastle@kleinfelder.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	newcastle@kleinfelder.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	newcastle@kleinfelder.com
- A4 - AU Tax Invoice (INV)	Email	newcastle@kleinfelder.com
- Chain of Custody (CoC) (COC)	Email	newcastle@kleinfelder.com
- EDI Format - ENMRG (ENMRG)	Email	newcastle@kleinfelder.com
- EDI Format - EQUIS V5 for KLEINFELDER (KLEINFELDER)	Email	newcastle@kleinfelder.com
- EDI Format - ESDAT (ESDAT)	Email	newcastle@kleinfelder.com

TOM OVERTON

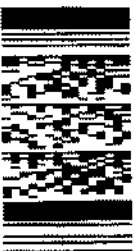
- *AU Certificate of Analysis - NATA (COA)	Email	toverton@kleinfelder.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	toverton@kleinfelder.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	toverton@kleinfelder.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	toverton@kleinfelder.com
- Chain of Custody (CoC) (COC)	Email	toverton@kleinfelder.com
- EDI Format - ENMRG (ENMRG)	Email	toverton@kleinfelder.com
- EDI Format - EQUIS V5 for KLEINFELDER (KLEINFELDER)	Email	toverton@kleinfelder.com
- EDI Format - ESDAT (ESDAT)	Email	toverton@kleinfelder.com



Refer to Work order Ref: ES1905499

Client:				SITE, COC AND CONTACT DATA				Laboratory:					
Kleinfelder Australia Pty Ltd 96 Mitchell Road Cardiff, NSW 2285 Phone: 02 4949 5200				Site Name: William Town Sande Shire COC NUMBER: ME/114/19 Job No.: 20190903 Required TAT: 24 hrs 48 hrs 3 days 5 days 7 days Data QA level: LAB minimum unless specified				ALS 5/585 Mathens Rd Mayfield West, Newcastle NSW 2304 Phone: (02) 4014 2500 Send Results to:					
Requisitioned by (print): <i>[Signature]</i>				Received by (print): <i>[Signature]</i>				Requisitioned (print): <i>[Signature]</i>					
Date / Time: 22.2.19				Date / Time: 22/2/19 12:11				Date / Time: 22/2/19 12:11					
Notes:				Notes: 1-9 Incinerated / no ice seals intact / no seal				Notes: 1-9 Incinerated / no ice seals intact / no seal					
Sample ID	Lab ID	Sample Point	Sample Type	Date	Start Depth	End Depth	Units	# Containers	W-05 SG	Organic Analytes	Metals	Other Analytes	Comments
GH2	9		Water	22.2.19				7	X				
BHS	10		Water	22.2.19				7	X				
OWC395	11		Water	22.2.19				7	X				
GH7	12		Water	22.2.19				7	X				
GH6	13		Water	22.2.19				7	X				
TRIO BLANK	14		Water	22.2.19				5	X				
GETTING LAB OF ORIGIN: NEWCASTLE													
W-05 SG: TRIO BLANK & Metale Silica Gel Clean Up NT14 - Extended water suite B Additional metals analysis to make up NEPM 15 Arsenic (As), Cadmium (Cd), Chromium (Cr), Copper (Cu), Lead (Pb), Mercury (Hg), Nickel (Ni), Zinc (Zn) Boron (B), Barium (Ba), Beryllium (Be), Cobalt (Co), Manganese (Mn), Selenium (Se), Vanadium (V)													

Environmental Division
Sydney
Work Order Reference
ES1905499



Telephone : + 61-2-8784 8555

CERTIFICATE OF ANALYSIS

Work Order : **ES1905667**
Client : **KLEINFELDER AUSTRALIA PTY LTD**
Contact : **DANIEL KOUSBROEK**
Address : **95 MITCHELL ROAD**
CARDIFF NSW 2285
Telephone : **----**
Project : **20190903**
Order number : **----**
C-O-C number : **----**
Sampler : **DANIEL KOUSBROEK**
Site : **WILLIAM TOWN SANDS SANDICATE**
Quote number : **ME/114/19**
No. of samples received : **1**
No. of samples analysed : **1**

Page : 1 of 8
Laboratory : Environmental Division Sydney
Contact : Shirley LeCornu
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +6138549 9630
Date Samples Received : 22-Feb-2019 17:16
Date Analysis Commenced : 22-Feb-2019
Issue Date : 28-Feb-2019 15:30



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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini		Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW



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

Ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- EK057G: LOR raised for Nitrite on sample 1 due to sample matrix.
- EK071G: LOR raised for Reactive Phosphorus on sample 1 due to sample matrix.
- EK059G-EK058G: LOR raised for NOx-Nitrate on sample 1 due to sample matrix.
- EA015: TDS by method EA-015 may bias high due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- 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

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW3	----	----	----	----
Client sampling date / time					22-Feb-2019 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1905667-001	-----	-----	-----	-----
				Result	----	----	----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		6.21	----	----	----	----
EA006: Sodium Adsorption Ratio (SAR)									
^ Sodium Adsorption Ratio	----	0.01	-		3.38	----	----	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		262	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		228	----	----	----	----
EA016: Calculated TDS (from Electrical Conductivity)									
Total Dissolved Solids (Calc.)	----	1	mg/L		170	----	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		58	----	----	----	----
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		26	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		11	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		11	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		16	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		82	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		4	----	----	----	----
Magnesium	7439-95-4	1	mg/L		4	----	----	----	----
Sodium	7440-23-5	1	mg/L		40	----	----	----	----
Potassium	7440-09-7	1	mg/L		1	----	----	----	----
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		0.003	----	----	----	----
Boron	7440-42-8	0.05	mg/L		<0.05	----	----	----	----
Barium	7440-39-3	0.001	mg/L		0.075	----	----	----	----
Beryllium	7440-41-7	0.001	mg/L		<0.001	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	----	----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW3	----	----	----	----
Client sampling date / time					22-Feb-2019 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1905667-001	-----	-----	-----	-----
					Result	----	----	----	----
EG020F: Dissolved Metals by ICP-MS - Continued									
Cobalt	7440-48-4	0.001	mg/L		<0.001	----	----	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	----	----	----	----
Copper	7440-50-8	0.001	mg/L		<0.001	----	----	----	----
Manganese	7439-96-5	0.001	mg/L		0.033	----	----	----	----
Nickel	7440-02-0	0.001	mg/L		0.002	----	----	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	----	----	----	----
Selenium	7782-49-2	0.01	mg/L		<0.01	----	----	----	----
Vanadium	7440-62-2	0.01	mg/L		<0.01	----	----	----	----
Zinc	7440-66-6	0.005	mg/L		0.016	----	----	----	----
Iron	7439-89-6	0.05	mg/L		4.84	----	----	----	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	----	----	----	----
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		<0.1	----	----	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		0.16	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.05	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<0.05	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.05	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		1.0	----	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		1.0	----	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		0.06	----	----	----	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.05	----	----	----	----
EN055: Ionic Balance									
Total Anions	----	0.01	meq/L		2.87	----	----	----	----
Total Cations	----	0.01	meq/L		2.55	----	----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW3	----	----	----	----
Client sampling date / time					22-Feb-2019 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1905667-001	-----	-----	-----	-----
					Result	----	----	----	----
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L		<50	----	----	----	----
C15 - C28 Fraction	----	100	µg/L		<100	----	----	----	----
C29 - C36 Fraction	----	50	µg/L		<50	----	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	----	----	----	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L		<100	----	----	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	----	----	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	----	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	----	----	----	----
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	----	----	----	----
Toluene	108-88-3	2	µg/L		<2	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	----	----	----	----
^ Total Xylenes	----	2	µg/L		<2	----	----	----	----
^ Sum of BTEX	----	1	µg/L		<1	----	----	----	----
Naphthalene	91-20-3	5	µg/L		<5	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
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	----	----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW3	----	----	----	----
Client sampling date / time					22-Feb-2019 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1905667-001	-----	-----	-----	-----
					Result	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	----	----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW3	----	----	----	----
Client sampling date / time					22-Feb-2019 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1905667-001	-----	-----	-----	-----
				Result		----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
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	----	----	----	----
EP231P: PFAS Sums									
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	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		106	----	----	----	----
Toluene-D8	2037-26-5	2	%		100	----	----	----	----
4-Bromofluorobenzene	460-00-4	2	%		98.6	----	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		100	----	----	----	----
13C8-PFOA	----	0.02	%		98.3	----	----	----	----



Surrogate Control Limits

Sub-Matrix: **WATER**

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

QUALITY CONTROL REPORT

Work Order	: ES1905667	Page	: 1 of 13
Client	: KLEINFELDER AUSTRALIA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Contact	: Shirley LeCornu
Address	: 95 MITCHELL ROAD CARDIFF NSW 2285	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +6138549 9630
Project	: 20190903	Date Samples Received	: 22-Feb-2019
Order number	:	Date Analysis Commenced	: 22-Feb-2019
C-O-C number	: ----	Issue Date	: 28-Feb-2019
Sampler	: DANIEL KOUSBROEK		
Site	: WILLIAM TOWN SANDS SANDICATE		
Quote number	: ME/114/19		
No. of samples received	: 1		
No. of samples analysed	: 1		



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 Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini		Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
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
RPD = Relative Percentage Difference
= Indicates failed QC

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 2201508)									
ES1905631-003	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.10	7.10	0.00	0% - 20%
EW1900748-005	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	6.33	6.31	0.316	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 2201505)									
ES1905451-004	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	<1	0.00	No Limit
EW1900748-005	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	96	96	0.00	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 2205368)									
ES1905581-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	3160	3210	1.60	0% - 20%
ES1905749-004	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	276	270	2.38	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 2205367)									
ES1905581-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	502	518	3.14	0% - 20%
ES1905749-004	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	<5	<5	0.00	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 2201509)									
ES1905631-003	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	1540	1630	5.24	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	1540	1630	5.24	0% - 20%
EW1900748-005	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	4	4	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	4	4	0.00	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2201771)									
ES1905601-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1220	1210	0.734	0% - 20%
ES1905667-001	SW3	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	16	17	0.00	No Limit
ED045G: Chloride by Discrete Analyser (QC Lot: 2201770)									



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ED045G: Chloride by Discrete Analyser (QC Lot: 2201770) - continued									
ES1905601-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	101	101	0.00	0% - 20%
ES1905636-002	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	36	36	0.00	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 2203447)									
EW1900729-005	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	4	4	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	6	6	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	26	27	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.00	No Limit
EW1900729-002	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	<1	1	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	4	4	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	27	26	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2203445)									
EW1900729-005	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.037	0.036	0.00	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.096	0.096	0.00	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.008	0.008	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.05	0.06	0.00	No Limit
EW1900729-002	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.009	0.009	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.097	0.097	0.00	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.007	0.006	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit

Page : 4 of 13
 Work Order : ES1905667
 Client : KLEINFELDER AUSTRALIA PTY LTD
 Project : 20190903



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2203445) - continued									
EW1900729-002	Anonymous	EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 2203446)									
ES1905625-012	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 2201507)									
ES1905631-003	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.4	0.4	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 2202253)									
ES1905472-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	2.52	2.50	0.863	0% - 20%
EW1900735-002	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	716	710	0.842	0% - 20%
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 2201775)									
ES1905667-001	SW3	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.05	<0.05	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 2202252)									
ES1905560-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
ES1905472-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.05	0.06	0.00	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 2202256)									
ES1905472-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	25.7	27.0	4.84	0% - 20%
ES1905559-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	60.2	54.2	10.5	0% - 20%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 2202255)									
ES1905472-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	3.82	3.90	2.10	0% - 20%
ES1905559-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	6.98	6.59	5.71	0% - 20%
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 2201774)									
ES1905667-001	SW3	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.05	<0.05	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2203150)									
ES1905399-003	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
ES1905540-002	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	510	520	1.97	0% - 20%
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2203150)									
ES1905399-003	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES1905540-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	510	520	1.95	0% - 20%
EP080: BTEXN (QC Lot: 2203150)									
ES1905399-003	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.00	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
ES1905540-002	Anonymous	EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
		EP080: Benzene	71-43-2	1	µg/L	2	2	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP080: BTEXN (QC Lot: 2203150) - continued									
ES1905540-002	Anonymous	EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.00	No Limit
		106-42-3							
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 2204280)									
EB1904270-002	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.05	0.05	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
ES1905499-006	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2204280)									
EB1904270-002	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	1.21	1.21	0.00	0% - 20%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.03	0.03	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.10	0.10	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.22	0.22	0.00	0% - 50%
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	0.02	0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
ES1905499-006	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2204280) - continued									
ES1905499-006	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2204280)									
EB1904270-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1905499-006	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2204280)									
EB1904270-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1905499-006	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit

Page : 7 of 13
 Work Order : ES1905667
 Client : KLEINFELDER AUSTRALIA PTY LTD
 Project : 20190903



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2204280) - continued									
ES1905499-006	Anonymous	EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 2204280)									
EB1904270-002	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	1.63	1.63	0.00	0% - 20%
ES1905499-006	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.00	No Limit



Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result		LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 2201508)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	102	98	102
				----	7 pH Unit	99.6	98	102
EA010P: Conductivity by PC Titrator (QCLot: 2201505)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2100 µS/cm	96.9	95	113
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 2205368)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	103	87	109
				<10	293 mg/L	123	66	126
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 2205367)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	98.0	83	129
				<5	1000 mg/L	91.0	82	110
ED037P: Alkalinity by PC Titrator (QCLot: 2201509)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	102	81	111
				----	50 mg/L	111	70	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2201771)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	108	82	122
ED045G: Chloride by Discrete Analyser (QCLot: 2201770)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	102	81	127
				<1	1000 mg/L	89.5	81	127
ED093F: Dissolved Major Cations (QCLot: 2203447)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	93.9	80	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	97.3	90	116
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	95.5	82	120
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	96.0	85	113
EG020F: Dissolved Metals by ICP-MS (QCLot: 2203445)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	92.4	85	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	87.5	85	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	96.1	82	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	92.7	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	93.1	85	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	92.4	82	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	91.6	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	92.2	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	95.1	82	110

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EG020F: Dissolved Metals by ICP-MS (QCLot: 2203445) - continued								
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	89.3	82	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	93.8	85	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	90.7	83	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	99.1	81	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	85.0	85	115
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	94.5	82	112
EG035F: Dissolved Mercury by FIMS (QCLot: 2203446)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	90.9	83	105
EK040P: Fluoride by PC Titrator (QCLot: 2201507)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	91.6	82	116
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2202253)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	101	90	114
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2201775)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	103	82	114
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2202252)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	100	91	113
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2202256)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	98.4	69	101
				<0.1	1 mg/L	85.5	70	118
				<0.1	5 mg/L	79.6	74	118
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2202255)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	93.2	71	101
				<0.01	0.442 mg/L	87.0	72	108
				<0.01	1 mg/L	79.4	78	118
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2201774)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	95.1	85	117
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QCLot: 2201957)								
EP071SG: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	84.0	75	117
EP071SG: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	93.6	81	113
EP071SG: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	82.0	71	117
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 2201957)								
EP071SG: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	93.0	73	119
EP071SG: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	99.0	81	113
EP071SG: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	108	65	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2203150)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	87.6	75	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2203150)								



Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result			Low	High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2203150) - continued								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	89.7	75	127
EP080: BTEXN (QCLot: 2203150)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	89.0	70	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	93.3	69	123
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	93.0	70	120
EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	10 µg/L	93.0	69	121
	106-42-3							
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	93.9	72	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	95.0	70	120
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2204280)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	90.8	70	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	89.8	70	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	90.4	70	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	97.6	70	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	95.4	70	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.5 µg/L	82.4	70	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2204280)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	97.3	70	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	104	70	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	99.6	70	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	100	70	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	98.6	70	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	98.4	70	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	102	70	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	99.2	70	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	98.0	70	130
EP231X: Perfluorotridecanoic acid (PFTriDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	105	70	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	103	70	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2204280)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	98.2	70	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	103	70	150
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	96.6	70	150
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	1.25 µg/L	98.0	70	150
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	98.9	70	150
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	123	70	130



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2204280) - continued								
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	94.2	70	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2204280)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	106	70	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	96.0	70	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	119	70	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	91.4	70	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2201771)							
ES1905601-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	# Not Determined	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 2201770)							
ES1905601-001	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	98.7	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2203445)							
ES1905625-011	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	94.7	70	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	90.8	70	130
		EG020A-F: Barium	7440-39-3	1 mg/L	94.6	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	94.6	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	90.0	70	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	94.0	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	94.4	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	93.8	70	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	88.4	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	93.9	70	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	90.0	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	95.0	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 2203446)							
ES1905625-011	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	104	70	130
EK040P: Fluoride by PC Titrator (QCLot: 2201507)							
ES1905631-001	Anonymous	EK040P: Fluoride	16984-48-8	5 mg/L	103	70	130

Page : 12 of 13
 Work Order : ES1905667
 Client : KLEINFELDER AUSTRALIA PTY LTD
 Project : 20190903



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2202253)							
ES1905472-001	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	87.9	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2201775)							
ES1905667-001	SW3	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	103	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2202252)							
ES1905472-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	109	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2202256)							
ES1905473-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	25 mg/L	82.2	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2202255)							
ES1905473-001	Anonymous	EK067G: Total Phosphorus as P	----	5 mg/L	90.8	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2201774)							
ES1905667-001	SW3	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	91.6	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2203150)							
ES1905399-003	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	98.6	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2203150)							
ES1905399-003	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	98.9	70	130
EP080: BTEXN (QCLot: 2203150)							
ES1905399-003	Anonymous	EP080: Benzene	71-43-2	25 µg/L	90.8	70	130
		EP080: Toluene	108-88-3	25 µg/L	92.1	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	93.3	70	130
		EP080: meta- & para-Xylene	108-38-3	25 µg/L	90.8	70	130
			106-42-3				
		EP080: ortho-Xylene	95-47-6	25 µg/L	93.0	70	130
		EP080: Naphthalene	91-20-3	25 µg/L	105	70	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2204280)							
EB1904270-002	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	80.6	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.5 µg/L	77.6	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	70.2	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	71.2	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	75.8	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.5 µg/L	74.6	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2204280)							
EB1904270-002	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	69.3	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	80.2	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	92.4	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	82.8	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	80.8	50	130



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2204280) - continued							
EB1904270-002	Anonymous	EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	93.6	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	90.6	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	94.2	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	98.2	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5 µg/L	84.6	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	76.2	50	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2204280)							
EB1904270-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	61.4	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	93.5	50	150
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	87.5	50	150
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	1.25 µg/L	86.3	50	150
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	75.1	50	150
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	95.6	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	75.6	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2204280)							
EB1904270-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	101	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	99.6	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	97.8	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	101	50	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES1905667	Page	: 1 of 9
Client	: KLEINFELDER AUSTRALIA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Telephone	: +6138549 9630
Project	: 20190903	Date Samples Received	: 22-Feb-2019
Site	: WILLIAM TOWN SANDS SANDICATE	Issue Date	: 28-Feb-2019
Sampler	: DANIEL KOUSBROEK	No. of samples received	: 1
Order number	:	No. of samples analysed	: 1

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- **NO** Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers exist - please see following pages for full details.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO ₄ 2- by DA	ES1905601--001	Anonymous	Sulfate as SO ₄ - Turbidimetric	14808-79-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
TRH - Total Recoverable Hydrocarbons - Silica Gel C	0	7	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Total Recoverable Hydrocarbons - Silica Gel C	0	7	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P) SW3	22-Feb-2019	----	----	----	22-Feb-2019	22-Feb-2019	✔
EA006: Sodium Adsorption Ratio (SAR)							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) SW3	22-Feb-2019	----	----	----	25-Feb-2019	22-Mar-2019	✔
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P) SW3	22-Feb-2019	----	----	----	22-Feb-2019	22-Mar-2019	✔
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H) SW3	22-Feb-2019	----	----	----	27-Feb-2019	01-Mar-2019	✔
EA025: Total Suspended Solids dried at 104 ± 2 °C							
Clear Plastic Bottle - Natural (EA025H) SW3	22-Feb-2019	----	----	----	27-Feb-2019	01-Mar-2019	✔



Matrix: **WATER**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA065: Total Hardness as CaCO3							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) SW3	22-Feb-2019	----	----	----	25-Feb-2019	22-Mar-2019	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P) SW3	22-Feb-2019	----	----	----	22-Feb-2019	08-Mar-2019	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G) SW3	22-Feb-2019	----	----	----	23-Feb-2019	22-Mar-2019	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G) SW3	22-Feb-2019	----	----	----	23-Feb-2019	22-Mar-2019	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) SW3	22-Feb-2019	----	----	----	25-Feb-2019	22-Mar-2019	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) SW3	22-Feb-2019	----	----	----	25-Feb-2019	21-Aug-2019	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) SW3	22-Feb-2019	----	----	----	26-Feb-2019	22-Mar-2019	✓
EK040P: Fluoride by PC Titrator							
Clear Plastic Bottle - Natural (EK040P) SW3	22-Feb-2019	----	----	----	22-Feb-2019	22-Mar-2019	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G) SW3	22-Feb-2019	----	----	----	25-Feb-2019	22-Mar-2019	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G) SW3	22-Feb-2019	----	----	----	23-Feb-2019	24-Feb-2019	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G) SW3	22-Feb-2019	----	----	----	25-Feb-2019	22-Mar-2019	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G) SW3	22-Feb-2019	25-Feb-2019	22-Mar-2019	✓	25-Feb-2019	22-Mar-2019	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G) SW3	22-Feb-2019	25-Feb-2019	22-Mar-2019	✓	25-Feb-2019	22-Mar-2019	✓



Matrix: **WATER**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G) SW3	22-Feb-2019	----	----	----	23-Feb-2019	24-Feb-2019	✓
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup							
Amber Glass Bottle - Unpreserved (EP071SG) SW3	22-Feb-2019	26-Feb-2019	01-Mar-2019	✓	28-Feb-2019	07-Apr-2019	✓
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup							
Amber Glass Bottle - Unpreserved (EP071SG) SW3	22-Feb-2019	26-Feb-2019	01-Mar-2019	✓	28-Feb-2019	07-Apr-2019	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber VOC Vial - Sulfuric Acid (EP080) SW3	22-Feb-2019	25-Feb-2019	08-Mar-2019	✓	25-Feb-2019	08-Mar-2019	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber VOC Vial - Sulfuric Acid (EP080) SW3	22-Feb-2019	25-Feb-2019	08-Mar-2019	✓	25-Feb-2019	08-Mar-2019	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080) SW3	22-Feb-2019	25-Feb-2019	08-Mar-2019	✓	25-Feb-2019	08-Mar-2019	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X) SW3	22-Feb-2019	26-Feb-2019	21-Aug-2019	✓	26-Feb-2019	21-Aug-2019	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X) SW3	22-Feb-2019	26-Feb-2019	21-Aug-2019	✓	26-Feb-2019	21-Aug-2019	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X) SW3	22-Feb-2019	26-Feb-2019	21-Aug-2019	✓	26-Feb-2019	21-Aug-2019	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X) SW3	22-Feb-2019	26-Feb-2019	21-Aug-2019	✓	26-Feb-2019	21-Aug-2019	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X) SW3	22-Feb-2019	26-Feb-2019	21-Aug-2019	✓	26-Feb-2019	21-Aug-2019	✓



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	15	13.33	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	2	11	18.18	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	18	11.11	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	3	33.33	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	19	10.53	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	7	14.29	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	14	14.29	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	5	20.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	18	11.11	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	5	20.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	18	11.11	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	14	14.29	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	0	7	0.00	10.00	✖	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	12	16.67	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	15	13.33	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	11	9.09	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	3	33.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	7	14.29	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	14	7.14	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	5	20.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	18	11.11	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	5	20.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard



Matrix: **WATER** Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Control Samples (LCS) - Continued							
Total Dissolved Solids (High Level)	EA015H	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	3	14	21.43	15.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	3	20	15.00	15.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	3	33.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	5	20.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	5	20.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	3	33.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	5	20.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	5	20.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	0	7	0.00	5.00	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (2013) Schedule B(3)
Calculated TDS (from Electrical Conductivity)	EA016	WATER	In house: Calculation from Electrical Conductivity (APHA 2510 B) using a conversion factor specified in the analytical report. This method is compliant with NEPM (2013) Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of 'non-filterable' residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C. This method is compliant with NEPM (2013) Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM (2013) Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (2013) Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.



Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Fluoride by PC Titrator	EK040P	WATER	In house: Referenced to APHA 4500-F C: CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH ₃ G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO ₂ - B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO ₃ - F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined separately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NO _x) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO ₃ - F. Combined oxidised Nitrogen (NO ₂ +NO ₃) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO ₃ -. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with orthophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Ionic Balance by PCT DA and Turbi SO ₄ DA	EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	WATER	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C36. This method is compliant with NEPM (2013) Schedule B(3) (Method 506.1)



Analytical Methods	Method	Matrix	Method Descriptions
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In house: Direct injection analysis of fresh waters after dilution (1:1) with methanol. Analysis by LC-Electrospray-MS-MS, Negative Mode using MRM. Where commercially available, isotopically labelled analogues of the target analytes are used as internal standards for quantification. Where a labelled analogue is not commercially available, the internal standard with similar chemistry and the closest retention time to the target is used for quantification. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. This method complies with the quality control definitions as stated in QSM 5.1. Data is reviewed in line with the DQOs as stated in QSM5.1
Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Preparation for PFAS in water.	EP231-PR	WATER	Method presumes direct injection without workup. Preparation includes addition of internal standard and surrogate, and filtration prior to analysis.
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : ES1905667

Client : KLEINFELDER AUSTRALIA PTY LTD Contact : DANIEL KOUSBROEK Address : 95 MITCHELL ROAD CARDIFF NSW 2285 E-mail : dkousbroek@kleinfelder.com Telephone : ---- Facsimile : ---- Project : 20190903 Order number : C-O-C number : ---- Site : WILLIAM TOWN SANDS SANDICATE Sampler : DANIEL KOUSBROEK	Laboratory : Environmental Division Sydney Contact : Shirley LeCornu Address : 277-289 Woodpark Road Smithfield NSW Australia 2164 E-mail : shirley.lecornu@Alsglobal.com Telephone : +6138549 9630 Facsimile : +61-2-8784 8500 Page : 1 of 2 Quote number : EM2019ALLENVENG0010 (ME/114/19) QC Level : NEPM 2013 B3 & ALS QC Standard

Dates

Date Samples Received : 22-Feb-2019 17:16	Issue Date : 22-Feb-2019
Client Requested Due : 28-Feb-2019	Scheduled Reporting Date : 28-Feb-2019
Date	

Delivery Details

Mode of Delivery : Undefined	Security Seal : Not Available
No. of coolers/boxes : 1	Temperature : 4.3°C - Ice present
Receipt Detail :	No. of samples received / analysed : 1 / 1

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- **Sample(s) requiring volatile organic compound analysis received in airtight containers (ZHE).**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- No sample container / preservation non-compliance exists.

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EG020F Dissolved Metals by ICP/MS	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-14 Extended Water Suite B	WATER - W-03 15 Metals (NEPM Suite)	WATER - W-05 SG TRH/BTEX/N8 Metals inc Silica Gel Clean Up
ES1905667-001	22-Feb-2019 00:00	SW3	✓	✓	✓	✓	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

DANIEL KOUSBROEK

- *AU Certificate of Analysis - NATA (COA)	Email	dkousbroek@kleinfelder.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	dkousbroek@kleinfelder.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	dkousbroek@kleinfelder.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	dkousbroek@kleinfelder.com
- A4 - AU Tax Invoice (INV)	Email	dkousbroek@kleinfelder.com
- Chain of Custody (CoC) (COC)	Email	dkousbroek@kleinfelder.com
- EDI Format - ENMRG (ENMRG)	Email	dkousbroek@kleinfelder.com
- EDI Format - EQuIS V5 for KLEINFELDER (KLEINFELDER)	Email	dkousbroek@kleinfelder.com
- EDI Format - ESDAT (ESDAT)	Email	dkousbroek@kleinfelder.com

INVOICES

- A4 - AU Tax Invoice (INV)	Email	Aus_Accounts@kleinfelder.com

Newcastle

- *AU Certificate of Analysis - NATA (COA)	Email	newcastle@kleinfelder.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	newcastle@kleinfelder.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	newcastle@kleinfelder.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	newcastle@kleinfelder.com
- Chain of Custody (CoC) (COC)	Email	newcastle@kleinfelder.com
- EDI Format - ENMRG (ENMRG)	Email	newcastle@kleinfelder.com
- EDI Format - EQuIS V5 for KLEINFELDER (KLEINFELDER)	Email	newcastle@kleinfelder.com
- EDI Format - ESDAT (ESDAT)	Email	newcastle@kleinfelder.com

TOM OVERTON

- *AU Certificate of Analysis - NATA (COA)	Email	toverton@kleinfelder.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	toverton@kleinfelder.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	toverton@kleinfelder.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	toverton@kleinfelder.com
- Chain of Custody (CoC) (COC)	Email	toverton@kleinfelder.com
- EDI Format - ENMRG (ENMRG)	Email	toverton@kleinfelder.com
- EDI Format - EQuIS V5 for KLEINFELDER (KLEINFELDER)	Email	toverton@kleinfelder.com
- EDI Format - ESDAT (ESDAT)	Email	toverton@kleinfelder.com



Client:		SITE, COC AND CONTACT DATA										Laboratory:		
Kleinfelder Australia Pty Ltd 95 Mitchell Road Cardiff, NSW 2285 Phone: 02 4949 5200		Site Name	William Town Sands Sincase				Sample Name	Dan Kousbroek				ALS 5585 Maitland Rd Mayfield West, Newcastle NSW 2304 Phone: (02) 4014 2500		
		QUOTE NUMBER	ME/114/10				Contact Number	045 8197 876						
		Job No.	20190903				Contact e-mail	dkousbroek@kleinfelder.com						
		Required TAT	24 hrs 48 hrs 3 days 5 days 7 days				PM name (if not sampler)	Tom Overton						
		Data QA level	LAB minimum unless specified				PM e-mail	toverton@kleinfelder.com						
CHAIN OF CUSTODY														
Relinquished by (print)		Relinquished by (sign)		Received by (print)		Received by (sign)		Relinquished by (print)		Relinquished by (sign)		Received by (print)		
Date / Time		21/2/19		Date / Time		21/2/19 16:43		Date / Time		Date / Time		Date / Time		
Notes				Temp (°C)		6.8		Notes		Temp (°C)		Notes		
				ice present / no ice		ice present / no ice				ice present / no ice		ice present / no ice		
				Seals intact / no seal		Seals intact / no seal				Seals intact / no seal		Seals intact / no seal		
Send Results to:														
95 Mitchell Road Cardiff, NSW 2285 newcastle@kleinfelder.com Phone: 02 4949 5200														
Sample ID	Lab ID	Sample Point	Sample Type	Date	Start Depth	End Depth	Units	# Containers	WAS SG	Organic Analyses	Metals	Other Analyses	Comments	
BH4			Water	21/2/19				7	X					
BH8			Water	21/2/19				7	X					
BH2			Water	21/2/19				6	X					
BH3			Water	21/2/19				7	X					
BH11			Water	21/2/19				7	X					
TRIP Blank			Water	21/2/19				2	X					
TRIP01			Water	21/2/19				5	X					
TRIP01			Water	21/2/19				5	X					
Rinsate01			Water	21/2/19				5	X					
Submit Forward Lab / Split WO Lab / Analysis: Organised By / Date: Relinquished By / Date: Connote / Courier: WCN: Attach By / Internal Sheet:														

W-46 SG - TRIGBTEXN 8 Metals Silica Gel Clean Up
NT14 - Extended water suite B
Additional metals analysis to make up NEPM 15

Arsenic (As), Cadmium (Cd), Chromium (Cr), Copper (Cu), Lead (Pb), Mercury (Hg), Nickel (Ni), Zinc (Zn)
Barium (Ba), Beryllium (Be), Cobalt (Co), Manganese (Mn), Selenium (Se), Vanadium (V)

Environmental Division
Sydney
Work Order Reference
ES1905499



Telephone : - 61-2-8784 8555

642019 8.83°C

Melbourne

6 Monterey Road
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NATA # 1261
Site # 1254 & 14271

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Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth

2/91 Leach Highway
Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261 Site # 23736

ABN – 50 005 085 521

e.mail : EnviroSales@eurofins.com

web : www.eurofins.com.au

Sample Receipt Advice

Company name: **Kleinfelder Aust Pty Ltd (NEWCASTLE)**
Contact name: **Dan Kousbroek**
Project name: **WILLIAM TOWN SANDS SINDICATE**
COC number: **Not provided**
Turn around time: **5 Day**
Date/Time received: **Feb 22, 2019 4:01 PM**
Eurofins | mgt reference: **642019**

Sample information

- ☒ A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- ☒ All samples have been received as described on the above COC.
- ☒ COC has been completed correctly.
- ☒ Attempt to chill was evident.
- ☒ Appropriately preserved sample containers have been used.
- ☒ All samples were received in good condition.
- ☒ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- ☒ Appropriate sample containers have been used.
- ☒ Sample containers for volatile analysis received with zero headspace.
- ☒ Split sample sent to requested external lab.
- ☒ Some samples have been subcontracted.

N/A Custody Seals intact (if used).

Contact notes

If you have any questions with respect to these samples please contact:

Andrew Black on Phone : (+61) 2 9900 8490 or by e.mail: AndrewBlack@eurofins.com

Results will be delivered electronically via e.mail to Dan Kousbroek - dkousbroek@kleinfelder.com.

Company Name: Kleinfelder Aust Pty Ltd (NEWCASTLE)
Address: 95 Mitchell Rd
Cardiff
NSW 2285
Project Name: WILLIAM TOWN SANDS SINDICATE

Order No.:
Report #: 642019
Phone: 02 4949 5200
Fax:

Received: Feb 22, 2019 4:01 PM
Due: Mar 1, 2019
Priority: 5 Day
Contact Name: Dan Kousbroek

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						Iron (filtered)	NEPM 1999 Metals : Metals M15	BTEX and Naphthalene	TRH (after Silica Gel cleanup)	Total Recoverable Hydrocarbons	Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254 & 14271											
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	
Brisbane Laboratory - NATA Site # 20794											X
Perth Laboratory - NATA Site # 23736											
External Laboratory											
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID						
1	TRIP01	Feb 21, 2019		Water	S19-Fe30830	X	X	X	X	X	X
Test Counts						1	1	1	1	1	1

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 642019-W
Project name WILLIAM TOWN SANDS SINDICATE
Received Date Feb 22, 2019

Client Sample ID			TRIP01
Sample Matrix			Water
Eurofins mgt Sample No.			S19-Fe30830
Date Sampled			Feb 21, 2019
Test/Reference	LOR	Unit	
Total Recoverable Hydrocarbons - 1999 NEPM Fractions			
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 C10-36 (Total)	0.1	mg/L	< 0.1
BTEX			
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	%	87
Total Recoverable Hydrocarbons - 2013 NEPM Fractions			
Naphthalene ^{N02}	0.01	mg/L	< 0.01
TRH C6-C10	0.02	mg/L	< 0.02
TRH C6-C10 less BTEX (F1) ^{N04}	0.02	mg/L	< 0.02
TRH >C10-C16	0.05	mg/L	< 0.05
TRH >C10-C16 less Naphthalene (F2) ^{N01}	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
TRH - 2013 NEPM Fractions (after silica gel clean-up)			
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
TRH - 1999 NEPM Fractions (after silica gel clean-up)			
TRH C10-C36 (Total) (after silica gel clean-up)	0.4	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

Client Sample ID			TRIP01
Sample Matrix			Water
Eurofins mgt Sample No.			S19-Fe30830
Date Sampled			Feb 21, 2019
Test/Reference	LOR	Unit	
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA) ^{N11}	0.01	ug/L	< 0.01
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA) ^{N11}	0.01	ug/L	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA) ^{N15}	0.01	ug/L	< 0.01
13C2-4:2 FTSA (surr.)	1	%	155
13C2-8:2 FTSA (surr.)	1	%	145
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA) ^{N11}	0.05	ug/L	< 0.05
13C2-6:2 FTSA (surr.)	1	%	INT
PFASs Summations			
Sum of WA DWER PFAS (n=10)*	0.05	ug/L	< 0.05
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 PFASs (n=30)*	0.1	ug/L	< 0.1
Chromium (hexavalent)	0.005	mg/L	< 0.005
Chromium (trivalent filtered)	0.005	mg/L	< 0.005
Heavy Metals			
Arsenic (filtered)	0.001	mg/L	0.001
Barium (filtered)	0.02	mg/L	< 0.02
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	< 0.001
Iron (filtered)	0.05	mg/L	4.5
Lead (filtered)	0.001	mg/L	< 0.001
Manganese (filtered)	0.005	mg/L	0.012
Mercury (filtered)	0.0001	mg/L	< 0.0001
Nickel (filtered)	0.001	mg/L	0.003
Vanadium (filtered)	0.005	mg/L	< 0.005
Zinc (filtered)	0.005	mg/L	0.006
Perfluoroalkyl carboxylic acids (PFCAs)			
Perfluorobutanoic acid (PFBA) ^{N11}	0.05	ug/L	< 0.05
Perfluoropentanoic acid (PFPeA) ^{N11}	0.01	ug/L	< 0.01
Perfluorohexanoic acid (PFHxA) ^{N11}	0.01	ug/L	< 0.01
Perfluoroheptanoic acid (PFHpA) ^{N11}	0.01	ug/L	< 0.01
Perfluorooctanoic acid (PFOA) ^{N11}	0.01	ug/L	< 0.01
Perfluorononanoic acid (PFNA) ^{N11}	0.01	ug/L	< 0.01
Perfluorodecanoic acid (PFDA) ^{N11}	0.01	ug/L	< 0.01
Perfluoroundecanoic acid (PFUnDA) ^{N11}	0.01	ug/L	< 0.01
Perfluorododecanoic acid (PFDoDA) ^{N11}	0.01	ug/L	< 0.01
Perfluorotridecanoic acid (PFTTrDA) ^{N15}	0.01	ug/L	< 0.01
Perfluorotetradecanoic acid (PFTeDA) ^{N11}	0.01	ug/L	< 0.01
13C4-PFBA (surr.)	1	%	140
13C5-PFPeA (surr.)	1	%	125

Client Sample ID			TRIP01
Sample Matrix			Water
Eurofins mgt Sample No.			S19-Fe30830
Date Sampled			Feb 21, 2019
Test/Reference	LOR	Unit	
Perfluoroalkyl carboxylic acids (PFCAs)			
13C5-PFHxA (surr.)	1	%	110
13C4-PFHpA (surr.)	1	%	124
13C8-PFOA (surr.)	1	%	122
13C5-PFNA (surr.)	1	%	90
13C6-PFDA (surr.)	1	%	132
13C2-PFUnDA (surr.)	1	%	102
13C2-PFDoDA (surr.)	1	%	97
13C2-PFTeDA (surr.)	1	%	93
Perfluoroalkyl sulfonamido substances			
Perfluorooctane sulfonamide (FOSA) ^{N11}	0.05	ug/L	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) ^{N11}	0.05	ug/L	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) ^{N11}	0.05	ug/L	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE) ^{N11}	0.05	ug/L	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE) ^{N11}	0.05	ug/L	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) ^{N11}	0.05	ug/L	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) ^{N11}	0.05	ug/L	< 0.05
13C8-FOSA (surr.)	1	%	92
D3-N-MeFOSA (surr.)	1	%	55
D5-N-EtFOSA (surr.)	1	%	54
D7-N-MeFOSE (surr.)	1	%	76
D9-N-EtFOSE (surr.)	1	%	93
D5-N-EtFOSAA (surr.)	1	%	36
D3-N-MeFOSAA (surr.)	1	%	33
Perfluoroalkyl sulfonic acids (PFSAs)			
Perfluorobutanesulfonic acid (PFBS) ^{N11}	0.01	ug/L	< 0.01
Perfluorononanesulfonic acid (PFNS) ^{N15}	0.01	ug/L	< 0.01
Perfluoropropanesulfonic acid (PFPrS) ^{N15}	0.01	ug/L	< 0.01
Perfluoropentanesulfonic acid (PFPeS) ^{N15}	0.01	ug/L	< 0.01
Perfluorohexanesulfonic acid (PFHxS) ^{N11}	0.01	ug/L	< 0.01
Perfluoroheptanesulfonic acid (PFHpS) ^{N15}	0.01	ug/L	< 0.01
Perfluorooctanesulfonic acid (PFOS) ^{N11}	0.01	ug/L	< 0.01
Perfluorodecanesulfonic acid (PFDS) ^{N15}	0.01	ug/L	< 0.01
13C3-PFBS (surr.)	1	%	128
18O2-PFHxS (surr.)	1	%	140
13C8-PFOS (surr.)	1	%	122

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 (regarding both quality and NATA accreditation).

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
Total Recoverable Hydrocarbons - 1999 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Sydney	Feb 22, 2019	7 Day
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Sydney	Feb 22, 2019	7 Day
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Sydney	Feb 22, 2019	7 Day
BTEX - Method: LTM-ORG-2150 VOCs in Soils Liquid and other Aqueous Matrices	Sydney	Feb 22, 2019	14 Day
TRH - 2013 NEPM Fractions (after silica gel clean-up) - Method: LTM-ORG-2010 TRH C6-C40	Sydney	Feb 22, 2019	7 Day
TRH - 1999 NEPM Fractions (after silica gel clean-up) - Method: LTM-ORG-2010 TRH C6-C40	Sydney	Feb 22, 2019	7 Day
Per- and Polyfluoroalkyl Substances (PFASs)			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs) - Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)	Brisbane	Feb 25, 2019	14 Day
Perfluoroalkyl carboxylic acids (PFCAs) - Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)	Brisbane	Feb 25, 2019	14 Day
Perfluoroalkyl sulfonamido substances - Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)	Brisbane	Feb 25, 2019	14 Day
Perfluoroalkyl sulfonic acids (PFASs) - Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)	Brisbane	Feb 25, 2019	14 Day
NEPM 1999 Metals : Metals M15 (Filtered)			
Chromium (hexavalent) - Method: E057 Total Speciated Chromium	Sydney	Feb 22, 2019	28 Day
Chromium (trivalent filtered) - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Sydney	Mar 01, 2019	28 Day
Heavy Metals (filtered) - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Sydney	Mar 01, 2019	180 Day
Mobil Metals : Metals M15 - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Sydney	Mar 01, 2019	28 Day

Company Name: Kleinfelder Aust Pty Ltd (NEWCASTLE)
Address: 95 Mitchell Rd
Cardiff
NSW 2285
Project Name: WILLIAM TOWN SANDS SINDICATE

Order No.:
Report #: 642019
Phone: 02 4949 5200
Fax:

Received: Feb 22, 2019 4:01 PM
Due: Mar 1, 2019
Priority: 5 Day
Contact Name: Dan Kousbroek

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						Iron (filtered)	NEPM 1999 Metals : Metals M15	BTEX and Naphthalene	TRH (after Silica Gel cleanup)	Total Recoverable Hydrocarbons	Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254 & 14271											
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	
Brisbane Laboratory - NATA Site # 20794											X
Perth Laboratory - NATA Site # 23736											
External Laboratory											
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID						
1	TRIP01	Feb 21, 2019		Water	S19-Fe30830	X	X	X	X	X	X
Test Counts						1	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, April 2011 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. 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

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	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.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.2 2018
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	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.
TEQ	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 50-150%-Phenols & PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.2 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
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
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	
Method Blank							
BTEX							
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	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
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	
Method Blank							
Chromium (hexavalent)	mg/L	< 0.005			0.005	Pass	
Method Blank							
Heavy Metals							
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	
Iron (filtered)	mg/L	< 0.05			0.05	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	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	86			70-130	Pass	
TRH C10-C14	%	105			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	92			70-130	Pass	
Toluene	%	92			70-130	Pass	
Ethylbenzene	%	92			70-130	Pass	
m&p-Xylenes	%	94			70-130	Pass	
o-Xylene	%	94			70-130	Pass	
Xylenes - Total	%	94			70-130	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions									
Naphthalene			%	108			70-130	Pass	
TRH C6-C10			%	87			70-130	Pass	
TRH >C10-C16			%	128			70-130	Pass	
LCS - % Recovery									
Chromium (hexavalent)			%	100			70-130	Pass	
LCS - % Recovery									
Heavy Metals									
Arsenic (filtered)			%	99			70-130	Pass	
Barium (filtered)			%	104			70-130	Pass	
Beryllium (filtered)			%	82			70-130	Pass	
Boron (filtered)			%	78			70-130	Pass	
Cadmium (filtered)			%	95			70-130	Pass	
Chromium (filtered)			%	104			70-130	Pass	
Cobalt (filtered)			%	103			70-130	Pass	
Copper (filtered)			%	104			70-130	Pass	
Iron (filtered)			%	98			70-130	Pass	
Lead (filtered)			%	99			70-130	Pass	
Manganese (filtered)			%	97			70-130	Pass	
Mercury (filtered)			%	106			70-130	Pass	
Nickel (filtered)			%	105			70-130	Pass	
Vanadium (filtered)			%	100			70-130	Pass	
Zinc (filtered)			%	102			70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
BTEX				Result 1					
Benzene	S19-Fe26112	NCP	%	124			70-130	Pass	
Toluene	S19-Fe26112	NCP	%	120			70-130	Pass	
Ethylbenzene	S19-Fe26112	NCP	%	113			70-130	Pass	
m&p-Xylenes	S19-Fe26112	NCP	%	123			70-130	Pass	
o-Xylene	S19-Fe26112	NCP	%	128			70-130	Pass	
Xylenes - Total	S19-Fe26112	NCP	%	125			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	S19-Fe26112	NCP	%	113			70-130	Pass	
Spike - % Recovery									
				Result 1					
Chromium (hexavalent)	S19-Fe38772	NCP	%	98			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic (filtered)	M19-Fe27538	NCP	%	117			70-130	Pass	
Barium (filtered)	M19-Fe27538	NCP	%	101			70-130	Pass	
Beryllium (filtered)	M19-Fe27538	NCP	%	99			70-130	Pass	
Cadmium (filtered)	M19-Fe27538	NCP	%	103			70-130	Pass	
Chromium (filtered)	M19-Fe27538	NCP	%	103			70-130	Pass	
Cobalt (filtered)	M19-Fe27538	NCP	%	90			70-130	Pass	
Copper (filtered)	M19-Fe27538	NCP	%	97			70-130	Pass	
Lead (filtered)	M19-Fe27538	NCP	%	91			70-130	Pass	
Nickel (filtered)	M19-Fe27538	NCP	%	97			70-130	Pass	
Vanadium (filtered)	M19-Fe27538	NCP	%	105			70-130	Pass	
Zinc (filtered)	M19-Fe27538	NCP	%	82			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	S19-Fe26111	NCP	mg/L	0.45	0.45	1.0	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	S19-Fe26111	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Toluene	S19-Fe26111	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Ethylbenzene	S19-Fe26111	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
m&p-Xylenes	S19-Fe26111	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
o-Xylene	S19-Fe26111	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Xylenes - Total	S19-Fe26111	NCP	mg/L	< 0.003	< 0.003	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	S19-Fe26111	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
TRH C6-C10	S19-Fe26111	NCP	mg/L	0.44	0.44	1.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Chromium (hexavalent)	S19-Fe30830	CP	mg/L	< 0.005	0.006	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic (filtered)	M19-Fe27537	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Barium (filtered)	M19-Fe27537	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Beryllium (filtered)	M19-Fe27537	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Boron (filtered)	M19-Fe27537	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Cadmium (filtered)	M19-Fe27537	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium (filtered)	M19-Fe27537	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cobalt (filtered)	M19-Fe27537	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Copper (filtered)	M19-Fe27537	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Iron (filtered)	M19-Fe27537	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Lead (filtered)	M19-Fe27537	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Manganese (filtered)	M19-Fe27537	NCP	mg/L	0.18	0.19	1.0	30%	Pass	
Mercury (filtered)	M19-Fe27537	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Nickel (filtered)	M19-Fe27537	NCP	mg/L	0.001	0.001	6.0	30%	Pass	
Vanadium (filtered)	M19-Fe27537	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Zinc (filtered)	M19-Fe27537	NCP	mg/L	0.008	0.008	3.0	30%	Pass	

Comments

Sample Integrity

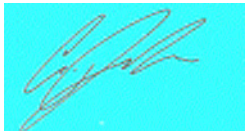
Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	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
Andrew Sullivan	Senior Analyst-Organic (NSW)
Gabriele Cordero	Senior Analyst-Inorganic (NSW)
Gabriele Cordero	Senior Analyst-Metal (NSW)
Jonathon Angell	Senior Analyst-Organic (QLD)



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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APPENDIX B2: MARCH 2019

13 April 2019

Document Ref: NCA19R-WSS190413

Williamtown Sand Syndicate
PO Box 898
Newcastle, NSW 2300

Attention: Darren Williams

Delivered by email: darren@arbus.com.au

Subject: Water quality monitoring results at Cabbage Tree Road Sand Quarry – March 2019 monitoring

Please find enclosed the Water quality monitoring results at Cabbage Tree Road Sand Quarry for the March 2019 monitoring.

1. SCOPE OF SERVICE

The scope of work includes monthly surface and groundwater monitoring for a combined period of 12 months. **Figure 1** (attached) presents the surface water and groundwater sampling locations.

The March monitoring round was to include 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) and sampling at four surface water locations.

2. SITE WORK

The monitoring round was conducted on 14 and 15 March 2019.

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 the gauging each of the HydraSleeves were removed and samples taken.

The March 2019 monitoring round included:

- Gauging of all available monitoring wells (a total of 14 wells);

- Groundwater sampling from a total of 8 monitoring wells (note MW239D, BH3, BH5 and BH12 did not require sampling, BH9 and BH10 was dry); and
- Surface water sampling from 1 location (SW1, SW2 and SW4 were 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 initial Water Quality Analysis

Analysis	Number of Samples				
	Primary	Intra-lab (Duplicate)	Inter-lab (Triplicate)	Transport Blank	Rinsate Blank
General Water Suite*	9	0	0	0	0
Hydrocarbons**	9	1	1	2	1
Metals***	9	1	1	2	1
Iron (dissolved)	9	1	1	2	1
Total Dissolved Solids (TDS)	10	0	0	0	0
Total Suspended Solids (TSS)	10	0	0	0	0
PFAS (28 analytes, standard level)	4	1	1	2	1

* General Water Suite: Ca, Mg, Na, K, pH, EC, Cl, SO₄, Alkalinity, Fluoride, Hardness & TDS (Calc')

** TRH (C6 – C40), BTEXN (Silica Gel)

*** 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), Selenium (Se), Vanadium (V), Zinc (Zn) - note sampling for Iron and no nickel

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 (mBTOC)	Groundwater Elevation (mAHD)	Well Total Depth at point of sampling (mBTOC)	Comment
BH1	8.64	6.145	2.495	8.12	Well recently reinstated. Strong acrylic odour when gauging. Light brown in colour.
BH2	7.79	5.184	2.606	8.93	Dark brown – No Odour.
BH3	7.57	6.146	1.544	8.75	No odour – No sample taken.
BH4	3.06	2.091	0.969	5.92	Light Brown – No Odour.

Borehole	Top of Casing (mAHD)	Depth to Water (mBTC)	Groundwater Elevation (mAHD)	Well Total Depth at point of sampling (mBTC)	Comment
BH5	7.36	6.146	1.214	8.63	Slight sulfur odour – No sample taken.
BH6	3.62	1.913	1.707	4.44	Brown – No Odour.
BH7	2.98	2.015	0.965	4.42	Slightly Cloudy, light brown, slight sulfur odour.
BH8	3.88	2.864	1.016	6.09	Sulfur smell - cloudy
BH9	17.75	Dry	-	16.01	Well was dry.
BH10	6.69	Dry	-	3.58	Well was dry.
BH11	6.63	3.181	3.02	5.21	Light Brown – Slight Odour.
BH12	8.67	6.924	1.746	8.03	40mm inner tube installed. No odour – No sample taken
MW239S	3.04	1.615	1.425	3.89	Dark Brown - Slight Sulfur odour.
MW239D	3.04	1.591	1.449	20.19	No odour – No sample taken
SW01*	2.5	Dry	-	N/A	Location was dry.
SW02*	3.3	Dry	-	N/A	Location was dry.
SW03*	2.1	1.1	1	N/A	Water was at a low level and was not seen to be flowing.
SW04*	2	Dry	-	N/A	Location was dry.

* Surface water levels measured from measuring tape installed

Table 3-3: Summary of field parameters

Sample ID	Time	Temp (°C)	EC (us/cm)	pH	Redox (mV)
BH01	0830	18.93	111	5.49	81
BH02	0915	19.35	101	4.49	264
BH04	0950	18.92	79	4.52	311
BH06	1415	23.17	159	4.74	178
BH07	1330	25	251	4.34	179
BH08	1300	21.54	307	4.96	176
BH11	0745	18.87	168	4.95	176
MW239S	1445	23.1	323	4.43	179
SW03	1515	25.87	342	6.08	10

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**.

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
Physical and Chemical Stressors	Sodium	0.01	9	9	64	No	Similar
	Sulphate	1	9	<1.0	44	No	Similar
	Chloride	1	9	18	126	No	Similar
	Fluoride	0.1	9	<0.1	<1.0	No	Similar
	Reactive Phosphorous	0.01	0	-	-	-	N/A
	Total Phosphorous	0.01	0	-	-	-	N/A
	Nitrite	0.01	0	-	-	-	N/A
	Nitrate	0.01	0	-	-	-	N/A
	Ammonia	0.01	0	-	-	-	N/A
	Total Nitrogen	0.1	0	-	-	-	N/A
	Total Hardness	1	9	5.0	40	No	Similar
	Total Dissolved Solids	1	9	50	266	No	Similar
	pH	0.01	9	4.71	5.67	All outside All above ANZECC 2000 Trigger range ¹ and drinking water guidelines	Similar
Dissolved Metals	As	0.005-0.1	9	<0.001	0.006		
	B	0.005-0.1	9	<0.05	<0.05	No	Similar
	Ba	0.005-0.1	9	0.003	0.027	No	Similar
	Be	0.005-0.1	9	<0.001	<0.001	No	Similar
	Cd	0.005-0.1	9	<0.0001	<0.0001	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
	Cr	0.005-0.1	9	<0.001	0.004	1 above ANZECC 2000 Trigger Values ²	Similar – Note BH1 that exceeded the criteria was not previously sampled
	Co	0.005-0.1	9	<0.001	0.003	No	Similar
	Cu	0.005-0.1	9	<0.001	0.003	1 above ANZECC 2000 Trigger Values ²	Similar
	Fe	0.005-0.1	9	0.06	13	7 above drinking water aesthetic criteria	Similar
	Mn	0.005-0.1	9	0.005	0.048	No	Similar
	Ni	0.005-0.1	9	<0.001	0.037	2 above ANZECC 2000 Trigger Values ² , and 2 above NHMRC ADWG 6	Similar
	Pb	0.005-0.1	9	<0.001	<0.001	No	Similar
	Se	0.005-0.1	9	<0.01	<0.01	No	Similar
	V	0.005-0.1	9	<0.01	<0.01	No	Similar
	Zn	0.005-0.1	9	<0.005	1.27	6 above ANZECC 2000 Trigger Values ²	Similar
	Hg	0.0001	9	<0.0001	<0.0001	No	Similar
TRH – Silica Clean up	C ₆ -C ₁₀	0.02	9	<0.02	1.69	No	Similar – Noting that BH1 was not sampled in the previous monitoring round and the well casing had recently been fixed using a volatile glue. Further consideration will be needed in the next monitoring event.
	>C ₁₀ -C ₁₆	0.1	9	<0.1	<0.1	No	Similar
	>C ₁₆ -C ₃₄	0.1	9	<0.1	<0.1	No	Similar
	>C ₃₄ -C ₄₀	0.1	9	<0.1	<0.1	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
	Total >C ₁₀ -C ₄₀	0.1	9	<0.1	<0.1	No	Similar
	C ₆ -C ₁₀ minus BTEX (F1)	0.02	9	<0.02	1.69	No	Similar – Noting that BH1 was not sampled in the previous monitoring round and the well casing had recently been fixed using a volatile glue. Further consideration will be needed in the next monitoring event.
	>C ₁₀ -C ₁₆ minus Naphthalene (F2)	0.1	9	<0.1	<0.1	No	Similar
BTEX	Benzene	0.001-0.005	9	<0.001	<0.001	No	Similar
	Toluene	0.001-0.005	9	<0.002	<0.002	No	Similar
	Ethylbenzene	0.001-0.005	9	<0.002	<0.002	No	Similar
	Total Xylene	0.001-0.005	9	<0.002	<0.002	No	Similar
	Naphthalene	0.001	9	<0.005	<0.005	No	Similar
PFAS	PFOS	0.00001-0.0001	10	<0.00001	<0.00001	HEPA NEMP 2018*	Similar
	PFOA	0.00001-0.0001	10	<0.00001	<0.00001	No	Similar
	PFOS/PFHxS	0.00001-0.0001	10	<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.

¹Australian 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)

²ANZECC 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

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 more rainfall in March than the mean.

Table 4.5 2019 Rainfall data

2019	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1st	2.0	0.8	0									
2nd	0	12.8	0									
3rd	0	0.4										
4th	0	0	0									
5th	0	0	0									
6th	0	0	0									
7th	5.0	0	8.2									
8th	0	0	0									
9th	0	6.6	0									
10th	0.2	0	12.0									
11th	0	0	0									
12th	3.0	0	0									
13th	0	0	0									
14th	0	0	0									
15th	0	0	0									
16th	0	0	4.8									
17th	0	0	59.4									
18th	0	0	2.6									
19th	0	0	2.2									
20th	2.4		0									
21st	1.0	1.4	0									
22nd	0	1.0	1.2									
23rd	0	1.4	0									
24th	0	9.2	5.4									
25th	0	0	5.2									
26th	0	0	0									
27th	0	0	0									
28th	1.0	0	0									
29th	0		0									
30th	0		38.2									
31st	0		6.6									
Monthly Total	14.6	33.6	145.8									
Mean	98.7	117.0	120.5	111.6	109.6	124.7	70.9	72.9	60.4	73.9	82.3	78.6

Despite the rainfall in March, based on the long term rainfall data, it is expected that the current groundwater and surface water levels would still be low.

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



Tom Overton MSc, BSc (Hons), Dip

Senior Project Manager

Contaminated Land Management

toverton@kleinfelder.com

Mobile: 0415 170 312

Attached:

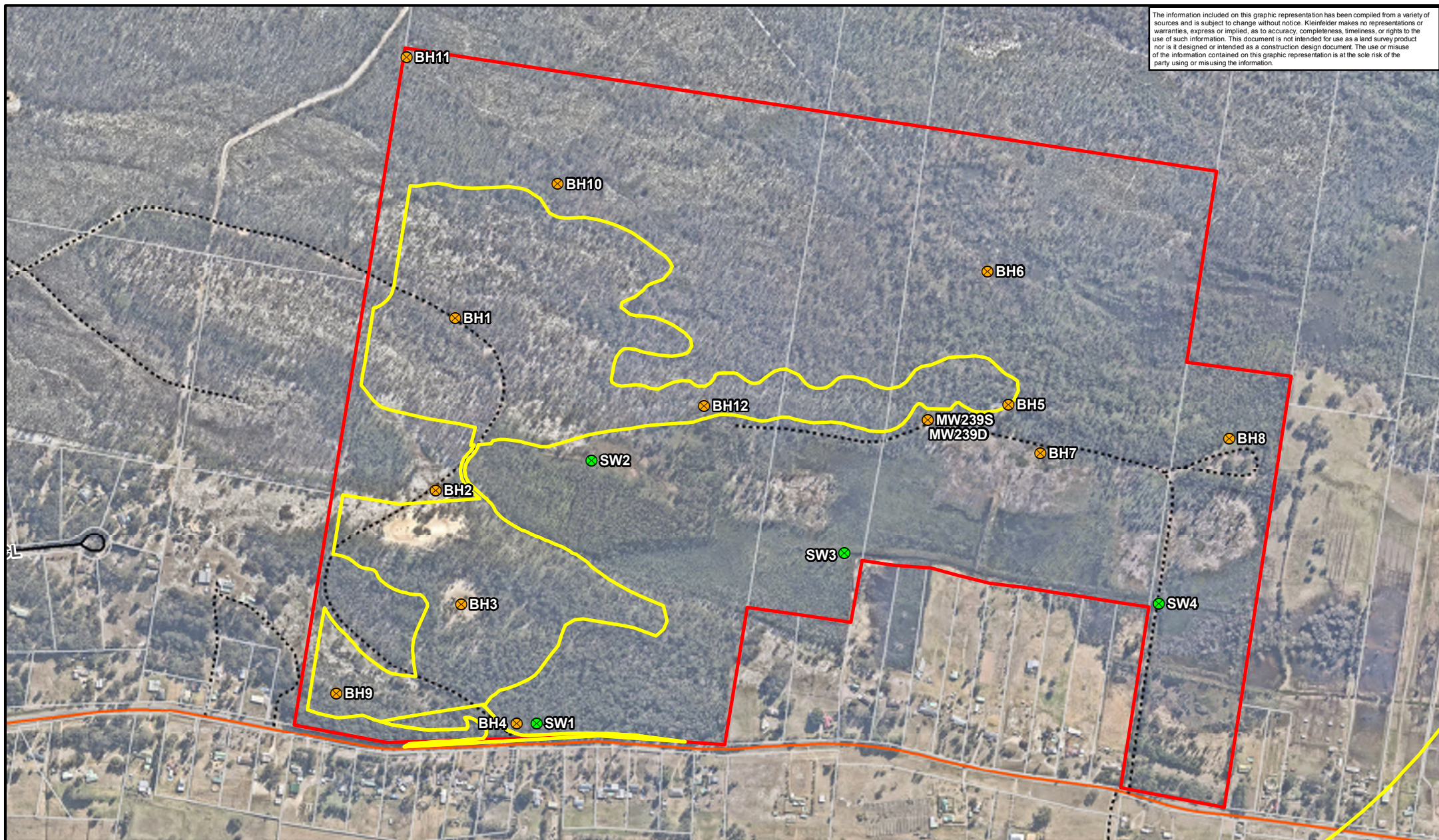
Figure 1

Data Tables

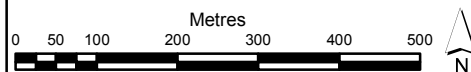
Attachment A – Laboratory reports

FIGURE 1

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 use of such information. This document is not intended for use as a land survey 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
- ▬ Subject Land Boundary
- ▬ Quarry Project Area
- ▬ Arterial Road
- ▬ Local Road
- - Track



PROJECT REFERENCE: 20170448
 DATE DRAWN: 13/02/2019 09:48 Version 1
 DRAWN BY: gjoyce
 DATA SOURCE:
 NSW DFSI - 2017
 Nearmap - 2018

Water monitoring locations February 2019 Monitoring

Williamtown Sand Syndicate
 Proposed Sand Quarry
 Cabbage Tree Road, Williamtown

FIGURE:

1

DATA TABLES

[illegible]



KLEINFELDER
Bright People. Right Solutions.

[illegible]

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Borehole	Easting (MGA)	Northing (MGA)	Ground Surface RL (mAHD)	Top of Casing (mAHD)	Bore Depth prior to monitoring (mBTC)	Screen Top (mBG)	Screen Bottom (mBG)	Well Diameter (mm)
MW239D	388619.1	-	2.98	3.04	21	-	-	50

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

Table 1
Groundwater Analytical Data - BTEXN
Williamstown Sand Syndicate



Analyte	BTEXN								Total Petroleum Hydrocarbons	Total Petroleum Hydrocarbons - Silica Clean up				Total Recoverable Hydrocarbons	Total Recoverable Hydrocarbons - Silica Clean up					
	Benzene**	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene**	Total Xylenes	Naphthalene**	Sum of BTEX	C ₈ - C ₉	C ₁₀ -C ₁₄ - Silica Cleanup	C ₁₅ -C ₂₈ - Silica Cleanup	C ₂₉ -C ₃₆ - Silica Cleanup	C ₁₀ -C ₃₆ Sum - Silica Cleanup	C ₈ - C ₁₀	C ₈ - C ₁₀ minus BTEX (F1)	>C ₁₀ -C ₁₆ - Silica Cleanup	F2 - Silica Cleanup	>C ₁₆ -C ₃₄ - Silica Cleanup	>C ₃₄ -C ₄₀ - Silica Cleanup	>C ₄₀ -C ₅₀ - Silica Cleanup
LOR	1	2	2	2	2	2	5	1	20	50	100	50	50	20	20	100	100	100	100	100
Units	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
ANZECC 2000 Trigger Values	950	-	-	-	350	-	16	-	-	-	-	-	-	-	-	-	-	-	-	-
NHMRC ADWG 6	1	800	300	-	350	600	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sample Name	Sample Date																			
BH1	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	1,710	< 50	< 100	< 50	< 50	1,690	1,690	< 100	< 100	< 100	< 100	< 100
BH11	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH11	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH2	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH2	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH3	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH4	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH4	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH5	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH6	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH6	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH7	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH7	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH8	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH8	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
MW2395	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
MW2395	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
SW3	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
SW3	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100

Notes:
 -- Not analysed
 < - Less than laboratory limit of reporting
 µg/L - Micrograms per litre
 BTEXN - Benzene, toluene, ethylbenzene, xylenes, naphthalene

** 95% Level of protection in freshwater

Table 2
Groundwater Analytical Data - Metals
Williamstown Sand Syndicate



Analyte		Metals															
		Arsenic**	Barium	Beryllium	Boron**	Cadmium**	Chromium** ¹	Cobalt	Copper**	Iron	Lead**	Manganese* *	Mercury** ²	Nickel**	Selenium**	Vanadium	Zinc**
LOR		0.001	0.001	0.001	0.05	0.0001	0.001	0.001	0.001	0.05	0.001	0.001	0.0001	0.001	0.01	0.01	0.005
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ANZECC 2000 Trigger Values		0.013		-	0.37	0.0002	0.001	-	0.0014	-	0.0034	1.9	0.0006	0.011	0.011	-	0.008
NHMRC ADWG 6		0.01		0.06	4	0.002	0.05	-	2	0.3 ³	0.01	0.5	0.001	0.02	0.01	-	3 ³
Sample Name	Sample Date																
BH1	15-Mar-19	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.004	< 0.001	< 0.001	13	< 0.001	0.014	< 0.0001	< 0.001	< 0.01	< 0.01	1.27
BH11	21-Feb-19	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.002	0.001	< 0.001	0.26	< 0.001	0.003	< 0.0001	0.005	< 0.01	< 0.01	0.031
BH11	15-Mar-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	1.49	< 0.001	0.007	< 0.0001	0.037	< 0.01	< 0.01	0.016
BH2	22-Feb-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.002	0.14	< 0.001	0.021	< 0.0001	0.015	< 0.01	< 0.01	0.006
BH2	15-Mar-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.003	< 0.05	< 0.001	0.02	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH3	21-Feb-19	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.06	< 0.001	0.005	< 0.0001	0.053	< 0.01	< 0.01	< 0.005
BH4	21-Feb-19	< 0.001	0.014	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.002	0.16	< 0.001	0.039	< 0.0001	0.018	< 0.01	< 0.01	0.014
BH4	15-Mar-19	< 0.001	0.014	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.001	< 0.05	< 0.001	0.014	< 0.0001	0.022	< 0.01	< 0.01	0.043
BH5	22-Feb-19	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	1.4	< 0.001	0.005	< 0.0001	0.003	< 0.01	< 0.01	0.008
BH6	22-Feb-19	< 0.001	0.03	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	1.03	< 0.001	0.014	< 0.0001	0.001	< 0.01	< 0.01	0.019
BH6	14-Mar-19	< 0.001	0.027	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	1.9	< 0.001	0.01	< 0.0001	< 0.001	< 0.01	< 0.01	0.012
BH7	22-Feb-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.002	0.003	< 0.001	1.8	< 0.001	0.026	< 0.0001	0.004	< 0.01	< 0.01	0.019
BH7	14-Mar-19	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
BH8	21-Feb-19	0.001 *	0.011	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.006
BH8	14-Mar-19	< 0.001	0.006	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	3.25	< 0.001	0.008	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
MW239S	22-Feb-19	< 0.001	0.007	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	1.11	< 0.001	0.003	< 0.0001	0.001	< 0.01	< 0.01	0.006
MW239S	14-Mar-19	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	1.25	< 0.001	0.005	< 0.0001	0.005	< 0.01	< 0.01	0.008
SW3	22-Feb-19	0.003	0.075	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	4.84	< 0.001	0.033	< 0.0001	0.002	< 0.01	< 0.01	0.016
SW3	14-Mar-19	0.006	0.08	< 0.001	< 0.05	< 0.0001	< 0.001	0.003	< 0.001	9.26	< 0.001	0.048	< 0.0001	0.002	< 0.01	< 0.01	0.009

Notes:

-- Not analysed

< - Less than laboratory limit of reporting

mg/L - Milligrams per litre

Bold indicates a detection above the laboratory limit of reporting

** denotes duplicate/triplicate sample result adopted for analytical use due to RPD >50%

RPD - Relative Percentage Difference

** 95% Level of protection in freshwater

¹ value for CR VI

² as inorganic

³ Aesthetic

Notes:
 - - Not analysed
 < - Less than laboratory limit of reporting
 µg/L - Micrograms per litre
 *** 99% Level of protection in freshwater
 † Recreation water

Table 4
Groundwater Analytical Data - Inorganics
Williamstown Sand Syncline



Analyte	Anions and Cations														Alkalinity										Inorganics		Total Dissolved		pH	
	Sodium	Calcium	Magnesium	Potassium	Sulphate	Chloride	Fluoride	Reactive phosphorus as P	Total Phosphorus	Nitrite as N	Nitrate as N	Nitrite + Nitrate as N	Ammonia as N	Total Nitrogen as N	Total Kjeldahl Nitrogen as N	Total Calcium	Total Anions	Ionic Balance	Sodium Adsorption Ratio	Bicarbonate Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Hydroxide Alkalinity as CaCO3	Total Alkalinity as CaCO3	Total Hardness as CaCO3	Electrical Conductivity @ 25°C ¹	Total Dissolved Solids	Total Dissolved Solids			
Units	1	1	1	1	1	1	0.1	0.01	0.01	0.01	0.01	0.01	0.01	0.1	0.1	0.01	0.01	%	-	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	mg/L		
ANZECC 2000 Trigger Values																														
NRMCC ADWGS 6																														
Sample Name	Sample Date																													
BH1	15-Mar-19	11	2.0	1.0	< 1.0	< 1.0	25	< 0.1	< 0.01	0.03	< 0.01	0.04	0.04	0.06	1.8	1.8	0.66	0.88	-	3.21	9.0	< 1.0	< 1.0	9.0	9.0	104	68	129	5.67	
BH11	21-Feb-19	48	< 1.0	10	< 1.0	24	80	0.1	< 0.01	0.03	< 0.01	0.04	0.04	0.06	1.8	1.8	2.91	2.76	-	3.21	< 1.0	< 1.0	< 1.0	< 1.0	41	346	278	4.67		
BH11	15-Mar-19	26	< 1.0	2.0	< 1.0	2.0	22	< 0.1	< 0.01	0.38	< 0.01	2.76	2.76	0.05	4.0	1.2	1.3	1.91	-	1.44	< 1.0	< 1.0	< 1.0	< 1.0	8.0	186	121	144	4.82	
BH2	22-Feb-19	12	2.0	2.0	< 1.0	6.0	22	0.1	< 0.01	0.38	< 0.01	2.76	2.76	0.05	4.0	1.2	0.75	0.75	-	1.44	< 1.0	< 1.0	< 1.0	< 1.0	13	91	128	4.87		
BH2	15-Mar-19	10	3.0	2.0	< 1.0	7.0	23	< 0.1	< 0.01	2.76	< 0.01	0.78	0.78	0.3	5.9	5.1	0.75	0.75	-	0.46	< 1.0	< 1.0	< 1.0	< 1.0	16	101	86	90	4.71	
BH3	21-Feb-19	4.0	4.0	1.0	< 1.0	4.0	10	< 0.1	< 0.01	0.46	< 0.01	0.54	0.54	0.35	0.6	0.3	0.46	0.54	-	0.46	9.0	< 1.0	< 1.0	9.0	14	60	438	5.55		
BH4	21-Feb-19	8.0	2.0	1.0	3.0	6.0	17	< 0.1	< 0.01	0.19	< 0.01	0.35	0.35	0.04	0.6	0.3	0.56	0.7	-	3.15	6.0	< 1.0	< 1.0	6.0	9.0	73	96	70	5.4	
BH4	15-Mar-19	9.0	2.0	< 1.0	< 1.0	6.0	19	< 0.1	< 0.01	0.49	< 0.01	0.61	0.61	0.09	3.0	3.0	2.35	2.34	-	3.59	< 1.0	< 1.0	< 1.0	< 1.0	25	250	211	20	5.12	
BH5	22-Feb-19	42	< 1.0	6.0	1.0	19	69	0.2	< 0.01	0.34	< 0.01	< 0.01	< 0.01	0.09	3.0	3.0	2.35	2.34	-	3.59	< 1.0	< 1.0	< 1.0	< 1.0	25	250	211	20	4.87	
BH6	22-Feb-19	28	3.0	4.0	1.0	28	42	< 0.1	< 0.01	0.05	< 0.01	0.09	0.09	0.14	0.5	0.4	1.72	1.77	-	2.49	< 1.0	< 1.0	< 1.0	< 1.0	24	177	144	4.37		
BH6	14-Mar-19	23	2.0	4.0	1.0	17	37	< 0.1	< 0.01	1.46	< 0.01	1.44	1.44	0.34	2.2	2.2	1.46	1.44	-	3.16	2.0	< 1.0	< 1.0	2.0	21	179	116	146	4.95	
BH7	22-Feb-19	34	< 1.0	5.0	2.0	12	64	0.2	< 0.01	0.13	< 0.01	0.02	0.34	2.2	2.2	1.94	2.06	-	3.16	< 1.0	< 1.0	< 1.0	< 1.0	20	213	196	4.76			
BH7	14-Mar-19	36	< 1.0	6.0	2.0	16	61	< 0.1	< 0.01	1.97	< 0.01	< 0.01	< 0.01	0.5	2.4	2.4	2.11	2.05	1.37	3.16	< 1.0	< 1.0	< 1.0	< 1.0	35	271	176	212	4.73	
BH8	21-Feb-19	52	< 1.0	6.0	< 1.0	11	90	< 0.1	< 0.01	1.97	< 0.01	< 0.01	< 0.01	0.5	2.4	2.4	2.76	2.77	-	4.44	< 1.0	< 1.0	< 1.0	< 1.0	25	352	258	4.46		
BH8	14-Mar-19	45	< 1.0	6.0	< 1.0	6.0	76	< 0.1	< 0.01	0.56	< 0.01	< 0.01	< 0.01	0.18	3.9	3.9	2.45	2.77	-	5.21	< 1.0	< 1.0	< 1.0	< 1.0	25	319	207	4.77		
MW2395	22-Feb-19	61	< 1.0	6.0	< 1.0	6.0	104	< 0.1	< 0.01	0.56	< 0.01	< 0.01	< 0.01	0.18	3.9	3.9	2.15	2.08	1.43	5.21	< 1.0	< 1.0	< 1.0	< 1.0	25	329	234	4.89		
MW2395	14-Mar-19	44	< 1.0	6.0	< 1.0	2.0	126	< 0.1	< 0.01	0.56	< 0.01	< 0.01	< 0.01	0.16	1.0	1.0	3.28	3.64	5.18	2.0	< 1.0	< 1.0	2.0	25	410	266	232	5.02		
SW3	22-Feb-19	40	4.0	4.0	1.0	16	82	< 0.1	< 0.01	0.06	< 0.01	< 0.01	< 0.01	0.16	1.0	1.0	2.55	2.87	-	3.38	11	< 1.0	< 1.0	11	26	262	228	6.21		
SW3	14-Mar-19	45	6.0	6.0	2.0	44	64	< 0.1	< 0.01	0.06	< 0.01	< 0.01	< 0.01	0.16	1.0	1.0	2.8	2.8	-	3.38	4.0	< 1.0	< 1.0	4.0	40	344	224	279	5.42	

Notes:

-- Not analysed
 < - Less than laboratory limit of reporting
 LOR - Laboratory limit of reporting
 mg/L - Milligrams per litre
 µS/cm - Microsiemens per centimeter
 Bold indicates a detection above the laboratory limit of reporting

* 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)
 ** 95% Level of protection in freshwater
¹ Acoustic

Table 5
Quality Control Sample Analysis - BTEXN
Willamtown Sand Syndicate



Analyte	BTEXN								Total Petroleum Hydrocarbons						Total Petroleum Hydrocarbons - Silica Cleanup				Total Recoverable Hydrocarbons						Total Recoverable Hydrocarbons - Silica Cleanup					
	Benzene	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene	Total Xylenes	Naphthalene	Sum of BTEX	C ₆ + C ₈	C ₁₀ + C ₁₄	C ₁₅ + C ₁₆	C ₁₈ + C ₂₀	C ₂₅ + C ₂₈	C ₃₀ + C ₃₄ sum	C ₆ -C ₁₄ - Silica Cleanup	C ₁₅ -C ₁₈ - Silica Cleanup	C ₁₉ -C ₂₄ - Silica Cleanup	C ₂₅ -C ₃₀ - Silica Cleanup	C ₆ + C ₁₀	C ₁₀ + C ₁₅ minus BTEX (F1)	>C ₁₀ + C ₁₅	>C ₁₀ + C ₁₅ minus Naphthalene (F2)	>C ₁₀ + C ₁₅	>C ₁₅ + C ₁₈	>C ₁₈ + C ₂₅	P2 - Silica Cleanup	>C ₁₀ -C ₁₅ - Silica Cleanup	>C ₁₅ -C ₁₈ - Silica Cleanup	>C ₁₈ -C ₂₅ - Silica Cleanup	
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Sample Name	Sample Date	Sample Type																												
TRIP BLANK_13022019	13-Feb-19	Tri Blank	<1.0	<2.0	<2.0	<2.0	<2.0	<5.0	<1.0	<20	-	-	-	-	<50	<100	<50	<50	<20	<20	-	-	-	-	-	<100	<100	<100	<100	<100
RINSEATE01_21022019	21-Feb-19	Rinseate	<1.0	<2.0	<2.0	<2.0	<2.0	<5.0	<1.0	<20	-	-	-	-	<50	<100	<50	<50	<20	<20	-	-	-	-	-	<100	<100	<100	<100	<100
BH7_21022019	21-Feb-19	Primary	<1.0	<2.0	<2.0	<2.0	<2.0	<5.0	<1.0	<20	-	-	-	-	<50	<100	<50	<50	<20	<20	-	-	-	-	-	<100	<100	<100	<100	<100
DUPL01_21022019	21-Feb-19	Duplicate	<1.0	<2.0	<2.0	<2.0	<2.0	<5.0	<1.0	<20	-	-	-	-	<50	<100	<50	<50	<20	<20	-	-	-	-	-	<100	<100	<100	<100	<100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
BH7_21022019	21-Feb-19	Primary	<1.0	<2.0	<2.0	<2.0	<2.0	<5.0	<1.0	<20	-	-	-	-	<50	<100	<50	<50	<20	<20	-	-	-	-	-	<100	<100	<100	<100	<100
TRIP01_21022019	21-Feb-19	Triplicate	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<20	<50	<100	<100	<100	<50	<100	<100	<400	<20	<20	<50	<50	<100	<100	<100	<100	<100	<100	<100	
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK_130319	13-Mar-19	Tri Blank	<1.0	<2.0	<2.0	<2.0	<2.0	<5.0	<1.0	<20	-	-	-	-	<50	<100	<50	<50	<20	<20	-	-	-	-	-	<100	<100	<100	<100	<100
RINSEATE02_140319	14-Mar-19	Rinseate	<1.0	<2.0	<2.0	<2.0	<2.0	<5.0	<1.0	<20	-	-	-	-	<50	<100	<50	<50	<20	<20	-	-	-	-	-	<100	<100	<100	<100	<100
BH7_140319	14-Mar-19	Primary	<1.0	<2.0	<2.0	<2.0	<2.0	<5.0	<1.0	<20	-	-	-	-	<50	<100	<50	<50	<20	<20	-	-	-	-	-	<100	<100	<100	<100	<100
DUPL02_140319	14-Mar-19	Duplicate	<1.0	<2.0	<2.0	<2.0	<2.0	<5.0	<1.0	<20	-	-	-	-	<50	<100	<50	<50	<20	<20	-	-	-	-	-	<100	<100	<100	<100	<100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

Notes:
 -- Not analysed
 < - Less than laboratory limit of reporting
 NC - Not calculated
 µg/L - Micrograms per litre
 BTEXN - Benzene, toluene, ethylbenzene, xylenes, naphthalene

Table 6
Quality Control Sample Analysis - Metals
Williamstown Sand Syndicate



Analyte			Metals																
			Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Chromium VI	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Nickel	Selenium	Vanadium	Zinc
Units			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Name	Sample Date	Sample Type																	
TRIP BLANK_13022019	13-Feb-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE01_21022019	21-Feb-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH8_21022019	21-Feb-19	Primary	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.005
DUP01_21022019	21-Feb-19	Duplicate	0.001	0.014	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.09	< 0.001	0.012	< 0.0001	0.003	< 0.01	< 0.01	0.015
Relative Percentage Difference			67%	24%	NC	NC	NC	0%	NC	NC	NC	0%	NC	0%	NC	40%	NC	NC	100%
BH8_21022019	21-Feb-19	Primary	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.005
TRIP01_21022019	21-Feb-19	Triplicate	0.001	< 0.02	< 0.001	< 0.05	< 0.0002	< 0.005	< 0.005	< 0.001	< 0.001	4.5	< 0.001	0.012	< 0.0001	0.003	-	< 0.005	0.006
Relative Percentage Difference			67%	10%	NC	NC	NC	86%	NC	NC	NC	9%	NC	0%	NC	40%	NC	NC	18%
TRIP BLANK_130319	13-Mar-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001		< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
TRIP BLANK02_150319	15-Mar-19	Trip Blank	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	< 0.001		< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE02_140319	14-Mar-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001		< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH7_140319	14-Mar-19	Primary	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001		0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
DUP02_140319	14-Mar-19	Duplicate	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001		0.002	< 0.001	2.51	< 0.001	0.021	< 0.0001	0.004	< 0.01	< 0.01	0.007
Relative Percentage Difference			NC	0%	NC	NC	NC	0%		40%	NC	33%	NC	5%	NC	0%	NC	NC	25%
BH7_140319	14-Mar-19	Primary	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001		0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
TRIP02_14032019	14-Mar-19	Triplicate	< 0.001	< 0.02	< 0.001	< 0.05	< 0.0002	0.001		0.002	< 0.001	1.7	< 0.001	0.019	< 0.0001	< 0.001	-	< 0.005	< 0.005
Relative Percentage Difference			NC	0%	NC	NC	NC	0%		40%	NC	6%	NC	5%	NC	156%	NC	NC	113%

Notes:
 -- Not analysed
 < - Less than laboratory limit of reporting
 NC - Not calculated
 mg/L - Milligrams per litre
 Half the laboratory limit of reporting used when calculating RPD
 RPD - Relative Percentage Difference

Notes:
 < - Less than laboratory limit of reporting
 NC - Not calculated
 µg/L - Micrograms per litre

ATTACHMENT A: LABORATORY REPORTS

CERTIFICATE OF ANALYSIS

Work Order : **ES1907792**
Client : **KLEINFELDER AUSTRALIA PTY LTD**
Contact : **TOM OVERTON**
Address : **95 MITCHELL ROAD**
CARDIFF NSW 2285
Telephone : **----**
Project : **20190803**
Order number : **----**
C-O-C number : **----**
Sampler : **Dan Kousbroek**
Site : **WSS - Cabbage Tree Rd water monitoring**
Quote number : **ME/114/19**
No. of samples received : **13**
No. of samples analysed : **13**

Page : 1 of 16
Laboratory : Environmental Division Sydney
Contact : Shirley LeCornu
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +6138549 9630
Date Samples Received : 14-Mar-2019 16:46
Date Analysis Commenced : 15-Mar-2019
Issue Date : 20-Mar-2019 18:29



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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW



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

Ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- EG020: Positive result for sample ES1907792 - #009 has been confirmed by redigestion and reanalysis.
- EG020: Filtered Iron Results for samples ES1907792-#005 and #008 have been confirmed by reanalysis.
- TDS by method EA-015 may bias high for various samples due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- 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

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Rinsate02	SW3	Trip Blank	MW239S	BH7
Client sampling date / time					14-Mar-2019 00:00	14-Mar-2019 00:00	13-Mar-2019 00:00	14-Mar-2019 00:00	14-Mar-2019 00:00
Compound	CAS Number	LOR	Unit		ES1907792-001	ES1907792-002	ES1907792-003	ES1907792-004	ES1907792-005
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		----	5.42	----	5.02	4.73
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		----	344	----	410	271
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		----	279	----	232	212
EA016: Calculated TDS (from Electrical Conductivity)									
Total Dissolved Solids (Calc.)	----	1	mg/L		----	224	----	266	176
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		----	34	----	504	149
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		----	40	----	25	25
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		----	<1	----	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		----	<1	----	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		----	4	----	2	<1
Total Alkalinity as CaCO3	----	1	mg/L		----	4	----	2	<1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		----	44	----	2	16
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		----	64	----	126	61
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		----	6	----	<1	<1
Magnesium	7439-95-4	1	mg/L		----	6	----	6	6
Sodium	7440-23-5	1	mg/L		----	45	----	64	36
Potassium	7440-09-7	1	mg/L		----	2	----	<1	2
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		----	0.006	----	<0.001	<0.001
Beryllium	7440-41-7	0.001	mg/L		----	<0.001	----	<0.001	<0.001
Barium	7440-39-3	0.001	mg/L		----	0.080	----	0.008	0.010
Cadmium	7440-43-9	0.0001	mg/L		----	<0.0001	----	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		----	<0.001	----	0.002	0.001
Copper	7440-50-8	0.001	mg/L		----	<0.001	----	<0.001	<0.001
Cobalt	7440-48-4	0.001	mg/L		----	0.003	----	<0.001	0.003



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Client sample ID

				Rinsate02	SW3	Trip Blank	MW239S	BH7
Client sampling date / time				14-Mar-2019 00:00	14-Mar-2019 00:00	13-Mar-2019 00:00	14-Mar-2019 00:00	14-Mar-2019 00:00
Compound	CAS Number	LOR	Unit	ES1907792-001	ES1907792-002	ES1907792-003	ES1907792-004	ES1907792-005
				Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued								
Nickel	7440-02-0	0.001	mg/L	----	0.002	----	0.005	0.004
Lead	7439-92-1	0.001	mg/L	----	<0.001	----	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L	----	0.009	----	0.008	0.009
Manganese	7439-96-5	0.001	mg/L	----	0.048	----	0.005	0.020
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
Boron	7440-42-8	0.05	mg/L	----	<0.05	----	<0.05	<0.05
Iron	7439-89-6	0.05	mg/L	----	9.26	----	1.25	1.80
EG020T: Total Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	----	<0.001	----	----
Beryllium	7440-41-7	0.001	mg/L	<0.001	----	<0.001	----	----
Barium	7440-39-3	0.001	mg/L	<0.001	----	<0.001	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	----	<0.0001	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	----	<0.001	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	----	<0.001	----	----
Cobalt	7440-48-4	0.001	mg/L	<0.001	----	<0.001	----	----
Nickel	7440-02-0	0.001	mg/L	<0.001	----	<0.001	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	----	<0.001	----	----
Zinc	7440-66-6	0.005	mg/L	<0.005	----	<0.005	----	----
Manganese	7439-96-5	0.001	mg/L	<0.001	----	<0.001	----	----
Selenium	7782-49-2	0.01	mg/L	<0.01	----	<0.01	----	----
Vanadium	7440-62-2	0.01	mg/L	<0.01	----	<0.01	----	----
Boron	7440-42-8	0.05	mg/L	<0.05	----	<0.05	----	----
Iron	7439-89-6	0.05	mg/L	<0.05	----	----	----	----
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	----	<0.0001	----	<0.0001	<0.0001
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	----	<0.0001	----	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	----	<0.1	----	<0.1	<0.1
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	----	2.80	----	3.64	2.05
Total Cations	----	0.01	meq/L	----	2.80	----	3.28	2.11
Ionic Balance	----	0.01	%	----	----	----	5.18	1.37



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Rinsate02	SW3	Trip Blank	MW239S	BH7
Client sampling date / time					14-Mar-2019 00:00	14-Mar-2019 00:00	13-Mar-2019 00:00	14-Mar-2019 00:00	14-Mar-2019 00:00
Compound	CAS Number	LOR	Unit		ES1907792-001	ES1907792-002	ES1907792-003	ES1907792-004	ES1907792-005
					Result	Result	Result	Result	Result
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L		<50	<50	----	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	----	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	----	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	----	<50	<50
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L		<100	<100	----	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	----	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	----	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	----	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	----	<100	<100
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP231A: Perfluoroalkyl Sulfonic Acids									
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



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				Rinsate02	SW3	Trip Blank	MW239S	BH7
Client sampling date / time				14-Mar-2019 00:00	14-Mar-2019 00:00	13-Mar-2019 00:00	14-Mar-2019 00:00	14-Mar-2019 00:00
Compound	CAS Number	LOR	Unit	ES1907792-001	ES1907792-002	ES1907792-003	ES1907792-004	ES1907792-005
				Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued								
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
EP231B: Perfluoroalkyl Carboxylic Acids								
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 (PFTTrDA)	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
EP231C: Perfluoroalkyl Sulfonamides								
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



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Rinsate02	SW3	Trip Blank	MW239S	BH7
Client sampling date / time					14-Mar-2019 00:00	14-Mar-2019 00:00	13-Mar-2019 00:00	14-Mar-2019 00:00	14-Mar-2019 00:00
Compound	CAS Number	LOR	Unit		ES1907792-001	ES1907792-002	ES1907792-003	ES1907792-004	ES1907792-005
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	----	<0.02	----	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
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
EP231P: PFAS Sums									
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
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		97.6	100	87.2	87.1	86.5
Toluene-D8	2037-26-5	2	%		105	104	101	98.4	92.1
4-Bromofluorobenzene	460-00-4	2	%		102	102	98.4	98.3	90.0
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		101	----	105	----	105
13C8-PFOA	----	0.02	%		91.1	----	97.3	----	92.1



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH6	BH8	Dup02	TRIP BLANK02	BH4
Client sampling date / time					14-Mar-2019 00:00	14-Mar-2019 00:00	14-Mar-2019 00:00	15-Mar-2019 00:00	15-Mar-2019 00:00
Compound	CAS Number	LOR	Unit		ES1907792-006	ES1907792-007	ES1907792-008	ES1907792-009	ES1907792-010
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		4.95	4.77	----	----	5.12
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		179	319	----	----	77
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		146	253	----	----	70
EA016: Calculated TDS (from Electrical Conductivity)									
Total Dissolved Solids (Calc.)	----	1	mg/L		116	207	----	----	50
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		144	138	----	----	45
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		21	25	----	----	5
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	----	----	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	----	----	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		2	<1	----	----	<1
Total Alkalinity as CaCO3	----	1	mg/L		2	<1	----	----	<1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		17	6	----	----	5
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		37	76	----	----	18
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		2	<1	----	----	2
Magnesium	7439-95-4	1	mg/L		4	6	----	----	<1
Sodium	7440-23-5	1	mg/L		23	45	----	----	9
Potassium	7440-09-7	1	mg/L		1	<1	----	----	<1
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	----	<0.001
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	----	<0.001
Barium	7440-39-3	0.001	mg/L		0.027	0.006	0.010	----	0.014
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	----	<0.0001
Chromium	7440-47-3	0.001	mg/L		<0.001	0.001	0.001	----	<0.001
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	----	0.001
Cobalt	7440-48-4	0.001	mg/L		<0.001	<0.001	0.002	----	<0.001

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH6	BH8	Dup02	TRIP BLANK02	BH4
Client sampling date / time				14-Mar-2019 00:00	14-Mar-2019 00:00	14-Mar-2019 00:00	15-Mar-2019 00:00	15-Mar-2019 00:00	
Compound	CAS Number	LOR	Unit	ES1907792-006	ES1907792-007	ES1907792-008	ES1907792-009	ES1907792-010	
				Result	Result	Result	Result	Result	
EG020F: Dissolved Metals by ICP-MS - Continued									
Nickel	7440-02-0	0.001	mg/L	<0.001	0.002	0.004	----	0.022	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	----	<0.001	
Zinc	7440-66-6	0.005	mg/L	0.012	<0.005	0.007	----	0.043	
Manganese	7439-96-5	0.001	mg/L	0.010	0.008	0.021	----	0.014	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	----	<0.01	
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	----	<0.01	
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	----	<0.05	
Iron	7439-89-6	0.05	mg/L	1.90	3.25	2.51	----	<0.05	
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	----	----	----	<0.001	----	
Beryllium	7440-41-7	0.001	mg/L	----	----	----	<0.001	----	
Barium	7440-39-3	0.001	mg/L	----	----	----	0.002	----	
Cadmium	7440-43-9	0.0001	mg/L	----	----	----	<0.0001	----	
Chromium	7440-47-3	0.001	mg/L	----	----	----	<0.001	----	
Copper	7440-50-8	0.001	mg/L	----	----	----	<0.001	----	
Cobalt	7440-48-4	0.001	mg/L	----	----	----	<0.001	----	
Nickel	7440-02-0	0.001	mg/L	----	----	----	<0.001	----	
Lead	7439-92-1	0.001	mg/L	----	----	----	<0.001	----	
Zinc	7440-66-6	0.005	mg/L	----	----	----	<0.005	----	
Manganese	7439-96-5	0.001	mg/L	----	----	----	<0.001	----	
Selenium	7782-49-2	0.01	mg/L	----	----	----	<0.01	----	
Vanadium	7440-62-2	0.01	mg/L	----	----	----	<0.01	----	
Boron	7440-42-8	0.05	mg/L	----	----	----	<0.05	----	
Iron	7439-89-6	0.05	mg/L	----	----	----	<0.05	----	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	<0.0001	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	----	----	----	<0.0001	----	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	----	----	<0.1	
EN055: Ionic Balance									
Total Anions	----	0.01	meq/L	1.44	2.27	----	----	0.61	
Total Cations	----	0.01	meq/L	1.46	2.45	----	----	0.49	
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH6	BH8	Dup02	TRIP BLANK02	BH4
Client sampling date / time					14-Mar-2019 00:00	14-Mar-2019 00:00	14-Mar-2019 00:00	15-Mar-2019 00:00	15-Mar-2019 00:00
Compound	CAS Number	LOR	Unit		ES1907792-006	ES1907792-007	ES1907792-008	ES1907792-009	ES1907792-010
					Result	Result	Result	Result	Result
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup - Continued									
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	----	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	----	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	----	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	----	<50
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	----	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	----	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	----	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	----	<100
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	----	<100
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	----	<20
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	----	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	----	<20
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	----	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	----	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	----	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	----	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	----	<2
^ Total Xylenes	----	2	µg/L		<2	<2	<2	----	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	----	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	----	<5
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				BH6	BH8	Dup02	TRIP BLANK02	BH4
Client sampling date / time				14-Mar-2019 00:00	14-Mar-2019 00:00	14-Mar-2019 00:00	15-Mar-2019 00:00	15-Mar-2019 00:00
Compound	CAS Number	LOR	Unit	ES1907792-006	ES1907792-007	ES1907792-008	ES1907792-009	ES1907792-010
				Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued								
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<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	<0.02	<0.02



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH6	BH8	Dup02	TRIP BLANK02	BH4
Client sampling date / time					14-Mar-2019 00:00	14-Mar-2019 00:00	14-Mar-2019 00:00	15-Mar-2019 00:00	15-Mar-2019 00:00
Compound	CAS Number	LOR	Unit		ES1907792-006	ES1907792-007	ES1907792-008	ES1907792-009	ES1907792-010
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<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	<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	<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	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<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	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		90.7	103	95.6	----	95.5
Toluene-D8	2037-26-5	2	%		107	109	102	----	97.7
4-Bromofluorobenzene	460-00-4	2	%		104	106	99.2	----	95.4
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		106	118	107	87.4	84.5
13C8-PFOA	----	0.02	%		94.3	117	91.7	86.9	88.6



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID		BH1	BH11	BH2	----	----	
Client sampling date / time				15-Mar-2019 00:00		15-Mar-2019 00:00		15-Mar-2019 00:00		----	----
Compound	CAS Number	LOR	Unit	ES1907792-011		ES1907792-012		ES1907792-013		-----	-----
				Result		Result		Result		----	----
EA005P: pH by PC Titrator											
pH Value	----	0.01	pH Unit	5.67		4.82		4.71		----	----
EA010P: Conductivity by PC Titrator											
Electrical Conductivity @ 25°C	----	1	µS/cm	104		186		101		----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C											
Total Dissolved Solids @180°C	----	10	mg/L	129		144		90		----	----
EA016: Calculated TDS (from Electrical Conductivity)											
Total Dissolved Solids (Calc.)	----	1	mg/L	68		121		66		----	----
EA025: Total Suspended Solids dried at 104 ± 2°C											
Suspended Solids (SS)	----	5	mg/L	78		152		352		----	----
EA065: Total Hardness as CaCO3											
Total Hardness as CaCO3	----	1	mg/L	9		8		16		----	----
ED037P: Alkalinity by PC Titrator											
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1		<1		<1		----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1		<1		<1		----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	9		<1		<1		----	----
Total Alkalinity as CaCO3	----	1	mg/L	9		<1		<1		----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA											
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1		2		7		----	----
ED045G: Chloride by Discrete Analyser											
Chloride	16887-00-6	1	mg/L	25		52		23		----	----
ED093F: Dissolved Major Cations											
Calcium	7440-70-2	1	mg/L	2		<1		3		----	----
Magnesium	7439-95-4	1	mg/L	1		2		2		----	----
Sodium	7440-23-5	1	mg/L	11		26		10		----	----
Potassium	7440-09-7	1	mg/L	<1		<1		<1		----	----
EG020F: Dissolved Metals by ICP-MS											
Arsenic	7440-38-2	0.001	mg/L	<0.001		<0.001		<0.001		----	----
Beryllium	7440-41-7	0.001	mg/L	<0.001		<0.001		<0.001		----	----
Barium	7440-39-3	0.001	mg/L	0.003		0.005		0.004		----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001		<0.0001		<0.0001		----	----
Chromium	7440-47-3	0.001	mg/L	0.004		0.001		<0.001		----	----
Copper	7440-50-8	0.001	mg/L	<0.001		<0.001		0.003		----	----
Cobalt	7440-48-4	0.001	mg/L	<0.001		<0.001		<0.001		----	----

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH1	BH11	BH2	----	----
Client sampling date / time				15-Mar-2019 00:00	15-Mar-2019 00:00	15-Mar-2019 00:00	----	----	
Compound	CAS Number	LOR	Unit	ES1907792-011	ES1907792-012	ES1907792-013	-----	-----	
				Result	Result	Result	----	----	
EG020F: Dissolved Metals by ICP-MS - Continued									
Nickel	7440-02-0	0.001	mg/L	<0.001	0.037	<0.001	----	----	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	----	----	
Zinc	7440-66-6	0.005	mg/L	1.27	0.016	<0.005	----	----	
Manganese	7439-96-5	0.001	mg/L	0.014	0.007	0.020	----	----	
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	----	----	
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	----	----	
Iron	7439-89-6	0.05	mg/L	12.5	1.49	<0.05	----	----	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	----	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	<0.1	----	----	
EN055: Ionic Balance									
Total Anions	----	0.01	meq/L	0.88	1.51	0.79	----	----	
Total Cations	----	0.01	meq/L	0.66	1.30	0.75	----	----	
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
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	----	----	
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	----	----	
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>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	----	----	
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L	1710	<20	<20	----	----	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L	1690	<20	<20	----	----	
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	1690	<20	<20	----	----	
EP080: BTEXN									



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Client sample ID

				BH1	BH11	BH2	----	----
Client sampling date / time				15-Mar-2019 00:00	15-Mar-2019 00:00	15-Mar-2019 00:00	----	----
Compound	CAS Number	LOR	Unit	ES1907792-011	ES1907792-012	ES1907792-013	-----	-----
				Result	Result	Result	----	----
EP080: BTEXN - Continued								
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	----	----
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	2	%	87.1	85.0	86.4	----	----
Toluene-D8	2037-26-5	2	%	99.8	103	102	----	----
4-Bromofluorobenzene	460-00-4	2	%	101	101	98.5	----	----



Surrogate Control Limits

Sub-Matrix: **WATER**

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

QUALITY CONTROL REPORT

Work Order	: ES1907792	Page	: 1 of 23
Client	: KLEINFELDER AUSTRALIA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: TOM OVERTON	Contact	: Shirley LeCornu
Address	: 95 MITCHELL ROAD CARDIFF NSW 2285	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +6138549 9630
Project	: 20190803	Date Samples Received	: 14-Mar-2019
Order number	: ----	Date Analysis Commenced	: 15-Mar-2019
C-O-C number	: ----	Issue Date	: 20-Mar-2019
Sampler	: Dan Kousbroek		
Site	: WSS - Cabbage Tree Rd water monitoring		
Quote number	: ME/114/19		
No. of samples received	: 13		
No. of samples analysed	: 13		



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 Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjari	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW



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

Key :
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 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
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 2237878)									
ES1907554-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.79	7.83	0.512	0% - 20%
ES1907792-005	BH7	EA005-P: pH Value	----	0.01	pH Unit	4.73	4.71	0.424	0% - 20%
EA005P: pH by PC Titrator (QC Lot: 2240085)									
ES1907792-010	BH4	EA005-P: pH Value	----	0.01	pH Unit	5.12	4.92	3.98	0% - 20%
ES1907958-009	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	8.38	8.51	1.54	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 2237879)									
ES1907554-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	382	379	0.808	0% - 20%
ES1907792-005	BH7	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	271	270	0.381	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 2240084)									
ES1907903-006	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	147	147	0.00	0% - 20%
ES1907792-010	BH4	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	77	78	0.00	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 2238874)									
ES1907792-002	SW3	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	279	288	3.35	0% - 20%
ES1907850-002	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	427	411	3.82	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 2238875)									
ES1907792-002	SW3	EA025H: Suspended Solids (SS)	----	5	mg/L	34	37	9.25	No Limit
ES1907850-002	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	7	8	13.8	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 2237880)									
ES1907770-008	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	39	40	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO ₃	----	1	mg/L	39	40	0.00	0% - 20%
ES1907554-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	<1	0.00	No Limit



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 2237880) - continued									
ES1907554-001	Anonymous	ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	225	228	1.64	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	225	228	1.64	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 2237881)									
ES1907853-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	402	387	3.96	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	402	387	3.96	0% - 20%
ES1907792-005	BH7	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	0.00	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 2240087)									
ES1907903-006	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	29	30	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	29	30	0.00	0% - 20%
ES1907792-010	BH4	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	0.00	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2238032)									
ES1906768-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	100	104	3.35	0% - 20%
ES1907792-004	MW239S	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2	3	42.3	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2239183)									
ES1907792-010	BH4	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	5	5	0.00	No Limit
ES1907887-006	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<5	<5	0.00	No Limit
ED045G: Chloride by Discrete Analyser (QC Lot: 2238033)									
ES1906768-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	3	3	0.00	No Limit
ES1907792-004	MW239S	ED045G: Chloride	16887-00-6	1	mg/L	126	130	3.30	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 2239182)									
ES1907792-010	BH4	ED045G: Chloride	16887-00-6	1	mg/L	18	18	0.00	0% - 50%
ES1907887-006	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	55	49	11.3	0% - 50%
ED093F: Dissolved Major Cations (QC Lot: 2237747)									
ES1907567-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	2	2	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	<1	1	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	306	307	0.346	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	6	6	0.00	No Limit
ES1907850-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	94	96	1.74	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	34	35	0.00	0% - 20%



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ED093F: Dissolved Major Cations (QC Lot: 2237747) - continued									
ES1907850-001	Anonymous	ED093F: Sodium	7440-23-5	1	mg/L	6	6	0.00	No Limit
		ED093F: Potassium	7440-09-7	1	mg/L	1	1	0.00	No Limit
ED093F: Dissolved Major Cations (QC Lot: 2239711)									
ES1907524-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	29	29	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	12	12	0.00	0% - 50%
		ED093F: Sodium	7440-23-5	1	mg/L	23	23	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	6	7	0.00	No Limit
ES1907958-003	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	339	346	2.13	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	230	232	0.954	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	833	838	0.630	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	38	39	0.00	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2237745)									
ES1907496-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	0.0002	0.0002	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.032	0.032	0.00	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.014	0.013	0.00	0% - 50%
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	1.08	1.08	0.284	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.012	0.013	0.00	0% - 50%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.074	0.075	0.00	0% - 50%
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.05	0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
ES1907850-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.015	0.014	0.00	0% - 50%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2237745) - continued									
ES1907850-001	Anonymous	EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2239713)									
ES1907524-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.047	0.047	0.00	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.015	0.016	0.00	0% - 50%
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.161	0.159	1.04	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.12	0.13	0.00	No Limit
ES1907958-003	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.178	0.183	2.56	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.005	0.006	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.481	0.491	1.92	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.008	0.009	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.07	0.07	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 2238334)									
ES1907779-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.017	0.018	0.00	0% - 50%
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020T: Total Metals by ICP-MS (QC Lot: 2238334) - continued									
ES1907779-001	Anonymous	EG020A-T: Copper	7440-50-8	0.001	mg/L	0.012	0.011	0.00	0% - 50%
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.006	0.006	0.00	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.10	<0.10	0.00	No Limit
ME1900358-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	0.0001	0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.106	0.104	2.40	0% - 20%
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	0.009	0.009	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.223	0.220	1.20	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.036	0.035	0.00	0% - 20%
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.060	0.058	4.14	0% - 50%
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	0.42	0.42	0.00	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 2239684)									
ES1906769-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<1 µg/L	<0.001	0.00	No Limit
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<1 µg/L	<0.001	0.00	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.156	0.162	3.90	0% - 20%
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.068	0.072	4.98	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.196	0.200	2.32	0% - 20%
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	0.08	0.08	0.00	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020T: Total Metals by ICP-MS (QC Lot: 2239684) - continued									
ES1907548-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.007	0.008	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.042	0.042	0.00	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	0.33	0.33	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 2237744)									
ES1907496-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES1907478-007	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.0001	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 2239712)									
ES1907792-008	Dup02	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 2239914)									
ES1907554-001	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES1907903-001	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 2237877)									
ES1907554-001	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.3	0.3	0.00	No Limit
ES1907792-005	BH7	EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 2240086)									
ES1907903-006	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit
ES1907792-010	BH4	EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2239738)									
EB1906198-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
ES1907792-010	BH4	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2239738)									
EB1906198-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES1907792-010	BH4	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 2239738)									
EB1906198-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP080: BTEXN (QC Lot: 2239738) - continued									
EB1906198-001	Anonymous	EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.00	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
ES1907792-010	BH4	EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
		EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.00	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 2238646)									
EM1903562-018	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
ES1907847-007	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 2240355)									
EM1903562-007	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.05	0.05	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
ES1907991-009	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2238646)									
EM1903562-018	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2238646) - continued									
EM1903562-018	Anonymous	EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
ES1907847-007	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.01	0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2240355)									
EM1903562-007	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
ES1907991-009	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2240355) - continued									
ES1907991-009	Anonymous	EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2238646)									
EM1903562-018	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1907847-007	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2240355)									
EM1903562-007	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2240355) - continued									
EM1903562-007	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1907991-009	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2238646)							
EM1903562-018	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1907847-007	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2240355)									
EM1903562-007	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit

Page : 12 of 23
 Work Order : ES1907792
 Client : KLEINFELDER AUSTRALIA PTY LTD
 Project : 20190803



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2240355) - continued									
EM1903562-007	Anonymous	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1907991-009	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 2238646)									
EM1903562-018	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.00	No Limit
ES1907847-007	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.01	0.01	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 2240355)									
EM1903562-007	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.05	0.05	0.00	No Limit
ES1907991-009	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.00	No Limit

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EA005P: pH by PC Titrator (QCLot: 2237878)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	99.8	98	102
				----	7 pH Unit	100	98	102
EA005P: pH by PC Titrator (QCLot: 2240085)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	98.8	98	102
				----	7 pH Unit	100	98	102
EA010P: Conductivity by PC Titrator (QCLot: 2237879)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2100 µS/cm	102	95	113
EA010P: Conductivity by PC Titrator (QCLot: 2240084)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2100 µS/cm	96.1	95	113
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 2238874)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	101	87	109
				<10	293 mg/L	118	66	126
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 2238875)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	109	83	129
				<5	1000 mg/L	96.6	82	110
ED037P: Alkalinity by PC Titrator (QCLot: 2237880)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	106	81	111
				----	50 mg/L	113	70	130
ED037P: Alkalinity by PC Titrator (QCLot: 2237881)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	101	81	111
				----	50 mg/L	107	70	130
ED037P: Alkalinity by PC Titrator (QCLot: 2240087)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	103	81	111
				----	50 mg/L	104	70	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2238032)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	98.2	82	122
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2239183)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	97.0	82	122
ED045G: Chloride by Discrete Analyser (QCLot: 2238033)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	94.0	81	127
				<1	1000 mg/L	102	81	127
ED045G: Chloride by Discrete Analyser (QCLot: 2239182)								



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
ED045G: Chloride by Discrete Analyser (QCLot: 2239182) - continued								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	117	81	127
				<1	1000 mg/L	101	81	127
ED093F: Dissolved Major Cations (QCLot: 2237747)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	98.2	80	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	98.7	90	116
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	99.5	82	120
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	97.3	85	113
ED093F: Dissolved Major Cations (QCLot: 2239711)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	113	80	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	99.8	90	116
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	97.3	82	120
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	99.3	85	113
EG020F: Dissolved Metals by ICP-MS (QCLot: 2237745)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	97.1	85	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	94.7	85	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	96.3	82	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	97.4	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	96.2	85	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	94.2	82	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	94.5	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	95.8	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	95.0	82	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	96.9	82	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	86.3	85	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	98.8	83	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	94.2	81	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	95.0	85	115
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	95.9	82	112
EG020F: Dissolved Metals by ICP-MS (QCLot: 2239713)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	100	85	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	85.8	85	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	99.7	82	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	98.7	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	89.7	85	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	90.7	82	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	90.8	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	98.5	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	91.7	82	110



Sub-Matrix: **WATER**

Method: Compound				Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
						LCS	Low	High
CAS Number	LOR	Unit						
EG020F: Dissolved Metals by ICP-MS (QCLot: 2239713) - continued								
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	96.9	82	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	100	85	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	90.8	83	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	93.7	81	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	86.0	85	115
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	92.5	82	112
EG020T: Total Metals by ICP-MS (QCLot: 2238334)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	101	82	114
EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	103	79	119
EG020A-T: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	102	84	116
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	102	84	112
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	102	86	116
EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	101	84	116
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	106	83	118
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	99.0	85	115
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	108	85	113
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	96.9	84	116
EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	94.5	68	126
EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	102	85	113
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	100	79	117
EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	104	75	129
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	106	85	117
EG020T: Total Metals by ICP-MS (QCLot: 2239684)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	105	82	114
EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	92.4	79	119
EG020A-T: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	98.4	84	116
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	98.2	84	112
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	90.1	86	116
EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	98.0	84	116
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	97.9	83	118
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	89.4	85	115
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	89.4	85	113
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	101	84	116
EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	103	68	126
EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	93.8	85	113
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	94.2	79	117
EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	93.0	75	129
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	97.4	85	117



Sub-Matrix: **WATER**

Method: Compound				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
						LCS	Low	High
CAS Number	LOR	Unit	Result					
EG035F: Dissolved Mercury by FIMS (QCLot: 2237744)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	98.2	83	105
EG035F: Dissolved Mercury by FIMS (QCLot: 2239712)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	98.5	83	105
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2239914)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	101	77	111
EK040P: Fluoride by PC Titrator (QCLot: 2237877)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	102	82	116
EK040P: Fluoride by PC Titrator (QCLot: 2240086)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	85.6	82	116
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QCLot: 2237202)								
EP071SG: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	102	75	117
EP071SG: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	99.4	81	113
EP071SG: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	103	71	117
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QCLot: 2239313)								
EP071SG: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	88.7	75	117
EP071SG: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	92.9	81	113
EP071SG: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	107	71	117
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 2237202)								
EP071SG: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	95.7	73	119
EP071SG: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	97.3	81	113
EP071SG: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	93.4	65	127
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 2239313)								
EP071SG: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	85.5	73	119
EP071SG: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	84.6	81	113
EP071SG: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	95.7	65	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2239738)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	89.8	75	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2239738)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	92.7	75	127
EP080: BTEXN (QCLot: 2239738)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	97.5	70	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	96.8	69	123
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	94.6	70	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	91.0	69	121
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	93.4	72	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	88.8	70	120

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result		LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2238646)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	92.4	70	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	98.8	70	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	100	70	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	108	70	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	100	70	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.5 µg/L	109	70	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2240355)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	76.2	70	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	70.2	70	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	71.6	70	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	80.8	70	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	70.0	70	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.5 µg/L	78.2	70	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2238646)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	106	70	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	111	70	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	112	70	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	113	70	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	106	70	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	111	70	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	105	70	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	123	70	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	126	70	130
EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	108	70	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	105	70	150
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2240355)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	91.4	70	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	80.6	70	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	78.6	70	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	81.4	70	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	74.2	70	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	72.8	70	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	73.2	70	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	77.8	70	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	81.6	70	130
EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	75.8	70	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	73.0	70	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2238646)								



Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result			Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2238646) - continued								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	107	70	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	116	70	150
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	121	70	150
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	1.25 µg/L	104	70	150
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	112	70	150
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	103	70	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	110	70	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2240355)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	77.6	70	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	82.8	70	150
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	75.6	70	150
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	1.25 µg/L	75.4	70	150
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	83.1	70	150
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	75.8	70	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	77.8	70	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2238646)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	108	70	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	113	70	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	115	70	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	110	70	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2240355)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	73.8	70	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	75.8	70	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	87.2	70	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	85.6	70	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Matrix Spike (MS) Report



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2238032)							
ES1906768-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	# Not Determined	70	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2239183)							
ES1907792-010	BH4	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	110	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 2238033)							
ES1906768-001	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	112	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 2239182)							
ES1907792-010	BH4	ED045G: Chloride	16887-00-6	250 mg/L	126	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2237745)							
ES1907567-001	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	99.8	70	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	130	70	130
		EG020A-F: Barium	7440-39-3	1 mg/L	92.7	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	86.3	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	123	70	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	97.9	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	98.8	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	109	70	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	92.2	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	94.9	70	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	124	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	77.1	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2239713)							
ES1907792-008	Dup02	EG020A-F: Arsenic	7440-38-2	1 mg/L	125	70	130
		EG020A-F: Beryllium	7440-41-7	2 mg/L	87.6	70	130
		EG020A-F: Barium	7440-39-3	1 mg/L	128	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	130	70	130
		EG020A-F: Chromium	7440-47-3	2 mg/L	83.8	70	130
		EG020A-F: Cobalt	7440-48-4	2 mg/L	79.2	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	124	70	130
		EG020A-F: Lead	7439-92-1	2 mg/L	72.0	70	130
		EG020A-F: Manganese	7439-96-5	2 mg/L	81.6	70	130
		EG020A-F: Nickel	7440-02-0	2 mg/L	86.4	70	130
		EG020A-F: Vanadium	7440-62-2	2 mg/L	83.2	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	121	70	130
EG020T: Total Metals by ICP-MS (QCLot: 2238334)							
ES1907792-001	Rinsate02	EG020A-T: Arsenic	7440-38-2	1 mg/L	101	70	130
		EG020A-T: Beryllium	7440-41-7	1 mg/L	102	70	130



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2239738) - continued							
EB1906198-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	101	70	130
EP080: BTEXN (QCLot: 2239738)							
EB1906198-001	Anonymous	EP080: Benzene	71-43-2	25 µg/L	96.9	70	130
		EP080: Toluene	108-88-3	25 µg/L	95.5	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	94.6	70	130
		EP080: meta- & para-Xylene	108-38-3	25 µg/L	91.2	70	130
			106-42-3				
		EP080: ortho-Xylene	95-47-6	25 µg/L	93.5	70	130
		EP080: Naphthalene	91-20-3	25 µg/L	86.7	70	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2238646)							
EM1903562-018	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	87.4	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.5 µg/L	96.6	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	95.8	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	105	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	98.2	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.5 µg/L	108	50	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2240355)							
EM1903562-007	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	71.0	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.5 µg/L	68.2	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	80.6	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	92.6	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	78.8	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.5 µg/L	91.2	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2238646)							
EM1903562-018	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	107	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	102	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	106	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	109	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	104	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	108	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	102	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	106	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	86.8	50	130
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.5 µg/L	97.8	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	110	50	150
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2240355)							
EM1903562-007	Anonymous	EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	79.6	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	89.6	50	130



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2240355) - continued							
EM1903562-007	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	81.8	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	76.4	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	78.6	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	85.6	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	97.2	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5 µg/L	85.4	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	70.4	50	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2238646)							
EM1903562-018	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	100	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	117	50	150
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	106	50	150
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	1.25 µg/L	108	50	150
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	104	50	150
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	104	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	114	50	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2240355)							
EM1903562-007	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	84.2	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	95.8	50	150
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	86.8	50	150
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	1.25 µg/L	77.0	50	150
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	93.8	50	150
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	87.6	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	82.4	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2238646)							
EM1903562-018	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	106	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	103	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	119	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	98.8	50	130



Sub-Matrix: WATER

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2240355)							
EM1903562-007	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	71.8	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	80.6	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	105	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	100	50	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES1907792	Page	: 1 of 13
Client	: KLEINFELDER AUSTRALIA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: TOM OVERTON	Telephone	: +6138549 9630
Project	: 20190803	Date Samples Received	: 14-Mar-2019
Site	: WSS - Cabbage Tree Rd water monitoring	Issue Date	: 20-Mar-2019
Sampler	: Dan Kousbroek	No. of samples received	: 13
Order number	:	No. of samples analysed	: 13

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers exist - please see following pages for full details.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	ES1906768--001	Anonymous	Sulfate as SO4 - Turbidimetric	14808-79-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method		Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
SW3, BH7, BH8	MW239S, BH6,	----	----	----	15-Mar-2019	14-Mar-2019	1
Clear Plastic Bottle - Natural							
BH4, BH11,	BH1, BH2	----	----	----	18-Mar-2019	15-Mar-2019	3

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
TRH - Total Recoverable Hydrocarbons - Silica Gel C	0	13	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Total Recoverable Hydrocarbons - Silica Gel C	0	13	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural (EA005-P)								
SW3, BH7, BH8	MW239S, BH6,	14-Mar-2019	----	----	----	15-Mar-2019	14-Mar-2019	✖
Clear Plastic Bottle - Natural (EA005-P)								
BH4, BH11,	BH1, BH2	15-Mar-2019	----	----	----	18-Mar-2019	15-Mar-2019	✖
EA010P: Conductivity by PC Titrator								
Clear Plastic Bottle - Natural (EA010-P)								
SW3, BH7, BH8	MW239S, BH6,	14-Mar-2019	----	----	----	15-Mar-2019	11-Apr-2019	✔
Clear Plastic Bottle - Natural (EA010-P)								
BH4, BH11,	BH1, BH2	15-Mar-2019	----	----	----	18-Mar-2019	12-Apr-2019	✔
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Clear Plastic Bottle - Natural (EA015H)								
SW3, BH7, BH8	MW239S, BH6,	14-Mar-2019	----	----	----	16-Mar-2019	21-Mar-2019	✔
Clear Plastic Bottle - Natural (EA015H)								
BH4, BH11,	BH1, BH2	15-Mar-2019	----	----	----	16-Mar-2019	22-Mar-2019	✔
EA025: Total Suspended Solids dried at 104 ± 2 °C								
Clear Plastic Bottle - Natural (EA025H)								
SW3, BH7, BH8	MW239S, BH6,	14-Mar-2019	----	----	----	16-Mar-2019	21-Mar-2019	✔
Clear Plastic Bottle - Natural (EA025H)								
BH4, BH11,	BH1, BH2	15-Mar-2019	----	----	----	16-Mar-2019	22-Mar-2019	✔
EA065: Total Hardness as CaCO3								
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)								
SW3, BH7, BH8	MW239S, BH6,	14-Mar-2019	----	----	----	15-Mar-2019	11-Apr-2019	✔
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)								
BH4, BH11,	BH1, BH2	15-Mar-2019	----	----	----	18-Mar-2019	12-Apr-2019	✔



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P)	MW239S,	14-Mar-2019	----	----	----	15-Mar-2019	28-Mar-2019	✓
SW3, BH7, BH8	BH6,							
Clear Plastic Bottle - Natural (ED037-P)	BH1,	15-Mar-2019	----	----	----	18-Mar-2019	29-Mar-2019	✓
BH4, BH11,	BH2							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G)	MW239S,	14-Mar-2019	----	----	----	15-Mar-2019	11-Apr-2019	✓
SW3, BH7, BH8	BH6,							
Clear Plastic Bottle - Natural (ED041G)	BH1,	15-Mar-2019	----	----	----	16-Mar-2019	12-Apr-2019	✓
BH4, BH11,	BH2							
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G)	MW239S,	14-Mar-2019	----	----	----	15-Mar-2019	11-Apr-2019	✓
SW3, BH7, BH8	BH6,							
Clear Plastic Bottle - Natural (ED045G)	BH1,	15-Mar-2019	----	----	----	16-Mar-2019	12-Apr-2019	✓
BH4, BH11,	BH2							
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)	MW239S,	14-Mar-2019	----	----	----	15-Mar-2019	11-Apr-2019	✓
SW3, BH7, BH8	BH6,							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)	BH1,	15-Mar-2019	----	----	----	18-Mar-2019	12-Apr-2019	✓
BH4, BH11,	BH2							
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)	MW239S,	14-Mar-2019	----	----	----	15-Mar-2019	10-Sep-2019	✓
SW3, BH7, BH8	BH6,							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)		14-Mar-2019	----	----	----	18-Mar-2019	10-Sep-2019	✓
Dup02								
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)	BH1,	15-Mar-2019	----	----	----	18-Mar-2019	11-Sep-2019	✓
BH4, BH11,	BH2							



Matrix: **WATER**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020T: Total Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) Trip Blank		13-Mar-2019	15-Mar-2019	09-Sep-2019	✓	15-Mar-2019	09-Sep-2019	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) Rinsate02		14-Mar-2019	15-Mar-2019	10-Sep-2019	✓	15-Mar-2019	10-Sep-2019	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) TRIP BLANK02		15-Mar-2019	18-Mar-2019	11-Sep-2019	✓	18-Mar-2019	11-Sep-2019	✓
EG035F: Dissolved Mercury by FIMS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) SW3, MW239S, BH7, BH6, BH8, Dup02		14-Mar-2019	----	----	----	18-Mar-2019	11-Apr-2019	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) BH4, BH1, BH11, BH2		15-Mar-2019	----	----	----	18-Mar-2019	12-Apr-2019	✓
EG035T: Total Recoverable Mercury by FIMS								
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) Trip Blank		13-Mar-2019	----	----	----	18-Mar-2019	10-Apr-2019	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) Rinsate02		14-Mar-2019	----	----	----	18-Mar-2019	11-Apr-2019	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) TRIP BLANK02		15-Mar-2019	----	----	----	18-Mar-2019	12-Apr-2019	✓
EK040P: Fluoride by PC Titrator								
Clear Plastic Bottle - Natural (EK040P) SW3, MW239S, BH7, BH6, BH8		14-Mar-2019	----	----	----	15-Mar-2019	11-Apr-2019	✓
Clear Plastic Bottle - Natural (EK040P) BH4, BH1, BH11, BH2		15-Mar-2019	----	----	----	18-Mar-2019	12-Apr-2019	✓
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup								
Amber Glass Bottle - Unpreserved (EP071SG) Rinsate02, SW3, MW239S, BH7, BH6, BH8, Dup02		14-Mar-2019	15-Mar-2019	21-Mar-2019	✓	18-Mar-2019	24-Apr-2019	✓
Amber Glass Bottle - Unpreserved (EP071SG) BH4, BH1, BH11, BH2		15-Mar-2019	18-Mar-2019	22-Mar-2019	✓	20-Mar-2019	27-Apr-2019	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
Amber Glass Bottle - Unpreserved (EP071SG)		14-Mar-2019	15-Mar-2019	21-Mar-2019	✓	18-Mar-2019	24-Apr-2019	✓
Rinsate02, SW3, MW239S, BH7, BH6, BH8, Dup02								
Amber Glass Bottle - Unpreserved (EP071SG)		15-Mar-2019	18-Mar-2019	22-Mar-2019	✓	20-Mar-2019	27-Apr-2019	✓
BH4, BH1, BH11, BH2								
EP080/071: Total Petroleum Hydrocarbons								
Amber VOC Vial - Sulfuric Acid (EP080)		13-Mar-2019	18-Mar-2019	27-Mar-2019	✓	18-Mar-2019	27-Mar-2019	✓
Trip Blank								
Amber VOC Vial - Sulfuric Acid (EP080)		14-Mar-2019	18-Mar-2019	28-Mar-2019	✓	18-Mar-2019	28-Mar-2019	✓
Rinsate02, SW3, MW239S, BH7, BH6, BH8, Dup02								
Amber VOC Vial - Sulfuric Acid (EP080)		15-Mar-2019	18-Mar-2019	29-Mar-2019	✓	18-Mar-2019	29-Mar-2019	✓
BH4, BH1, BH11, BH2								
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Amber VOC Vial - Sulfuric Acid (EP080)		13-Mar-2019	18-Mar-2019	27-Mar-2019	✓	18-Mar-2019	27-Mar-2019	✓
Trip Blank								
Amber VOC Vial - Sulfuric Acid (EP080)		14-Mar-2019	18-Mar-2019	28-Mar-2019	✓	18-Mar-2019	28-Mar-2019	✓
Rinsate02, SW3, MW239S, BH7, BH6, BH8, Dup02								
Amber VOC Vial - Sulfuric Acid (EP080)		15-Mar-2019	18-Mar-2019	29-Mar-2019	✓	18-Mar-2019	29-Mar-2019	✓
BH4, BH1, BH11, BH2								
EP080: BTEXN								
Amber VOC Vial - Sulfuric Acid (EP080)		13-Mar-2019	18-Mar-2019	27-Mar-2019	✓	18-Mar-2019	27-Mar-2019	✓
Trip Blank								
Amber VOC Vial - Sulfuric Acid (EP080)		14-Mar-2019	18-Mar-2019	28-Mar-2019	✓	18-Mar-2019	28-Mar-2019	✓
Rinsate02, SW3, MW239S, BH7, BH6, BH8, Dup02								
Amber VOC Vial - Sulfuric Acid (EP080)		15-Mar-2019	18-Mar-2019	29-Mar-2019	✓	18-Mar-2019	29-Mar-2019	✓
BH4, BH1, BH11, BH2								



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X) Trip Blank		13-Mar-2019	15-Mar-2019	09-Sep-2019	✔	18-Mar-2019	09-Sep-2019	✔
HDPE (no PTFE) (EP231X) Rinsate02, BH6, Dup02	BH7, BH8,	14-Mar-2019	15-Mar-2019	10-Sep-2019	✔	18-Mar-2019	10-Sep-2019	✔
HDPE (no PTFE) (EP231X) TRIP BLANK02,	BH4	15-Mar-2019	18-Mar-2019	11-Sep-2019	✔	18-Mar-2019	11-Sep-2019	✔
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X) Trip Blank		13-Mar-2019	15-Mar-2019	09-Sep-2019	✔	18-Mar-2019	09-Sep-2019	✔
HDPE (no PTFE) (EP231X) Rinsate02, BH6, Dup02	BH7, BH8,	14-Mar-2019	15-Mar-2019	10-Sep-2019	✔	18-Mar-2019	10-Sep-2019	✔
HDPE (no PTFE) (EP231X) TRIP BLANK02,	BH4	15-Mar-2019	18-Mar-2019	11-Sep-2019	✔	18-Mar-2019	11-Sep-2019	✔
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X) Trip Blank		13-Mar-2019	15-Mar-2019	09-Sep-2019	✔	18-Mar-2019	09-Sep-2019	✔
HDPE (no PTFE) (EP231X) Rinsate02, BH6, Dup02	BH7, BH8,	14-Mar-2019	15-Mar-2019	10-Sep-2019	✔	18-Mar-2019	10-Sep-2019	✔
HDPE (no PTFE) (EP231X) TRIP BLANK02,	BH4	15-Mar-2019	18-Mar-2019	11-Sep-2019	✔	18-Mar-2019	11-Sep-2019	✔
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X) Trip Blank		13-Mar-2019	15-Mar-2019	09-Sep-2019	✔	18-Mar-2019	09-Sep-2019	✔
HDPE (no PTFE) (EP231X) Rinsate02, BH6, Dup02	BH7, BH8,	14-Mar-2019	15-Mar-2019	10-Sep-2019	✔	18-Mar-2019	10-Sep-2019	✔
HDPE (no PTFE) (EP231X) TRIP BLANK02,	BH4	15-Mar-2019	18-Mar-2019	11-Sep-2019	✔	18-Mar-2019	11-Sep-2019	✔



Matrix: WATER

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X) Trip Blank	13-Mar-2019	15-Mar-2019	09-Sep-2019	✓	18-Mar-2019	09-Sep-2019	✓
HDPE (no PTFE) (EP231X) Rinsate02, BH7, BH6, BH8, Dup02	14-Mar-2019	15-Mar-2019	10-Sep-2019	✓	18-Mar-2019	10-Sep-2019	✓
HDPE (no PTFE) (EP231X) TRIP BLANK02, BH4	15-Mar-2019	18-Mar-2019	11-Sep-2019	✓	18-Mar-2019	11-Sep-2019	✓



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)		Quality Control Specification	
Analytical Methods	Method	QC	Regular	Actual	Expected		Evaluation
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	6	60	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	39	10.26	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	4	39	10.26	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	3	28	10.71	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	4	38	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	4	37	10.81	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	4	32	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	38	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	4	36	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	0	13	0.00	10.00	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	6	60	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	39	10.26	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	39	5.13	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	28	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	38	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	37	5.41	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	32	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	38	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	36	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	2	13	15.38	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chloride by Discrete Analyser	ED045G	2	39	5.13	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	39	5.13	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Method Blanks (MB) - Continued							
Dissolved Mercury by FIMS	EG035F	2	28	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	38	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	37	5.41	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	32	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	38	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	36	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	2	13	15.38	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	2	39	5.13	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	28	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	38	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	32	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	38	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	36	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	0	13	0.00	5.00	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (2013) Schedule B(3)
Calculated TDS (from Electrical Conductivity)	EA016	WATER	In house: Calculation from Electrical Conductivity (APHA 2510 B) using a conversion factor specified in the analytical report. This method is compliant with NEPM (2013) Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of 'non-filterable' residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C. This method is compliant with NEPM (2013) Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM (2013) Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (2013) Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.



Analytical Methods	Method	Matrix	Method Descriptions
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Fluoride by PC Titrator	EK040P	WATER	In house: Referenced to APHA 4500-F C: CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (2013) Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	WATER	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C36. This method is compliant with NEPM (2013) Schedule B(3) (Method 506.1)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In house: Direct injection analysis of fresh waters after dilution (1:1) with methanol. Analysis by LC-Electrospray-MS-MS, Negative Mode using MRM. Where commercially available, isotopically labelled analogues of the target analytes are used as internal standards for quantification. Where a labelled analogue is not commercially available, the internal standard with similar chemistry and the closest retention time to the target is used for quantification. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. This method complies with the quality control definitions as stated in QSM 5.1. Data is reviewed in line with the DQOs as stated in QSM5.1

Preparation Methods	Method	Matrix	Method Descriptions
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Preparation for PFAS in water.	EP231-PR	WATER	Method presumes direct injection without workup. Preparation includes addition of internal standard and surrogate, and filtration prior to analysis.

Page : 13 of 13
Work Order : ES1907792
Client : KLEINFELDER AUSTRALIA PTY LTD
Project : 20190803



Preparation Methods	Method	Matrix	Method Descriptions
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

Please Refer to WO# ES1907792

Client:				SITE, COC AND CONTACT DATA				Laboratory:								
Kleinfelder Australia Pty Ltd 95 Mitchell Road Cardiff, NSW 2285 Phone: 02 4948 5200				Site Name: WSS - Cabbage Tree Rd water monitoring QUOTE NUMBER: ME/14/19 Job No: 20100803 Required IAT: 24 hrs 48 hrs 3 days 5 days 7 days Data QA level: LAB minimum unless specified.				Sample Name: Dan Kousbroek Contact Number: 045 8197 678 Contact e-mail: dkousbroek@kleinfelder.com Tom Overton Pvt e-mail: toverton@kleinfelder.com								
Refiniquished by (pm):				Refiniquished: (sign)				Refiniquished by: (sign)								
(sign)				C. Sullivan				AT								
Date / Time:				Date / Time:				Date / Time:								
Temp (°C):				Temp (°C):				Temp (°C):								
Notes:				Notes:				Notes:								
Sample ID	Lab ID	Sample Point	Sample Type	Date	Start Depth	End Depth	Units	# Containers	W-05 SG	Additional Metals to make up NEPM 15	Iron (dissolved)	General test work / site	Total Dissolved Solids (TDS)	Total Suspended Solids (TSS)	PFAS (28 analytes, standard level)	Comments
Top Blank	0			15/3				4	X	X	X		X	X	X	
SH4	10			15/3				6	X	X	X		X	X	X	
SH1	11			15/3				5	X	X	X		X	X	X	
SH11	12			15/3				5	X	X	X		X	X	X	
SH2	13			15/3				5	X	X	X		X	X	X	

Environmental Division
Sydney
Work Order Reference
ES1907792

LAB OF ORIGIN:
NEWCASTLE

W-05 SG - TRISTEXN 3 Metals Silica Gel Clean Up
MT4 - Extended water suite B
Additional metals analysis to make up NEPM 15

Arsenic (As), Cadmium (Cd), Chromium (Cr), Copper (Cu), Lead (Pb), Mercury (Hg), Nickel (Ni), Zinc (Zn)
Boron (B), Barium (Ba), Beryllium (Be), Cobalt (Co), Manganese (Mn), Selenium (Se), Vanadium (V)

1 March 2019 - 01 28794 0555



#645653



Client:		SITE, COC AND CONTACT DATA										Laboratory:	
Kleinfelder Australia Pty Ltd 95 Mitchell Road Cardiff, NSW 2285 Phone: 02 4949 5200		Site Name: WSS - Cabbage Tree Rd water monitoring				Sampler Name: Dan Kousbroek						ALS 5/585 Mollard Rd Mayfield West, Newcastle NSW 2304 Phone: (02) 4014 2500	
QUOTE NUMBER: ME/114/19		Contact Number: 045 8197 676				Contact e-mail: dkousbroek@kleinfelder.com						Send Results to:	
Job No: 20190803		Contact e-mail: dkousbroek@kleinfelder.com				Tons Quoted						95 Mitchell Road Cardiff, NSW 2285	
Required TAT: 24 hrs 48 hrs 3 days 5 days 7 days		Pilot name (if not sampled)				Pilot e-mail: dkousbroek@kleinfelder.com						newcastle@kleinfelder.com	
Data QA level: LAB minimum unless specified.												Phone: 02 4949 5200	
CHAIN OF CUSTODY													
Relinquished by (print):		Received by (print):		Relinquished (print):		Received by (print):							
(sign):		(sign):		(sign):		(sign):							
Date / Time: 14/7		Date / Time: 14/03/19		Date / Time:		Date / Time:							
Temp (°C):		Temp (°C):		Temp (°C):		Temp (°C):							
Notes:		Notes: 5-3 10		Notes:		Notes:							
		ice present / no ice		ice present / no ice		ice present / no ice							
		seals intact / no seal		seals intact / no seal		seals intact / no seal							
Sample ID	Lab ID	Sample Point	Sample Type	Date	Start Depth	End Depth	Units	# Containers	W-05 SG	Organic Analyses	Metals	Other Analyses	Comments
Rinsed02			Water	14/3				5	X				
SW3			Water	14/3				5	X				
Trip Blank			Water	14/3				3	X				
MW2545			Water	14/3				5	X				
BH7			Water	14/3				6	X				
BH6			Water	14/3				6	X				
BH8			Water	14/3				6	X				
Qp02			Water	14/3				5	X				
Trip02			Water	14/3				5	X				
Subcon / Forward Lab / Split WO													
Lab / Analysis: TRIP / Trip													
Organised By / Date:													
Relinquished By / Date:													
Connote / Courier:													
WO No:													
Attach By PO / Internal Sheet:													

W-05 SG - TRUBTEXN 5 Metals Silica Gel Clean Up
NT14 - Extended water suite B
Additional metals analysis to make up NEPM 15

Arsenic (As), Cadmium (Cd), Chromium (Cr), Copper (Cu), Lead (Pb), Mercury (Hg), Nickel (Ni), Zinc (Zn)
Boron (B), Barium (Ba), Beryllium (Be), Cobalt (Co), Manganese (Mn), Selenium (Se), Vanadium (V)

LAB OF ORIGIN:
NEWCASTLE

Environmental Division
Sydney
Work Order Reference
ES1907792



Telephone: 02 4949 5200

Sample Receipt Advice

Company name: **Kleinfelder Aust Pty Ltd (NEWCASTLE)**
Contact name: **Dan Kousbroek**
Project name: **WSS - CABBAGE TREE RD WATER MONITORING**
Project ID: **20190803**
COC number: **Not provided**
Turn around time: **5 Day**
Date/Time received: **Mar 15, 2019 3:48 PM**
Eurofins | mgt reference: **645653**

Sample information

- ☒ A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- ☒ All samples have been received as described on the above COC.
- ☒ COC has been completed correctly.
- ☒ Attempt to chill was evident.
- ☒ Appropriately preserved sample containers have been used.
- ☒ All samples were received in good condition.
- ☒ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- ☒ Appropriate sample containers have been used.
- ☒ Sample containers for volatile analysis received with zero headspace.
- ☒ Split sample sent to requested external lab.
- ☒ Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

Contact notes

If you have any questions with respect to these samples please contact:

Andrew Black on Phone : (+61) 2 9900 8490 or by e.mail: AndrewBlack@eurofins.com

Results will be delivered electronically via e.mail to Dan Kousbroek - dkousbroek@kleinfelder.com.

Company Name:	Kleinfelder Aust Pty Ltd (NEWCASTLE)	Order No.:		Received:	Mar 15, 2019 3:48 PM
Address:	95 Mitchell Rd	Report #:	645653	Due:	Mar 22, 2019
	Cardiff	Phone:	02 4949 5200	Priority:	5 Day
	NSW 2285	Fax:		Contact Name:	Dan Kousbroek
Project Name:	WSS - CABBAGE TREE RD WATER MONITORING				
Project ID:	20190803				
Eurofins mgt Analytical Services Manager : Andrew Black					

Sample Detail						Iron (filtered)	NEPM 1999 Metals : Metals M15	Per - and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217						X	X	
Brisbane Laboratory - NATA Site # 20794								X
Perth Laboratory - NATA Site # 23736								
External Laboratory								
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID			
1	TRIP02	Mar 14, 2019		Water	S19-Ma19698	X	X	X
Test Counts						1	1	1

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 645653-W
Project name WSS - CABBAGE TREE RD WATER MONITORING
Project ID 20190803
Received Date Mar 15, 2019

Client Sample ID			TRIP02
Sample Matrix			Water
Eurofins mgt Sample No.			S19-Ma19698
Date Sampled			Mar 14, 2019
Test/Reference	LOR	Unit	
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)			
1H,1H,2H,2H-perfluorohexanesulfonic acid (4:2 FTSA) ^{N11}	0.01	ug/L	< 0.01
1H,1H,2H,2H-perfluorodecanesulfonic acid (8:2 FTSA) ^{N11}	0.01	ug/L	< 0.01
1H,1H,2H,2H-perfluorododecanesulfonic acid (10:2 FTSA) ^{N15}	0.01	ug/L	< 0.01
13C2-4:2 FTSA (surr.)	1	%	107
13C2-8:2 FTSA (surr.)	1	%	104
1H,1H,2H,2H-perfluorooctanesulfonic acid (6:2 FTSA) ^{N11}	0.05	ug/L	< 0.05
13C2-6:2 FTSA (surr.)	1	%	139
PFASs Summations			
Sum of WA DWER PFAS (n=10)*	0.05	ug/L	< 0.05
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 PFASs (n=30)*	0.1	ug/L	< 0.1
Heavy Metals			
Arsenic (filtered)	0.001	mg/L	< 0.001
Barium (filtered)	0.02	mg/L	< 0.02
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	0.002
Copper (filtered)	0.001	mg/L	< 0.001
Iron (filtered)	0.05	mg/L	1.7
Lead (filtered)	0.001	mg/L	< 0.001
Manganese (filtered)	0.005	mg/L	0.019
Mercury (filtered)	0.0001	mg/L	< 0.0001
Nickel (filtered)	0.001	mg/L	< 0.001
Vanadium (filtered)	0.005	mg/L	< 0.005
Zinc (filtered)	0.005	mg/L	< 0.005

Client Sample ID			TRIP02
Sample Matrix			Water
Eurofins mgt Sample No.			S19-Ma19698
Date Sampled			Mar 14, 2019
Test/Reference	LOR	Unit	
Perfluoroalkyl carboxylic acids (PFCAs)			
Perfluorobutanoic acid (PFBA) ^{N11}	0.05	ug/L	< 0.05
Perfluoropentanoic acid (PFPeA) ^{N11}	0.01	ug/L	< 0.01
Perfluorohexanoic acid (PFHxA) ^{N11}	0.01	ug/L	< 0.01
Perfluoroheptanoic acid (PFHpA) ^{N11}	0.01	ug/L	< 0.01
Perfluorooctanoic acid (PFOA) ^{N11}	0.01	ug/L	< 0.01
Perfluorononanoic acid (PFNA) ^{N11}	0.01	ug/L	< 0.01
Perfluorodecanoic acid (PFDA) ^{N11}	0.01	ug/L	< 0.01
Perfluoroundecanoic acid (PFUnDA) ^{N11}	0.01	ug/L	< 0.01
Perfluorododecanoic acid (PFDoDA) ^{N11}	0.01	ug/L	< 0.01
Perfluorotridecanoic acid (PFTrDA) ^{N15}	0.01	ug/L	< 0.01
Perfluorotetradecanoic acid (PFTeDA) ^{N11}	0.01	ug/L	< 0.01
13C4-PFBA (surr.)	1	%	112
13C5-PFPeA (surr.)	1	%	141
13C5-PFHxA (surr.)	1	%	136
13C4-PFHpA (surr.)	1	%	115
13C8-PFOA (surr.)	1	%	119
13C5-PFNA (surr.)	1	%	96
13C6-PFDA (surr.)	1	%	132
13C2-PFUnDA (surr.)	1	%	102
13C2-PFDoDA (surr.)	1	%	134
13C2-PFTeDA (surr.)	1	%	188
Perfluoroalkyl sulfonamido substances			
Perfluorooctane sulfonamide (FOSA) ^{N11}	0.05	ug/L	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) ^{N11}	0.05	ug/L	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) ^{N11}	0.05	ug/L	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE) ^{N11}	0.05	ug/L	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE) ^{N11}	0.05	ug/L	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) ^{N11}	0.05	ug/L	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) ^{N11}	0.05	ug/L	< 0.05
13C8-FOSA (surr.)	1	%	106
D3-N-MeFOSA (surr.)	1	%	84
D5-N-EtFOSA (surr.)	1	%	90
D7-N-MeFOSE (surr.)	1	%	96
D9-N-EtFOSE (surr.)	1	%	128
D5-N-EtFOSAA (surr.)	1	%	56
D3-N-MeFOSAA (surr.)	1	%	78
Perfluoroalkyl sulfonic acids (PFSAs)			
Perfluorobutanesulfonic acid (PFBS) ^{N11}	0.01	ug/L	< 0.01
Perfluorononanesulfonic acid (PFNS) ^{N15}	0.01	ug/L	< 0.01
Perfluoropropanesulfonic acid (PFPrS) ^{N15}	0.01	ug/L	< 0.01
Perfluoropentanesulfonic acid (PFPeS) ^{N15}	0.01	ug/L	< 0.01
Perfluorohexanesulfonic acid (PFHxS) ^{N11}	0.01	ug/L	< 0.01
Perfluoroheptanesulfonic acid (PFHpS) ^{N15}	0.01	ug/L	< 0.01
Perfluorooctanesulfonic acid (PFOS) ^{N11}	0.01	ug/L	< 0.01
Perfluorodecanesulfonic acid (PFDS) ^{N15}	0.01	ug/L	< 0.01
13C3-PFBS (surr.)	1	%	156

Client Sample ID			TRIP02
Sample Matrix			Water
Eurofins mgt Sample No.			S19-Ma19698
Date Sampled			Mar 14, 2019
Test/Reference	LOR	Unit	
Perfluoroalkyl sulfonic acids (PFSA's)			
18O2-PFHxS (surr.)	1	%	122
13C8-PFOS (surr.)	1	%	116

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 (regarding both quality and NATA accreditation).

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
Per- and Polyfluoroalkyl Substances (PFASs)			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)	Brisbane	Mar 21, 2019	14 Day
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl carboxylic acids (PFCAs)	Brisbane	Mar 21, 2019	14 Day
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonamido substances	Brisbane	Mar 21, 2019	14 Day
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonic acids (PFSAs)	Brisbane	Mar 21, 2019	14 Day
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
NEPM 1999 Metals : Metals M15 (Filtered)			
Heavy Metals (filtered)	Sydney	Mar 19, 2019	180 Day
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Mobil Metals : Metals M15	Sydney	Mar 19, 2019	28 Day
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			

Company Name: Kleinfelder Aust Pty Ltd (NEWCASTLE)
Address: 95 Mitchell Rd
Cardiff
NSW 2285
Project Name: WSS - CABBAGE TREE RD WATER MONITORING
Project ID: 20190803

Order No.:
Report #: 645653
Phone: 02 4949 5200
Fax:

Received: Mar 15, 2019 3:48 PM
Due: Mar 22, 2019
Priority: 5 Day
Contact Name: Dan Kousbroek

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						Iron (filtered)	NEPM 1999 Metals : Metals M15	Per - and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217						X	X	
Brisbane Laboratory - NATA Site # 20794								X
Perth Laboratory - NATA Site # 23736								
External Laboratory								
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID			
1	TRIP02	Mar 14, 2019		Water	S19-Ma19698	X	X	X
Test Counts						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, April 2011 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. 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

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	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.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.2 2018
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	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.
TEQ	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 50-150%-Phenols & PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.2 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
Method Blank							
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/L	< 0.01			0.01	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	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	ug/L	< 0.05			0.05	Pass	
Method Blank							
Heavy Metals							
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	
Iron (filtered)	mg/L	< 0.05			0.05	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	
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	ug/L	< 0.05			0.05	Pass	
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 (PFTeDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/L	< 0.01			0.01	Pass	
Method Blank							
Perfluoroalkyl sulfonamido substances							
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	
Method Blank							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	ug/L	< 0.01			0.01	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/L	< 0.01			0.01	Pass	
Perfluoropropanesulfonic acid (PFPrS)	ug/L	< 0.01			0.01	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/L	< 0.01			0.01	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluorohexanesulfonic acid (PFHxS)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/L	< 0.01			0.01	Pass	
LCS - % Recovery							
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	%	78			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	%	95			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	%	102			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	%	87			50-150	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic (filtered)	%	96			70-130	Pass	
Barium (filtered)	%	93			70-130	Pass	
Beryllium (filtered)	%	81			70-130	Pass	
Boron (filtered)	%	89			70-130	Pass	
Cadmium (filtered)	%	94			70-130	Pass	
Chromium (filtered)	%	93			70-130	Pass	
Cobalt (filtered)	%	93			70-130	Pass	
Copper (filtered)	%	91			70-130	Pass	
Iron (filtered)	%	91			70-130	Pass	
Lead (filtered)	%	91			70-130	Pass	
Manganese (filtered)	%	90			70-130	Pass	
Mercury (filtered)	%	93			70-130	Pass	
Nickel (filtered)	%	90			70-130	Pass	
Vanadium (filtered)	%	95			70-130	Pass	
Zinc (filtered)	%	83			70-130	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	%	84			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	99			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	80			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	76			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	68			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	89			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	68			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	81			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	70			50-150	Pass	
Perfluorotridecanoic acid (PFTriDA)	%	69			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	77			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	%	53			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	60			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	52			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	%	86			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	%	67			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	%	50			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	%	74			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	%	67			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	%	68			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	%	57			50-150	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluoropentanesulfonic acid (PFPeS)			%	59			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)			%	84			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)			%	65			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)			%	73			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)			%	74			50-150	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	S19-Ma26190	NCP	%	71			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	S19-Ma26190	NCP	%	104			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	S19-Ma26190	NCP	%	95			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	S19-Ma26190	NCP	%	84			50-150	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic (filtered)	S19-Ma22192	NCP	%	103			70-130	Pass	
Barium (filtered)	S19-Ma22192	NCP	%	100			70-130	Pass	
Beryllium (filtered)	S19-Ma22192	NCP	%	85			70-130	Pass	
Boron (filtered)	S19-Ma22192	NCP	%	93			70-130	Pass	
Cadmium (filtered)	S19-Ma22192	NCP	%	96			70-130	Pass	
Chromium (filtered)	S19-Ma22192	NCP	%	94			70-130	Pass	
Cobalt (filtered)	S19-Ma22192	NCP	%	94			70-130	Pass	
Copper (filtered)	S19-Ma22192	NCP	%	92			70-130	Pass	
Iron (filtered)	S19-Ma22192	NCP	%	87			70-130	Pass	
Lead (filtered)	S19-Ma22192	NCP	%	91			70-130	Pass	
Manganese (filtered)	S19-Ma22192	NCP	%	92			70-130	Pass	
Mercury (filtered)	S19-Ma22192	NCP	%	88			70-130	Pass	
Nickel (filtered)	S19-Ma22192	NCP	%	89			70-130	Pass	
Vanadium (filtered)	S19-Ma22192	NCP	%	97			70-130	Pass	
Zinc (filtered)	S19-Ma22192	NCP	%	85			70-130	Pass	
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1					
Perfluorobutanoic acid (PFBA)	S19-Ma26190	NCP	%	82			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	S19-Ma26190	NCP	%	90			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	S19-Ma26190	NCP	%	76			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	S19-Ma26190	NCP	%	76			50-150	Pass	
Perfluorooctanoic acid (PFOA)	S19-Ma26190	NCP	%	68			50-150	Pass	
Perfluorononanoic acid (PFNA)	S19-Ma26190	NCP	%	83			50-150	Pass	
Perfluorodecanoic acid (PFDA)	S19-Ma26190	NCP	%	70			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	S19-Ma26190	NCP	%	81			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	S19-Ma26190	NCP	%	68			50-150	Pass	
Perfluorotridecanoic acid (PFTTrDA)	S19-Ma26190	NCP	%	73			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	S19-Ma26190	NCP	%	72			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonamido substances				Result 1					
Perfluorooctane sulfonamide (FOSA)	S19-Ma26190	NCP	%	61			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	S19-Ma26190	NCP	%	58			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	S19-Ma26190	NCP	%	52			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	S19-Ma26190	NCP	%	111			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	S19-Ma26190	NCP	%	60			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	S19-Ma26190	NCP	%	56			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	S19-Ma26190	NCP	%	74			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonic acids (PFASs)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	S19-Ma26190	NCP	%	64			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	S19-Ma26190	NCP	%	92			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	S19-Ma26190	NCP	%	58			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	S19-Ma26190	NCP	%	53			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	S19-Ma26190	NCP	%	71			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	S19-Ma26190	NCP	%	54			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	S19-Ma26190	NCP	%	67			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	S19-Ma26190	NCP	%	63			50-150	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)				Result 1	Result 2	RPD			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	S19-Ma26189	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	S19-Ma26189	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	S19-Ma26189	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	S19-Ma26189	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic (filtered)	S19-Ma19698	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Barium (filtered)	S19-Ma19698	CP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Beryllium (filtered)	S19-Ma19698	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cadmium (filtered)	S19-Ma19698	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium (filtered)	S19-Ma19698	CP	mg/L	0.001	0.001	3.0	30%	Pass	
Cobalt (filtered)	S19-Ma19698	CP	mg/L	0.002	0.002	4.0	30%	Pass	
Copper (filtered)	S19-Ma19698	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Iron (filtered)	S19-Ma19698	CP	mg/L	1.7	1.7	<1	30%	Pass	
Lead (filtered)	S19-Ma19698	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Manganese (filtered)	S19-Ma19698	CP	mg/L	0.019	0.018	5.0	30%	Pass	
Nickel (filtered)	S19-Ma19698	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Vanadium (filtered)	S19-Ma19698	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Zinc (filtered)	S19-Ma19698	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	

Duplicate								
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD		
Perfluorobutanoic acid (PFBA)	S19-Ma26189	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
Perfluoropentanoic acid (PFPeA)	S19-Ma26189	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorohexanoic acid (PFHxA)	S19-Ma26189	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoroheptanoic acid (PFHpA)	S19-Ma26189	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorooctanoic acid (PFOA)	S19-Ma26189	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorononanoic acid (PFNA)	S19-Ma26189	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorodecanoic acid (PFDA)	S19-Ma26189	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoroundecanoic acid (PFUnDA)	S19-Ma26189	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorododecanoic acid (PFDoDA)	S19-Ma26189	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorotridecanoic acid (PFTrDA)	S19-Ma26189	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorotetradecanoic acid (PFTeDA)	S19-Ma26189	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Duplicate								
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD		
Perfluorooctane sulfonamide (FOSA)	S19-Ma26189	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	S19-Ma26189	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	S19-Ma26189	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	S19-Ma26189	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	S19-Ma26189	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	S19-Ma26189	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	S19-Ma26189	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
Duplicate								
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1	Result 2	RPD		
Perfluorobutanesulfonic acid (PFBS)	S19-Ma26189	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorononanesulfonic acid (PFNS)	S19-Ma26189	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoropropanesulfonic acid (PFPrS)	S19-Ma26189	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoropentanesulfonic acid (PFPeS)	S19-Ma26189	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorohexanesulfonic acid (PFHxS)	S19-Ma26189	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoroheptanesulfonic acid (PFHpS)	S19-Ma26189	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorooctanesulfonic acid (PFOS)	S19-Ma26189	NCP	ug/L	0.04	0.04	10	30%	Pass
Perfluorodecanesulfonic acid (PFDS)	S19-Ma26189	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass

Comments

Sample Integrity

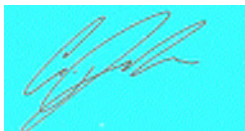
Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted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

Qualifier Codes/Comments

Code	Description
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
Gabriele Cordero	Senior Analyst-Inorganic (NSW)
Gabriele Cordero	Senior Analyst-Metal (NSW)
Jonathon Angell	Senior Analyst-Organic (QLD)



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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APPENDIX B3: APRIL 2019

31 May 2019

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Attention: Darren Williams

Delivered by email: darren@arbus.com.au

Subject: Water quality monitoring results at Cabbage Tree Road Sand Quarry – April 2019 monitoring

Please find enclosed the Water quality monitoring results at Cabbage Tree Road Sand Quarry for the April 2019 monitoring.

1. SCOPE OF SERVICE

The scope of work includes monthly surface and groundwater monitoring for a combined period of 12 months. **Figure 1** (attached) presents the surface water and groundwater sampling locations.

The April monitoring round was to include 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) and sampling at four surface water locations.

2. SITE WORK

The monitoring round was conducted on 24 April 2019.

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 the gauging each of the HydraSleeves were removed and samples taken.

The April 2019 monitoring round included:

- Gauging of all available monitoring wells (a total of 14 wells);

- 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 initial Water Quality Analysis

Analysis	Number of Samples				
	Primary	Intra-lab (Duplicate)	Inter-lab (Triplicate)	Transport Blank	Rinsate Blank
General Water Suite*	11	0	0	0	0
Hydrocarbons**	11	1	1	2	1
Metals***	11	1	1	2	1
Iron (dissolved)	11	1	1	2	1
Total Dissolved Solids (TDS)	11	0	0	0	0
Total Suspended Solids (TSS)	11	0	0	0	0
PFAS (28 analytes, standard level)	4	1	1	2	1

* General Water Suite: Ca, Mg, Na, K, pH, EC, Cl, SO₄, Alkalinity, Fluoride, Hardness & TDS (Calc')

** TRH (C6 – C40), BTEXN (Silica Gel)

*** 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), Selenium (Se), Vanadium (V), Zinc (Zn) - note sampling for Iron and no nickel

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 (mBTC)	Groundwater Elevation (mAHD)	Well Total Depth (mBTC)	Comment
BH1	8.64	6.277	2.363	8.12	Well in good condition, will require well end cap. Slightly cloudy, no apparent odour
BH2	7.79	5.833	1.957	9.02	Dark brown to black, no odour
BH3	7.57	6.059	1.511	9.03	Data logger attached, Silty material at base. No sample taken.
BH4	3.06	1.878	1.182	5.92	Cloudy, no odour.

Borehole	Top of Casing (mAHD)	Depth to Water (mBTC)	Groundwater Elevation (mAHD)	Well Total Depth (mBTC)	Comment
BH5	7.36	5.914	1.446	8.71	Slight sulfur odour – No sample taken.
BH6	3.62	1.761	1.859	4.52	Cloudy with slight sulfur odour.
BH7	2.98	1.744	1.236	4.51	Slightly Cloudy, light brown, slight sulfur odour.
BH8	3.88	2.511	1.369	6.18	Sulfur smell - cloudy
BH9	17.75	Dry	-	16.01	Well was dry.
BH10	6.69	Dry	-	3.58	Well was dry.
BH11	6.63	3.254	3.376	5.29	Cloudy, slight sulfur smell
BH12	8.67	6.846	1.824	8.12	40mm inner tube installed. No odour – No sample taken
MW239S	3.04	1.421	1.619	3.89	Light Brown - Slight Sulfur odour
MW239D	3.04	1.392	1.648	20.2	No odour – No sample taken
SW01*	2.5	2.49	0.01	N/A	Small pool of surface water with stained brown water.
SW02*	3.3	Dry	-	N/A	Location was dry.
SW03*	2.1	1.1	0.1	N/A	Water clear, no odour.
SW04*	2	1.9	1.9	N/A	Water 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	1315	21.41	87	5.48	91.9
BH02	1245	22.9	87	4.59	308
BH04	1210	21.43	43	4.88	269.9
BH06	1510	22.03	144	4.52	140.1
BH07	1530	22.9	233	4.45	94.3
BH08	1600	20.66	300	4.53	17.6
BH11	1345	21.64	155	4.75	78.3
MW239S	1445	21.43	352	4.72	45.3
SW01	1200	23.16	1003	3.95	405.9
SW03	1430	19.88	311	6.02	-12.8
SW04	1115	17.57	339	3.69	430.5

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**.

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
Physical and Chemical Stressors	Sodium	0.01	11	10	94	No	Similar
	Sulphate	1	11	2.0	310	SW1 outside NHMRC ADWG 6 aesthetic criteria	Similar
	Chloride	1	11	19	97	No	Similar
	Fluoride	0.1	11	<0.1	0.5	No	Similar
	Reactive Phosphorous	0.01	0	-	-	-	N/A
	Total Phosphorous	0.01	0	-	-	-	N/A
	Nitrite	0.01	0	-	-	-	N/A
	Nitrate	0.01	0	-	-	-	N/A
	Ammonia	0.01	0	-	-	-	N/A
	Total Nitrogen	0.1	0	-	-	-	N/A
	Total Hardness	1	11	9.0	299	SW1 outside NHMRC ADWG 6 aesthetic criteria	Similar
	Total Dissolved Solids	1	11	35	580	No	Similar
	pH	0.01	11	4.0	5.83	All outside All above ANZECC 2000 Trigger range ¹ and drinking water guidelines	Similar
Dissolved Metals	As	0.005-0.1	11	<0.001	0.001	No	Similar
	B	0.005-0.1	11	<0.05	0.014	No	Similar
	Ba	0.005-0.1	11	0.003	0.059	No	Similar
	Be	0.005-0.1	11	<0.001	<0.001	No	Similar
	Cd	0.005-0.1	11	<0.0001	<0.0001	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
	Cr	0.005-0.1	11	<0.001	0.004	5 above ANZECC 2000 Trigger Values ²	Similar
	Co	0.005-0.1	11	<0.001	0.017	No	Similar
	Cu	0.005-0.1	11	<0.001	0.003	5 above ANZECC 2000 Trigger Values ²	Similar – note that SW1 and SW4 had not previously been sampled due to insufficient water
	Fe	0.005-0.1	11	0.06	13	10 above NHMRC ADWG 6 aesthetic criteria	Similar – note that SW1 had not previously been sampled due to insufficient water
	Mn	0.005-0.1	11	0.003	0.841	1 above NHMRC ADWG 6 aesthetic criteria	Similar – note that SW1 had not previously been sampled due to insufficient water
	Ni	0.005-0.1	11	<0.001	0.07	1 above ANZECC 2000 Trigger Values ² , and 2 above NHMRC ADWG 6	Similar
	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
	Zn	0.005-0.1	11	0.007	0.363	7 above ANZECC 2000 Trigger Values ²	Similar – note that SW1 and SW4 had not previously been sampled due to insufficient water
	Hg	0.0001	11	<0.0001	<0.0001	No	Similar
TRH – Silica Clean up	C ₆ -C ₁₀	0.02	11	<0.02	0.03	No	Similar – Noting that BH1 results indicate a significant reduction in C ₆ -C ₁₀ compared to previous sample round
	>C ₁₀ -C ₁₆	0.1	11	<0.1	<0.1	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
	>C ₁₆ -C ₃₄	0.1	11	<0.1	0.28	No	Marginal increase in results at BH4 compared to previous non-detect results
	>C ₃₄ -C ₄₀	0.1	11	<0.1	<0.1	No	Similar
	Total >C ₁₀ -C ₄₀	0.1	11	<0.1	0.28	No	Marginal increase in results compared to previous non-detect results
	C ₆ -C ₁₀ minus BTEX (F1)	0.02	11	<0.02	0.03	No	Similar – Noting that BH1 results indicate a significant reduction in C ₆ -C ₁₀ minus BTEX (F1) compared to previous sample round
	>C ₁₀ -C ₁₆ minus Naphthalene (F2)	0.1	11	<0.1	<0.1	No	Similar
TPH – Silica Clean up	C ₁₀ -C ₁₄	0.05	11	<0.05	<0.05	No	Similar
	C ₁₅ -C ₂₈	0.1	11	<0.1	0.25	No	Marginal increase in results at BH4 compared to previous non-detect results
	C ₂₉ -C ₃₆	0.05	11	<0.05	<0.05	No	Similar
	C ₁₀ -C ₃₆	0.05	11	<0.05	0.25	No	Marginal increase in results at BH4 compared to previous non-detect results
BTEXN	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

Analytical Groupings	Analyte	Limit of reporting (mg/L)	Number of Samples	Minimum (mg/L)	Maximum (mg/L)	Criteria Exceeded	Relative to previous monitoring
PFAS	PFOS	0.00001-0.0001	4	<0.00001	<0.00001	HEPA NEMP 2018*	Similar
	PFOA	0.00001-0.0001	4	<0.00001	<0.00001	No	Similar
	PFOS/PFHxS	0.00001-0.0001	4	<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.

¹Australian 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)

²ANZECC 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

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 April than the mean.

Table 4.5 2019 Rainfall data

2019	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1st	2.0	0.8	0	0								
2nd	0	12.8	0	23.8								
3rd	0	0.4		0.6								
4th	0	0	0	0								
5th	0	0	0	0								
6th	0	0	0	0								
7th	5.0	0	8.2	0								
8th	0	0	0	0								
9th	0	6.6	0	0								
10th	0.2	0	12.0	2.2								
11th	0	0	0	0								
12th	3.0	0	0	0								
13th	0	0	0	0								
14th	0	0	0	0.2								
15th	0	0	0	1.4								
16th	0	0	4.8	3.6								
17th	0	0	59.4	1.4								
18th	0	0	2.6	0.2								
19th	0	0	2.2	0.2								
20th	2.4		0	2.0								
21st	1.0	1.4	0	0.2								
22nd	0	1.0	1.2	0.2								
23rd	0	1.4	0	0								
24th	0	9.2	5.4	0								
25th	0	0	5.2	0								
26th	0	0	0	0								
27th	0	0	0	0								
28th	1.0	0	0	0								
29th	0		0	0								
30th	0		38.2	0								
31st	0		6.6									
Monthly Total	14.6	33.6	145.8	36.0								
Mean	98.7	117.0	120.5	111.6	109.6	124.7	70.9	72.9	60.4	73.9	82.3	78.6

Based on the long-term rainfall data and below average rainfall for April it is expected that the current groundwater and surface water levels would still be low.

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

dkousbroek@kleinfelder.com

Mobile: 045 819 7676

Attached:

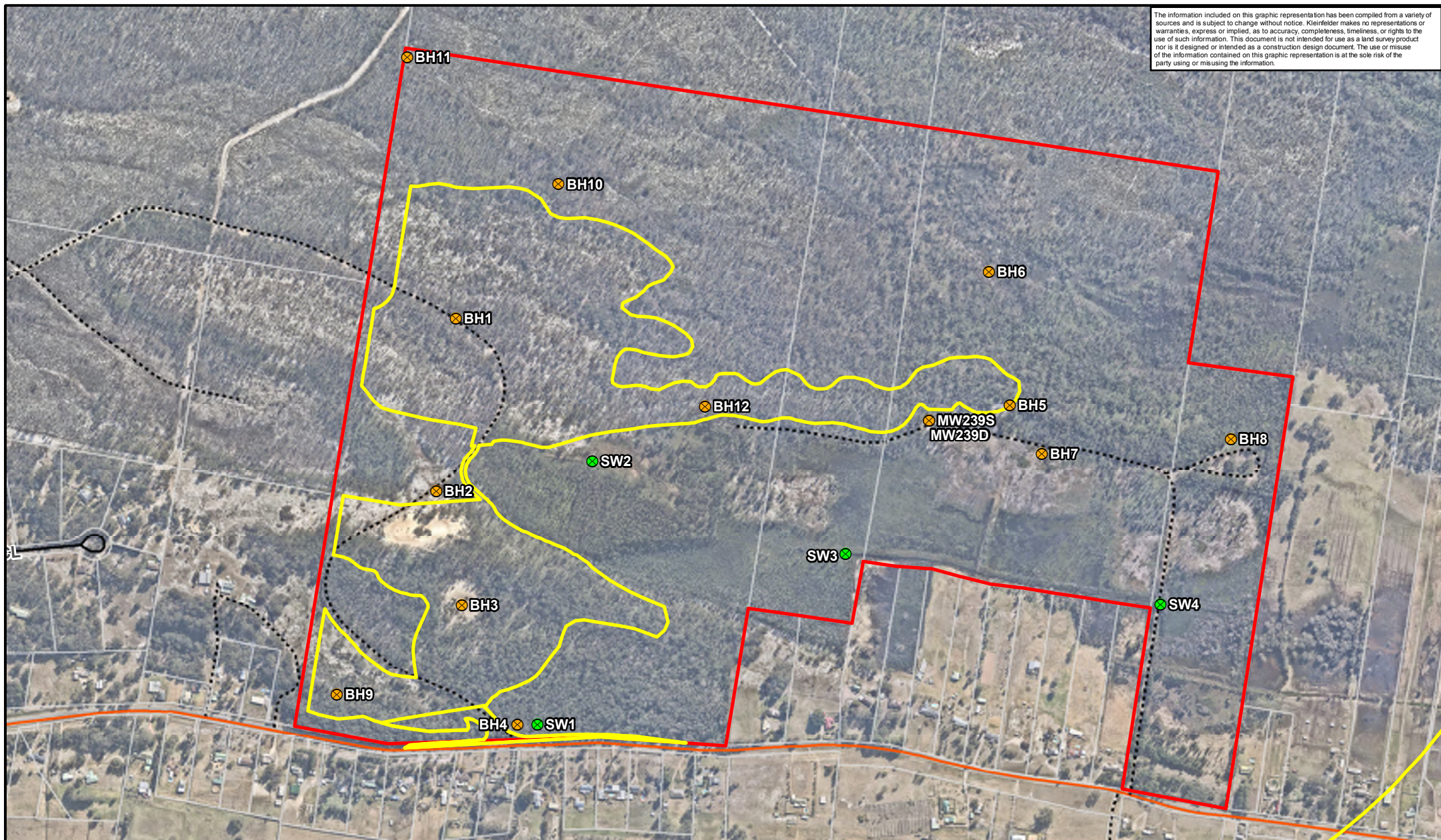
Figure 1

Data Tables

Attachment A – Laboratory reports

FIGURE 1

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 use of such information. This document is not intended for use as a land survey 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
- ▬ Subject Land Boundary
- ▬ Quarry Project Area
- Arterial Road
- Local Road
- - Track



PROJECT REFERENCE: 20170448
 DATE DRAWN: 13/02/2019 09:48 Version 1
 DRAWN BY: gjoyce
 DATA SOURCE:
 NSW DFSI - 2017
 Nearmap - 2018

Water monitoring locations February 2019 Monitoring

Williamtown Sand Syndicate
 Proposed Sand Quarry
 Cabbage Tree Road, Williamtown

FIGURE:

1

DATA TABLES

Table 1
Groundwater Analytical Data - BTEXN
Williamstown Sand Syndicate



Analyte	BTEXN								Total Petroleum Hydrocarbons	Total Petroleum Hydrocarbons - Silica Clean up					Total Recoverable Hydrocarbons		Total Recoverable Hydrocarbons - Silica Clean up				
	Benzene**	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene**	Total Xylenes	Naphthalene	Sum of BTEX	C ₆ - C ₉	C ₁₀ -C ₁₄ - Silica Cleanup	C ₁₅ -C ₁₈ - Silica Cleanup	C ₂₀ -C ₂₈ - Silica Cleanup	C ₁₀ -C ₁₈ Sum - Silica Cleanup	C ₆ - C ₁₀	C ₆ - C ₁₀ minus BTEX (F1)	>C ₁₀ -C ₁₈ - Silica Cleanup	F2 - Silica Cleanup	>C ₁₄ -C ₁₈ - Silica Cleanup	>C ₁₄ -C ₂₀ - Silica Cleanup	>C ₁₀ -C ₄₀ - Silica Cleanup	
LOR	1	2	2	2	2	2	5	1	20	50	100	50	50	20	20	100	100	100	100	100	
Units	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	
ANZECC 2000 Trigger Values	950	-	-	-	350	-	16														
NHMRC ADWG 6	1	800	300	-	350	600															
Sample Name	Sample Date																				
BH1	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	1,710	< 50	< 100	< 50	< 50	1,690	1,690	< 100	< 100	< 100	< 100	
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	40	< 50	< 100	< 50	< 50	30	30	< 100	< 100	< 100	< 100	
BH2	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
BH3	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
BH4	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
BH5	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
BH6	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
BH7	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
BH8	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
BH11	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
MW2395	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
SW1	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
SW3	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
SW4	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 20	< 20	< 100	< 100	< 100	< 100		

Notes:
 - - Not analysed
 < - Less than laboratory limit of reporting
 µg/L - Micrograms per litre
 BTEXN - Benzene, toluene, ethylbenzene, xylenes, naphthalene

** 95% Level of protection in freshwater

Table 2
Groundwater Analytical Data - Metals
Williamstown Sand Syndicate



Analyte		Metals															
		Arsenic**	Barium	Beryllium	Boron**	Cadmium**	Chromium** ¹	Cobalt	Copper**	Iron	Lead**	Manganese* *	Mercury** ²	Nickel**	Selenium**	Vanadium	Zinc**
LOR		0.001	0.001	0.001	0.05	0.0001	0.001	0.001	0.001	0.05	0.001	0.001	0.0001	0.001	0.01	0.01	0.005
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ANZECC 2000 Trigger Values		0.013		-	0.37	0.0002	0.001	-	0.0014	-	0.0034	1.9	0.0006	0.011	0.011	-	0.008
NHMRC ADWG 6		0.01		0.06	4	0.002	0.05	-	2	0.3 ³	0.01	0.5	0.001	0.02	0.01	-	3 ³
Sample Name	Sample Date																
BH1	15-Mar-19	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.004	< 0.001	< 0.001	13	< 0.001	0.014	< 0.0001	< 0.001	< 0.01	< 0.01	1.27
	23-Apr-19	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.004	< 0.001	0.002	10	0.001	0.015	< 0.0001	0.002	< 0.01	< 0.01	0.363
BH2	22-Feb-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.002	0.14	< 0.001	0.021	< 0.0001	0.015	< 0.01	< 0.01	0.006
	15-Mar-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.003	< 0.05	< 0.001	0.02	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH3	23-Apr-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.004	0.19	< 0.001	0.018	< 0.0001	0.001	< 0.01	< 0.01	0.008
	21-Feb-19	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.06	< 0.001	0.005	< 0.0001	0.053	< 0.01	< 0.01	< 0.005
BH4	21-Feb-19	< 0.001	0.014	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.002	0.16	< 0.001	0.039	< 0.0001	0.018	< 0.01	< 0.01	0.014
	15-Mar-19	< 0.001	0.014	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.001	< 0.05	< 0.001	0.014	< 0.0001	0.022	< 0.01	< 0.01	0.043
BH5	23-Apr-19	< 0.001	0.013	< 0.001	0.05	< 0.0001	< 0.001	< 0.001	0.002	0.99	< 0.001	0.045	< 0.0001	0.007	< 0.01	< 0.01	0.008
	22-Feb-19	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	1.4	< 0.001	0.005	< 0.0001	0.003	< 0.01	< 0.01	0.008
BH6	22-Feb-19	< 0.001	0.03	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	1.03	< 0.001	0.014	< 0.0001	0.001	< 0.01	< 0.01	0.019
	14-Mar-19	< 0.001	0.027	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	1.9	< 0.001	0.01	< 0.0001	< 0.001	< 0.01	< 0.01	0.012
BH7	23-Apr-19	< 0.001	0.03	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.001	0.96	< 0.001	0.01	< 0.0001	< 0.001	< 0.01	< 0.01	0.022
	22-Feb-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.002	0.003	< 0.001	1.8	< 0.001	0.026	< 0.0001	0.004	< 0.01	< 0.01	0.019
BH8	14-Mar-19	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
	23-Apr-19	< 0.001	0.012	< 0.001	< 0.05	< 0.0001	0.002	0.003	< 0.001	2.0	< 0.001	0.026	< 0.0001	0.004	< 0.01	< 0.01	0.01
BH11	21-Feb-19	0.001 *	0.011	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.006
	14-Mar-19	< 0.001	0.006	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	3.25	< 0.001	0.008	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
MW239S	23-Apr-19	0.001	0.008	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	3.2	< 0.001	0.009	< 0.0001	0.002	< 0.01	< 0.01	0.008
	21-Feb-19	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.002	0.001	< 0.001	0.26	< 0.001	0.003	< 0.0001	0.005	< 0.01	< 0.01	0.031
SW1	15-Mar-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	1.49	< 0.001	0.007	< 0.0001	0.037	< 0.01	< 0.01	0.016
	23-Apr-19	< 0.001	0.006	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.98	< 0.001	0.007	< 0.0001	0.07	< 0.01	< 0.01	0.04
SW3	22-Feb-19	< 0.001	0.007	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	1.11	< 0.001	0.003	< 0.0001	0.001	< 0.01	< 0.01	0.006
	14-Mar-19	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	1.25	< 0.001	0.005	< 0.0001	0.005	< 0.01	< 0.01	0.008
SW4	23-Apr-19	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	1.01	< 0.001	0.004	< 0.0001	0.004	< 0.01	< 0.01	0.007
	23-Apr-19	< 0.001	0.043	< 0.001	0.14	< 0.0001	< 0.001	0.017	0.002	4.16	< 0.001	0.841	< 0.0001	0.02	< 0.01	< 0.01	0.356
SW3	22-Feb-19	0.003	0.075	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	4.84	< 0.001	0.033	< 0.0001	0.002	< 0.01	< 0.01	0.016
	14-Mar-19	0.006	0.08	< 0.001	< 0.05	< 0.0001	< 0.001	0.003	< 0.001	9.26	< 0.001	0.048	< 0.0001	0.002	< 0.01	< 0.01	0.009
SW4	23-Apr-19	< 0.001	0.043	< 0.001	< 0.05	< 0.0001	< 0.001	0.003	0.001	2.01	< 0.001	0.046	< 0.0001	0.004	< 0.01	< 0.01	0.016
	23-Apr-19	< 0.001	0.059	< 0.001	< 0.05	< 0.0001	< 0.001	0.003	0.003	2.09	< 0.001	0.037	< 0.0001	0.005	< 0.01	< 0.01	0.03

Notes:

-- Not analysed

< - Less than laboratory limit of reporting

mg/L - Milligrams per litre

Bold indicates a detection above the laboratory limit of reporting

"*" denotes duplicate/triplicate sample result adopted for analytical use due to RPD >50%

RPD - Relative Percentage Difference

** 95% Level of protection in freshwater

¹ value for CR VI

² as inorganic

³ Aesthetic

Notes:
 - - Not analysed
 < - Less than laboratory limit of reporting
 µg/L - Micrograms per litre
 *** 99% Level of protection in freshwater
 * Recreation water

Table 4
Groundwater Analytical Data - Inorganics
Wellington Sand Syncline



Analyte	Anions and Cations													Alkalinity										Inorganics		pH			
	Sodium	Calcium	Magnesium	Potassium	Sulphate	Chloride	Fluoride	Reactive phosphorus as P	Total Phosphorus	Nitrite as N	Nitrate as N	Nitrite + Nitrate as N	Ammonia as N	Total Nitrogen as N	Total Kjeldahl Nitrogen as N	Total Cations	Total Anions	Ionic Balance	Sodium Adsorption Ratio	Bicarbonate Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Hydroxide Alkalinity as CaCO3	Total Alkalinity as CaCO3	Total Hardness as CaCO3	Electrical Conductivity @ 25°C*		Total Dissolved Solids	Total Dissolved Solids	
LOR	1	1	1	1	1	1	0.1	0.01	0.01	0.01	0.01	0.01	0.01	0.1	0.1	0.01	0.01	%	0.01	1	1	1	1	1	1	10	0.01		
Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	%	-	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L		
ANZECC 2000 Trigger Values	180 [†]				250 [†]	250 [†]	1.5	0.02*	0.02*	3	50	0.3**	0.5*	0.35*										200 [†]	125-2200	600 [†]			
Sample Name	Sample Date																												
BH1	15-Mar-19	11	2.0	1.0	< 1.0	< 1.0	25	< 0.1	-	-	-	-	-	-	-	0.66	0.88	-	-	9.0	< 1.0	< 1.0	< 1.0	9.0	68	104	68	129	5.67
	23-Apr-19	14	1.0	2.0	< 1.0	< 1.0	4.0	25	< 0.1	-	-	-	-	-	-	0.82	0.99	-	-	10	< 1.0	< 1.0	< 1.0	10	11	84	85	57	5.83
	22-Feb-19	12	2.0	2.0	< 1.0	< 1.0	6.0	22	0.1	< 0.01	2.76	2.76	0.05	4.0	1.2	0.79	0.74	-	1.44	< 1.0	< 1.0	< 1.0	< 1.0	13	91	128	66	4.87	
BH2	15-Mar-19	10	3.0	2.0	< 1.0	< 1.0	7.0	23	< 0.1	-	-	-	-	-	-	0.75	0.79	-	-	< 1.0	< 1.0	< 1.0	< 1.0	16	101	66	90	4.71	
	23-Apr-19	14	2.0	2.0	< 1.0	< 1.0	6.0	23	< 0.1	-	-	-	-	-	-	0.87	0.77	-	-	< 1.0	< 1.0	< 1.0	< 1.0	13	79	66	84	4.82	
	21-Feb-19	4.0	4.0	1.0	< 1.0	< 1.0	4.0	10	< 0.1	< 0.01	0.78	0.78	0.3	5.9	5.1	0.46	0.54	-	0.46	9.0	< 1.0	< 1.0	< 1.0	9.0	14	60	438	60	5.55
BH3	15-Mar-19	8.0	2.0	1.0	< 1.0	< 1.0	5.0	17	< 0.1	< 0.01	0.19	< 0.01	0.35	0.35	0.04	0.56	0.7	-	1.15	6.0	< 1.0	< 1.0	< 1.0	6.0	73	96	73	96	5.4
	15-Mar-19	9.0	2.0	1.0	< 1.0	< 1.0	5.0	18	< 0.1	-	-	-	-	-	-	0.49	0.63	-	-	< 1.0	< 1.0	< 1.0	< 1.0	9.0	77	96	70	5.12	
	23-Apr-19	10	2.0	1.0	< 1.0	< 1.0	3.0	19	< 0.1	-	-	-	-	-	-	0.64	0.6	-	-	< 1.0	< 1.0	< 1.0	< 1.0	9.0	54	35	61	5.05	
BH5	22-Feb-19	42	< 1.0	6.0	1.0	19	69	0.1	< 0.01	0.34	< 0.01	< 0.01	0.89	3.0	3.0	3.35	3.34	-	3.59	< 1.0	< 1.0	< 1.0	< 1.0	25	259	211	211	4.87	
	22-Feb-19	28	3.0	4.0	1.0	28	42	< 0.1	< 0.01	0.05	< 0.01	0.09	0.09	0.14	0.5	0.4	1.72	1.77	-	2.49	< 1.0	< 1.0	< 1.0	< 1.0	24	177	144	144	4.37
	14-Mar-19	22	3.0	4.0	1.0	17	37	< 0.1	< 0.01	0.05	< 0.01	0.09	0.09	0.14	0.5	0.4	1.46	1.44	-	-	< 1.0	< 1.0	< 1.0	3.0	21	179	116	146	4.95
BH6	23-Apr-19	25	3.0	4.0	1.0	18	42	< 0.1	-	-	-	-	-	-	-	1.59	1.56	-	-	< 1.0	< 1.0	< 1.0	< 1.0	24	136	88	115	4.64	
	22-Feb-19	34	< 1.0	5.0	2.0	12	64	0.2	< 0.01	0.13	< 0.01	0.02	0.02	0.34	2.2	2.2	1.94	2.06	-	3.16	< 1.0	< 1.0	< 1.0	< 1.0	20	213	196	-	4.76
	14-Mar-19	36	< 1.0	6.0	2.0	16	61	< 0.1	-	-	-	-	-	-	-	2.11	2.05	1.37	-	< 1.0	< 1.0	< 1.0	< 1.0	25	271	176	212	4.73	
BH7	23-Apr-19	38	< 1.0	6.0	2.0	17	62	< 0.1	-	-	-	-	-	-	-	2.2	2.1	-	-	< 1.0	< 1.0	< 1.0	< 1.0	25	205	133	185	4.51	
	11-Feb-19	52	< 1.0	6.0	< 1.0	11	90	< 0.1	< 0.01	1.97	< 0.01	< 0.01	< 0.01	8.5	3.4	2.4	2.76	3.77	-	4.44	< 1.0	< 1.0	< 1.0	< 1.0	19	357	358	358	4.66
	14-Mar-19	45	< 1.0	6.0	< 1.0	6.0	76	< 0.1	-	-	-	-	-	-	-	2.45	2.27	-	-	< 1.0	< 1.0	< 1.0	< 1.0	25	319	207	283	4.77	
BH8	23-Apr-19	33	< 1.0	7.0	< 1.0	8.0	89	< 0.1	-	-	-	-	-	-	-	2.88	2.68	-	-	< 1.0	< 1.0	< 1.0	< 1.0	29	264	172	223	4.76	
	22-Feb-19	48	< 1.0	10	< 1.0	24	80	0.1	< 0.01	0.63	< 0.01	0.04	0.04	0.06	1.8	1.8	2.91	2.76	-	3.21	< 1.0	< 1.0	< 1.0	< 1.0	41	346	278	278	4.67
	15-Mar-19	26	< 1.0	2.0	< 1.0	2.0	52	< 0.1	-	-	-	-	-	-	-	1.3	1.53	-	-	< 1.0	< 1.0	< 1.0	< 1.0	8.0	186	121	144	4.82	
BH11	13-Mar-19	32	< 1.0	5.0	< 1.0	2.0	57	< 0.1	-	-	-	-	-	-	-	1.8	1.65	-	-	< 1.0	< 1.0	< 1.0	< 1.0	20	150	98	135	4.59	
	22-Feb-19	61	< 1.0	6.0	< 1.0	6.0	104	< 0.1	< 0.01	0.56	< 0.01	< 0.01	< 0.01	0.18	3.9	3.9	3.15	3.06	1.43	5.21	< 1.0	< 1.0	< 1.0	< 1.0	25	329	234	277	4.89
	14-Mar-19	64	< 1.0	6.0	< 1.0	2.0	126	< 0.1	-	-	-	-	-	-	-	3.28	3.64	0.18	-	2.0	< 1.0	< 1.0	< 1.0	2.0	25	410	265	222	5.82
HHW2396	23-Apr-19	64	< 1.0	7.0	1.0	9.0	97	< 0.1	-	-	-	-	-	-	-	3.38	3.62	2.32	-	< 1.0	< 1.0	< 1.0	< 1.0	20	264	191	208	4.92	
	23-Apr-19	94	35	52	6.0	310	95	0.5	< 0.01	0.66	< 0.01	< 0.01	< 0.01	0.16	1.0	1.0	10	0.13	5.6	-	< 1.0	< 1.0	< 1.0	< 1.0	299	893	580	707	4.01
	22-Feb-19	40	4.0	4.0	1.0	16	81	< 0.1	< 0.01	0.66	< 0.01	< 0.01	< 0.01	0.16	1.0	1.0	10	0.13	5.6	-	< 1.0	< 1.0	< 1.0	< 1.0	11	46	262	228	6.21
SW1	14-Mar-19	45	6.0	6.0	2.0	44	64	< 0.1	-	-	-	-	-	-	-	2.8	2.8	-	-	4.0	< 1.0	< 1.0	< 1.0	4.0	40	344	224	279	5.42
	23-Apr-19	37	8.0	6.0	2.0	42	52	< 0.1	-	-	-	-	-	-	-	2.53	2.77	-	-	< 1.0	< 1.0	< 1.0	< 1.0	40	220	141	190	5.2	
	22-Feb-19	27	8.0	6.0	2.0	42	52	< 0.1	-	-	-	-	-	-	-	2.36	3.05	13	-	< 1.0	< 1.0	< 1.0	< 1.0	33	203	190	198	4.8	
SW4	15-Mar-19	11	2.0	1.0	< 1.0	< 1.0	25	< 0.1	-	-	-	-	-	-	-	0.66	0.88	-	-	9.0	< 1.0	< 1.0	< 1.0	9.0	68	104	68	129	5.67
	23-Apr-19	14	1.0	2.0	< 1.0	< 1.0	4.0	25	< 0.1	-	-	-	-	-	-	0.82	0.99	-	-	10	< 1.0	< 1.0	< 1.0	10	11	84	85	57	5.83
	22-Feb-19	12	2.0	2.0	< 1.0	< 1.0	6.0	22	0.1	< 0.01	2.76	2.76	0.05	4.0	1.2	0.79	0.74	-	1.44	< 1.0	< 1.0	< 1.0	< 1.0	13	91	128	66	4.87	
BH2	15-Mar-19	10	3.0	2.0	< 1.0	< 1.0	7.0	23	< 0.1	-	-	-	-	-	-	0.75	0.79	-	-	< 1.0	< 1.0	< 1.0	< 1.0	16	101	66	90	4.71	
	23-Apr-19	14	2.0	2.0	< 1.0	< 1.0	6.0	23	< 0.1	-	-	-	-	-	-	0.87	0.77	-	-	< 1.0	< 1.0	< 1.0	< 1.0	13	79	66	84	4.82	
	21-Feb-19	4.0	4.0	1.0	< 1.0	< 1.0	4.0	10	< 0.1	< 0.01	0.78	0.78	0.3	5.9	5.1	0.46	0.54	-	0.46	9.0	< 1.0	< 1.0	< 1.0	9.0	14	60	438	60	5.55
BH4	15-Mar-19	8.0	2.0	1.0	< 1.0	< 1.0	5.0	17	< 0.1	< 0.01	0.19	< 0.01	0.35	0.35	0.04	0.56	0.7	-	1.15	6.0	< 1.0	< 1.0	< 1.0	6.0	73	96	73	96	5.4
	15-Mar-19	9.0	2.0	1.0	< 1.0	< 1.0	5.0	18	< 0.1	-	-	-	-	-	-	0.49	0.63	-	-	< 1.0	< 1.0	< 1.0	< 1.0	9.0	77	96	70	5.12	
	23-Apr-19	10	2.0	1.0	< 1.0	< 1.0	3.0	19	< 0.1	-	-	-	-	-	-	0.64	0.6	-	-	< 1.0	< 1.0	< 1.0	< 1.0	9.0	54	35	61	5.05	
BH5	22-Feb-19	42	< 1.0	6.0	1.0	19	69	0.1	< 0.01	0.34	< 0.01	< 0.01	0.89	3.0	3.0	3.35	3.34	-	3.59	< 1.0	< 1.0	< 1.0	< 1.0	25	259	211	211	4.87	
	22-Feb-19	28	3.0	4.0	1.0	28	42	< 0.1	< 0.01	0.05	< 0.01	0.09	0.09	0.14	0.5	0.4	1.72	1.77	-	2.49	< 1.0	< 1.0	< 1.0	< 1.0	24	177	144	144	4.37
	14-Mar-19	22	3.0	4.0	1.0	17	37	< 0.1	< 0.01	0.05	< 0.01	0.09	0.09	0.14	0.5	0.4	1.46	1.44	-	-	< 1.0	< 1.0	< 1.0	3.0	21	179	116	146	4.95
BH6	23-Apr-19	25	3.0	4.0	1.0	18	42	< 0.1	-	-	-	-	-	-	-	1.59	1.56	-	-	< 1.0	< 1.0	< 1.0	< 1.0	24	136	88	115	4.64	
	22-Feb-19	34	< 1.0	5.0	2.0	12	64	0.2	< 0.01	0.13	< 0.01	0.02	0.02	0.34	2.2	2.2	1.94	2.06	-	3.16	< 1.0	< 1.0	< 1.0	< 1.0	20	213	196	-	4.76
	14-Mar-19	36	< 1.0	6.0	2.0	16	61	< 0.1	-	-	-	-	-	-	-	2.11	2.05	1.37	-	< 1.0	< 1.0	< 1.0	< 1.0	25	271	176	212	4.73	
BH7	23-Apr-19	38	< 1.0	6.0	2.0	17	62	< 0.1	-	-	-	-	-	-	-	2.2	2.1	-	-	< 1.0	< 1.0	< 1.0	< 1.0	25	205	133	185	4.51	
	11-Feb-19	52	< 1.0	6.0	< 1.0	11	90	< 0.1	< 0.01	1.97	< 0.01	< 0.01	< 0.01	8.5	3.4	2.4	2.76	3.77	-	4.44	< 1.0	<							

Table 5
Quality Control Sample Analysis - BTEXN
Willamtown Sand Syndicate



Analyte	BTEXN								Total Petroleum Hydrocarbons					Total Petroleum Hydrocarbons - Silica Clean up					Total Recoverable Hydrocarbons					Total Recoverable Hydrocarbons - Silica Clean up				
	Benzene	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene	Total Xylenes	Naphthalene	Sum of BTEX	C ₆ - C ₈	C ₉ - C ₁₀	C ₁₁ - C ₁₂	C ₁₃ - C ₁₄	C ₁₅ - C ₁₆	C ₁₇ -C ₁₈ + Silica Cleanup	C ₁₇ -C ₁₈ + Silica Cleanup	C ₁₇ -C ₁₈ + Silica Cleanup	C ₁₇ -C ₁₈ Sum + Silica Cleanup	C ₆ - C ₁₀	C ₆ - C ₁₀ minus BTEX (F1)	>C ₁₀ - C ₁₄	minus Naphthalene	>C ₁₄ - C ₁₈	>C ₁₄ - C ₁₈	>C ₁₀ -C ₁₄ + Silica Cleanup	P2 - Silica Cleanup	>C ₁₀ -C ₁₄ + Silica Cleanup	>C ₁₇ -C ₁₈ + Silica Cleanup	
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Sample Name	Sample Date	Sample Type																										
TRIP BLANK 11022019	13-Feb-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	
RUNGATED1 21022019	21-Feb-19	Rinate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	
BH6 21022019	21-Feb-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	
DUPO1 21022019	21-Feb-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
BH6 21022019	21-Feb-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	
TRIPBL 21022019	21-Feb-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 1.0	< 20	< 50	< 100	< 100	< 50	< 100	< 100	< 400	< 20	< 20	< 50	< 50	< 100	< 100	< 100	< 100	< 100	< 100	
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK 130319	13-Mar-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20				< 50	< 100	< 50	< 50	< 20	< 20					< 100	< 100	< 100	< 100	
RUNGATED2 140319	14-Mar-19	Rinate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20				< 50	< 100	< 50	< 50	< 20	< 20					< 100	< 100	< 100	< 100	
BH7 140319	14-Mar-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20				< 50	< 100	< 50	< 50	< 20	< 20					< 100	< 100	< 100	< 100	
DUPO2 140319	14-Mar-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20				< 50	< 100	< 50	< 50	< 20	< 20					< 100	< 100	< 100	< 100	
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC				NC	NC	NC	NC	NC	NC					NC	NC	NC	NC	NC

Notes:
 -- - Not analysed
 < - Less than laboratory limit of reporting
 NC - Not calculated
 µg/L - Micrograms per litre
 BTEXN - Benzene, toluene, ethylbenzene, xylenes, naphthalene

Table 6
Quality Control Sample Analysis - Metals
Williamstown Sand Syndicate



Analyte			Metals																
			Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Chromium VI	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Nickel	Selenium	Vanadium	Zinc
Units			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Name	Sample Date	Sample Type																	
TRIP BLANK_13022019	13-Feb-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATED01_21022019	21-Feb-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH8_21022019	21-Feb-19	Primary	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.005
DUP01_21022019	21-Feb-19	Duplicate	0.001	0.014	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.09	< 0.001	0.012	< 0.0001	0.003	< 0.01	< 0.01	0.015
Relative Percentage Difference			67%	24%	NC	NC	NC	0%	NC	NC	0%	NC	0%	NC	0%	NC	40%	NC	100%
BH8_21022019	21-Feb-19	Primary	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.005
TRIP01_21022019	21-Feb-19	Triplicate	0.001	< 0.02	< 0.001	< 0.05	< 0.0002	< 0.005	< 0.005	< 0.001	< 0.001	4.5	< 0.001	0.012	< 0.0001	0.003	-	< 0.005	0.006
Relative Percentage Difference			67%	10%	NC	NC	NC	86%	NC	NC	NC	9%	NC	0%	NC	40%	NC	NC	18%
TRIP BLANK_130319	13-Mar-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001		< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
TRIP BLANK02_150319	15-Mar-19	Trip Blank	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	< 0.001		< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE02_140319	14-Mar-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001		< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH7_140319	14-Mar-19	Primary	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001		0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
DUP02_140319	14-Mar-19	Duplicate	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001		0.002	< 0.001	2.51	< 0.001	0.021	< 0.0001	0.004	< 0.01	< 0.01	0.007
Relative Percentage Difference			NC	0%	NC	NC	NC	0%		40%	NC	33%	NC	5%	NC	0%	NC	NC	25%
BH7_140319	14-Mar-19	Primary	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001		0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
TRIP02_14032019	14-Mar-19	Triplicate	< 0.001	< 0.02	< 0.001	< 0.05	< 0.0002	0.001		0.002	< 0.001	1.7	< 0.001	0.019	< 0.0001	< 0.001	-	< 0.005	< 0.005
Relative Percentage Difference			NC	0%	NC	NC	NC	0%		40%	NC	6%	NC	5%	NC	156%	NC	NC	113%

Notes:
 - - Not analysed
 < - Less than laboratory limit of reporting
 NC - Not calculated
 mg/L - Milligrams per litre
 Half the laboratory limit of reporting used when calculating RPD
 RPD - Relative Percentage Difference

Notes:
 < - Less than laboratory limit of reporting
 NC - Not calculated
 µg/L - Micrograms per litre

ATTACHMENT A: LABORATORY REPORTS

CERTIFICATE OF ANALYSIS

Work Order : **ES1912421**
Client : **KLEINFELDER AUSTRALIA PTY LTD**
Contact : TOM OVERTON
Address : 95 MITCHELL ROAD
 CARDIFF NSW 2285
Telephone : ----
Project : 2019003
Order number :
C-O-C number : ----
Sampler : DANIEL KOUSBROEK
Site : WSS-CABBAGE TREE RD WATER MONITORING
Quote number : ME/114/19
No. of samples received : 13
No. of samples analysed : 13

Page : 1 of 18
Laboratory : Environmental Division Sydney
Contact : Shirley LeCornu
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +6138549 9630
Date Samples Received : 23-Apr-2019 16:59
Date Analysis Commenced : 26-Apr-2019
Issue Date : 01-May-2019 16:39



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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini		Sydney Organics, Smithfield, NSW



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

Ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- TDS by method EA-015 may bias high FOR VARIOUS SAMPLES due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- EN055: Ionic Balance out of acceptable limits for sample 1 and 8 due to analytes not quantified in this 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

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW4	SW1	BH4	BH2	BH1
Client sampling date / time					23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00
Compound	CAS Number	LOR	Unit		ES1912421-001	ES1912421-002	ES1912421-003	ES1912421-004	ES1912421-005
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		4.00	4.01	5.05	4.82	5.83
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		293	893	54	70	84
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		198	707	61	84	97
EA016: Calculated TDS (from Electrical Conductivity)									
Total Dissolved Solids (Calc.)	----	1	mg/L		190	580	35	46	55
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		<5	32	147	575	248
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		33	299	9	13	11
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		<1	<1	<1	<1	10
Total Alkalinity as CaCO3	----	1	mg/L		<1	<1	<1	<1	10
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		60	310	3	6	4
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		64	95	19	23	25
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		5	34	2	2	1
Magnesium	7439-95-4	1	mg/L		5	52	1	2	2
Sodium	7440-23-5	1	mg/L		39	94	10	14	14
Potassium	7440-09-7	1	mg/L		<1	6	1	<1	<1
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Boron	7440-42-8	0.05	mg/L		<0.05	0.14	0.05	<0.05	<0.05
Barium	7440-39-3	0.001	mg/L		0.059	0.043	0.013	0.005	0.003
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L		0.003	0.017	<0.001	<0.001	<0.001
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	0.004



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW4	SW1	BH4	BH2	BH1
Client sampling date / time					23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00
Compound	CAS Number	LOR	Unit		ES1912421-001	ES1912421-002	ES1912421-003	ES1912421-004	ES1912421-005
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued									
Copper	7440-50-8	0.001	mg/L		0.003	0.002	0.002	0.004	0.002
Manganese	7439-96-5	0.001	mg/L		0.037	0.841	0.045	0.018	0.015
Nickel	7440-02-0	0.001	mg/L		0.005	0.020	0.007	0.001	0.002
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	0.001
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L		0.030	0.356	0.008	0.008	0.363
Iron	7439-89-6	0.05	mg/L		2.09	4.16	0.99	0.19	10.1
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		0.1	0.5	<0.1	<0.1	<0.1
EN055: Ionic Balance									
Total Anions	----	0.01	meq/L		3.05	9.13	0.60	0.77	0.99
Total Cations	----	0.01	meq/L		2.36	10.2	0.64	0.87	0.82
Ionic Balance	----	0.01	%		12.9	5.60	----	----	----
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	250	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	250	<50	<50
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	280	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	280	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	40
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	30
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	30



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				SW4	SW1	BH4	BH2	BH1
Client sampling date / time				23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00
Compound	CAS Number	LOR	Unit	ES1912421-001	ES1912421-002	ES1912421-003	ES1912421-004	ES1912421-005
				Result	Result	Result	Result	Result
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L	<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L	<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L	<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L	<5	<5	<5	<5	<5
EP231A: Perfluoroalkyl Sulfonic Acids								
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	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	----	----	<0.02	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	----	----	<0.1	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	----	----	<0.02	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	----	----	<0.02	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	----	----	<0.02	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	----	----	<0.01	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	----	----	<0.02	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	----	----	<0.02	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	----	----	<0.02	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	----	----	<0.02	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	----	----	<0.02	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW4	SW1	BH4	BH2	BH1
Client sampling date / time					23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00
Compound	CAS Number	LOR	Unit		ES1912421-001	ES1912421-002	ES1912421-003	ES1912421-004	ES1912421-005
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		----	----	<0.05	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		----	----	<0.02	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		----	----	<0.05	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		----	----	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		----	----	<0.05	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		----	----	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		----	----	<0.02	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		----	----	<0.02	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
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	----	----
EP231P: PFAS Sums									
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	----	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		103	99.7	104	102	106
Toluene-D8	2037-26-5	2	%		114	116	112	115	112



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Client sample ID

				SW4	SW1	BH4	BH2	BH1
Client sampling date / time				23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00
Compound	CAS Number	LOR	Unit	ES1912421-001	ES1912421-002	ES1912421-003	ES1912421-004	ES1912421-005
				Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued								
4-Bromofluorobenzene	460-00-4	2	%	122	117	119	115	116
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	----	----	102	----	----
13C8-PFOA	----	0.02	%	----	----	83.9	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH11	SW3	MW239S	BH6	BH7
Client sampling date / time					23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00
Compound	CAS Number	LOR	Unit		ES1912421-006	ES1912421-007	ES1912421-008	ES1912421-009	ES1912421-010
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		4.99	5.20	4.92	4.64	4.51
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		150	220	294	136	205
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		135	190	208	115	185
EA016: Calculated TDS (from Electrical Conductivity)									
Total Dissolved Solids (Calc.)	----	1	mg/L		98	143	191	88	133
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		112	9	385	62	20
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		20	45	29	24	25
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		<1	<1	<1	<1	<1
Total Alkalinity as CaCO3	----	1	mg/L		<1	<1	<1	<1	<1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		2	42	9	18	17
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		57	53	97	42	62
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		<1	8	<1	3	<1
Magnesium	7439-95-4	1	mg/L		5	6	7	4	6
Sodium	7440-23-5	1	mg/L		32	37	64	25	38
Potassium	7440-09-7	1	mg/L		<1	1	1	1	2
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	<0.05	<0.05	<0.05
Barium	7440-39-3	0.001	mg/L		0.006	0.043	0.008	0.030	0.012
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L		<0.001	0.003	<0.001	<0.001	0.003
Chromium	7440-47-3	0.001	mg/L		0.002	<0.001	0.002	<0.001	0.002



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH11	SW3	MW239S	BH6	BH7
Client sampling date / time					23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00
Compound	CAS Number	LOR	Unit		ES1912421-006	ES1912421-007	ES1912421-008	ES1912421-009	ES1912421-010
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued									
Copper	7440-50-8	0.001	mg/L		<0.001	0.001	<0.001	0.001	<0.001
Manganese	7439-96-5	0.001	mg/L		0.007	0.046	0.004	0.010	0.026
Nickel	7440-02-0	0.001	mg/L		0.070	0.004	0.004	<0.001	0.004
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L		0.040	0.016	0.007	0.022	0.010
Iron	7439-89-6	0.05	mg/L		0.98	2.01	1.01	0.96	2.00
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		<0.1	<0.1	<0.1	<0.1	<0.1
EN055: Ionic Balance									
Total Anions	----	0.01	meq/L		1.65	2.37	2.92	1.56	2.10
Total Cations	----	0.01	meq/L		1.80	2.53	3.38	1.59	2.20
Ionic Balance	----	0.01	%		----	----	7.32	----	----
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	<50
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH11	SW3	MW239S	BH6	BH7
Client sampling date / time					23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00
Compound	CAS Number	LOR	Unit		ES1912421-006	ES1912421-007	ES1912421-008	ES1912421-009	ES1912421-010
					Result	Result	Result	Result	Result
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		----	----	----	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		----	----	----	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		----	----	----	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		----	----	----	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		----	----	----	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		----	----	----	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		----	----	----	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		----	----	----	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		----	----	----	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		----	----	----	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		----	----	----	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		----	----	----	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		----	----	----	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		----	----	----	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		----	----	----	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		----	----	----	<0.02	<0.02



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH11	SW3	MW239S	BH6	BH7
Client sampling date / time					23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00
Compound	CAS Number	LOR	Unit		ES1912421-006	ES1912421-007	ES1912421-008	ES1912421-009	ES1912421-010
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		----	----	----	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		----	----	----	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		----	----	----	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		----	----	----	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		----	----	----	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		----	----	----	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		----	----	----	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		----	----	----	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		----	----	----	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		----	----	----	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		----	----	----	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		----	----	----	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		----	----	----	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		----	----	----	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		----	----	----	<0.01	<0.01
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		104	107	100	109	111
Toluene-D8	2037-26-5	2	%		115	111	113	112	113



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Client sample ID

				BH11	SW3	MW239S	BH6	BH7
Client sampling date / time				23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00
Compound	CAS Number	LOR	Unit	ES1912421-006	ES1912421-007	ES1912421-008	ES1912421-009	ES1912421-010
				Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued								
4-Bromofluorobenzene	460-00-4	2	%	115	118	112	120	120
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	----	----	----	105	110
13C8-PFOA	----	0.02	%	----	----	----	80.4	76.1



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH8	RINSATE 03	TRIP BLANK 03	----	----
Client sampling date / time					23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1912421-011	ES1912421-012	ES1912421-013	-----	-----
					Result	Result	Result	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		4.76	----	----	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		264	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		223	----	----	----	----
EA016: Calculated TDS (from Electrical Conductivity)									
Total Dissolved Solids (Calc.)	----	1	mg/L		172	----	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		121	----	----	----	----
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		29	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		<1	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		<1	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		8	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		89	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		<1	----	----	----	----
Magnesium	7439-95-4	1	mg/L		7	----	----	----	----
Sodium	7440-23-5	1	mg/L		53	----	----	----	----
Potassium	7440-09-7	1	mg/L		<1	----	----	----	----
EG020F: Dissolved Metals by ICP-MS									
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		0.008	<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	----	----

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH8	RINSATE 03	TRIP BLANK 03	----	----
Client sampling date / time					23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00	----	----
Compound	CAS Number	LOR	Unit	ES1912421-011	ES1912421-012	ES1912421-013	-----	-----	
				Result	Result	Result	----	----	
EG020F: Dissolved Metals by ICP-MS - Continued									
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	----	----	
Manganese	7439-96-5	0.001	mg/L	0.009	<0.001	<0.001	----	----	
Nickel	7440-02-0	0.001	mg/L	0.002	<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	0.008	<0.005	<0.005	----	----	
Iron	7439-89-6	0.05	mg/L	3.20	<0.05	<0.05	----	----	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	----	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	<0.1	----	----	----	----	
EN055: Ionic Balance									
Total Anions	----	0.01	meq/L	2.68	----	----	----	----	
Total Cations	----	0.01	meq/L	2.88	----	----	----	----	
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
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	----	----	
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	----	----	
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>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	----	----	
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	----	----	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	----	----	
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	----	----	
EP080: BTEXN									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH8	RINSATE 03	TRIP BLANK 03	----	----
Client sampling date / time					23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1912421-011	ES1912421-012	ES1912421-013	-----	-----
					Result	Result	Result	----	----
EP080: BTEXN - Continued									
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	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
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	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
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	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH8	RINSATE 03	TRIP BLANK 03	----	----
Client sampling date / time					23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1912421-011	ES1912421-012	ES1912421-013	-----	-----
					Result	Result	Result	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	----	----
EP231C: Perfluoroalkyl Sulfonamides									
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	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
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	----	----
EP231P: PFAS Sums									
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	----	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		104	108	106	----	----
Toluene-D8	2037-26-5	2	%		115	111	111	----	----



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Client sample ID

				BH8	RINSATE 03	TRIP BLANK 03	----	----
Client sampling date / time				23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00	----	----
Compound	CAS Number	LOR	Unit	ES1912421-011	ES1912421-012	ES1912421-013	-----	-----
				Result	Result	Result	----	----
EP080S: TPH(V)/BTEX Surrogates - Continued								
4-Bromofluorobenzene	460-00-4	2	%	112	116	115	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	108	106	104	----	----
13C8-PFOA	----	0.02	%	84.8	91.7	89.3	----	----



Surrogate Control Limits

Sub-Matrix: **WATER**

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

QUALITY CONTROL REPORT

Work Order	: ES1912421	Page	: 1 of 13
Client	: KLEINFELDER AUSTRALIA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: TOM OVERTON	Contact	: Shirley LeCornu
Address	: 95 MITCHELL ROAD CARDIFF NSW 2285	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +6138549 9630
Project	: 2019003	Date Samples Received	: 23-Apr-2019
Order number	:	Date Analysis Commenced	: 26-Apr-2019
C-O-C number	: ----	Issue Date	: 01-May-2019
Sampler	: DANIEL KOUSBROEK		
Site	: WSS-CABBAGE TREE RD WATER MONITORING		
Quote number	: ME/114/19		
No. of samples received	: 13		
No. of samples analysed	: 13		



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 Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjat	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini		Sydney Organics, Smithfield, NSW

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
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
RPD = Relative Percentage Difference
= Indicates failed QC

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: WATER					Laboratory Duplicate (DUP) Report				
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 2316377)									
ES1912421-001	SW4	EA005-P: pH Value	----	0.01	pH Unit	4.00	3.90	2.53	0% - 20%
ES1912421-010	BH7	EA005-P: pH Value	----	0.01	pH Unit	4.51	4.49	0.444	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 2316380)									
ES1912421-001	SW4	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	293	289	1.26	0% - 20%
ES1912421-010	BH7	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	205	206	0.00	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 2314835)									
ES1911927-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	169	155	8.63	0% - 50%
ES1912421-002	SW1	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	707	702	0.638	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 2314834)									
ES1911927-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	<5	<5	0.00	No Limit
ES1912421-002	SW1	EA025H: Suspended Solids (SS)	----	5	mg/L	32	34	8.36	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 2316379)									
ES1912421-001	SW4	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	0.00	No Limit
ES1912421-010	BH7	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	0.00	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2316032)									
ES1912421-001	SW4	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	60	57	6.32	0% - 20%
ES1912421-010	BH7	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	17	16	6.46	0% - 50%
ED045G: Chloride by Discrete Analyser (QC Lot: 2316033)									



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ED045G: Chloride by Discrete Analyser (QC Lot: 2316033) - continued									
ES1912421-001	SW4	ED045G: Chloride	16887-00-6	1	mg/L	64	59	7.71	0% - 20%
ES1912421-010	BH7	ED045G: Chloride	16887-00-6	1	mg/L	62	62	0.00	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 2315894)									
ES1912421-001	SW4	ED093F: Calcium	7440-70-2	1	mg/L	5	5	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	5	5	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	39	39	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.00	No Limit
ES1912494-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	3	3	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	1	1	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	319	319	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	6	6	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2315892)									
ES1912421-001	SW4	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.059	0.059	0.00	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.037	0.038	0.00	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.005	0.005	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.030	0.027	10.5	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	2.09	2.12	1.70	0% - 20%
ES1912494-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.006	0.007	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.006	0.006	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.002	0.003	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.007	0.007	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.005	0.005	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.032	0.031	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2315892) - continued									
ES1912494-001	Anonymous	EG020A-F: Boron	7440-42-8	0.05	mg/L	0.09	0.09	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2317350)									
ES1912361-011	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.074	0.076	1.98	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	3.66	3.66	0.0574	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.006	<0.005	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	1.05	1.05	0.00	0% - 20%
		ES1912586-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001
EG020A-F: Arsenic	7440-38-2			0.001	mg/L	<0.001	<0.001	0.00	No Limit
EG020A-F: Beryllium	7440-41-7			0.001	mg/L	<0.001	<0.001	0.00	No Limit
EG020A-F: Barium	7440-39-3			0.001	mg/L	0.008	0.009	0.00	No Limit
EG020A-F: Chromium	7440-47-3			0.001	mg/L	<0.001	<0.001	0.00	No Limit
EG020A-F: Cobalt	7440-48-4			0.001	mg/L	<0.001	<0.001	0.00	No Limit
EG020A-F: Copper	7440-50-8			0.001	mg/L	<0.001	<0.001	0.00	No Limit
EG020A-F: Lead	7439-92-1			0.001	mg/L	<0.001	<0.001	0.00	No Limit
EG020A-F: Manganese	7439-96-5			0.001	mg/L	0.019	0.020	6.19	0% - 50%
EG020A-F: Nickel	7440-02-0			0.001	mg/L	<0.001	<0.001	0.00	No Limit
EG020A-F: Zinc	7440-66-6			0.005	mg/L	<0.005	<0.005	0.00	No Limit
EG020A-F: Selenium	7782-49-2			0.01	mg/L	<0.01	<0.01	0.00	No Limit
EG020A-F: Vanadium	7440-62-2			0.01	mg/L	<0.01	<0.01	0.00	No Limit
EG020A-F: Boron	7440-42-8			0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG020A-F: Iron	7439-89-6			0.05	mg/L	0.15	0.16	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 2315893)									
ES1912421-002	SW1	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES1912421-009	BH6	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 2317347)									
ES1912345-008	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES1912345-001	Anonymous	EG035F: Mercurv	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EK040P: Fluoride by PC Titrator (QC Lot: 2316378)									
ES1912421-001	SW4	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.1	<0.1	0.00	No Limit
ES1912421-010	BH7	EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2318345)									
ES1912421-001	SW4	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
ES1912421-010	BH7	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2318345)									
ES1912421-001	SW4	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES1912421-010	BH7	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 2318345)									
ES1912421-001	SW4	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.00	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
ES1912421-010	BH7	EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
		EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.00	No Limit
			106-42-3						
	EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit	
	EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit	
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 2318601)									
ES1912421-012	RINSATE 03	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
ES1912561-001	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	150	156	4.38	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	1.56	1.64	5.12	0% - 20%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.88	0.89	0.00	0% - 20%
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	5.65	5.77	2.07	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	4.04	4.16	2.95	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	0.31	0.34	9.44	0% - 50%
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2318601)									
ES1912421-012	RINSATE 03	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2318601) - continued									
ES1912421-012	RINSATE 03	EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
ES1912561-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.95	0.95	0.00	0% - 20%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.93	0.91	2.50	0% - 20%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	3.56	3.46	2.80	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.42	0.43	2.58	0% - 20%
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	0.54	0.50	8.03	0% - 20%
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	0.90	0.86	4.68	0% - 20%
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	0.10	0.11	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	0.03	0.03	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	0.7	0.8	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2318601)									
ES1912421-012	RINSATE 03	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1912561-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	0.68	0.64	6.68	0% - 20%
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2318601) - continued									
ES1912561-001	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2318601)									
ES1912421-012	RINSATE 03	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1912561-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	5.00	4.98	0.441	0% - 20%
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 2318601)									
ES1912421-012	RINSATE 03	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.00	No Limit
ES1912561-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	176	182	3.47	0% - 20%



Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result		LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 2316377)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	99.2	98	102
				----	7 pH Unit	99.3	98	102
EA010P: Conductivity by PC Titrator (QCLot: 2316380)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2000 µS/cm	98.4	95	113
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 2314835)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	99.3	87	109
				<10	293 mg/L	110	66	126
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 2314834)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	90.7	83	129
				<5	1000 mg/L	99.4	82	110
ED037P: Alkalinity by PC Titrator (QCLot: 2316379)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	84.9	81	111
				----	50 mg/L	89.1	70	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2316032)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	103	82	122
ED045G: Chloride by Discrete Analyser (QCLot: 2316033)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	106	81	127
				<1	1000 mg/L	102	81	127
ED093F: Dissolved Major Cations (QCLot: 2315894)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	108	80	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	109	90	116
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	108	82	120
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	107	85	113
EG020F: Dissolved Metals by ICP-MS (QCLot: 2315892)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	104	85	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	103	85	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	104	82	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	101	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	102	85	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	102	82	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	102	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	99.4	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	101	82	110



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
						LCS	Low	High
Method: Compound	CAS Number	LOR	Unit	Result				
EG020F: Dissolved Metals by ICP-MS (QCLot: 2315892) - continued								
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	101	82	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	102	85	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	105	83	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	104	81	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	113	85	115
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	112	82	112
EG020F: Dissolved Metals by ICP-MS (QCLot: 2317350)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	86.9	85	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	95.8	85	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	89.3	82	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	88.2	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	86.8	85	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	84.5	82	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	84.0	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	92.9	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	84.8	82	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	83.1	82	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	94.9	85	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	90.3	83	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	85.8	81	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	87.9	85	115
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	85.4	82	112
EG035F: Dissolved Mercury by FIMS (QCLot: 2315893)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	95.1	83	105
EG035F: Dissolved Mercury by FIMS (QCLot: 2317347)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	94.5	83	105
EK040P: Fluoride by PC Titrator (QCLot: 2316378)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	87.0	82	116
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QCLot: 2314899)								
EP071SG: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	80.0	75	117
EP071SG: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	98.3	81	113
EP071SG: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	103	71	117
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 2314899)								
EP071SG: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	85.1	73	119
EP071SG: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	101	81	113
EP071SG: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	100	65	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2318345)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	83.8	75	127



Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result			Low	High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2318345)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	85.2	75	127
EP080: BTEXN (QCLot: 2318345)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	86.0	70	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	94.1	69	123
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	95.7	70	120
EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	10 µg/L	94.5	69	121
	106-42-3							
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	98.5	72	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	104	70	120
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2318601)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	90.0	70	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	100	70	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	99.0	70	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	99.6	70	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	96.6	70	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.5 µg/L	92.6	70	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2318601)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	105	70	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	108	70	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	110	70	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	97.2	70	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	105	70	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	106	70	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	103	70	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	96.4	70	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	107	70	130
EP231X: Perfluorotridecanoic acid (PFTriDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	111	70	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	105	70	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2318601)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	91.6	70	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	110	70	150
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	93.2	70	150
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	1.25 µg/L	102	70	150
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	97.4	70	150
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	105	70	130



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2318601) - continued								
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	108	70	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2318601)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	115	70	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	98.2	70	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	114	70	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	94.8	70	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2316032)							
ES1912421-001	SW4	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	# Not Determined	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 2316033)							
ES1912421-001	SW4	ED045G: Chloride	16887-00-6	250 mg/L	99.6	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2315892)							
ES1912421-003	BH4	EG020A-F: Arsenic	7440-38-2	1 mg/L	103	70	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	105	70	130
		EG020A-F: Barium	7440-39-3	1 mg/L	102	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	102	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	101	70	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	102	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	103	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	98.8	70	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	101	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	102	70	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	101	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	106	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2317350)							
ES1912361-012	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	128	70	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	130	70	130
		EG020A-F: Barium	7440-39-3	1 mg/L	86.7	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	89.3	70	130



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 2317350) - continued							
ES1912361-012	Anonymous	EG020A-F: Chromium	7440-47-3	1 mg/L	95.2	70	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	130	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	130	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	110	70	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	92.1	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	130	70	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	92.0	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	91.3	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 2315893)							
ES1911757-001	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	94.5	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 2317347)							
ES1911923-001	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	84.5	70	130
EK040P: Fluoride by PC Titrator (QCLot: 2316378)							
ES1912421-001	SW4	EK040P: Fluoride	16984-48-8	5 mg/L	80.4	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2318345)							
ES1912421-001	SW4	EP080: C6 - C9 Fraction	----	325 µg/L	87.6	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2318345)							
ES1912421-001	SW4	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	85.7	70	130
EP080: BTEXN (QCLot: 2318345)							
ES1912421-001	SW4	EP080: Benzene	71-43-2	25 µg/L	85.4	70	130
		EP080: Toluene	108-88-3	25 µg/L	93.5	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	96.9	70	130
		EP080: meta- & para-Xylene	108-38-3	25 µg/L	95.6	70	130
		106-42-3					
		EP080: ortho-Xylene	95-47-6	25 µg/L	99.9	70	130
		EP080: Naphthalene	91-20-3	25 µg/L	95.9	70	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2318601)							
ES1912421-012	RINSATE 03	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	94.6	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.5 µg/L	114	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	104	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	109	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	97.2	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.5 µg/L	94.0	50	130
		EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2318601)					
ES1912421-012	RINSATE 03	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	103	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	111	50	130



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2318601) - continued							
ES1912421-012	RINSATE 03	EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	118	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	110	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	106	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	106	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	110	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	105	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	118	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5 µg/L	105	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	103	50	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2318601)							
ES1912421-012	RINSATE 03	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	91.0	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	104	50	150
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	78.3	50	150
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	1.25 µg/L	105	50	150
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	101	50	150
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	114	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	107	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2318601)							
ES1912421-012	RINSATE 03	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	106	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	101	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	102	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	113	50	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES1912421	Page	: 1 of 11
Client	: KLEINFELDER AUSTRALIA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: TOM OVERTON	Telephone	: +6138549 9630
Project	: 2019003	Date Samples Received	: 23-Apr-2019
Site	: WSS-CABBAGE TREE RD WATER MONITORING	Issue Date	: 01-May-2019
Sampler	: DANIEL KOUSBROEK	No. of samples received	: 13
Order number	:	No. of samples analysed	: 13

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers exist - please see following pages for full details.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	ES1912421--001	SW4	Sulfate as SO4 - Turbidimetric	14808-79-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method		Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
SW4, BH4, BH11, SW3, BH6, BH8	SW1, BH2, BH11, MW239S, BH7,	----	----	----	26-Apr-2019	23-Apr-2019	3

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
TRH - Total Recoverable Hydrocarbons - Silica Gel C	0	14	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Total Recoverable Hydrocarbons - Silica Gel C	0	14	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural (EA005-P)		23-Apr-2019	----	----	----	26-Apr-2019	23-Apr-2019	✖
SW4, BH4, BH11, SW3, BH6, BH8	SW1, BH2, BH11, MW239S, BH7,							
EA010P: Conductivity by PC Titrator								
Clear Plastic Bottle - Natural (EA010-P)		23-Apr-2019	----	----	----	26-Apr-2019	21-May-2019	✔
SW4, BH4, BH11, SW3, BH6, BH8	SW1, BH2, BH11, MW239S, BH7,							
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Clear Plastic Bottle - Natural (EA015H)		23-Apr-2019	----	----	----	26-Apr-2019	30-Apr-2019	✔
SW4, BH4, BH11, SW3, BH6, BH8	SW1, BH2, BH11, MW239S, BH7,							
EA025: Total Suspended Solids dried at 104 ± 2°C								
Clear Plastic Bottle - Natural (EA025H)		23-Apr-2019	----	----	----	26-Apr-2019	30-Apr-2019	✔
SW4, BH4, BH11, SW3, BH6, BH8	SW1, BH2, BH11, MW239S, BH7,							
EA065: Total Hardness as CaCO3								
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)		23-Apr-2019	----	----	----	26-Apr-2019	21-May-2019	✔
SW4, BH4, BH11, SW3, BH6, BH8	SW1, BH2, BH11, MW239S, BH7,							



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P)		23-Apr-2019	----	----	----	26-Apr-2019	07-May-2019	✓
SW4, BH4, BH1, SW3, BH6, BH8	SW1, BH2, BH11, MW239S, BH7,							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G)		23-Apr-2019	----	----	----	26-Apr-2019	21-May-2019	✓
SW4, BH4, BH1, SW3, BH6, BH8	SW1, BH2, BH11, MW239S, BH7,							
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G)		23-Apr-2019	----	----	----	26-Apr-2019	21-May-2019	✓
SW4, BH4, BH1, SW3, BH6, BH8	SW1, BH2, BH11, MW239S, BH7,							
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)		23-Apr-2019	----	----	----	26-Apr-2019	21-May-2019	✓
SW4, BH4, BH1, SW3, BH6, BH8	SW1, BH2, BH11, MW239S, BH7,							
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)		23-Apr-2019	----	----	----	26-Apr-2019	20-Oct-2019	✓
SW4, BH4, BH1, SW3, BH6, BH8	SW1, BH2, BH11, MW239S, BH7,							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)	TRIP BLANK 03	23-Apr-2019	----	----	----	29-Apr-2019	20-Oct-2019	✓
RINSATE 03,								

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation				Analysis	
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG035F: Dissolved Mercury by FIMS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)								
SW4, BH4, BH1, SW3, BH6, BH8	SW1, BH2, BH11, MW239S, BH7,	23-Apr-2019	----	----	----	29-Apr-2019	21-May-2019	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)								
RINSATE 03,	TRIP BLANK 03	23-Apr-2019	----	----	----	30-Apr-2019	21-May-2019	✓
EK040P: Fluoride by PC Titrator								
Clear Plastic Bottle - Natural (EK040P)								
SW4, BH4, BH1, SW3, BH6, BH8	SW1, BH2, BH11, MW239S, BH7,	23-Apr-2019	----	----	----	26-Apr-2019	21-May-2019	✓
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup								
Amber Glass Bottle - Unpreserved (EP071SG)								
SW4, BH4, BH1, SW3, BH6, BH8, TRIP BLANK 03	SW1, BH2, BH11, MW239S, BH7, RINSATE 03,	23-Apr-2019	29-Apr-2019	30-Apr-2019	✓	01-May-2019	08-Jun-2019	✓
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
Amber Glass Bottle - Unpreserved (EP071SG)								
SW4, BH4, BH1, SW3, BH6, BH8, TRIP BLANK 03	SW1, BH2, BH11, MW239S, BH7, RINSATE 03,	23-Apr-2019	29-Apr-2019	30-Apr-2019	✓	01-May-2019	08-Jun-2019	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP080/071: Total Petroleum Hydrocarbons									
Amber VOC Vial - Sulfuric Acid (EP080)	SW4, BH4, BH1, SW3, BH6, BH8, TRIP BLANK 03	SW1, BH2, BH11, MW239S, BH7, RINSATE 03,	23-Apr-2019	30-Apr-2019	07-May-2019	✔	30-Apr-2019	07-May-2019	✔
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
Amber VOC Vial - Sulfuric Acid (EP080)	SW4, BH4, BH1, SW3, BH6, BH8, TRIP BLANK 03	SW1, BH2, BH11, MW239S, BH7, RINSATE 03,	23-Apr-2019	30-Apr-2019	07-May-2019	✔	30-Apr-2019	07-May-2019	✔
EP080: BTEXN									
Amber VOC Vial - Sulfuric Acid (EP080)	SW4, BH4, BH1, SW3, BH6, BH8, TRIP BLANK 03	SW1, BH2, BH11, MW239S, BH7, RINSATE 03,	23-Apr-2019	30-Apr-2019	07-May-2019	✔	30-Apr-2019	07-May-2019	✔
EP231A: Perfluoroalkyl Sulfonic Acids									
HDPE (no PTFE) (EP231X)	BH4, BH7, RINSATE 03,	BH6, BH8, TRIP BLANK 03	23-Apr-2019	29-Apr-2019	20-Oct-2019	✔	30-Apr-2019	20-Oct-2019	✔
EP231B: Perfluoroalkyl Carboxylic Acids									
HDPE (no PTFE) (EP231X)	BH4, BH7, RINSATE 03,	BH6, BH8, TRIP BLANK 03	23-Apr-2019	29-Apr-2019	20-Oct-2019	✔	30-Apr-2019	20-Oct-2019	✔
EP231C: Perfluoroalkyl Sulfonamides									
HDPE (no PTFE) (EP231X)	BH4, BH7, RINSATE 03,	BH6, BH8, TRIP BLANK 03	23-Apr-2019	29-Apr-2019	20-Oct-2019	✔	30-Apr-2019	20-Oct-2019	✔

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X) BH4, BH7, RINSATE 03,	BH6, BH8, TRIP BLANK 03	23-Apr-2019	29-Apr-2019	20-Oct-2019	✓	30-Apr-2019	20-Oct-2019	✓
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X) BH4, BH7, RINSATE 03,	BH6, BH8, TRIP BLANK 03	23-Apr-2019	29-Apr-2019	20-Oct-2019	✓	30-Apr-2019	20-Oct-2019	✓



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	4	34	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	4	36	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	14	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	0	14	0.00	10.00	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	34	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	36	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chloride by Discrete Analyser	ED045G	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	34	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	36	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Method Blanks (MB) - Continued							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	14	7.14	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	1	14	7.14	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	34	5.88	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	36	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	14	7.14	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	0	14	0.00	5.00	✖	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (2013) Schedule B(3)
Calculated TDS (from Electrical Conductivity)	EA016	WATER	In house: Calculation from Electrical Conductivity (APHA 2510 B) using a conversion factor specified in the analytical report. This method is compliant with NEPM (2013) Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of 'non-filterable' residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C. This method is compliant with NEPM (2013) Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM (2013) Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (2013) Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.



Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Fluoride by PC Titrator	EK040P	WATER	In house: Referenced to APHA 4500-F C: CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (2013) Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	WATER	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C36. This method is compliant with NEPM (2013) Schedule B(3) (Method 506.1)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In house: Direct injection analysis of fresh waters after dilution (1:1) with methanol. Analysis by LC-Electrospray-MS-MS, Negative Mode using MRM. Where commercially available, isotopically labelled analogues of the target analytes are used as internal standards for quantification. Where a labelled analogue is not commercially available, the internal standard with similar chemistry and the closest retention time to the target is used for quantification. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. This method complies with the quality control definitions as stated in QSM 5.1. Data is reviewed in line with the DQOs as stated in QSM5.1
Preparation Methods	Method	Matrix	Method Descriptions
Preparation for PFAS in water.	EP231-PR	WATER	Method presumes direct injection without workup. Preparation includes addition of internal standard and surrogate, and filtration prior to analysis.
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : ES1912421

Client : KLEINFELDER AUSTRALIA PTY LTD Contact : TOM OVERTON Address : 95 MITCHELL ROAD CARDIFF NSW 2285 E-mail : toverton@kleinfelder.com Telephone : ---- Facsimile : ---- Project : 2019003 Order number : ---- C-O-C number : ---- Site : WSS-CABBAGE TREE RD WATER MONITORING Sampler : DANIEL KOUSBROEK	Laboratory : Environmental Division Sydney Contact : Shirley LeCornu Address : 277-289 Woodpark Road Smithfield NSW Australia 2164 E-mail : shirley.lecornu@Alsglobal.com Telephone : +6138549 9630 Facsimile : +61-2-8784 8500 Page : 1 of 3 Quote number : EM2019ALLENVENG0010 (ME/114/19) QC Level : NEPM 2013 B3 & ALS QC Standard

Dates

Date Samples Received : 23-Apr-2019 16:59	Issue Date : 25-Apr-2019
Client Requested Due : 01-May-2019	Scheduled Reporting Date : 01-May-2019
Date	

Delivery Details

Mode of Delivery : Undefined	Security Seal : Intact.
No. of coolers/boxes : 1	Temperature : 0.6°C - Ice present
Receipt Detail :	No. of samples received / analysed : 13 / 13

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- **Sample(s) requiring volatile organic compound analysis received in airtight containers (ZHE).**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA recommends samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- No sample container / preservation non-compliance exists.

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EG020F Dissolved Metals by ICP/MS	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-12 General Water Suite	WATER - W-03 15 Metals (NEPM Suite)	WATER - W-05 SG TRH/BTEX/N8 Metals inc Silica Gel Clean Up
ES1912421-001	23-Apr-2019 00:00	SW4	✓	✓	✓		✓	✓	✓
ES1912421-002	23-Apr-2019 00:00	SW1	✓	✓	✓		✓	✓	✓
ES1912421-003	23-Apr-2019 00:00	BH4	✓	✓	✓	✓	✓	✓	✓
ES1912421-004	23-Apr-2019 00:00	BH2	✓	✓	✓		✓	✓	✓
ES1912421-005	23-Apr-2019 00:00	BH1	✓	✓	✓		✓	✓	✓
ES1912421-006	23-Apr-2019 00:00	BH11	✓	✓	✓		✓	✓	✓
ES1912421-007	23-Apr-2019 00:00	SW3	✓	✓	✓		✓	✓	✓
ES1912421-008	23-Apr-2019 00:00	MW239S	✓	✓	✓		✓	✓	✓
ES1912421-009	23-Apr-2019 00:00	BH6	✓	✓	✓	✓	✓	✓	✓
ES1912421-010	23-Apr-2019 00:00	BH7	✓	✓	✓	✓	✓	✓	✓
ES1912421-011	23-Apr-2019 00:00	BH8	✓	✓	✓	✓	✓	✓	✓
ES1912421-012	23-Apr-2019 00:00	RINSATE 03			✓	✓		✓	✓
ES1912421-013	23-Apr-2019 00:00	TRIP BLANK 03			✓	✓		✓	✓

Proactive Holding Time Report

The following table summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory.

Matrix: **WATER**

Evaluation: ✗ = Holding time breach ; ✓ = Within holding time.

Method	Client Sample ID(s)	Container	Due for extraction	Due for analysis	Samples Received		Instructions Received	
					Date	Evaluation	Date	Evaluation
EA005-P: pH by PC Titrator								
BH11		Clear Plastic Bottle - Natural	----	23-Apr-2019	23-Apr-2019	✓	24-Apr-2019	✗
BH1		Clear Plastic Bottle - Natural	----	23-Apr-2019	23-Apr-2019	✓	24-Apr-2019	✗
BH2		Clear Plastic Bottle - Natural	----	23-Apr-2019	23-Apr-2019	✓	24-Apr-2019	✗
BH4		Clear Plastic Bottle - Natural	----	23-Apr-2019	23-Apr-2019	✓	24-Apr-2019	✗
BH6		Clear Plastic Bottle - Natural	----	23-Apr-2019	23-Apr-2019	✓	24-Apr-2019	✗
BH7		Clear Plastic Bottle - Natural	----	23-Apr-2019	23-Apr-2019	✓	24-Apr-2019	✗
BH8		Clear Plastic Bottle - Natural	----	23-Apr-2019	23-Apr-2019	✓	24-Apr-2019	✗
MW239S		Clear Plastic Bottle - Natural	----	23-Apr-2019	23-Apr-2019	✓	24-Apr-2019	✗
SW1		Clear Plastic Bottle - Natural	----	23-Apr-2019	23-Apr-2019	✓	24-Apr-2019	✗
SW3		Clear Plastic Bottle - Natural	----	23-Apr-2019	23-Apr-2019	✓	24-Apr-2019	✗
SW4		Clear Plastic Bottle - Natural	----	23-Apr-2019	23-Apr-2019	✓	24-Apr-2019	✗



Requested Deliverables

DANIEL KOUSBROEK

- *AU Certificate of Analysis - NATA (COA)	Email	dkousbroek@kleinfelder.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	dkousbroek@kleinfelder.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	dkousbroek@kleinfelder.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	dkousbroek@kleinfelder.com
- Chain of Custody (CoC) (COC)	Email	dkousbroek@kleinfelder.com
- EDI Format - ENMRG (ENMRG)	Email	dkousbroek@kleinfelder.com
- EDI Format - EQUIS V5 for KLEINFELDER (KLEINFELDER)	Email	dkousbroek@kleinfelder.com
- EDI Format - ESDAT (ESDAT)	Email	dkousbroek@kleinfelder.com

INVOICES

- A4 - AU Tax Invoice (INV)	Email	Aus_Accounts@kleinfelder.com

Newcastle

- *AU Certificate of Analysis - NATA (COA)	Email	newcastle@kleinfelder.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	newcastle@kleinfelder.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	newcastle@kleinfelder.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	newcastle@kleinfelder.com
- Chain of Custody (CoC) (COC)	Email	newcastle@kleinfelder.com
- EDI Format - ENMRG (ENMRG)	Email	newcastle@kleinfelder.com
- EDI Format - EQUIS V5 for KLEINFELDER (KLEINFELDER)	Email	newcastle@kleinfelder.com
- EDI Format - ESDAT (ESDAT)	Email	newcastle@kleinfelder.com

TOM OVERTON

- *AU Certificate of Analysis - NATA (COA)	Email	toverton@kleinfelder.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	toverton@kleinfelder.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	toverton@kleinfelder.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	toverton@kleinfelder.com
- A4 - AU Tax Invoice (INV)	Email	toverton@kleinfelder.com
- Chain of Custody (CoC) (COC)	Email	toverton@kleinfelder.com
- EDI Format - ENMRG (ENMRG)	Email	toverton@kleinfelder.com
- EDI Format - EQUIS V5 for KLEINFELDER (KLEINFELDER)	Email	toverton@kleinfelder.com
- EDI Format - ESDAT (ESDAT)	Email	toverton@kleinfelder.com

Client:				SITE, COC AND CONTACT DATA				Laboratory:						
Kleinfelder Australia Pty Ltd 96 Mitchell Road Cardiff, NSW 2285 Phone: 02 4949 5200				WSS - Cabbage Tree Rd water monitoring QUOTE NUMBER: ME114/19 Job No.: 20190903 Required TAT: 24 hrs 48 hrs 3 days 5 days 7 days Data QA level: LAB minimum unless specified.				Sampers Name: Dan Koussrook Contact Number: 045 8197 676 Contact e-mail: dan.koussrook@kleinfelder.com PM name (if not sampler): Tom Cvetkov PM e-mail: tovcvet@kleinfelder.com						
CHAIN OF CUSTODY		Requisition by (print):		Received by (print):		Relinquished by (print):		Received by (print):		Date / Time:				
(sign)		(sign)		(sign)		(sign)		(sign)		Date / Time:				
Date / Time:		Date / Time:		Date / Time:		Date / Time:		Date / Time:		Date / Time:				
Notes:		Notes:		Notes:		Notes:		Notes:		Notes:				
Sample ID	Lab ID	Sample Point	Sample Type	Date	Start Depth	End Depth	Units	# Containers	W-05 SG	Organic Analysis	Additional Metals to make up NEPM 15	Metals	Other Analysis	Comments
SW4	1		Water 23.4	23/4/19				5	X	X	X	X	X	
SW1	2		Water 23.4	23/4/19				5	X	X	X	X	X	
BH4	3							5	X	X	X	X	X	
BH2	4							5	X	X	X	X	X	
BH1	5							5	X	X	X	X	X	
BH11	6							5	X	X	X	X	X	
SV3	7							5	X	X	X	X	X	
MW2395	8							5	X	X	X	X	X	
BH6	9							6	X	X	X	X	X	
BH7	10							6	X	X	X	X	X	
BH8	11							6	X	X	X	X	X	
Rinsate 09	12							5	X	X	X	X	X	
Tip Blank 08	13							5	X	X	X	X	X	

Environmental Division
Sydney
Work Order Reference
ES1912421

LAB OF ORIGIN:
NEWCASTLE

0.6°C
1.2

ALS
5/585 Maitland Rd
Mayfield West,
Newcastle NSW 2304
Phone: (02) 4014 2500
Send Results to:

95 Mitchell Road
Cardiff, NSW 2285
newcastle@kleinfelder.com
Phone: 02 4949 5200

WAS SG - TERRESTRIAL MARINE SLIMY GEL CLEAN UP
NT14 - Extended water suite B
Additional metals analysis to make up NEPM 15

Arsenic (As), Cadmium (Cd), Chromium (Cr), Co
Barium (Ba), Beryllium (Be), Cobalt (Co)



APPENDIX B4: MAY 2019

31 May 2019

Document Ref: NCA19R96068

Williamtown Sand Syndicate
PO Box 898
Newcastle, NSW 2300

Attention: Darren Williams

Delivered by email: darren@arbus.com.au

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

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

1. SCOPE OF SERVICE

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

The May monitoring round was to include 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 monitoring round was conducted on 16 May 2019.

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 the gauging each of the HydraSleeves were removed and samples taken.

The May 2019 monitoring round included:

- Gauging of all available monitoring wells (a total of 14 wells);

- 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

* General Water Suite: Ca, Mg, Na, K, pH, EC, Cl, SO₄, Alkalinity, Fluoride, Hardness & TDS (Calc')

** TRH (C6 – C40), BTEXN (Silica Gel)

*** 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), Selenium (Se), Vanadium (V), Zinc (Zn) - note sampling for Iron and no nickel

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 (mBTC)	Groundwater Elevation (mAHD)	Well Total Depth (mBTC)	Comment
BH1	8.64	6.319	2.321	8.12	Very light brown, no odour.
BH2	7.79	5.86	1.93	9.02	Dark brown, no odour
BH3	7.57	6.064	1.506	9.03	Data logger downloaded.
BH4	3.06	1.847	1.213	5.92	Stained brown, no odour.
BH5	7.36	5.894	1.466	8.71	No sample taken. Data logger downloaded.
BH6	3.62	1.766	1.854	4.52	Light brown, no odour.

Borehole	Top of Casing (mAHD)	Depth to Water (mBTC)	Groundwater Elevation (mAHD)	Well Total Depth (mBTC)	Comment
BH7	2.98	1.744	1.236	4.51	Slightly Cloudy, light brown, slight sulfur odour.
BH8	3.88	2.511	1.369	6.18	Sulfur smell - cloudy
BH9	17.75	Dry	-	16.01	Well was dry.
BH10	6.69	Dry	-	3.58	Well was dry.
BH11	6.63	3.311	3.319	5.29	Data logger downloaded. Light brown, no odour.
BH12	8.67	6.863	1.807	8.12	Acrylic odour. No sample taken.
MW239S	3.04	1.412	1.628	3.89	Data logger downloaded. Dark brown, sulfur odour.
MW239D	3.04	1.383	1.657	20.2	No odour – No sample taken
SW01*	2.5	0.01	2.51	N/A	Small pool of surface water with stained brown water.
SW02*	3.3	Dry	-	N/A	Location was dry.
SW03*	2.1	0.1	1.1	N/A	Water clear, no odour.
SW04*	2	0.135	2.135	N/A	Water 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	1220	20.57	150	5.42	25.6
BH02	1200	21.13	124	4.56	111
BH04	1145	20.14	110	4.65	98.5
BH06	1415	20.62	226	4.7	-5.2
BH07	1445	20.62	226	4.7	-5.2
BH08	1500	20.86	298	4.74	-75
BH11	1245	19.94	232	4.68	-71.5
MW239S	1345	19.49	392	4.64	-65.8
SW01	1115	14.9	966	4.42	106.7
SW03	1315	14.54	344	5.54	71.6
SW04	1030	12.03	389	3.69	211.4

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**.

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
Physical and Chemical Stressors	Sodium	0.01	11	9	86	No	Similar
	Sulphate	1	11	2.0	324	1 outside NHMRC ADWG 6 aesthetics	Similar
	Chloride	1	11	19	112	No	Similar
	Fluoride	0.1	11	<0.1	0.3	No	Similar
	Reactive Phosphorous	0.01	11	< 0.01	0.03	1 outside ANZECC 2000 Trigger range ¹	No comparison data for the extended water suite at BH1. Similar to start up sampling event 22/02/19 with the extended water suite
	Total Phosphorous	0.01	11	< 0.01	0.97	6 outside ANZECC 2000 Trigger range ¹	Similar to start up sampling event 22/02/19 with the extended water suite
	Nitrite	0.01	11	< 0.01	< 0.01	No	Similar to start up sampling event 22/02/19 with the extended water suite
	Nitrate	0.01	11	< 0.01	0.38	No	Similar to start up sampling event 22/02/19 with the extended water suite
	Ammonia	0.01	11	< 0.01	0.27	No	Similar to start up sampling event 22/02/19 with the extended water suite
	Total Nitrogen	0.1	11	0.1	1.8	8 outside ANZECC 2000 Trigger range ¹	Similar to start up sampling event 22/02/19 with the extended water suite
	Total Hardness	1	11	8.0	233	1 outside NHMRC ADWG 6 aesthetics	Similar

Analytical Groupings	Analyte	Limit of reporting (mg/L)	Number of Samples	Minimum (mg/L)	Maximum (mg/L)	Criteria Exceeded	Relative to previous monitoring
	Total Dissolved Solids	1	11	47	616	1 outside NHMRC ADWG 6 aesthetics	Similar
	pH	0.01	11	4.08	5.82	All above ANZECC 2000 Trigger range ¹ and drinking water guidelines	Similar
Dissolved Metals	As	0.005-0.1	11	<0.001	0.003	No	Similar
	B	0.005-0.1	11	<0.05	0.1	No	Similar
	Ba	0.005-0.1	11	0.002	0.047	No	Similar
	Be	0.005-0.1	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	0.003	4 above ANZECC 2000 Trigger Values ²	Similar
	Co	0.005-0.1	11	<0.001	0.017	No	Similar
	Cu	0.005-0.1	11	<0.001	0.003	1 above ANZECC 2000 Trigger Values ²	Similar
	Fe	0.005-0.1	11	0.06	8.33	9 above NHMRC ADWG 6 aesthetics	Similar
	Mn	0.005-0.1	11	0.006	0.666	1 above NHMRC ADWG 6 aesthetics	Similar
	Ni	0.005-0.1	11	<0.001	0.053	1 above ANZECC 2000 Trigger Values ² , and 1 above NHMRC ADWG 6 aesthetics	Similar
	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
	Zn	0.005-0.1	11	<0.005	0.132	7 above ANZECC 2000 Trigger Values ²	Similar
	Hg	0.0001	11	<0.0001	<0.0001	No	Similar
TRH – Silica Clean up	C ₆ -C ₁₀	0.02	11	<0.02	<0.02	No	Similar – Noting that BH1 has now stabilised to below the Limit of reporting
	>C ₁₀ -C ₁₆	0.1	11	<0.1	<0.1	No	Similar
	>C ₁₆ -C ₃₄	0.1	11	<0.1	<0.1	No	Similar – Noting that BH4 has now stabilised to below the limit of reporting
	>C ₃₄ -C ₄₀	0.1	11	<0.1	<0.1	No	Similar
	Total >C ₁₀ -C ₄₀	0.1	11	<0.1	<0.1	No	Similar
	C ₆ -C ₁₀ minus BTEX (F1)	0.02	11	<0.02	<0.02	No	Similar – Noting that BH1 has now stabilised to below the Limit of reporting
	>C ₁₀ -C ₁₆ minus Naphthalene (F2)	0.1	11	<0.1	<0.1	No	Similar
TPH – Silica Clean up	C ₁₀ -C ₁₄	0.05	11	<0.05	<0.05	No	Similar
	C ₁₅ -C ₂₈	0.1	11	<0.1	0.25	No	Similar – Noting that BH4 has now stabilised to below the limit of reporting
	C ₂₉ -C ₃₆	0.05	11	<0.05	<0.05	No	Similar
	C ₁₀ -C ₃₆	0.05	11	<0.05	0.25	No	Similar – Noting that BH4 has now stabilised to below the limit of reporting
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

Analytical Groupings	Analyte	Limit of reporting (mg/L)	Number of Samples	Minimum (mg/L)	Maximum (mg/L)	Criteria Exceeded	Relative to previous monitoring
	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	HEPA NEMP 2018*	Similar
	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

* 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.

¹Australian 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)

²ANZECC 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

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 May than the mean.

Table 4.5 2019 Rainfall data

2019	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1st	2.0	0.8	0	0	0							
2nd	0	12.8	0	23.8	0							
3rd	0	0.4		0.6	0							
4th	0	0	0	0	20.8							
5th	0	0	0	0	0.2							
6th	0	0	0	0	23.2							
7th	5.0	0	8.2	0	0.2							
8th	0	0	0	0	0							
9th	0	6.6	0	0	0							
10th	0.2	0	12.0	2.2	0							
11th	0	0	0	0	0.6							
12th	3.0	0	0	0	0							
13th	0	0	0	0	1.4							
14th	0	0	0	0.2	0							
15th	0	0	0	1.4	0							
16th	0	0	4.8	3.6	0							
17th	0	0	59.4	1.4	0							
18th	0	0	2.6	0.2	0							
19th	0	0	2.2	0.2	0							
20th	2.4		0	2.0	0							
21st	1.0	1.4	0	0.2	0							
22nd	0	1.0	1.2	0.2	0							
23rd	0	1.4	0	0	0							
24th	0	9.2	5.4	0	0							
25th	0	0	5.2	0	0							
26th	0	0	0	0	0							
27th	0	0	0	0	0							
28th	1.0	0	0	0	0.8							
29th	0		0	0								
30th	0		38.2	0								
31st	0		6.6									
Monthly Total	14.6	33.6	145.8	36.0	47.2							
Mean	98.7	117.0	120.5	111.6	109.6	124.7	70.9	72.9	60.4	73.9	82.3	78.6

Based on the long-term rainfall data and below average rainfall for May it is expected that the current groundwater and surface water levels would still be low.

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

Dkousbroek@kleinfelder.com

Mobile: 0458 197 676

Attached:

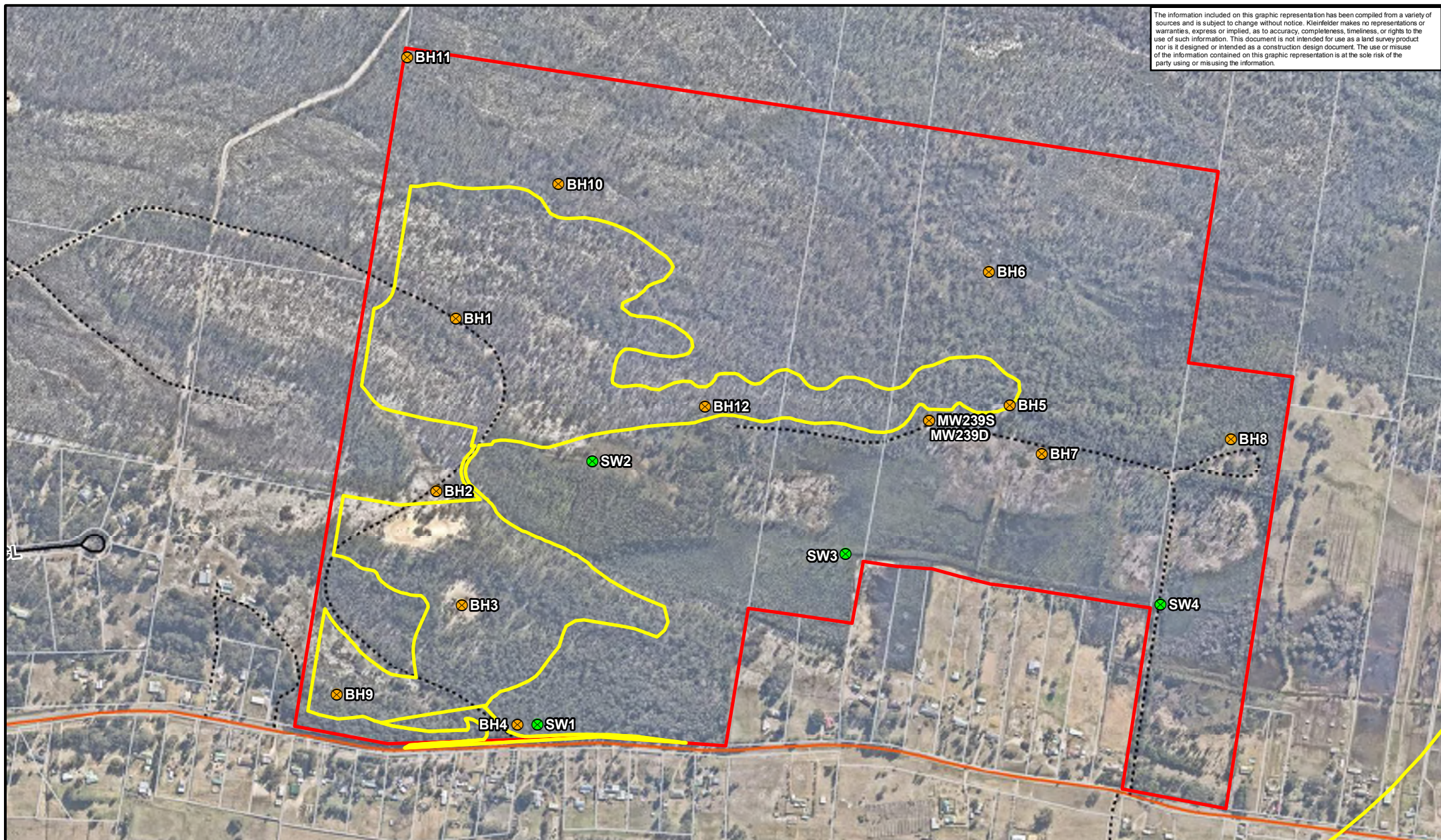
Figure 1

Data Tables

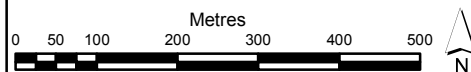
Attachment A – Laboratory reports

FIGURE 1

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 use of such information. This document is not intended for use as a land survey 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
- ▬ Subject Land Boundary
- ▬ Quarry Project Area
- ▬ Arterial Road
- ▬ Local Road
- - Track



PROJECT REFERENCE: 20170448
 DATE DRAWN: 13/02/2019 09:48 Version 1
 DRAWN BY: gjoyce
 DATA SOURCE:
 NSW DFSI - 2017
 Nearmap - 2018

Water monitoring locations Monitoring

Williamtown Sand Syndicate
 Proposed Sand Quarry
 Cabbage Tree Road, Williamtown

FIGURE:

1

DATA TABLES



KLEINFELDER
Bright People. Right Solutions.

Notes:
 - - Not analysed
 < - Less than laboratory limit of reporting
 µg/L - Micrograms per litre
 BTEXN - Benzene, toluene, ethylbenzene, xylenes, naphthalene
 ** 95% Level of protection in freshwater

Table 2
Groundwater Analytical Data - Metals
Williamstown Sand Syndicate



Analyte	Metals																
	Arsenic**	Barium	Beryllium	Boron**	Cadmium**	Chromium** ¹	Cobalt	Copper**	Iron	Lead**	Manganese* *	Mercury** ²	Nickel**	Selenium**	Vanadium	Zinc**	
LOR	0.001	0.001	0.001	0.05	0.0001	0.001	0.001	0.001	0.05	0.001	0.001	0.0001	0.001	0.01	0.01	0.005	
Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	
ANZECC 2000 Trigger Values	0.013	-	-	0.37	0.0002	0.001	-	0.0014	-	0.0034	1.9	0.0006	0.011	0.011	-	0.008	
NHMRC ADWG 6	0.01		0.06	4	0.002	0.05	-	2	0.3 ³	0.01	0.5	0.001	0.02	0.01	-	3 ³	
Sample Name	Sample Date																
BH1	15-Mar-19	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.004	< 0.001	< 0.001	13	< 0.001	0.014	< 0.0001	< 0.001	< 0.01	< 0.01	1.27
	23-Apr-19	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.004	< 0.001	0.002	10	0.001	0.015	< 0.0001	0.002	< 0.01	< 0.01	0.363
	16-May-19	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	< 0.001	8.33	< 0.001	0.009	< 0.0001	0.002	< 0.01	< 0.01	0.132
BH2	22-Feb-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.002	0.14	< 0.001	0.021	< 0.0001	0.015	< 0.01	< 0.01	0.006
	15-Mar-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.003	< 0.05	< 0.001	0.02	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	23-Apr-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.004	0.19	< 0.001	0.018	< 0.0001	0.001	< 0.01	< 0.01	0.008
BH3	16-May-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.001	0.06	< 0.001	0.014	< 0.0001	0.001	< 0.01	< 0.01	< 0.005
	21-Feb-19	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.06	< 0.001	0.005	< 0.0001	0.053	< 0.01	< 0.01	< 0.005
	21-Feb-19	< 0.001	0.014	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.002	0.16	< 0.001	0.039	< 0.0001	0.018	< 0.01	< 0.01	0.014
BH4	15-Mar-19	< 0.001	0.014	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.001	< 0.05	< 0.001	0.014	< 0.0001	0.022	< 0.01	< 0.01	0.043
	23-Apr-19	< 0.001	0.013	< 0.001	0.05	< 0.0001	< 0.001	< 0.001	0.002	0.99	< 0.001	0.045	< 0.0001	0.007	< 0.01	< 0.01	0.008
	16-May-19	< 0.001	0.013	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.027	< 0.001	< 0.001	0.022	< 0.0001	0.022	< 0.01	< 0.01	0.011
BH5	22-Feb-19	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	1.4	< 0.001	0.005	< 0.0001	0.003	< 0.01	< 0.01	0.008
BH6	22-Feb-19	< 0.001	0.03	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	1.03	< 0.001	0.014	< 0.0001	0.001	< 0.01	< 0.01	0.019
	14-Mar-19	< 0.001	0.027	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	1.9	< 0.001	0.01	< 0.0001	< 0.001	< 0.01	< 0.01	0.012
	23-Apr-19	< 0.001	0.03	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.001	0.96	< 0.001	0.01	< 0.0001	< 0.001	< 0.01	< 0.01	0.022
BH7	16-May-19	< 0.001	0.029	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	2.57	< 0.001	0.009	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	22-Feb-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.002	0.003	< 0.001	1.8	< 0.001	0.026	< 0.0001	0.004	< 0.01	< 0.01	0.019
	14-Mar-19	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
BH8	23-Apr-19	< 0.001	0.012	< 0.001	< 0.05	< 0.0001	0.002	0.003	< 0.001	2.0	< 0.001	0.026	< 0.0001	0.004	< 0.01	< 0.01	0.01
	16-May-19	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.002	0.003	< 0.001	2.32	< 0.001	0.035	< 0.0001	0.005	< 0.01	< 0.01	0.013
	21-Feb-19	0.001 *	0.011	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.006
BH11	14-Mar-19	< 0.001	0.006	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	3.25	< 0.001	0.008	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
	23-Apr-19	0.001	0.008	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	3.2	< 0.001	0.009	< 0.0001	0.002	< 0.01	< 0.01	0.008
	16-May-19	0.003	0.01	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	3.0	< 0.001	0.01	< 0.0001	0.003	< 0.01	< 0.01	< 0.005
MW239S	21-Feb-19	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.002	0.001	< 0.001	0.26	< 0.001	0.003	< 0.0001	0.005	< 0.01	< 0.01	0.031
	15-Mar-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	1.49	< 0.001	0.007	< 0.0001	0.037	< 0.01	< 0.01	0.016
	23-Apr-19	< 0.001	0.006	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.98	< 0.001	0.007	< 0.0001	0.07	< 0.01	< 0.01	0.04
SW1	16-May-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.97	< 0.001	0.006	< 0.0001	0.004	< 0.01	< 0.01	0.024
	22-Feb-19	< 0.001	0.007	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	1.11	< 0.001	0.003	< 0.0001	0.001	< 0.01	< 0.01	0.006
	14-Mar-19	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	1.25	< 0.001	0.005	< 0.0001	0.005	< 0.01	< 0.01	0.008
SW3	23-Apr-19	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	1.01	< 0.001	0.004	< 0.0001	0.004	< 0.01	< 0.01	0.007
	16-May-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.87	< 0.001	0.003	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
	23-Apr-19	< 0.001	0.043	< 0.001	< 0.05	< 0.0001	< 0.001	0.003	0.001	2.01	< 0.001	0.046	< 0.0001	0.004	< 0.01	< 0.01	0.016
SW4	16-May-19	< 0.001	0.034	< 0.001	< 0.05	< 0.0001	< 0.001	0.002	< 0.001	1.78	< 0.001	0.038	< 0.0001	0.003	< 0.01	< 0.01	0.012
	23-Apr-19	< 0.001	0.059	< 0.001	< 0.05	< 0.0001	< 0.001	0.003	0.003	2.09	< 0.001	0.037	< 0.0001	0.005	< 0.01	< 0.01	0.03
	16-May-19	< 0.001	0.047	< 0.001	< 0.05	< 0.0001	< 0.001	0.002	< 0.001	1.12	< 0.001	0.03	< 0.0001	0.003	< 0.01	< 0.01	0.019

Notes:
 -- Not analysed
 < - Less than laboratory limit of reporting
 mg/L - Milligrams per litre
Bold indicates a detection above the laboratory limit of reporting
 "*" denotes duplicate/triplicate sample result adopted for analytical use due to RPD > 50%
 RPD - Relative Percentage Difference

** 95% Level of protection in freshwater

¹ value for CR VI

² as inorganic

Table 2
Groundwater Analytical Data - Metals
Williamtown Sand Syndicate



³ Aesthetic

Notes:
 - - Not analysed
 < - Less than laboratory limit of reporting
 µg/L - Micrograms per litre
 *** 99% Level of protection in freshwater
 * Recreation water

Table 4
Groundwater Analytical Data - Inorganics
Wellington Sand Syndrome



Analyte	Anions and Cations										Alkalinity										Inorganics		pH							
	Sodium	Calcium	Magnesium	Potassium	Sulphate	Chloride	Fluoride	Reactive phosphorus as P	Total Phosphorus	Nitrite as N	Nitrate as N	Nitrite + Nitrate as N	Ammonia as N	Total Nitrogen as N	Total Kjeldahl Nitrogen as N	Total Cations	Total Anions	Ionic Balance %	Sodium Adsorption Ratio	Bicarbonate Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Hydroxide Alkalinity as CaCO3		Total Alkalinity as CaCO3	Total Hardness as CaCO3	Electrical conductivity @ 25°C*	Total Dissolved Solids	Total Dissolved Solids		
LOR Units	1	1	1	1	1	1	0.1	0.01	0.01	0.01	0.01	0.01	0.01	0.1	0.1	0.01	0.01	%	0.01	1	1	1	1	1	1	1	10	0.01		
ANZECC 2000 Trigger Values								0.02*	0.02*		0.25*	0.25*	0.25*	0.25*	0.25*									125-2200	600*					
NHMRC ADWS 6	180*				270*		1.5			3	50		0.5*											200*						
Sample Name	Sample Date																													
BH1	15-Mar-19	11	2.0	1.0	<1.0	<1.0	25	<0.1	-	-	-	-	-	-	-	0.66	0.88	-	-	9.0	<1.0	<1.0	9.0	104	68	129	5.67			
	23-Apr-19	14	1.0	2.0	<1.0	<1.0	4.0	<0.1	-	-	-	-	-	-	-	0.82	0.99	<1.0	-	10	<1.0	<1.0	10	64	95	84	5.83			
	16-May-19	12	<1.0	2.0	<1.0	<1.0	5.0	25	<0.1	0.03	<0.01	<0.01	<0.01	0.11	0.3	0.3	0.69	1.01	-	1.7	10	<1.0	<1.0	10	8.0	105	68	5.83		
	22-Feb-19	12	2.0	2.0	<1.0	<1.0	6.0	22	0.1	<0.01	2.76	2.76	0.05	6.0	1.2	0.79	0.74	-	1.44	<1.0	<1.0	<1.0	<1.0	91	128	487	4.87			
	15-May-19	10	3.0	2.0	<1.0	<1.0	7.0	23	<0.1	-	-	-	-	-	-	-	0.75	0.79	-	-	<1.0	<1.0	<1.0	<1.0	16	101	66	90	4.71	
BH2	23-Apr-19	14	2.0	2.0	<1.0	<1.0	6.0	23	<0.1	-	-	-	-	-	-	-	0.87	0.77	-	-	<1.0	<1.0	<1.0	<1.0	13	70	46	84	4.82	
	16-May-19	12	2.0	2.0	<1.0	<1.0	21	22	<0.01	0.26	<0.01	0.38	0.38	0.01	1.3	0.9	0.79	1.06	-	1.44	<1.0	<1.0	<1.0	<1.0	13	94	61	244	4.85	
	21-Feb-19	4.0	4.0	1.0	<1.0	<1.0	4.0	19	<0.1	0.76	<0.01	0.78	0.78	0.3	5.9	5.1	0.46	0.54	-	0.46	9.0	<1.0	<1.0	9.0	14	60	439	5.55		
	21-Feb-19	8.0	2.0	1.0	1.0	5.0	17	<0.1	<0.01	0.19	<0.01	0.35	0.35	0.04	0.6	0.3	0.56	0.7	-	1.15	6.0	<1.0	<1.0	6.0	9.0	73	96	5.4		
	15-May-19	9.0	2.0	<1.0	<1.0	5.0	18	<0.1	-	-	-	-	-	-	-	-	0.49	0.61	-	-	<1.0	<1.0	<1.0	<1.0	5.0	77	50	70	5.12	
BH4	23-Apr-19	10	2.0	1.0	1.0	3.0	19	<0.1	-	-	-	-	-	-	-	-	0.64	0.6	-	-	<1.0	<1.0	<1.0	<1.0	5.0	54	35	61	5.05	
	16-May-19	9.0	3.0	1.0	1.0	22	19	<0.1	<0.01	0.97	<0.01	0.29	0.29	<0.01	1.0	0.7	0.6	0.99	-	1.3	<1.0	<1.0	<1.0	<1.0	6.0	73	47	100	4.99	
	22-Feb-19	42	<1.0	6.0	1.0	19	69	0.2	<0.01	0.34	<0.01	<0.01	<0.01	0.09	3.0	3.0	2.35	2.34	-	3.59	<1.0	<1.0	<1.0	<1.0	25	250	211	4.87		
	22-Feb-19	28	3.0	4.0	1.0	28	42	<0.1	<0.01	0.05	<0.01	0.09	0.09	0.14	0.5	0.4	1.72	1.77	-	2.49	<1.0	<1.0	<1.0	<1.0	24	177	144	4.37		
	14-Mar-19	23	2.0	4.0	1.0	17	37	<0.1	-	-	-	-	-	-	-	-	1.46	1.44	-	-	3.0	<1.0	<1.0	<1.0	3.0	21	179	116	4.95	
BH6	23-Apr-19	25	3.0	4.0	1.0	18	42	<0.1	-	-	-	-	-	-	-	-	1.59	1.56	-	-	<1.0	<1.0	<1.0	<1.0	24	136	88	115	4.64	
	16-May-19	23	3.0	4.0	1.0	18	48	<0.1	<0.01	0.13	<0.01	<0.01	<0.01	0.14	0.6	0.6	1.5	1.64	-	2.04	<1.0	<1.0	<1.0	<1.0	24	175	114	214	4.88	
	22-Feb-19	34	<1.0	5.0	2.0	12	64	0.2	<0.01	0.13	<0.01	0.02	0.02	0.34	2.2	2.2	1.84	2.06	-	3.16	<1.0	<1.0	<1.0	<1.0	20	213	196	-	4.76	
	14-Mar-19	36	<1.0	6.0	2.0	16	61	<0.1	-	-	-	-	-	-	-	-	2.11	2.05	1.37	-	<1.0	<1.0	<1.0	<1.0	25	271	176	212	4.73	
	23-Apr-19	38	<1.0	6.0	2.0	17	62	<0.1	-	-	-	-	-	-	-	-	2.5	2.1	-	-	<1.0	<1.0	<1.0	<1.0	25	265	133	185	4.81	
BH7	16-May-19	35	<1.0	5.0	2.0	15	68	0.2	<0.01	0.05	<0.01	<0.01	<0.01	0.27	0.9	0.9	1.98	2.23	-	3.26	<1.0	<1.0	<1.0	<1.0	20	235	153	310	4.87	
	21-Feb-19	52	<1.0	6.0	<1.0	11	90	<0.1	<0.01	1.97	<0.01	<0.01	<0.01	0.5	2.4	2.4	2.76	2.77	-	4.44	<1.0	<1.0	<1.0	<1.0	25	352	258	-	4.46	
	14-Mar-19	45	<1.0	6.0	<1.0	6.0	76	<0.1	-	-	-	-	-	-	-	-	2.45	2.27	-	-	<1.0	<1.0	<1.0	<1.0	25	319	207	253	4.77	
	23-Apr-19	53	<1.0	7.0	<1.0	6.0	80	<0.1	-	-	-	-	-	-	-	-	2.88	2.68	-	-	<1.0	<1.0	<1.0	<1.0	25	264	172	233	4.76	
	16-May-19	47	<1.0	4.0	<1.0	6.0	81	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01	0.12	0.4	0.4	2.37	2.43	-	4.86	1.0	<1.0	<1.0	<1.0	16	302	196	354	4.9	
BH11	21-Feb-19	46	<1.0	10	<1.0	24	80	0.1	<0.01	0.03	<0.01	0.04	0.04	0.04	1.8	1.8	2.91	2.76	-	3.21	<1.0	<1.0	<1.0	<1.0	41	346	278	4.67		
	15-May-19	26	<1.0	2.0	<1.0	2.0	52	<0.1	-	-	-	-	-	-	-	-	1.3	1.51	-	-	<1.0	<1.0	<1.0	<1.0	8.0	186	121	144	4.82	
	23-Apr-19	32	<1.0	5.0	<1.0	2.0	97	<0.1	-	-	-	-	-	-	-	-	1.8	1.65	-	-	<1.0	<1.0	<1.0	<1.0	20	150	98	135	4.99	
	16-May-19	29	<1.0	4.0	<1.0	2.0	95	<0.1	<0.01	0.01	<0.01	<0.01	<0.01	0.12	0.4	0.4	1.59	1.59	-	3.0	<1.0	<1.0	<1.0	<1.0	16	188	122	216	4.91	
	22-Feb-19	61	<1.0	6.0	<1.0	6.0	104	<0.1	<0.01	0.56	<0.01	<0.01	<0.01	0.18	3.9	3.9	3.15	3.06	1.43	5.21	<1.0	<1.0	<1.0	<1.0	25	329	234	4.89		
MW2395	14-Mar-19	64	<1.0	6.0	<1.0	2.0	126	<0.1	-	-	-	-	-	-	-	-	3.28	3.64	5.18	-	2.0	<1.0	<1.0	<1.0	2.0	25	410	266	232	5.02
	23-Apr-19	64	<1.0	7.0	1.0	9.0	97	<0.1	-	-	-	-	-	-	-	-	3.38	2.92	7.32	-	<1.0	<1.0	<1.0	<1.0	29	294	191	208	4.92	
	16-May-19	52	<1.0	6.0	<1.0	13	88	<0.1	<0.01	0.43	<0.01	<0.01	<0.01	0.09	1.7	1.7	2.76	2.75	-	4.44	<1.0	<1.0	<1.0	<1.0	25	327	212	320	4.87	
	23-Apr-19	94	34	34	32	6.0	310	95	0.5	-	-	-	-	-	-	-	10	9.13	5.96	-	<1.0	<1.0	<1.0	<1.0	299	893	580	787	4.91	
	16-May-19	86	24	42	6.0	324	112	0.3	<0.01	0.13	<0.01	<0.01	<0.01	<0.01	1.8	1.8	8.94	9.9	5.13	2.45	<1.0	<1.0	<1.0	<1.0	233	947	616	715	4.6	
DW1	22-Feb-19	49	6.0	4.0	1.0	16	82	<0.1	<0.01	0.06	<0.01	<0.01	<0.01	0.16	1.0	1.0	2.97	2.87	-	3.38	1.1	<1.0	<1.0	1.1	26	262	228	-	6.21	
	14-Mar-19	45	6.0	6.0	2.0	44	64	<0.1	-	-	-	-	-	-	-	-	2.8	2.8	-	-	4.0	<1.0	<1.0	<1.0	6.0	24	344	224	279	5.42
	23-Apr-19	37	6.0	6.0	1.0	42	53	<0.1	-	-	-	-	-	-	-	-	2.53	2.37	-	-	<1.0	<1.0	<1.0	<1.0	1.0	143	190	190	5.2	
	16-May-19	35	7.0	9.0	<1.0	34	54	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01	0.1	0.1	0.1	2.29	2.25	-	3.47	1.0	<1.0	<1.0	<1.0	18	271	176	300	5.24	
	23-Apr-19	39	6.0	5.0	<1.0	60	64	0.1	-	-	-	-	-	-	-	-	2.36	2.34	3.05	13	<1.0	<1.0	<1.0	<1.0	33	293	190	198	4.0	
DW4	16-May-19	41	5.0	5.0	<1.0	41	59	<0.1	0.01	<0.01	<0.01	0.05	0.05	<0.01	0.2	0.2	2.42	2.45	-	3.1	<1.0	<1.0	<1.0	<1.0	33	311	215	288	4.08	

Notes:
 -- Not analysed
 < - Less than laboratory limit of reporting
 LOR - Laboratory limit of reporting
 mg/L - Milligrams per litre
 µS/cm - Microsiemens per centimeter
 Bold indicates a detection above the laboratory limit of reporting
 * 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)
 ** 95% Level of protection in freshwater
 † Acute

Table 5
Quality Control Sample Analysis - BTEXN
Willamtown Sand Syndicate



Analyte	BTEXN								Total Petroleum Hydrocarbons					Total Petroleum Hydrocarbons - Silica Clean up				Total Recoverable Hydrocarbons					Total Recoverable Hydrocarbons - Silica Clean up						
	Benzene	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene	Total Xylenes	Naphthalene	Sum of BTEX	C ₆ - C ₈	C ₉ - C ₁₀	C ₁₁ - C ₁₄	C ₁₅ - C ₁₈	C ₁₉ - C ₂₄ sum	C ₁₀ -C ₁₄ - Silica Cleanup	C ₁₅ -C ₁₈ - Silica Cleanup	C ₁₉ -C ₂₄ - Silica Cleanup	C ₂₅ -C ₃₀ Sum - Silica Cleanup	C ₆ - C ₈	C ₉ - C ₁₀ minus BTEX (F1)	>C ₁₀ - C ₁₄	minus Naphthalene	>C ₁₄ - C ₁₄	>C ₁₈ - C ₁₈	>C ₁₀ -C ₁₄ - Silica Cleanup	P2 - Silica Cleanup	>C ₁₀ -C ₁₄ - Silica Cleanup	>C ₁₉ -C ₂₄ - Silica Cleanup	>C ₂₅ -C ₃₀ - Silica Cleanup	
Sample Name	Units	Sample Date	Sample Type	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
TRIP BLANK 11022019	13-Feb-19	Trip Blank	<1.0	<2.0	<2.0	<2.0	<2.0	<5.0	<1.0	<20	-	-	-	<50	<100	<50	<50	<20	<20	-	-	-	-	<100	<100	<100	<100	<100	
RUNGATED1 21022019	21-Feb-19	Rinate	<1.0	<2.0	<2.0	<2.0	<2.0	<5.0	<1.0	<20	-	-	-	<50	<100	<50	<50	<20	<20	-	-	-	-	<100	<100	<100	<100	<100	
BH6 21022019	21-Feb-19	Primary	<1.0	<2.0	<2.0	<2.0	<2.0	<5.0	<1.0	<20	-	-	-	<50	<100	<50	<50	<20	<20	-	-	-	-	<100	<100	<100	<100	<100	
DUPO1 21022019	21-Feb-19	Duplicate	<1.0	<2.0	<2.0	<2.0	<2.0	<5.0	<1.0	<20	-	-	-	<50	<100	<50	<50	<20	<20	-	-	-	-	<100	<100	<100	<100	<100	
Relative Percentage Difference	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	
BH6 21022019	21-Feb-19	Primary	<1.0	<2.0	<2.0	<2.0	<2.0	<5.0	<1.0	<20	-	-	-	<50	<100	<50	<50	<20	<20	-	-	-	-	<100	<100	<100	<100	<100	
TRIPBL 21022019	21-Feb-19	Triplicate	<1.0	<1.0	<1.0	<2.0	<1.0	<3.0	<1.0	<20	<50	<100	<100	<50	<100	<100	<400	<20	<20	<50	<50	<100	<100	<100	<100	<100	<100		
Relative Percentage Difference	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	
TRIP BLANK 130319	13-Mar-19	Trip Blank	<1.0	<2.0	<2.0	<2.0	<2.0	<5.0	<1.0	<20	-	-	-	<50	<100	<50	<50	<20	<20	-	-	-	-	<100	<100	<100	<100	<100	
RUNGATED2 140319	14-Mar-19	Rinate	<1.0	<2.0	<2.0	<2.0	<2.0	<5.0	<1.0	<20	-	-	-	<50	<100	<50	<50	<20	<20	-	-	-	-	<100	<100	<100	<100	<100	
BH7 140319	14-Mar-19	Primary	<1.0	<2.0	<2.0	<2.0	<2.0	<5.0	<1.0	<20	-	-	-	<50	<100	<50	<50	<20	<20	-	-	-	-	<100	<100	<100	<100	<100	
DUPO2 140319	14-Mar-19	Duplicate	<1.0	<2.0	<2.0	<2.0	<2.0	<5.0	<1.0	<20	-	-	-	<50	<100	<50	<50	<20	<20	-	-	-	-	<100	<100	<100	<100	<100	
Relative Percentage Difference	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	

Notes:
 - - Not analysed
 < - Less than laboratory limit of reporting
 NC - Not calculated
 µg/L - Micrograms per litre
 BTEXN - Benzene, toluene, ethylbenzene, xylenes, naphthalene

Table 6
Quality Control Sample Analysis - Metals
Williamstown Sand Syndicate



Analyte			Metals																
			Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Chromium VI	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Nickel	Selenium	Vanadium	Zinc
Units			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Name	Sample Date	Sample Type																	
TRIP BLANK_13022019	13-Feb-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATED01_21022019	21-Feb-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH8_21022019	21-Feb-19	Primary	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.005
DUP01_21022019	21-Feb-19	Duplicate	0.001	0.014	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.09	< 0.001	0.012	< 0.0001	0.003	< 0.01	< 0.01	0.015
Relative Percentage Difference			67%	24%	NC	NC	NC	0%	NC	NC	0%	NC	0%	NC	40%	NC	NC	NC	100%
BH8_21022019	21-Feb-19	Primary	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.005
TRIP01_21022019	21-Feb-19	Triplicate	0.001	< 0.02	< 0.001	< 0.05	< 0.0002	< 0.005	< 0.005	< 0.001	< 0.001	4.5	< 0.001	0.012	< 0.0001	0.003	-	< 0.005	0.006
Relative Percentage Difference			67%	10%	NC	NC	NC	86%	NC	NC	NC	9%	NC	0%	NC	40%	NC	NC	18%
TRIP BLANK_130319	13-Mar-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001		< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
TRIP BLANK02_150319	15-Mar-19	Trip Blank	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	< 0.001		< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE02_140319	14-Mar-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001		< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH7_140319	14-Mar-19	Primary	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001		0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
DUP02_140319	14-Mar-19	Duplicate	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001		0.002	< 0.001	2.51	< 0.001	0.021	< 0.0001	0.004	< 0.01	< 0.01	0.007
Relative Percentage Difference			NC	0%	NC	NC	NC	0%		40%	NC	33%	NC	5%	NC	0%	NC	NC	25%
BH7_140319	14-Mar-19	Primary	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001		0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
TRIP02_14032019	14-Mar-19	Triplicate	< 0.001	< 0.02	< 0.001	< 0.05	< 0.0002	0.001		0.002	< 0.001	1.7	< 0.001	0.019	< 0.0001	< 0.001	-	< 0.005	< 0.005
Relative Percentage Difference			NC	0%	NC	NC	NC	0%		40%	NC	6%	NC	5%	NC	156%	NC	NC	113%

Notes:
 - - Not analysed
 < - Less than laboratory limit of reporting
 NC - Not calculated
 mg/L - Milligrams per litre
 Half the laboratory limit of reporting used when calculating RPD
 RPD - Relative Percentage Difference

Notes:
 < - Less than laboratory limit of reporting
 NC - Not calculated
 µg/L - Micrograms per litre

ATTACHMENT A: LABORATORY REPORTS

CERTIFICATE OF ANALYSIS

Work Order : **ES1914860**
Client : **KLEINFELDER AUSTRALIA PTY LTD**
Contact : DANIEL KOUSBROEK
Address : 95 MITCHELL ROAD
 CARDIFF NSW 2285
Telephone : ----
Project : 20193820
Order number :
C-O-C number : ----
Sampler : DANIEL KOUSBROEK
Site : WSS-CABBAGE TREE RO WATER MONITORING
Quote number : ME/114/19
No. of samples received : 13
No. of samples analysed : 13

Page : 1 of 18
Laboratory : Environmental Division Sydney
Contact : Shirley LeCornu
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +6138549 9630
Date Samples Received : 16-May-2019 16:31
Date Analysis Commenced : 17-May-2019
Issue Date : 23-May-2019 15:47



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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini		Sydney Organics, Smithfield, NSW
Sanjeshni Jyoti	Senior Chemist Volatiles	Sydney Organics, Smithfield, NSW



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

ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- TDS by method EA-015 may bias high for various samples due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- EK071G: It has been noted that Reactive P is greater than Total P on sample No 7, however this difference is within the limits of experimental variation.
- 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

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID				
Client sampling date / time				BH8	BH7	BH6	MW239S	SW3
16-May-2019 00:00				16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00
Compound	CAS Number	LOR	Unit	ES1914860-001	ES1914860-002	ES1914860-003	ES1914860-004	ES1914860-005
Result				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	4.90	4.87	4.88	4.87	5.24
EA006: Sodium Adsorption Ratio (SAR)								
^ Sodium Adsorption Ratio	----	0.01	-	4.86	3.26	2.04	4.44	2.47
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	302	235	175	327	271
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	354	310	214	320	300
EA016: Calculated TDS (from Electrical Conductivity)								
Total Dissolved Solids (Calc.)	----	1	mg/L	196	153	114	212	176
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	312	29	106	371	14
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	16	20	24	25	38
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	1	<1	<1	<1	1
Total Alkalinity as CaCO3	----	1	mg/L	1	<1	<1	<1	1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	6	15	18	13	34
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	81	68	45	88	54
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	<1	<1	3	<1	7
Magnesium	7439-95-4	1	mg/L	4	5	4	6	5
Sodium	7440-23-5	1	mg/L	47	35	23	52	35
Potassium	7440-09-7	1	mg/L	<1	2	1	<1	<1
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	0.003	<0.001	<0.001	<0.001	<0.001
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Barium	7440-39-3	0.001	mg/L	0.010	0.008	0.029	0.005	0.034
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH8	BH7	BH6	MW239S	SW3
Client sampling date / time					16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00
Compound	CAS Number	LOR	Unit		ES1914860-001	ES1914860-002	ES1914860-003	ES1914860-004	ES1914860-005
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued									
Cobalt	7440-48-4	0.001	mg/L		<0.001	0.003	<0.001	<0.001	0.002
Chromium	7440-47-3	0.001	mg/L		0.001	0.002	<0.001	0.002	<0.001
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L		0.010	0.035	0.009	0.003	0.038
Nickel	7440-02-0	0.001	mg/L		0.003	0.005	<0.001	0.002	0.003
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L		<0.005	0.013	<0.005	<0.005	0.012
Iron	7439-89-6	0.05	mg/L		3.00	2.32	2.57	0.87	1.78
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		<0.1	0.2	<0.1	<0.1	<0.1
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		0.12	0.27	0.14	0.09	<0.01
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		0.4	0.9	0.6	1.7	0.1
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		0.4	0.9	0.6	1.7	0.1
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		<0.01	0.06	0.13	0.43	<0.01
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		2.43	2.23	1.64	2.75	2.25
ø Total Cations	----	0.01	meq/L		2.37	1.98	1.50	2.76	2.28



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH8	BH7	BH6	MW239S	SW3
Client sampling date / time					16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00
Compound	CAS Number	LOR	Unit		ES1914860-001	ES1914860-002	ES1914860-003	ES1914860-004	ES1914860-005
					Result	Result	Result	Result	Result
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	<50
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				BH8	BH7	BH6	MW239S	SW3
Client sampling date / time				16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00
Compound	CAS Number	LOR	Unit	ES1914860-001	ES1914860-002	ES1914860-003	ES1914860-004	ES1914860-005
				Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued								
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	----	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	----	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	----	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	<0.02	----	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	<0.02	----	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	----	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	<0.01	----	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	----	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	----	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	----	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	----	<0.02
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	----	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	----	<0.05
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	----	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	----	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	----	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	----	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<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	----	<0.02



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH8	BH7	BH6	MW239S	SW3
Client sampling date / time					16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00
Compound	CAS Number	LOR	Unit		ES1914860-001	ES1914860-002	ES1914860-003	ES1914860-004	ES1914860-005
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<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	----	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<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	----	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<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	----	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	----	<0.01
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		103	115	110	119	107
Toluene-D8	2037-26-5	2	%		95.8	110	119	119	102
4-Bromofluorobenzene	460-00-4	2	%		95.1	106	108	111	98.3
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		93.7	95.4	96.9	----	99.7
13C8-PFOA	----	0.02	%		92.3	94.4	89.4	----	106



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH11	BH1	BH2	BH4	SW1
Client sampling date / time					16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00
Compound	CAS Number	LOR	Unit		ES1914860-006	ES1914860-007	ES1914860-008	ES1914860-009	ES1914860-010
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		4.91	5.82	4.85	4.99	4.60
EA006: Sodium Adsorption Ratio (SAR)									
^ Sodium Adsorption Ratio	----	0.01	-		3.00	1.70	1.44	1.30	2.45
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		188	105	94	73	947
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		216	164	144	100	715
EA016: Calculated TDS (from Electrical Conductivity)									
Total Dissolved Solids (Calc.)	----	1	mg/L		122	68	61	47	616
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		156	80	111	44	59
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		16	8	13	9	233
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		<1	10	<1	<1	<1
Total Alkalinity as CaCO3	----	1	mg/L		<1	10	<1	<1	<1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		2	5	21	22	324
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		55	25	22	19	112
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		<1	<1	2	2	24
Magnesium	7439-95-4	1	mg/L		4	2	2	1	42
Sodium	7440-23-5	1	mg/L		29	12	12	9	86
Potassium	7440-09-7	1	mg/L		<1	<1	<1	1	6
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	<0.05	<0.05	0.10
Barium	7440-39-3	0.001	mg/L		0.005	0.002	0.004	0.013	0.029
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH11	BH1	BH2	BH4	SW1
Client sampling date / time					16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00
Compound	CAS Number	LOR	Unit		ES1914860-006	ES1914860-007	ES1914860-008	ES1914860-009	ES1914860-010
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued									
Cobalt	7440-48-4	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	0.010
Chromium	7440-47-3	0.001	mg/L		0.002	0.003	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	0.001	<0.001	0.003
Manganese	7439-96-5	0.001	mg/L		0.006	0.009	0.014	0.022	0.666
Nickel	7440-02-0	0.001	mg/L		0.004	0.002	0.001	0.022	0.012
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L		0.024	0.132	<0.005	0.011	0.077
Iron	7439-89-6	0.05	mg/L		0.97	8.33	0.06	0.27	7.25
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		<0.1	<0.1	<0.1	<0.1	0.3
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		0.12	0.11	0.01	<0.01	<0.01
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<0.01	<0.01	0.38	0.29	<0.01
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	<0.01	0.38	0.29	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		0.4	0.3	0.9	0.7	1.8
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		0.4	0.3	1.3	1.0	1.8
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		0.01	<0.01	0.26	0.97	0.13
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	0.03	<0.01	<0.01	<0.01
EN055: Ionic Balance									
Ø Total Anions	----	0.01	meq/L		1.59	1.01	1.06	0.99	9.90
Ø Total Cations	----	0.01	meq/L		----	----	----	----	8.94



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH11	BH1	BH2	BH4	SW1
Client sampling date / time					16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00
Compound	CAS Number	LOR	Unit		ES1914860-006	ES1914860-007	ES1914860-008	ES1914860-009	ES1914860-010
					Result	Result	Result	Result	Result
EN055: Ionic Balance - Continued									
∅ Total Cations	----	0.01	meq/L		1.59	0.69	0.79	0.60	----
∅ Ionic Balance	----	0.01	%		----	----	----	----	5.13
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	<50
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		----	----	----	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		----	----	----	<0.02	<0.02



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID				
Client sampling date / time				BH11	BH1	BH2	BH4	SW1
Compound				CAS Number	LOR	Unit		
				ES1914860-006	ES1914860-007	ES1914860-008	ES1914860-009	ES1914860-010
				Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued								
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	----	----	----	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	----	----	----	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	----	----	----	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	----	----	----	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	----	----	----	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	----	----	----	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	----	----	----	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	----	----	----	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	----	----	----	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	----	----	----	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	----	----	----	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	----	----	----	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	----	----	----	<0.02	<0.02
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	----	----	----	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	----	----	----	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	----	----	----	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	----	----	----	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	----	----	----	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	----	----	----	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	----	----	----	<0.05	<0.05



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH11	BH1	BH2	BH4	SW1
Client sampling date / time					16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00
Compound	CAS Number	LOR	Unit		ES1914860-006	ES1914860-007	ES1914860-008	ES1914860-009	ES1914860-010
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		----	----	----	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		----	----	----	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		----	----	----	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		----	----	----	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		----	----	----	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		----	----	----	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		----	----	----	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		----	----	----	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		----	----	----	<0.01	<0.01
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		103	117	106	102	125
Toluene-D8	2037-26-5	2	%		91.6	115	100	99.2	120
4-Bromofluorobenzene	460-00-4	2	%		95.9	108	101	94.8	114
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		----	----	----	97.3	97.0
13C8-PFOA	----	0.02	%		----	----	----	99.9	96.8



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW4	RINSATE 04	TRIP BLANK 04	----	----
Client sampling date / time					16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1914860-011	ES1914860-012	ES1914860-013	-----	-----
					Result	Result	Result	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		4.08	----	----	----	----
EA006: Sodium Adsorption Ratio (SAR)									
^ Sodium Adsorption Ratio	----	0.01	-		3.10	----	----	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		331	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		288	----	----	----	----
EA016: Calculated TDS (from Electrical Conductivity)									
Total Dissolved Solids (Calc.)	----	1	mg/L		215	----	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		13	----	----	----	----
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		33	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		<1	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		<1	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		41	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		59	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		5	----	----	----	----
Magnesium	7439-95-4	1	mg/L		5	----	----	----	----
Sodium	7440-23-5	1	mg/L		41	----	----	----	----
Potassium	7440-09-7	1	mg/L		<1	----	----	----	----
EG020F: Dissolved Metals by ICP-MS									
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		0.047	<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	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW4	RINSATE 04	TRIP BLANK 04	----	----
Client sampling date / time					16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1914860-011	ES1914860-012	ES1914860-013	-----	-----
					Result	Result	Result	----	----
EG020F: Dissolved Metals by ICP-MS - Continued									
Cobalt	7440-48-4	0.001	mg/L		0.002	<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		0.030	<0.001	<0.001	----	----
Nickel	7440-02-0	0.001	mg/L		0.003	<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		0.019	<0.005	<0.005	----	----
Iron	7439-89-6	0.05	mg/L		1.12	<0.05	<0.05	----	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	----	----
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		<0.1	----	----	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		<0.01	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		0.05	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		0.05	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		0.2	----	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		0.2	----	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		<0.01	----	----	----	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		0.01	----	----	----	----
EN055: Ionic Balance									
Ø Total Anions	----	0.01	meq/L		2.52	----	----	----	----
Ø Total Cations	----	0.01	meq/L		2.44	----	----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW4	RINSATE 04	TRIP BLANK 04	----	----
Client sampling date / time					16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1914860-011	ES1914860-012	ES1914860-013	-----	-----
					Result	Result	Result	----	----
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
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	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	----	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>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	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	----	----
EP080: BTEXN									
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	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
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	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW4	RINSATE 04	TRIP BLANK 04	----	----
Client sampling date / time					16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1914860-011	ES1914860-012	ES1914860-013	-----	-----
					Result	Result	Result	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
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	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
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 (PFTTrDA)	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	----	----
EP231C: Perfluoroalkyl Sulfonamides									
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	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW4	RINSATE 04	TRIP BLANK 04	----	----
Client sampling date / time					16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1914860-011	ES1914860-012	ES1914860-013	-----	-----
					Result	Result	Result	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
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	----	----
EP231P: PFAS Sums									
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	----	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		115	110	102	----	----
Toluene-D8	2037-26-5	2	%		111	106	92.2	----	----
4-Bromofluorobenzene	460-00-4	2	%		105	104	93.2	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		92.3	102	96.1	----	----
13C8-PFOA	----	0.02	%		96.0	96.2	97.2	----	----



Surrogate Control Limits

Sub-Matrix: **WATER**

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

QUALITY CONTROL REPORT

Work Order	: ES1914860	Page	: 1 of 16
Client	: KLEINFELDER AUSTRALIA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Contact	: Shirley LeCornu
Address	: 95 MITCHELL ROAD CARDIFF NSW 2285	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +6138549 9630
Project	: 20193820	Date Samples Received	: 16-May-2019
Order number	:	Date Analysis Commenced	: 17-May-2019
C-O-C number	: ----	Issue Date	: 23-May-2019
Sampler	: DANIEL KOUSBROEK		
Site	: WSS-CABBAGE TREE RO WATER MONITORING		
Quote number	: ME/114/19		
No. of samples received	: 13		
No. of samples analysed	: 13		



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 Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjari	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini		Sydney Organics, Smithfield, NSW
Sanjeshni Jyoti	Senior Chemist Volatiles	Sydney Organics, Smithfield, NSW



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

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 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
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 2353639)									
ES1914928-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.01	7.04	0.427	0% - 20%
ES1914860-008	BH2	EA005-P: pH Value	----	0.01	pH Unit	4.85	4.75	2.08	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 2353635)									
ES1914858-007	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	860	859	0.119	0% - 20%
ES1914846-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	732	733	0.139	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 2353641)									
ES1914930-003	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	10700	10600	0.387	0% - 20%
ES1914860-008	BH2	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	94	94	0.00	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 2352249)									
ES1914805-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	2320	2260	2.44	0% - 20%
ES1914857-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	6850	6880	0.422	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 2352251)									
ES1914860-010	SW1	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	715	703	1.69	0% - 20%
ES1914930-044	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	808	826	2.26	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 2352248)									
ES1914805-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	69	56	20.3	0% - 50%
ES1914857-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	5	<5	0.00	No Limit
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 2352250)									
ES1914860-010	SW1	EA025H: Suspended Solids (SS)	----	5	mg/L	59	52	11.2	0% - 50%
ES1914930-044	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	111	112	0.897	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 2353637)									
ES1914846-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 2353637) - continued									
ES1914846-001	Anonymous	ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	186	186	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	186	186	0.00	0% - 20%
ES1914860-008	BH2	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	0.00	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2352241)									
ES1914831-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2490	2340	6.12	0% - 20%
ES1914860-004	MW239S	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	13	12	0.00	0% - 50%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2352244)									
ES1914860-010	SW1	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	324	283	13.3	0% - 20%
ES1914930-047	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	249	241	3.43	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 2352242)									
ES1914831-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	2750	2410	13.3	0% - 20%
ES1914860-004	MW239S	ED045G: Chloride	16887-00-6	1	mg/L	88	87	0.00	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 2355265)									
ES1914860-005	SW3	ED093F: Calcium	7440-70-2	1	mg/L	7	8	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	5	5	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	35	34	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.00	No Limit
ES1914692-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	4	4	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	2	2	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	326	327	0.413	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	8	8	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2355266)									
ES1914858-008	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	0.0698	0.0691	0.993	0% - 20%
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.018	0.017	0.00	0% - 50%
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	0.088	0.096	8.86	0% - 20%
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.009	0.009	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.013	0.013	0.00	0% - 50%
		EG020A-F: Copper	7440-50-8	0.001	mg/L	1.04	1.04	0.242	0% - 20%
		EG020A-F: Lead	7439-92-1	0.001	mg/L	0.088	0.085	2.71	0% - 20%
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	5.92	6.07	2.38	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.012	0.012	0.00	0% - 50%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	13.2	13.3	0.579	0% - 20%
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	0.02	0.03	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2355266) - continued									
ES1914858-008	Anonymous	EG020A-F: Iron	7439-89-6	0.05	mg/L	3.92	4.07	3.62	0% - 20%
ES1914860-005	SW3	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.034	0.032	4.22	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.038	0.035	9.49	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.012	0.012	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	1.78	1.77	0.00	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2360227)									
ES1914854-003	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.020	0.020	0.00	0% - 50%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.004	0.004	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.403	0.399	1.09	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.029	0.029	0.00	0% - 20%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.24	0.24	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.23	0.22	0.00	No Limit
ES1914854-019	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.014	0.014	0.00	0% - 50%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2360227) - continued									
ES1914854-019	Anonymous	EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.007	0.008	16.4	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2360230)									
ES1914860-013	TRIP BLANK 04	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
ES1915052-005	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.034	0.034	0.00	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.012	0.012	0.00	0% - 50%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 2355267)									
ES1914858-014	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG035F: Dissolved Mercury by FIMS (QC Lot: 2355267) - continued									
ES1914860-008	BH2	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 2360229)									
ES1914854-019	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 2353640)									
ES1914860-008	BH2	EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit
ES1914937-003	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 2355417)									
ES1914860-007	BH1	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.11	0.11	0.00	0% - 50%
ES1914844-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.01	0.02	0.00	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 2352240)									
ES1914831-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
ES1914860-004	MW239S	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 2355418)									
ES1914860-003	BH6	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
ES1914844-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	6.40	6.42	0.393	0% - 20%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 2355413)									
ES1914844-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.4	0.3	0.00	No Limit
ES1914860-008	BH2	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.9	0.9	0.00	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 2355414)									
ES1914854-003	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	1.15	1.04	9.37	0% - 20%
ES1914860-008	BH2	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.26	0.26	0.00	0% - 20%
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 2352243)									
ES1914860-010	SW1	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
ES1914860-004	MW239S	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2354333)									
ES1914845-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
ES1914860-004	MW239S	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2354333)									
ES1914845-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES1914860-004	MW239S	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 2354333)									
ES1914845-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.00	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP080: BTEXN (QC Lot: 2354333) - continued									
ES1914860-004	MW239S	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.00	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 2359754)									
ES1914860-001	BH8	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2359754)									
ES1914860-001	BH8	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2359754)									
ES1914860-001	BH8	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit

Page : 8 of 16
 Work Order : ES1914860
 Client : KLEINFELDER AUSTRALIA PTY LTD
 Project : 20193820



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2359754)									
ES1914860-001	BH8	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 2359754)									
ES1914860-001	BH8	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.00	No Limit



Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EA005P: pH by PC Titrator (QCLot: 2353639)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	99.0	98	102
				----	7 pH Unit	100	98	102
EA010P: Conductivity by PC Titrator (QCLot: 2353635)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2000 µS/cm	104	95	113
EA010P: Conductivity by PC Titrator (QCLot: 2353641)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2000 µS/cm	106	95	113
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 2352249)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	102	87	109
				<10	293 mg/L	122	66	126
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 2352251)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	105	87	109
				<10	293 mg/L	89.2	66	126
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 2352248)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	102	83	129
				<5	1000 mg/L	101	82	110
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 2352250)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	106	83	129
				<5	1000 mg/L	99.3	82	110
ED037P: Alkalinity by PC Titrator (QCLot: 2353637)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	81.0	81	111
				----	50 mg/L	84.4	70	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2352241)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	103	82	122
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2352244)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	98.3	82	122
ED045G: Chloride by Discrete Analyser (QCLot: 2352242)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	105	81	127
				<1	1000 mg/L	97.8	81	127
ED093F: Dissolved Major Cations (QCLot: 2355265)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	97.1	80	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	99.4	90	116
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	98.8	82	120
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	98.0	85	113



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EG020F: Dissolved Metals by ICP-MS (QCLot: 2355266)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	93.5	85	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	90.5	85	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	94.2	82	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	92.7	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	92.2	85	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	92.1	82	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	92.9	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	90.4	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	90.8	82	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	93.9	82	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	92.4	85	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	96.6	83	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	91.3	81	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	90.2	85	115
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	94.4	82	112
EG020F: Dissolved Metals by ICP-MS (QCLot: 2360227)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	97.5	85	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	89.5	85	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	97.1	82	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	99.1	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	95.4	85	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	94.7	82	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	97.5	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	97.1	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	102	82	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	101	82	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	99.2	85	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	93.8	83	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	101	81	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	93.7	85	115
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	93.2	82	112
EG020F: Dissolved Metals by ICP-MS (QCLot: 2360230)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	97.7	85	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	89.8	85	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	94.2	82	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	96.8	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	98.1	85	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	95.7	82	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	96.4	81	111



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EG020F: Dissolved Metals by ICP-MS (QCLot: 2360230) - continued								
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	95.8	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	96.7	82	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	98.4	82	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	90.6	85	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	97.9	83	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	98.0	81	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	93.3	85	115
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	98.4	82	112
EG035F: Dissolved Mercury by FIMS (QCLot: 2355267)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	94.4	83	105
EG035F: Dissolved Mercury by FIMS (QCLot: 2360229)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	94.8	83	105
EK040P: Fluoride by PC Titrator (QCLot: 2353640)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	89.4	82	116
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2355417)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	104	90	114
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2352240)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	104	82	114
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2355418)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	104	91	113
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2355413)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	89.3	69	101
				<0.1	1 mg/L	70.0	70	118
				<0.1	5 mg/L	99.2	74	118
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2355414)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	92.2	71	101
				<0.01	0.442 mg/L	82.4	72	108
				<0.01	1 mg/L	99.4	78	118
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2352243)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	90.6	85	117
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QCLot: 2352522)								
EP071SG: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	83.1	75	117
EP071SG: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	93.8	81	113
EP071SG: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	87.8	71	117
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 2352522)								
EP071SG: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	92.7	73	119
EP071SG: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	98.2	81	113



Sub-Matrix: **WATER**

Method: Compound				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%)	
							Low	High
CAS Number	LOR	Unit	Result					
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 2352522) - continued								
EP071SG: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	95.3	65	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2354333)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	93.1	75	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2354333)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	93.7	75	127
EP080: BTEXN (QCLot: 2354333)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	96.7	70	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	94.7	69	123
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	92.7	70	120
EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	10 µg/L	89.7	69	121
	106-42-3							
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	94.4	72	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	95.8	70	120
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2359754)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	94.8	70	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	111	70	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	103	70	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	96.4	70	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	92.0	70	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.5 µg/L	102	70	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2359754)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	104	70	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	110	70	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	106	70	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	108	70	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	109	70	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	109	70	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	108	70	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	118	70	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	117	70	130
EP231X: Perfluorotridecanoic acid (PFTriDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	121	70	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	108	70	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2359754)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	106	70	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	107	70	150
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	102	70	150
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	1.25 µg/L	102	70	150



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2359754) - continued								
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	95.0	70	150
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	107	70	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	98.8	70	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2359754)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	112	70	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	112	70	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	105	70	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	119	70	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery (%) MS	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number			Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2352241)							
ES1914831-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	# Not Determined	70	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2352244)							
ES1914860-010	SW1	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	# Not Determined	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 2352242)							
ES1914831-001	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	# Not Determined	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2355266)							
ES1914858-009	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	92.0	70	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	89.0	70	130
		EG020A-F: Barium	7440-39-3	1 mg/L	81.8	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	91.9	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	92.9	70	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	91.5	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	# Not Determined	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	94.2	70	130



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 2355266) - continued							
ES1914858-009	Anonymous	EG020A-F: Manganese	7439-96-5	1 mg/L	# Not Determined	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	93.7	70	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	92.8	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	# Not Determined	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2360227)							
ES1914854-002	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	108	70	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	98.2	70	130
		EG020A-F: Barium	7440-39-3	1 mg/L	104	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	102	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	99.9	70	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	103	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	104	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	118	70	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	99.6	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	105	70	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	103	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	104	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2360230)							
ES1914993-001	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	107	70	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	100	70	130
		EG020A-F: Barium	7440-39-3	1 mg/L	104	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	104	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	102	70	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	104	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	107	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	121	70	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	101	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	107	70	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	104	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	107	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 2355267)							
ES1914858-013	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	92.5	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 2360229)							
ES1914854-006	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	87.3	70	130
EK040P: Fluoride by PC Titrator (QCLot: 2353640)							
ES1914860-001	BH8	EK040P: Fluoride	16984-48-8	10 mg/L	74.2	70	130

Page : 15 of 16
 Work Order : ES1914860
 Client : KLEINFELDER AUSTRALIA PTY LTD
 Project : 20193820



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2355417)							
ES1914844-001	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	105	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2352240)							
ES1914831-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	103	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2355418)							
ES1914844-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	# Not Determined	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2355413)							
ES1914844-002	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	97.5	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2355414)							
ES1914854-006	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	90.0	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2352243)							
ES1914860-010	SW1	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	81.7	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2354333)							
ES1914845-001	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	84.1	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2354333)							
ES1914845-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	81.9	70	130
EP080: BTEXN (QCLot: 2354333)							
ES1914845-001	Anonymous	EP080: Benzene	71-43-2	25 µg/L	92.6	70	130
		EP080: Toluene	108-88-3	25 µg/L	92.2	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	92.9	70	130
		EP080: meta- & para-Xylene	108-38-3	25 µg/L	90.5	70	130
			106-42-3				
		EP080: ortho-Xylene	95-47-6	25 µg/L	95.6	70	130
		EP080: Naphthalene	91-20-3	25 µg/L	93.2	70	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2359754)							
ES1914860-001	BH8	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	100	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.5 µg/L	115	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	104	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	98.4	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	91.4	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.5 µg/L	99.8	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2359754)							
ES1914860-001	BH8	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	115	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	107	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	114	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	112	50	130



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2359754) - continued							
ES1914860-001	BH8	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	113	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	109	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	114	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	123	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	115	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5 µg/L	111	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	102	50	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2359754)							
ES1914860-001	BH8	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	104	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	110	50	150
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	98.0	50	150
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	1.25 µg/L	117	50	150
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	87.5	50	150
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	115	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	94.6	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2359754)							
ES1914860-001	BH8	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	111	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	118	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	114	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	116	50	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES1914860	Page	: 1 of 14
Client	: KLEINFELDER AUSTRALIA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Telephone	: +6138549 9630
Project	: 20193820	Date Samples Received	: 16-May-2019
Site	: WSS-CABBAGE TREE RO WATER MONITORING	Issue Date	: 23-May-2019
Sampler	: DANIEL KOUSBROEK	No. of samples received	: 13
Order number	:	No. of samples analysed	: 13

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers exist - please see following pages for full details.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO ₄ 2- by DA	ES1914860--010	SW1	Sulfate as SO ₄ - Turbidimetric	14808-79-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
ED041G: Sulfate (Turbidimetric) as SO ₄ 2- by DA	ES1914831--001	Anonymous	Sulfate as SO ₄ - Turbidimetric	14808-79-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
ED045G: Chloride by Discrete Analyser	ES1914831--001	Anonymous	Chloride	16887-00-6	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EG020F: Dissolved Metals by ICP-MS	ES1914858--009	Anonymous	Copper	7440-50-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EG020F: Dissolved Metals by ICP-MS	ES1914858--009	Anonymous	Manganese	7439-96-5	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EG020F: Dissolved Metals by ICP-MS	ES1914858--009	Anonymous	Zinc	7440-66-6	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EK059G: Nitrite plus Nitrate as N (NO _x) by Discrete Ar	ES1914844--001	Anonymous	Nitrite + Nitrate as N	----	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method		Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
BH8, BH6, SW3, BH1, BH4, SW4	BH7, MW239S, BH11, BH2, SW1,	----	----	----	17-May-2019	16-May-2019	1

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					



Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP) - Continued					
TRH - Total Recoverable Hydrocarbons - Silica Gel C	0	16	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Total Recoverable Hydrocarbons - Silica Gel C	0	16	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural (EA005-P)		16-May-2019	----	----	----	17-May-2019	16-May-2019	✘
BH8,	BH7,							
BH6,	MW239S,							
SW3,	BH11,							
BH1,	BH2,							
BH4,	SW1,							
SW4								
EA006: Sodium Adsorption Ratio (SAR)								
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)		16-May-2019	----	----	----	20-May-2019	13-Jun-2019	✔
BH8,	BH7,							
BH6,	MW239S,							
SW3,	BH11,							
BH1,	BH2,							
BH4,	SW1,							
SW4								
EA010P: Conductivity by PC Titrator								
Clear Plastic Bottle - Natural (EA010-P)		16-May-2019	----	----	----	17-May-2019	13-Jun-2019	✔
BH8,	BH7,							
BH6,	MW239S,							
SW3,	BH11,							
BH1,	BH2,							
BH4,	SW1,							
SW4								



Matrix: **WATER**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Clear Plastic Bottle - Natural (EA015H)		16-May-2019	----	----	----	17-May-2019	23-May-2019	✓
BH8,	BH7,							
BH6,	MW239S,							
SW3,	BH11,							
BH1,	BH2,							
BH4,	SW1,							
SW4								
EA025: Total Suspended Solids dried at 104 ± 2°C								
Clear Plastic Bottle - Natural (EA025H)		16-May-2019	----	----	----	17-May-2019	23-May-2019	✓
BH8,	BH7,							
BH6,	MW239S,							
SW3,	BH11,							
BH1,	BH2,							
BH4,	SW1,							
SW4								
EA065: Total Hardness as CaCO3								
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)		16-May-2019	----	----	----	20-May-2019	13-Jun-2019	✓
BH8,	BH7,							
BH6,	MW239S,							
SW3,	BH11,							
BH1,	BH2,							
BH4,	SW1,							
SW4								
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P)		16-May-2019	----	----	----	17-May-2019	30-May-2019	✓
BH8,	BH7,							
BH6,	MW239S,							
SW3,	BH11,							
BH1,	BH2,							
BH4,	SW1,							
SW4								
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G)		16-May-2019	----	----	----	17-May-2019	13-Jun-2019	✓
BH8,	BH7,							
BH6,	MW239S,							
SW3,	BH11,							
BH1,	BH2,							
BH4,	SW1,							
SW4								

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G)								
BH8, BH6, SW3, BH1, BH4, SW4	BH7, MW239S, BH11, BH2, SW1,	16-May-2019	----	----	----	17-May-2019	13-Jun-2019	✓
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)								
BH8, BH6, SW3, BH1, BH4, SW4	BH7, MW239S, BH11, BH2, SW1,	16-May-2019	----	----	----	20-May-2019	13-Jun-2019	✓
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)								
BH8, BH6, SW3, BH1, BH4, SW4	BH7, MW239S, BH11, BH2, SW1,	16-May-2019	----	----	----	20-May-2019	12-Nov-2019	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)								
RINSATE 04,	TRIP BLANK 04	16-May-2019	----	----	----	22-May-2019	12-Nov-2019	✓
EG035F: Dissolved Mercury by FIMS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)								
BH8, BH6, SW3, BH1, BH4, SW4	BH7, MW239S, BH11, BH2, SW1,	16-May-2019	----	----	----	21-May-2019	13-Jun-2019	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)								
RINSATE 04,	TRIP BLANK 04	16-May-2019	----	----	----	22-May-2019	13-Jun-2019	✓

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation				Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation		Date analysed	Due for analysis	Evaluation
EK040P: Fluoride by PC Titrator									
Clear Plastic Bottle - Natural (EK040P)		16-May-2019	----	----	----		17-May-2019	13-Jun-2019	✓
BH8,	BH7,								
BH6,	MW239S,								
SW3,	BH11,								
BH1,	BH2,								
BH4,	SW1,								
SW4									
EK055G: Ammonia as N by Discrete Analyser									
Clear Plastic Bottle - Sulfuric Acid (EK055G)		16-May-2019	----	----	----		20-May-2019	13-Jun-2019	✓
BH8,	BH7,								
BH6,	MW239S,								
SW3,	BH11,								
BH1,	BH2,								
BH4,	SW1,								
SW4									
EK057G: Nitrite as N by Discrete Analyser									
Clear Plastic Bottle - Natural (EK057G)		16-May-2019	----	----	----		17-May-2019	18-May-2019	✓
BH8,	BH7,								
BH6,	MW239S,								
SW3,	BH11,								
BH1,	BH2,								
BH4,	SW1,								
SW4									
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Clear Plastic Bottle - Sulfuric Acid (EK059G)		16-May-2019	----	----	----		20-May-2019	13-Jun-2019	✓
BH8,	BH7,								
BH6,	MW239S,								
SW3,	BH11,								
BH1,	BH2,								
BH4,	SW1,								
SW4									
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Clear Plastic Bottle - Sulfuric Acid (EK061G)		16-May-2019	20-May-2019	13-Jun-2019	✓		20-May-2019	13-Jun-2019	✓
BH8,	BH7,								
BH6,	MW239S,								
SW3,	BH11,								
BH1,	BH2,								
BH4,	SW1,								
SW4									



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK067G: Total Phosphorus as P by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK067G)		16-May-2019	20-May-2019	13-Jun-2019	✓	20-May-2019	13-Jun-2019	✓
BH8, BH6, SW3, BH1, BH4, SW4	BH7, MW239S, BH11, BH2, SW1,							
EK071G: Reactive Phosphorus as P by discrete analyser								
Clear Plastic Bottle - Natural (EK071G)		16-May-2019	----	----	----	17-May-2019	18-May-2019	✓
BH8, BH6, SW3, BH1, BH4, SW4	BH7, MW239S, BH11, BH2, SW1,							
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup								
Amber Glass Bottle - Unpreserved (EP071SG)		16-May-2019	20-May-2019	23-May-2019	✓	22-May-2019	29-Jun-2019	✓
BH8, BH6, SW3, BH1, BH4, SW4, TRIP BLANK 04	BH7, MW239S, BH11, BH2, SW1, RINSATE 04,							
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
Amber Glass Bottle - Unpreserved (EP071SG)		16-May-2019	20-May-2019	23-May-2019	✓	22-May-2019	29-Jun-2019	✓
BH8, BH6, SW3, BH1, BH4, SW4, TRIP BLANK 04	BH7, MW239S, BH11, BH2, SW1, RINSATE 04,							



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons								
Amber VOC Vial - Sulfuric Acid (EP080)	BH7, MW239S, BH11, BH2, SW1, RINSATE 04,	16-May-2019	20-May-2019	30-May-2019	✓	20-May-2019	30-May-2019	✓
BH8, BH6, SW3, BH1, BH4, SW4, TRIP BLANK 04								
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Amber VOC Vial - Sulfuric Acid (EP080)	BH7, MW239S, BH11, BH2, SW1, RINSATE 04,	16-May-2019	20-May-2019	30-May-2019	✓	20-May-2019	30-May-2019	✓
BH8, BH6, SW3, BH1, BH4, SW4, TRIP BLANK 04								
EP080: BTEXN								
Amber VOC Vial - Sulfuric Acid (EP080)	BH7, MW239S, BH11, BH2, SW1, RINSATE 04,	16-May-2019	20-May-2019	30-May-2019	✓	20-May-2019	30-May-2019	✓
BH8, BH6, SW3, BH1, BH4, SW4, TRIP BLANK 04								
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X)	BH7, SW3, SW1, RINSATE 04,	16-May-2019	21-May-2019	12-Nov-2019	✓	22-May-2019	12-Nov-2019	✓
BH8, BH6, BH4, SW4, TRIP BLANK 04								
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X)	BH7, SW3, SW1, RINSATE 04,	16-May-2019	21-May-2019	12-Nov-2019	✓	22-May-2019	12-Nov-2019	✓
BH8, BH6, BH4, SW4, TRIP BLANK 04								

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X) BH8, BH6, BH4, SW4, TRIP BLANK 04	BH7, SW3, SW1, RINSATE 04,	16-May-2019	21-May-2019	12-Nov-2019	✓	22-May-2019	12-Nov-2019	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X) BH8, BH6, BH4, SW4, TRIP BLANK 04	BH7, SW3, SW1, RINSATE 04,	16-May-2019	21-May-2019	12-Nov-2019	✓	22-May-2019	12-Nov-2019	✓
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X) BH8, BH6, BH4, SW4, TRIP BLANK 04	BH7, SW3, SW1, RINSATE 04,	16-May-2019	21-May-2019	12-Nov-2019	✓	22-May-2019	12-Nov-2019	✓



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	19	10.53	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	19	10.53	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	4	40	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	3	20	15.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	6	53	11.32	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	18	11.11	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	9	11.11	10.00	✔	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	13	15.38	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	37	10.81	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	4	39	10.26	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	39	10.26	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	0	16	0.00	10.00	✖	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	19	10.53	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	19	10.53	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	40	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	20	10.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	3	53	5.66	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	9	11.11	5.00	✔	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	13	7.69	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	37	5.41	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	4	39	10.26	10.00	✔	NEPM 2013 B3 & ALS QC Standard



Matrix: **WATER** Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Control Samples (LCS) - Continued							
Total Dissolved Solids (High Level)	EA015H	4	39	10.26	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	3	20	15.00	15.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	3	20	15.00	15.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	20	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	3	53	5.66	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	37	5.41	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	39	5.13	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	39	5.13	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	20	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	3	53	5.66	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	37	5.41	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	0	16	0.00	5.00	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (2013) Schedule B(3)
Calculated TDS (from Electrical Conductivity)	EA016	WATER	In house: Calculation from Electrical Conductivity (APHA 2510 B) using a conversion factor specified in the analytical report. This method is compliant with NEPM (2013) Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of 'non-filterable' residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C. This method is compliant with NEPM (2013) Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM (2013) Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (2013) Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.



Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Fluoride by PC Titrator	EK040P	WATER	In house: Referenced to APHA 4500-F C: CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH ₃ G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO ₂ - B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO ₃ - F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined separately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NO _x) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO ₃ - F. Combined oxidised Nitrogen (NO ₂ +NO ₃) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO ₃ -. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with orthophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Ionic Balance by PCT DA and Turbi SO ₄ DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	WATER	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C36. This method is compliant with NEPM (2013) Schedule B(3) (Method 506.1)



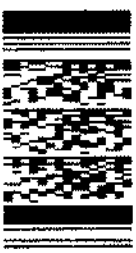
Analytical Methods	Method	Matrix	Method Descriptions
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In house: Direct injection analysis of fresh waters after dilution (1:1) with methanol. Analysis by LC-Electrospray-MS-MS, Negative Mode using MRM. Where commercially available, isotopically labelled analogues of the target analytes are used as internal standards for quantification. Where a labelled analogue is not commercially available, the internal standard with similar chemistry and the closest retention time to the target is used for quantification. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. This method complies with the quality control definitions as stated in QSM 5.1. Data is reviewed in line with the DQOs as stated in QSM5.1
Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Preparation for PFAS in water.	EP231-PR	WATER	Method presumes direct injection without workup. Preparation includes addition of internal standard and surrogate, and filtration prior to analysis.
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

Client:		SITE, COC AND CONTACT DATA		Laboratory:												
Kleinfelder Australia Pty Ltd 95 Mitchell Road Cardiff, NSW 2285 Phone: 02 4949 5200		Site Name: WSS - Cathage Tree Rd water monitoring QUOTE NUMBER: ME1/14/19 Job No.: 20193920 Required TAT: 24 hrs 48 hrs 3 days 5 days 7 days LVB minimum unless specified: John CA level		Sample Name: Dan Koustbroek Contact Number: 045 8197 576 Contact e-mail: dkoustbroek@kleinfelder.com Pw e-mail: dkoustbroek@kleinfelder.com Tom Overton dkoustbroek@kleinfelder.com												
CHAIN OF CUSTODY		Requisitioned by (print):		Received by:												
Requisitioned by (sign):		(sign)		(sign)												
Date / Time:	16/5	Date / Time:	16/5 19:43	Date / Time:	16/5 19:30											
Temp (°C):		Temp (°C):	16.5	Temp (°C):	16.5											
Notes:		Notes:	ice present / no ice seals intact / no seal	Notes:	ice present / no ice seals intact / no seal											
Sample ID	Lab ID	Sample Point	Sample Type	Date	Start Depth	End Depth	Units	# Containers	W-25 SG TRH/BTEX/M	W-03 Metals, NEPM 15	Iron (dissolved)	NT 14 - Extended Water Suite	Total Dissolved Solids (TDS)	Total Suspended Solids (TSS)	EP231X PFAS (28 analytes, standard level)	Comments
BH8	1			16/5				7	X	X	X	X	X	X	X	
BH7	2			16/5				7	X	X	X	X	X	X	X	
BH6	3			16/5				7	X	X	X	X	X	X	X	
MW239S	4			16/5				6	X	X	X	X	X	X	X	
SW3	5			16/5				7	X	X	X	X	X	X	X	
BH11	6			16/5				6	X	X	X	X	X	X	X	
BH1	7			16/5				6	X	X	X	X	X	X	X	
BH2	8			16/5				6	X	X	X	X	X	X	X	
BH4	9			16/5				7	X	X	X	X	X	X	X	
SW1	10			16/5				7	X	X	X	X	X	X	X	
SW4	11			16/5				7	X	X	X	X	X	X	X	
Rinsed	12			16/5				5	X	X	X	X	X	X	X	
Tip Blank	13			16/5				5	X	X	X	X	X	X	X	

W-03 SG - TRH/BTEX/M 8 Metals Silica Gel Clean Up
 NT14 - Extended water suite B
 Additional metals analysis to make up NEPM 15

Arsenic (As), Cadmium (Cd), Chromium (Cr), Copper (Cu), Lead (Pb), Mercury (Hg), Nickel (Ni), Zinc (Zn)
 Boron (B), Barium (Ba), Beryllium (Be), Cobalt (Co), Manganese (Mn), Selenium (Se), Vanadium (V)

Telephone : - 01-2-8734 8555



Environmental Division
 Sydney
 Work Order Reference
ES1914860

APPENDIX B5: JUNE 2019

09 July 2019

Document Ref: NCA19R97643

Williamtown Sand Syndicate
PO Box 898
Newcastle, NSW 2300

Attention: Darren Williams

Delivered by email: darren@arbus.com.au

Subject: Monthly water quality monitoring results at Cabbage Tree Road Sand Quarry – June 2019 monitoring

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

1. SCOPE OF SERVICE

The scope of work includes the monthly surface and groundwater monitoring for a combined period of 12 months. **Figure 1** (attached) presents the surface water and groundwater sampling locations.

The June monitoring round was to include 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) and sampling at four surface water locations.

2. SITE WORK

The monitoring round was conducted on 14 June 2019.

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 the gauging each of the HydraSleeves were removed and samples taken.

The June 2019 monitoring round included:

- Gauging of all available monitoring wells (a total of 14 wells);

- 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
General 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)	4	1	1	1	1

* General Water Suite: Ca, Mg, Na, K, pH, EC, Cl, SO₄, Alkalinity, Fluoride, Hardness & TDS (Calc')

** TRH (C6 – C40), BTEXN (Silica Gel)

*** 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), Selenium (Se), Vanadium (V), Zinc (Zn) - note sampling for Iron and no nickel

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 (mBTC)	Groundwater Elevation (mAHD)	Well Total Depth (mBTC)	Comment
BH1	8.64	6.375	2.265	8.12	Clear, no odour.
BH2	7.79	8.852	-1.062	9.02	Very cloudy, dark brown, no odour
BH3	7.57	6.005	1.565	9.03	Data logger attached, Silty material at base. No sample taken.
BH4	3.06	1.723	1.337	5.92	Mildly cloudy, no odour.
BH5	7.36	5.823	1.537	8.71	No odour - No sample taken.

Borehole	Top of Casing (mAHD)	Depth to Water (mBTC)	Groundwater Elevation (mAHD)	Well Total Depth (mBTC)	Comment
BH6	3.62	1.713	1.907	4.52	Cloudy, slight sulfur odour
BH7	2.98	1.634	1.346	4.51	Slightly cloudy sulfur odour.
BH8	3.88	2.346	1.534	6.18	Dark brown cloudy, sulfur odour
BH9	17.75	Dry	-	16.01	Well was dry.
BH10	6.69	Dry	-	3.58	Well was dry.
BH11	6.63	3.382	3.248	5.29	Cloudy with sulfur odour
BH12	8.67	6.832	1.838	8.12	Slight acrylic odour. No sample taken.
MW239S	3.04	1.344	1.696	3.89	Cloudy, sulfur odour.
MW239D	3.04	1.32	1.72	20.2	No odour – No sample taken
SW01*	N/A	0.14	2.51	N/A	Small pool of surface water with stained brown water.
SW02*	N/A	Dry	-	N/A	Location was dry.
SW03*	N/A	0.15	1.1	N/A	Water clear, no odour.
SW04*	N/A	0.175	2.135	N/A	Water 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	1230	19.97	111	6.43	33.6
BH02	1215	20.84	77	6.41	255
BH04	1145	19.01	55	6.41	321.9
BH06	1410	19.73	176	5.45	-104.7
BH07	1430	19.56	217	5.47	-227.9
BH08	1440	18.78	289	7.43	-340.8
BH11	1250	18.93	185	6.41	-78.5
MW239S	1350	19.3	305	5.7	-117.9
SW01	1140	14.5	811	6.4	298.4
SW03	1330	16.36	290	6.41	52.4
SW04	1045	13.34	313	6.44	377.3

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**.

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
Physical and Chemical Stressors	Sodium	1	11	6	77	No	Similar
	Sulphate	1	11	<1.0	182	No	Significant reduction at SW1
	Chloride	1	11	18	112	No	Similar
	Fluoride	0.1	11	<0.1	0.4	No	Similar
	Reactive ³ Phosphorous	0.01	NA	NA	NA	NA	NA
	Total Phosphorous ³	0.01	NA	NA	NA	NA	NA
	Nitrite ³	0.01	NA	NA	NA	NA	NA
	Nitrate ³	0.01	NA	NA	NA	NA	NA
	Ammonia ³	0.01	NA	NA	NA	NA	NA
	Total Nitrogen ³	0.1	NA	NA	NA	NA	NA
	Total Hardness	1	11	7.0	190	No	Similar
	Total Dissolved Solids	1	11	45	550	No	Similar
	pH	0.01	11	4.31	5.52	All above ANZECC 2000 Trigger range ¹ and drinking water guidelines	Similar
Dissolved Metals	As	0.001	11	<0.001	<0.001	No	Similar
	B	0.05	11	<0.005	0.09	No	Similar
	Ba	0.001	11	0.002	0.047	No	Similar
	Be	0.001	11	<0.001	<0.001	No	Similar
	Cd	0.005-0.1	11	<0.0001	<0.0002	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
	Cr	0.005-0.1	11	<0.001	0.002	3 above ANZECC 2000 Trigger Values ²	Similar
	Co	0.001	11	<0.001	0.009	No	Similar
	Cu	0.001	11	<0.001	0.038	5 above ANZECC 2000 Trigger Values ²	Similar
	Fe	0.05	11	<0.05	6.31	9 above NHMRC ADWG 6 aesthetics	Similar
	Mn	0.001	11	<0.05	0.666	1 above NHMRC ADWG 6 aesthetics	Similar
	Ni	0.001	11	<0.001	0.011	No	Similar
	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
	Zn	0.005-0.1	11	<0.005	0.535	4 above ANZECC 2000 Trigger Values ²	Similar
	Hg	0.0001	11	<0.0001	<0.0001	No	Similar
TRH – Silica Clean up	C ₆ -C ₁₀	0.02	11	<0.02	<0.02	No	Similar
	>C ₁₀ -C ₁₆	0.1	11	<0.1	<0.1	No	Similar
	>C ₁₆ -C ₃₄	0.1	11	<0.1	<0.1	No	Similar
	>C ₃₄ -C ₄₀	0.1	11	<0.1	<0.1	No	Similar
	Total >C ₁₀ -C ₄₀	0.1	11	<0.1	<0.1	No	Similar
	C ₆ -C ₁₀ minus BTEX (F1)	0.02	11	<0.02	<0.02	No	Similar
	>C ₁₀ -C ₁₆ minus Naphthalene (F2)	0.1	11	<0.1	<0.1	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
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	4	<0.00001	<0.00001	HEPA NEMP 2018*	Similar
	PFOA	0.00001-0.0001	4	<0.00001	<0.00001	No	Similar
	PFOS/PFHxS	0.00001-0.0001	4	<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.

¹Australian 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)

²ANZECC 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

³Analysis 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 more rainfall in June than the mean.

Table 4.5 2019 Rainfall data

2019	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1st	2.0	0.8	0	0	0	0						
2nd	0	12.8	0	23.8	0	21.2						
3rd	0	0.4		0.6	0	0.6						
4th	0	0	0	0	20.8	0.4						
5th	0	0	0	0	0.2	25						
6th	0	0	0	0	23.2	2.6						
7th	5.0	0	8.2	0	0.2	1						
8th	0	0	0	0	0	0						
9th	0	6.6	0	0	0	0						
10th	0.2	0	12.0	2.2	0	0						
11th	0	0	0	0	0.6	0						
12th	3.0	0	0	0	0	0						
13th	0	0	0	0	1.4	0						
14th	0	0	0	0.2	0	0						
15th	0	0	0	1.4	0	0						
16th	0	0	4.8	3.6	0	0						
17th	0	0	59.4	1.4	0	0						
18th	0	0	2.6	0.2	0	17.8						
19th	0	0	2.2	0.2	0	0						
20th	2.4		0	2.0	0	0						
21st	1.0	1.4	0	0.2	0	0						
22nd	0	1.0	1.2	0.2	0	0.2						
23rd	0	1.4	0	0	0	20						
24th	0	9.2	5.4	0	0	50.6						
25th	0	0	5.2	0	0	15.2						
26th	0	0	0	0	0	1.8						
27th	0	0	0	0	0	0.8						
28th	1.0	0	0	0	0.8	0						
29th	0		0	0	0	0						
30th	0		38.2	0	0	0						
31st	0		6.6		0							
Monthly Total	14.6	33.6	145.8	36.0	47.2	157.2						
Mean	98.7	117.0	120.5	111.6	109.6	124.7	70.9	72.9	60.4	73.9	82.3	78.6

Based on the long-term rainfall data for June it is expected that the current groundwater and surface water levels maintain current levels.

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

Dkousbroek@kleinfelder.com

Mobile: 0458 197 676

Attached:

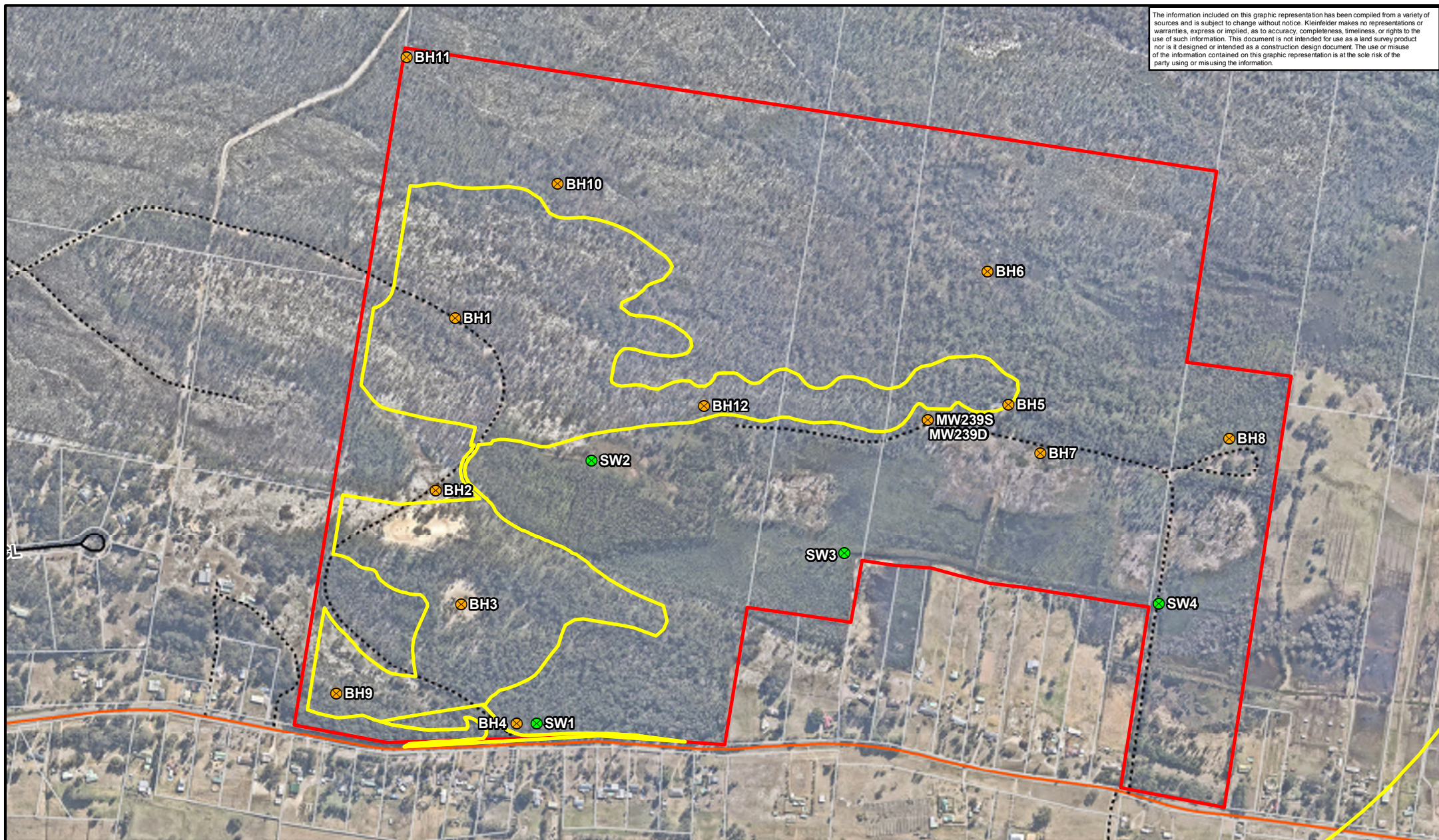
Figure 1

Data Tables

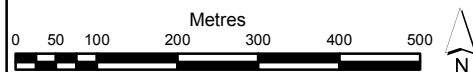
Attachment A – Laboratory reports

FIGURE 1

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 use of such information. This document is not intended for use as a land survey 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
- ▬ Subject Land Boundary
- ▬ Quarry Project Area
- ▬ Arterial Road
- ▬ Local Road
- - Track



www.kleinfelder.com

PROJECT REFERENCE: 20170448

DATE DRAWN: 13/02/2019 09:48 Version 1

DRAWN BY: gjoyce

DATA SOURCE:
NSW DFSI - 2017
Nearmap - 2018

Water monitoring locations 2019 Monitoring

Williamtown Sand Syndicate
Proposed Sand Quarry
Cabbage Tree Road, Williamtown

FIGURE:

1

DATA TABLES



Notes:
 - - Not analysed
 < - Less than laboratory limit of reporting
 µg/L - Micrograms per litre
 BTEXN - Benzene, toluene, ethylbenzene, xylenes, naphthalene

20190803.001A

Table 2
Groundwater Analytical Data - Metals
Williamstown Sand Syndicate



Analyte		Metals															
		Arsenic**	Barium	Beryllium	Boron**	Cadmium**	Chromium** ¹	Cobalt	Copper**	Iron	Lead**	Manganese* *	Mercury** ²	Nickel**	Selenium**	Vanadium	Zinc**
LOR		0.001	0.001	0.001	0.05	0.0001	0.001	0.001	0.001	0.05	0.001	0.001	0.0001	0.001	0.01	0.01	0.005
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ANZECC 2000 Trigger Values		0.013		-	0.37	0.0002	0.001	-	0.0014	-	0.0034	1.9	0.0006	0.011	0.011	-	0.008
NHMRC ADWG 6		0.01		0.06	4	0.002	0.05		2	0.3 ³	0.01	0.5	0.001	0.02	0.01	-	3 ³
Sample Name	Sample Date																
BH1	15-Mar-19	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.004	< 0.001	< 0.001	13	< 0.001	0.014	< 0.0001	< 0.001	< 0.01	< 0.01	1.27
	23-Apr-19	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.004	< 0.001	0.002	10	0.001	0.015	< 0.0001	0.002	< 0.01	< 0.01	0.363
	16-May-19	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	< 0.001	8.33	< 0.001	0.009	< 0.0001	0.002	< 0.01	< 0.01	0.132
	14-Jun-19	< 0.001	0.001	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.001	6.31	< 0.001	0.009	< 0.0001	< 0.001	< 0.01	< 0.01	0.074
BH2	22-Feb-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.002	0.14	< 0.001	0.021	< 0.0001	0.015	< 0.01	< 0.01	0.006
	15-Mar-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.003	< 0.05	< 0.001	0.02	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	23-Apr-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.004	0.19	< 0.001	0.018	< 0.0001	0.001	< 0.01	< 0.01	0.008
	16-May-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.001	0.06	< 0.001	0.014	< 0.0001	0.001	< 0.01	< 0.01	< 0.005
BH3	14-Jun-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.004	0.08	< 0.001	0.009	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	21-Feb-19	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.06	< 0.001	0.005	< 0.0001	0.053	< 0.01	< 0.01	< 0.005
	21-Feb-19	< 0.001	0.014	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.002	0.16	< 0.001	0.039	< 0.0001	0.018	< 0.01	< 0.01	0.014
	15-Mar-19	< 0.001	0.014	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.001	< 0.05	< 0.001	0.014	< 0.0001	0.022	< 0.01	< 0.01	0.043
BH4	23-Apr-19	< 0.001	0.013	< 0.001	0.05	< 0.0001	< 0.001	< 0.001	0.002	0.99	< 0.001	0.045	< 0.0001	0.007	< 0.01	< 0.01	0.008
	16-May-19	< 0.001	0.013	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	0.27	< 0.001	0.022	< 0.0001	0.022	< 0.01	< 0.01	0.011
	14-Jun-19	< 0.001	0.012	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.038	< 0.05	< 0.001	0.014	< 0.0001	< 0.001	< 0.01	< 0.01	0.005
	22-Feb-19	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	1.4	< 0.001	0.005	< 0.0001	0.003	< 0.01	< 0.01	0.008
BH5	22-Feb-19	< 0.001	0.03	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	1.03	< 0.001	0.014	< 0.0001	0.001	< 0.01	< 0.01	0.019
	14-Mar-19	< 0.001	0.027	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	1.9	< 0.001	0.01	< 0.0001	< 0.001	< 0.01	< 0.01	0.012
	23-Apr-19	< 0.001	0.03	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.001	0.96	< 0.001	0.01	< 0.0001	< 0.001	< 0.01	< 0.01	0.022
	16-May-19	< 0.001	0.029	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	2.57	< 0.001	0.009	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH6	14-Jun-19	< 0.001	0.027	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.001	2.86	< 0.001	0.008	< 0.0001	< 0.001	< 0.01	< 0.01	0.008
	22-Feb-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.002	0.003	< 0.001	1.8	< 0.001	0.026	< 0.0001	0.004	< 0.01	< 0.01	0.019
	14-Mar-19	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
	23-Apr-19	< 0.001	0.012	< 0.001	< 0.05	< 0.0001	0.002	0.003	< 0.001	2.0	< 0.001	0.026	< 0.0001	0.004	< 0.01	< 0.01	0.01
BH7	16-May-19	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.002	0.003	< 0.001	2.32	< 0.001	0.035	< 0.0001	0.005	< 0.01	< 0.01	0.013
	14-Jun-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	0.002	< 0.001	2.06	< 0.001	0.03	< 0.0001	0.004	< 0.01	< 0.01	0.006
	21-Feb-19	0.001 *	0.011	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.006
	14-Mar-19	< 0.001	0.006	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	3.25	< 0.001	0.008	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
BH8	23-Apr-19	0.001	0.008	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	3.2	< 0.001	0.009	< 0.0001	0.002	< 0.01	< 0.01	0.008
	16-May-19	0.003	0.01	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	3.0	< 0.001	0.01	< 0.0001	0.003	< 0.01	< 0.01	< 0.005
	14-Jun-19	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	2.5	< 0.001	0.005	< 0.0001	0.002	< 0.01	< 0.01	0.006
	21-Feb-19	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.002	0.001	< 0.001	0.26	< 0.001	0.003	< 0.0001	0.005	< 0.01	< 0.01	0.031
BH11	15-Mar-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	1.49	< 0.001	0.007	< 0.0001	0.037	< 0.01	< 0.01	0.016
	23-Apr-19	< 0.001	0.006	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.98	< 0.001	0.007	< 0.0001	0.07	< 0.01	< 0.01	0.04
	16-May-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.97	< 0.001	0.006	< 0.0001	0.004	< 0.01	< 0.01	0.024
	14-Jun-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	0.98	< 0.001	0.005	< 0.0001	0.001	< 0.01	< 0.01	0.005
MW239S	22-Feb-19	< 0.001	0.007	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	1.11	< 0.001	0.003	< 0.0001	0.001	< 0.01	< 0.01	0.006
	14-Mar-19	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	1.25	< 0.001	0.005	< 0.0001	0.005	< 0.01	< 0.01	0.008
	23-Apr-19	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	1.01	< 0.001	0.004	< 0.0001	0.004	< 0.01	< 0.01	0.007
	16-May-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.87	< 0.001	0.003	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
SW1	14-Jun-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.002	0.8	< 0.001	0.003	< 0.0001	0.001	< 0.01	< 0.01	< 0.005
	23-Apr-19	< 0.001	0.043	< 0.001	0.14	< 0.0001	< 0.001	0.017	0.002	4.16	< 0.001	0.841	< 0.0001	0.02	< 0.01	< 0.01	0.356
	16-May-19	< 0.001	0.029	< 0.001	0.1	< 0.0001	< 0.001	0.01	0.003	7.25	< 0.001	0.666	< 0.0001	0.012	< 0.01	< 0.01	0.077
	14-Jun-19	< 0.001	0.029	< 0.001	0.09	0.0002	< 0.001	0.009	0.006	2.75	< 0.001	0.595	< 0.0001	0.011	< 0.01	< 0.01	0.535
SW3	22-Feb-19	0.003	0.075	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	4.84	< 0.001	0.033	< 0.0001	0.002	< 0.01	< 0.01	0.016
	14-Mar-19	0.006	0.08	< 0.001	< 0.05	< 0.0001	< 0.001	0.003	< 0.001	9.26	< 0.001	0.048	< 0.0001	0.002	< 0.01	< 0.01	0.009
	23-Apr-19	< 0.001	0.043	< 0.001	< 0.05	< 0.0001	< 0.001	0.003	0.001	2.01	< 0.001	0.046	< 0.0001	0.004	< 0.01	< 0.01	0.016
	16-May-19	< 0.001	0.034	< 0.001	< 0.05	< 0.0001	< 0.001	0.002	< 0.001	1.78	< 0.001	0.038	< 0.0001	0.003	< 0.01	<	

Table 2
Groundwater Analytical Data - Metals
Williamstown Sand Syndicate



Notes:

- - Not analysed

< - Less than laboratory limit of reporting

mg/L - Milligrams per litre

Bold indicates a detection above the laboratory limit of reporting

^{1,2,3} denotes duplicate/triplicate sample result adopted for analytical use due to RPD >50%

RPD - Relative Percentage Difference

** 95% Level of protection in freshwater

¹ value for CR VI

² as inorganic

³ Aesthetic

Notes:
 - - Not analysed
 < - Less than laboratory limit of reporting
 µg/L - Micrograms per litre
 *** 99% Level of protection in freshwater
 * Recreation water

Table 4
Groundwater Analytical Data - Inorganics
Wellington Sand Syndrome



Analyte	Anions and Cations										Alkalinity										Inorganics		pH							
	Sodium	Calcium	Magnesium	Potassium	Sulphate	Chloride	Fluoride	Reactive phosphorus as P	Total Phosphorus	Nitrite as N	Nitrate as N	Nitrite + Nitrate as N	Ammonia as N	Total Nitrogen as N	Total Kjeldahl Nitrogen as N	Total Cations	Total Anions	Ionic Balance	Sodium Adsorption Ratio	Bicarbonate Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Hydroxide Alkalinity as CaCO3		Total Alkalinity as CaCO3	Total Hardness as CaCO3	Electrical Conductivity @ 25°C ¹	Total Dissolved Solids	Total Dissolved Solids		
Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	%		mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L			
LODR	1	1	1	1	1	1	0.1	0.01	0.01	0.01	0.01	0.01	0.01	0.1	0.1	0.01	0.01		0.01	1	1	1	1	1	1	1	0.01			
ANZECC 2000 Trigger Values																														
NHMRC ADWS 6	180 ²				270 ²	250 ²	1.5	0.02 ³	0.02 ³	3	50	0.5 ³	0.35 ³										200 ²	125-2200	600 ²			6.5-8.5 ¹		
Sample Name																														
Sample Date																														
BH1	15-Mar-10	11	2.0	1.0	<1.0	<1.0	25	<0.1	-	-	-	-	-	-	-	0.66	0.88	-	-	9.0	<1.0	<1.0	<1.0	9.0	104	68	129	5.67		
	23-Apr-10	14	1.0	2.0	<1.0	<1.0	25	<0.1	-	-	-	-	-	-	-	0.82	0.99	-	-	10	<1.0	<1.0	<1.0	10	84	55	97	5.83		
	16-May-10	12	<1.0	2.0	<1.0	5.0	25	<0.1	0.03	<0.01	<0.01	<0.01	0.11	0.3	0.3	0.69	1.01	-	1.7	10	<1.0	<1.0	<1.0	10	8.0	105	68	164	5.83	
	14-Jun-10	10	<1.0	2.0	<1.0	3.0	24	<0.1	-	-	-	-	-	-	-	0.6	0.94	-	-	10	<1.0	<1.0	<1.0	10	8.0	95	64	72	5.82	
	22-Feb-10	12	2.0	2.0	<1.0	5.0	22	0.1	<0.01	0.28	<0.01	2.76	2.76	0.85	4.0	1.2	0.75	0.74	-	1.44	<1.0	<1.0	<1.0	<1.0	13	91	128	95	4.87	
BH2	15-Mar-10	10	3.0	2.0	<1.0	7.0	23	<0.1	-	-	-	-	-	-	-	0.75	0.79	-	-	<1.0	<1.0	<1.0	<1.0	<1.0	16	103	66	80	4.71	
	23-Apr-10	14	2.0	2.0	<1.0	5.0	23	<0.1	-	-	-	-	-	-	-	0.87	0.77	-	-	<1.0	<1.0	<1.0	<1.0	<1.0	13	70	46	94	4.82	
	16-May-10	12	2.0	2.0	<1.0	21	22	<0.1	<0.01	0.26	<0.01	0.39	0.39	0.01	1.3	0.9	0.79	1.06	-	1.44	<1.0	<1.0	<1.0	<1.0	13	94	61	144	4.86	
	14-Jun-10	11	1.0	2.0	<1.0	5.0	23	<0.1	-	-	-	-	-	-	-	0.89	0.75	-	-	<1.0	<1.0	<1.0	<1.0	<1.0	11	81	89	51	4.76	
	22-Feb-10	4.0	4.0	1.0	<1.0	5.0	10	<0.1	<0.01	2.76	<0.01	0.78	0.78	0.3	5.9	5.1	0.46	1.54	-	0.46	9.0	<1.0	<1.0	<1.0	9.0	14	66	438	5.55	
BH3	21-Feb-10	8.0	2.0	1.0	1.0	5.0	17	<0.1	<0.01	0.19	<0.01	0.35	0.35	0.04	0.6	0.3	0.56	0.7	-	1.15	6.0	<1.0	<1.0	<1.0	6.0	73	96	5.4		
	15-Mar-10	9.0	2.0	<1.0	<1.0	5.0	18	<0.1	<0.01	-	-	-	-	-	-	0.49	0.61	-	-	<1.0	<1.0	<1.0	<1.0	<1.0	5.0	77	50	70	5.13	
	23-Apr-10	10	2.0	1.0	1.0	3.0	19	<0.1	-	-	-	-	-	-	-	0.64	0.6	-	-	<1.0	<1.0	<1.0	<1.0	<1.0	9.0	54	35	61	5.05	
	16-May-10	9.0	2.0	1.0	1.0	22	19	<0.1	<0.01	0.97	<0.01	0.29	0.29	<0.01	1.0	0.7	0.6	0.95	-	1.3	0.6	<1.0	<1.0	<1.0	0.6	73	47	100	4.99	
	14-Jun-10	6.0	1.0	1.0	<1.0	5.0	18	<0.1	-	-	-	-	-	-	-	0.39	0.59	-	-	<1.0	<1.0	<1.0	<1.0	<1.0	7.0	69	45	36	4.81	
BH5	22-Feb-10	42	<1.0	6.0	1.0	19	69	0.2	<0.01	0.34	<0.01	<0.01	<0.01	0.09	3.0	3.0	2.35	2.34	-	3.59	<1.0	<1.0	<1.0	<1.0	25	250	211	-	4.87	
	23-Apr-10	28	3.0	4.0	1.0	38	42	<0.1	<0.01	0.03	<0.01	0.09	0.09	0.14	0.5	0.4	1.72	1.77	-	2.49	<1.0	<1.0	<1.0	<1.0	24	177	144	-	4.76	
	14-Mar-10	23	2.0	4.0	1.0	17	37	<0.1	-	-	-	-	-	-	-	1.46	1.44	-	-	2.0	<1.0	<1.0	<1.0	<1.0	2.0	21	179	116	146	4.95
	23-Apr-10	25	3.0	4.0	1.0	18	45	<0.1	-	-	-	-	-	-	-	1.99	1.98	-	-	<1.0	<1.0	<1.0	<1.0	<1.0	24	138	88	115	4.84	
	16-May-10	23	3.0	4.0	1.0	18	40	<0.1	<0.01	0.13	<0.01	<0.01	<0.01	0.14	0.6	0.6	1.15	1.64	-	2.04	<1.0	<1.0	<1.0	<1.0	<1.0	24	175	114	214	4.88
BH6	14-Jun-10	20	3.0	4.0	1.0	16	42	<0.1	-	-	-	-	-	-	-	1.32	1.52	-	-	<1.0	<1.0	<1.0	<1.0	<1.0	21	174	113	90	4.82	
	22-Feb-10	34	<1.0	5.0	2.0	12	64	0.2	<0.01	0.13	<0.01	0.02	0.02	0.34	2.2	2.2	1.94	2.06	-	3.16	<1.0	<1.0	<1.0	<1.0	20	213	186	-	4.76	
	14-Mar-10	36	<1.0	6.0	2.0	16	61	<0.1	-	-	-	-	-	-	-	2.11	2.08	1.37	-	<1.0	<1.0	<1.0	<1.0	<1.0	25	271	176	212	4.73	
	23-Apr-10	38	<1.0	6.0	2.0	17	62	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01	0.27	0.9	0.9	1.98	2.23	-	3.26	<1.0	<1.0	<1.0	<1.0	20	225	153	310	4.87	
	14-Jun-10	31	<1.0	4.0	2.0	11	56	0.1	<0.01	0.06	<0.01	<0.01	<0.01	0.09	0.9	0.9	1.72	1.81	-	-	<1.0	<1.0	<1.0	<1.0	16	213	138	145	4.91	
BH7	22-Feb-10	52	<1.0	6.0	<1.0	11	90	<0.1	<0.01	1.97	<0.01	<0.01	<0.01	0.5	2.4	2.4	2.76	2.77	-	4.44	<1.0	<1.0	<1.0	<1.0	25	392	295	-	4.86	
	14-Mar-10	45	<1.0	6.0	<1.0	6.0	76	<0.1	-	-	-	-	-	-	-	2.45	2.27	-	-	<1.0	<1.0	<1.0	<1.0	<1.0	25	392	297	253	4.77	
	23-Apr-10	53	<1.0	7.0	<1.0	5.0	89	<0.1	-	-	-	-	-	-	-	2.68	2.68	-	-	<1.0	<1.0	<1.0	<1.0	<1.0	20	264	172	233	4.76	
	16-May-10	47	<1.0	4.0	<1.0	6.0	81	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01	0.12	0.4	0.4	2.37	2.43	-	4.86	1.0	<1.0	<1.0	<1.0	16	302	196	384	4.9	
	14-Jun-10	47	<1.0	5.0	<1.0	4.0	89	<0.1	<0.01	0.03	<0.01	0.04	0.04	0.05	1.8	1.8	2.45	2.59	-	-	<1.0	<1.0	<1.0	<1.0	20	315	205	194	4.82	
BH11	22-Feb-10	48	<1.0	10	<1.0	24	80	0.1	<0.01	0.03	<0.01	0.04	0.04	0.05	1.8	1.8	2.91	2.76	-	3.21	<1.0	<1.0	<1.0	<1.0	<1.0	41	346	278	407	4.87
	14-Mar-10	26	<1.0	2.0	<1.0	2.0	52	<0.1	-	-	-	-	-	-	-	1.3	1.51	-	-	<1.0	<1.0	<1.0	<1.0	<1.0	8.0	186	121	144	4.82	
	23-Apr-10	32	<1.0	5.0	<1.0	2.0	57	<0.1	-	-	-	-	-	-	-	1.8	1.45	-	-	<1.0	<1.0	<1.0	<1.0	<1.0	20	150	98	135	4.89	
	16-May-10	29	<1.0	4.0	<1.0	2.0	55	<0.1	<0.01	0.01	<0.01	<0.01	<0.01	0.12	0.4	0.4	1.59	1.59	-	3.0	<1.0	<1.0	<1.0	<1.0	16	188	122	216	4.91	
	14-Jun-10	26	<1.0	3.0	<1.0	<1.0	53	<0.1	-	-	-	-	-	-	-	1.38	1.5	-	-	<1.0	<1.0	<1.0	<1.0	<1.0	12	175	114	107	4.86	
HW2305	22-Feb-10	61	<1.0	6.0	<1.0	5.0	104	<0.1	<0.01	0.56	<0.01	<0.01	<0.01	0.18	3.9	3.9	1.15	1.05	5.31	-	-	<1.0	<1.0	<1.0	<1.0	25	329	215	-	4.86
	14-Mar-10	64	<1.0	6.0	<1.0	2.0	126	<0.1	-	-	-	-	-	-	-	3.28	3.64	5.18	-	2.0	<1.0	<1.0	<1.0	<1.0	2.0	250	266	232	5.02	
	23-Apr-10	64	<1.0	7.0	1.0	9.0	97	<0.1	-	-	-	-	-	-	-	3.38	3.92	7.32	-	<1.0	<1.0	<1.0	<1.0	<1.0	28	284	191	208	4.92	
	16-May-10	92	<1.0	6.0	<1.0	13	88	<0.1	<0.01	0.43	<0.01	<0.01	<0.01	0.09	1.7	1.7	2.76	2.78	-	4.44	<1.0	<1.0	<1.0	<1.0	25	327	212	320	4.87	
	14-Jun-10	59	<1.0	6.0	<1.0	13	87	<0.1	-	-	-	-	-	-	-	2.57	2.66	-	-	7.0	<1.0	<1.0	<1.0	<1.0	7.0	324	217	230	5.28	
SW1	23-Apr-10	94	34	92	6.0	324	112	0.5	-	-	-	-	-	-	-	10.1	11.3	5.6	-	9.0	<1.0	<1.0	<1.0	<1.0	60	503	303	-	4.91	
	16-May-10	86	24	42	6.0	324	112	0.3	<0.01	0.13	<0.01	<0.01	<0.01	1.8	1.8	8.04	9.9	5.13	2.45	<1.0	<1.0	<1.0	<1.0	<1.0	233	947	616	415	4.6	
	18-Jun-10	70	20	34	5.0	182	112	0.4	<0.01	-	-	-	-	-	-	7.27	6.95	2.28	-	10.0	<1.0	<1.0	<1.0	<1.0	<1.0	180	847	550	512	4.5
	23-Apr-10	49	4.0	1.0	<1.0	11	62	<0.1	<0.01	0.06	<0.01	<0.01	<0.01	0.16	1.0	1.0	3.87	3.9	1.16	1.1	<1.0	<1.0	<1.0	<1.0	<1.0	11	287	263	121	4.63
	14-Mar-10	45	6.0	2.0	4.0	44	<0.1	-	-	-	-	-	-	-	-	2.8	2.8	-	-	4.0	<1.0	<1.0	<1.0	<1.0	<1.0	4.0	40	244	224	544
SW2	23-Apr-10	37	8.0	1.0	4.0	42	<0.1	-	-	-	-	-	-	-	-	2.93	3.27	1.0	-	4.0	<1.0	<1.0	<1.0	<1.0	<1.0	3.0	220	180	5.3	4.93
	16-May-10	35	7.0	5.0	<1.0	34	54	<0.1																						

Table 5
Quality Control Sample Analysis - BTEXN
Willamtown Sand Syndicate



BTEXN										Total Petroleum Hydrocarbons										Total Petroleum Hydrocarbons - Silica Clean up										Total Recoverable Hydrocarbons										Total Recoverable Hydrocarbons - Silica Clean up									
Analyte			Benzene	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene	Total Xylenes	Naphthalene	Sum of BTEX	C ₆ - C ₈	C ₉ - C ₁₀	C ₁₁ - C ₁₂	C ₁₃ - C ₁₄	C ₁₅ - C ₁₆	C ₁₇ - C ₁₈ sum	C ₁₀ -C ₁₄ Silica Cleanup	C ₁₅ -C ₁₈ Silica Cleanup	C ₁₉ -C ₂₀ Silica Cleanup	C ₂₁ -C ₂₂ Sum-Silica Cleanup	C ₆ - C ₁₀	C ₁₁ - C ₁₄ minus BTEX (F1)	>C ₁₅ - C ₁₈	minus Naphthalene	>C ₁₄ - C ₁₅	>C ₁₄ - C ₁₆	>C ₁₀ -C ₁₄ Silica Cleanup	P2 - Silica Cleanup	>C ₁₀ -C ₁₄ Silica Cleanup	>C ₁₅ -C ₁₈ Silica Cleanup	>C ₁₉ -C ₂₀ Silica Cleanup																		
Units			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L																	
Sample Name	Sample Date	Sample Type																																															
TRIP BLANK 13022019	13-Feb-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100																	
RUNGATE01 21022019	21-Feb-19	Rinate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100																	
BW8 21022019	21-Feb-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100																	
DUP01 21022019	21-Feb-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100																	
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC																	
BW8 21022019	21-Feb-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100																	
TRIP01 21022019	21-Feb-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 20	< 50	< 100	< 100	< 100	< 100	< 50	< 100	< 100	< 400	< 20	< 20	< 50	< 50	< 100	< 100	< 100	< 100	< 100	< 100	< 100																		
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC																	
TRIP BLANK 130319	13-Mar-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100																	
RUNGATE02 140319	14-Mar-19	Rinate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100																	
BW7 140319	14-Mar-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100																	
DUP01 140319	14-Mar-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100																	
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC																	
TRIP BLANK 05 14062019	14-Jun-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100																	
RUNGATE 05 14062019	14-Jun-19	Rinate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100																	
SW3 14062019	14-Jun-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100																	
DUP05 14062019	14-Jun-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100																	
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC																	
SW3 14062019	14-Jun-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100																	
TRIP05 140619	14-Jun-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 20	-	-	-	-	-	< 50	< 100	< 100	< 100	< 20	< 20	-	-	-	-	-	< 50	< 100	< 100	< 100	< 100																	
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC																	

Notes:
 -- Not analysed
 < - Less than laboratory limit of reporting
 NC - Not calculated
 µg/L - Micrograms per litre
 BTEXN - Benzene, toluene, ethylbenzene, xylenes, naphthalene

Table 6
Quality Control Sample Analysis - Metals
Williamstown Sand Syndicate



Analyte			Metals																
			Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Chromium VI	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Nickel	Selenium	Vanadium	Zinc
Units			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Name	Sample Date	Sample Type																	
TRIP BLANK 13022019	13-Feb-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATED1 21022019	21-Feb-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH8 21022019	21-Feb-19	Primary	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.005
DUP01 21022019	21-Feb-19	Duplicate	0.001	0.014	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.09	< 0.001	0.012	< 0.0001	0.003	< 0.01	< 0.01	0.015
Relative Percentage Difference			67%	24%	NC	NC	NC	0%	NC	NC	NC	0%	NC	0%	NC	40%	NC	NC	100%
BH8 21022019	21-Feb-19	Primary	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.005
TRIP01 21022019	21-Feb-19	Triplicate	0.001	< 0.02	< 0.001	< 0.05	< 0.0002	< 0.005	< 0.005	< 0.001	< 0.001	4.5	< 0.001	0.012	< 0.0001	0.003	-	< 0.005	0.006
Relative Percentage Difference			67%	10%	NC	NC	NC	86%	NC	NC	NC	9%	NC	0%	NC	40%	NC	NC	18%
TRIP BLANK 130319	13-Mar-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
TRIP BLANK02 150319	15-Mar-19	Trip Blank	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE02 140319	14-Mar-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH7 140319	14-Mar-19	Primary	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	-	0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
DUP02 140319	14-Mar-19	Duplicate	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	-	0.002	< 0.001	2.51	< 0.001	0.021	< 0.0001	0.004	< 0.01	< 0.01	0.007
Relative Percentage Difference			NC	0%	NC	NC	NC	0%	40%	NC	33%	NC	5%	NC	0%	NC	NC	NC	25%
BH7 140319	14-Mar-19	Primary	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	-	0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
TRIP02 14032019	14-Mar-19	Triplicate	< 0.001	< 0.02	< 0.001	< 0.05	< 0.0002	0.001	-	0.002	< 0.001	1.7	< 0.001	0.019	< 0.0001	< 0.001	-	< 0.005	< 0.005
Relative Percentage Difference			NC	0%	NC	NC	NC	0%	40%	NC	6%	NC	5%	NC	156%	NC	NC	NC	113%
TRIP BLANK 05 14062019	14-Jun-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE 05 14062019	14-Jun-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
SW3 14062019	14-Jun-19	Primary	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.003	< 0.001	1.68	< 0.001	0.038	< 0.0001	0.003	< 0.01	< 0.01	0.016
DUP05 14062019	14-Jun-19	Duplicate	< 0.001	0.036	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.003	< 0.001	1.63	< 0.001	0.039	< 0.0001	0.003	< 0.01	< 0.01	0.013
Relative Percentage Difference			NC	3%	NC	NC	NC	NC	0%	NC	3%	NC	3%	NC	0%	NC	NC	NC	21%
SW3 14062019	14-Jun-19	Primary	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.003	< 0.001	1.68	< 0.001	0.038	< 0.0001	0.003	< 0.01	< 0.01	0.016
TRIP05 140619	14-Jun-19	Triplicate	< 0.001	-	-	-	< 0.0002	0.001	-	-	< 0.001	1.6	< 0.001	-	< 0.0001	0.003	-	-	0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	67%	NC	NC	NC	5%	NC	NC	NC	0%	NC	NC	46%

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
NC - Not calculated
mg/L - Milligrams per litre
Half the laboratory limit of reporting used when calculating RPD
RPD - Relative Percentage Difference

Notes:
 < - Less than laboratory limit of reporting
 NC - Not calculated
 µg/L - Micrograms per litre

ATTACHMENT A: LABORATORY REPORTS

CERTIFICATE OF ANALYSIS

Work Order : **ES1918356**
Client : **KLEINFELDER AUSTRALIA PTY LTD**
Contact : DANIEL KOUSBROEK
Address : 95 MITCHELL ROAD
 CARDIFF NSW 2285
Telephone : ----
Project : 20193820
Order number :
C-O-C number : ----
Sampler : DANIEL KOUSBROEK
Site : WSS-CABBAGE TREE RD WATER MONITORING
Quote number : ME/114/19
No. of samples received : 14
No. of samples analysed : 14

Page : 1 of 18
Laboratory : Environmental Division Sydney
Contact : Shirley LeCornu
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +6138549 9630
Date Samples Received : 14-Jun-2019 15:59
Date Analysis Commenced : 15-Jun-2019
Issue Date : 20-Jun-2019 15:30



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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini		Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW



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

Ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- 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

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW239S	BH6	BH7	BH8	SW4
Client sampling date / time					14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00
Compound	CAS Number	LOR	Unit		ES1918356-001	ES1918356-002	ES1918356-003	ES1918356-004	ES1918356-005
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		5.39	4.82	4.91	4.82	4.31
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		334	174	213	315	316
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		220	90	145	194	163
EA016: Calculated TDS (from Electrical Conductivity)									
Total Dissolved Solids (Calc.)	----	1	mg/L		217	113	138	205	205
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		427	32	39	83	<5
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		25	21	16	20	33
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		7	<1	<1	<1	<1
Total Alkalinity as CaCO3	----	1	mg/L		7	<1	<1	<1	<1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		13	16	11	4	39
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		87	42	56	89	60
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		<1	2	<1	<1	5
Magnesium	7439-95-4	1	mg/L		6	4	4	5	5
Sodium	7440-23-5	1	mg/L		50	20	31	47	40
Potassium	7440-09-7	1	mg/L		<1	1	2	<1	<1
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	<0.05	<0.05	<0.05
Barium	7440-39-3	0.001	mg/L		0.005	0.027	0.005	0.010	0.041
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L		<0.001	<0.001	0.002	<0.001	0.002
Chromium	7440-47-3	0.001	mg/L		0.002	<0.001	0.002	0.001	<0.001

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW239S	BH6	BH7	BH8	SW4
Client sampling date / time				14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	
Compound	CAS Number	LOR	Unit	ES1918356-001	ES1918356-002	ES1918356-003	ES1918356-004	ES1918356-005	
				Result	Result	Result	Result	Result	
EG020F: Dissolved Metals by ICP-MS - Continued									
Copper	7440-50-8	0.001	mg/L	0.002	0.001	<0.001	<0.001	0.003	
Manganese	7439-96-5	0.001	mg/L	0.003	0.008	0.030	0.005	0.034	
Nickel	7440-02-0	0.001	mg/L	0.001	<0.001	0.004	0.002	0.003	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	<0.005	0.008	0.006	0.006	0.014	
Iron	7439-89-6	0.05	mg/L	0.80	2.86	2.06	2.50	0.79	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	0.1	<0.1	<0.1	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	2.86	1.52	1.81	2.59	2.50	
∅ Total Cations	----	0.01	meq/L	2.67	1.32	1.73	2.46	2.40	
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	<50	
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	<100	<100	
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	<50	
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	<50	<50	
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	<100	<100	
>C16 - C34 Fraction	----	100	µg/L	<100	<100	<100	<100	<100	
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	<100	
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100	<100	<100	<100	
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	<100	<100	<100	<100	
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	<20	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	<20	<20	
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	<20	<20	
EP080: BTEXN									



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				MW239S	BH6	BH7	BH8	SW4
Client sampling date / time				14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00
Compound	CAS Number	LOR	Unit	ES1918356-001	ES1918356-002	ES1918356-003	ES1918356-004	ES1918356-005
				Result	Result	Result	Result	Result
EP080: BTEXN - Continued								
Benzene	71-43-2	1	µg/L	<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L	<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L	<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L	<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L	<5	<5	<5	<5	<5
EP231A: Perfluoroalkyl Sulfonic Acids								
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	----
EP231B: Perfluoroalkyl Carboxylic Acids								
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 (PFTTrDA)	72629-94-8	0.02	µg/L	----	<0.02	<0.02	<0.02	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW239S	BH6	BH7	BH8	SW4
Client sampling date / time					14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00
Compound	CAS Number	LOR	Unit		ES1918356-001	ES1918356-002	ES1918356-003	ES1918356-004	ES1918356-005
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		----	<0.05	<0.05	<0.05	----
EP231C: Perfluoroalkyl Sulfonamides									
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	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
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	----
EP231P: PFAS Sums									
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	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		97.0	99.2	93.1	95.1	102
Toluene-D8	2037-26-5	2	%		121	127	112	115	107



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Client sample ID

				MW239S	BH6	BH7	BH8	SW4
Client sampling date / time				14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00
Compound	CAS Number	LOR	Unit	ES1918356-001	ES1918356-002	ES1918356-003	ES1918356-004	ES1918356-005
				Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued								
4-Bromofluorobenzene	460-00-4	2	%	114	120	110	114	110
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	----	97.9	92.4	97.8	----
13C8-PFOA	----	0.02	%	----	94.6	94.5	95.5	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH1	BH2	BH4	BH11	SW1
Client sampling date / time					14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00
Compound	CAS Number	LOR	Unit		ES1918356-006	ES1918356-007	ES1918356-008	ES1918356-009	ES1918356-010
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		5.52	4.76	4.84	4.84	4.50
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		99	91	69	175	847
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		72	51	36	107	512
EA016: Calculated TDS (from Electrical Conductivity)									
Total Dissolved Solids (Calc.)	----	1	mg/L		64	59	45	114	550
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		39	215	186	136	26
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		8	11	7	12	190
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		10	<1	<1	<1	<1
Total Alkalinity as CaCO3	----	1	mg/L		10	<1	<1	<1	<1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		3	5	4	<1	182
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		24	23	18	53	112
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		<1	1	1	<1	20
Magnesium	7439-95-4	1	mg/L		2	2	1	3	34
Sodium	7440-23-5	1	mg/L		10	11	6	26	77
Potassium	7440-09-7	1	mg/L		<1	<1	<1	<1	5
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	<0.05	<0.05	0.09
Barium	7440-39-3	0.001	mg/L		0.001	0.004	0.012	0.004	0.029
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	0.0002
Cobalt	7440-48-4	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	0.009
Chromium	7440-47-3	0.001	mg/L		0.002	<0.001	<0.001	0.001	<0.001



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH1	BH2	BH4	BH11	SW1
Client sampling date / time					14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00
Compound	CAS Number	LOR	Unit		ES1918356-006	ES1918356-007	ES1918356-008	ES1918356-009	ES1918356-010
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued									
Copper	7440-50-8	0.001	mg/L		0.001	0.004	0.038	<0.001	0.006
Manganese	7439-96-5	0.001	mg/L		0.009	0.009	0.014	0.005	0.595
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	<0.001	0.001	0.011
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L		0.074	<0.005	0.005	0.005	0.535
Iron	7439-89-6	0.05	mg/L		6.31	0.08	<0.05	0.98	2.75
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		<0.1	<0.1	<0.1	<0.1	0.4
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L		0.94	0.75	0.59	1.50	6.95
∅ Total Cations	----	0.01	meq/L		0.60	0.69	0.39	1.38	7.27
∅ Ionic Balance	----	0.01	%		----	----	----	----	2.28
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	<50
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH1	BH2	BH4	BH11	SW1
Client sampling date / time					14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00
Compound	CAS Number	LOR	Unit		ES1918356-006	ES1918356-007	ES1918356-008	ES1918356-009	ES1918356-010
					Result	Result	Result	Result	Result
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP231A: Perfluoroalkyl Sulfonic Acids									
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	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		----	----	<0.02	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		----	----	<0.1	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		----	----	<0.02	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		----	----	<0.02	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		----	----	<0.02	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		----	----	<0.01	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		----	----	<0.02	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		----	----	<0.02	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		----	----	<0.02	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		----	----	<0.02	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		----	----	<0.02	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH1	BH2	BH4	BH11	SW1
Client sampling date / time					14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00
Compound	CAS Number	LOR	Unit		ES1918356-006	ES1918356-007	ES1918356-008	ES1918356-009	ES1918356-010
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		----	----	<0.05	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		----	----	<0.02	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		----	----	<0.05	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		----	----	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		----	----	<0.05	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		----	----	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		----	----	<0.02	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		----	----	<0.02	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
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	----	----
EP231P: PFAS Sums									
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	----	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		99.6	94.2	96.0	90.3	103
Toluene-D8	2037-26-5	2	%		128	119	119	112	130



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Client sample ID

				BH1	BH2	BH4	BH11	SW1
Client sampling date / time				14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00
Compound	CAS Number	LOR	Unit	ES1918356-006	ES1918356-007	ES1918356-008	ES1918356-009	ES1918356-010
				Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued								
4-Bromofluorobenzene	460-00-4	2	%	119	113	115	108	122
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	----	----	97.1	----	----
13C8-PFOA	----	0.02	%	----	----	99.6	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW3	DUP05	RINSATE 05	TRIP BLANK 05	----
Client sampling date / time					14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	----
Compound	CAS Number	LOR	Unit		ES1918356-011	ES1918356-012	ES1918356-013	ES1918356-014	-----
					Result	Result	Result	Result	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		4.58	----	----	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		300	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		170	----	----	----	----
EA016: Calculated TDS (from Electrical Conductivity)									
Total Dissolved Solids (Calc.)	----	1	mg/L		195	----	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		12	----	----	----	----
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		42	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		<1	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		<1	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		41	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		55	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		7	----	----	----	----
Magnesium	7439-95-4	1	mg/L		6	----	----	----	----
Sodium	7440-23-5	1	mg/L		32	----	----	----	----
Potassium	7440-09-7	1	mg/L		<1	----	----	----	----
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	<0.05	<0.05	----
Barium	7440-39-3	0.001	mg/L		0.035	0.036	<0.001	<0.001	----
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	----
Cobalt	7440-48-4	0.001	mg/L		0.003	0.003	<0.001	<0.001	----
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW3	DUP05	RINSATE 05	TRIP BLANK 05	----
Client sampling date / time				14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	----	
Compound	CAS Number	LOR	Unit	ES1918356-011	ES1918356-012	ES1918356-013	ES1918356-014	-----	
				Result	Result	Result	Result	----	
EG020F: Dissolved Metals by ICP-MS - Continued									
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----	
Manganese	7439-96-5	0.001	mg/L	0.038	0.039	<0.001	<0.001	----	
Nickel	7440-02-0	0.001	mg/L	0.003	0.003	<0.001	<0.001	----	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	----	
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	----	
Zinc	7440-66-6	0.005	mg/L	0.016	0.013	<0.005	<0.005	----	
Iron	7439-89-6	0.05	mg/L	1.68	1.63	<0.05	<0.05	----	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	----	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	<0.1	----	----	----	----	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	2.40	----	----	----	----	
∅ Total Cations	----	0.01	meq/L	2.24	----	----	----	----	
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	----	
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	<100	----	
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	----	
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	<50	----	
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	<100	----	
>C16 - C34 Fraction	----	100	µg/L	<100	<100	<100	<100	----	
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	----	
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100	<100	<100	----	
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	<100	<100	<100	----	
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	----	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	<20	----	
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	<20	----	
EP080: BTEXN									



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				SW3	DUP05	RINSATE 05	TRIP BLANK 05	----
Client sampling date / time				14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	----
Compound	CAS Number	LOR	Unit	ES1918356-011	ES1918356-012	ES1918356-013	ES1918356-014	-----
				Result	Result	Result	Result	----
EP080: BTEXN - Continued								
Benzene	71-43-2	1	µg/L	<1	<1	<1	<1	----
Toluene	108-88-3	2	µg/L	<2	<2	<2	<2	----
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	<2	----
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	----
^ Total Xylenes	----	2	µg/L	<2	<2	<2	<2	----
^ Sum of BTEX	----	1	µg/L	<1	<1	<1	<1	----
Naphthalene	91-20-3	5	µg/L	<5	<5	<5	<5	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	----	----	<0.02	<0.02	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	----	----	<0.02	<0.02	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	----	----	<0.02	<0.02	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	----	----	<0.02	<0.02	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	----	----	<0.01	<0.01	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	----	----	<0.02	<0.02	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	----	----	<0.1	<0.1	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	----	----	<0.02	<0.02	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	----	----	<0.02	<0.02	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	----	----	<0.02	<0.02	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	----	----	<0.01	<0.01	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	----	----	<0.02	<0.02	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	----	----	<0.02	<0.02	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	----	----	<0.02	<0.02	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	----	----	<0.02	<0.02	----
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	----	----	<0.02	<0.02	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW3	DUP05	RINSATE 05	TRIP BLANK 05	----
Client sampling date / time					14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	----
Compound	CAS Number	LOR	Unit		ES1918356-011	ES1918356-012	ES1918356-013	ES1918356-014	-----
					Result	Result	Result	Result	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		----	----	<0.05	<0.05	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		----	----	<0.02	<0.02	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		----	----	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		----	----	<0.05	<0.05	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		----	----	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		----	----	<0.05	<0.05	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		----	----	<0.02	<0.02	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		----	----	<0.02	<0.02	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		----	----	<0.05	<0.05	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		----	----	<0.05	<0.05	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		----	----	<0.05	<0.05	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		----	----	<0.05	<0.05	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		----	----	<0.01	<0.01	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		----	----	<0.01	<0.01	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		----	----	<0.01	<0.01	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		94.8	92.5	93.2	88.7	----
Toluene-D8	2037-26-5	2	%		116	114	113	108	----



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Client sample ID

				SW3	DUP05	RINSATE 05	TRIP BLANK 05	----
Client sampling date / time				14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	----
Compound	CAS Number	LOR	Unit	ES1918356-011	ES1918356-012	ES1918356-013	ES1918356-014	-----
				Result	Result	Result	Result	----
EP080S: TPH(V)/BTEX Surrogates - Continued								
4-Bromofluorobenzene	460-00-4	2	%	112	108	109	105	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	----	----	99.3	101	----
13C8-PFOA	----	0.02	%	----	----	91.3	96.3	----



Surrogate Control Limits

Sub-Matrix: **WATER**

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

QUALITY CONTROL REPORT

Work Order	: ES1918356	Page	: 1 of 15
Client	: KLEINFELDER AUSTRALIA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Contact	: Shirley LeCornu
Address	: 95 MITCHELL ROAD CARDIFF NSW 2285	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +6138549 9630
Project	: 20193820	Date Samples Received	: 14-Jun-2019
Order number	:	Date Analysis Commenced	: 15-Jun-2019
C-O-C number	: ----	Issue Date	: 20-Jun-2019
Sampler	: DANIEL KOUSBROEK		
Site	: WSS-CABBAGE TREE RD WATER MONITORING		
Quote number	: ME/114/19		
No. of samples received	: 14		
No. of samples analysed	: 14		



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 Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjari	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini		Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW



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

Key :
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 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
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 2407901)									
ES1918347-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.31	7.35	0.546	0% - 20%
ES1918356-001	MW239S	EA005-P: pH Value	----	0.01	pH Unit	5.39	4.94	8.71	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 2407902)									
ES1918347-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	3520	3580	1.78	0% - 20%
ES1918356-001	MW239S	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	334	329	1.54	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 2410338)									
ES1918104-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	2030	1990	2.19	0% - 20%
ES1918347-003	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	1580	1670	5.74	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 2410340)									
ES1918356-004	BH8	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	194	180	7.47	0% - 50%
ES1918538-007	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	648	640	1.09	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 2414080)									
ES1918356-008	BH4	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	36	34	7.19	No Limit
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 2410337)									
ES1918104-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	172	169	1.47	0% - 20%
ES1918347-003	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	11	<5	73.0	No Limit
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 2410339)									
ES1918356-004	BH8	EA025H: Suspended Solids (SS)	----	5	mg/L	83	80	4.29	0% - 50%
ES1918538-007	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	31	34	8.56	No Limit
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 2414079)									
ES1918356-008	BH4	EA025H: Suspended Solids (SS)	----	5	mg/L	186	184	0.675	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 2407900)									
ES1918347-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 2407900) - continued									
ES1918347-001	Anonymous	ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	479	503	4.83	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	479	503	4.83	0% - 20%
ES1918356-001	MW239S	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	7	2	110	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	7	2	110	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2406923)									
ES1918276-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	547	532	2.90	0% - 20%
ES1918347-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	256	253	1.49	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2406926)									
ES1918356-003	BH7	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	11	13	15.7	0% - 50%
ES1918364-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	47	47	0.00	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 2406924)									
ES1918276-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	179	179	0.00	0% - 20%
ES1918347-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	766	758	1.01	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 2406925)									
ES1918356-003	BH7	ED045G: Chloride	16887-00-6	1	mg/L	56	55	0.00	0% - 20%
ES1918364-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	1800	1790	0.592	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 2409648)									
ES1918356-001	MW239S	ED093F: Calcium	7440-70-2	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	6	6	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	50	50	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.00	No Limit
ES1918429-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	220	219	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	170	169	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	646	654	1.18	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	58	58	0.00	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2409647)									
ES1918356-001	MW239S	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.005	0.005	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.001	0.001	0.00	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2409647) - continued									
ES1918356-001	MW239S	EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.80	0.81	0.00	0% - 50%
ES1918429-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.010	0.010	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.102	0.104	1.88	0% - 20%
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	5.56	5.60	0.818	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.379	0.383	0.974	0% - 20%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.171	0.175	2.56	0% - 20%
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	1.49	1.62	8.33	0% - 20%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.54	0.52	2.90	0% - 50%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2410246)									
ES1918347-008	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.021	0.021	0.00	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.023	0.025	9.81	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.10	0.10	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.56	0.58	3.66	0% - 50%
ES1918347-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.024	0.024	0.00	0% - 20%



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2410246) - continued									
ES1918347-001	Anonymous	EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.009	0.009	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.11	0.11	0.00	No Limit
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit		
EG035F: Dissolved Mercury by FIMS (QC Lot: 2409646)									
ES1918356-004	BH8	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES1918356-010	SW1	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 2410245)									
ES1918322-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES1918347-006	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 2407903)									
ES1918356-010	SW1	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.4	0.4	0.00	No Limit
ES1918356-001	MW239S	EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2411564)									
ES1918356-001	MW239S	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
ES1918356-008	BH4	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2411564)									
ES1918356-001	MW239S	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES1918356-008	BH4	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 2411564)									
ES1918356-001	MW239S	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.00	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
ES1918356-008	BH4	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.00	No Limit
			106-42-3						



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP080: BTEXN (QC Lot: 2411564) - continued									
ES1918356-008	BH4	EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 2411006)									
EM1909131-001	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
ES1918311-002	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	1.08	1.00	7.12	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.06	0.05	16.9	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.05	0.04	28.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.38	0.33	16.0	0% - 50%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2411006)									
EM1909131-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		ES1918311-002	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.04	0.03
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3			0.02	µg/L	0.04	0.04	0.00	No Limit
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4			0.02	µg/L	0.18	0.16	15.7	No Limit
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9			0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231X: Perfluorononanoic acid (PFNA)	375-95-1			0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2			0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8			0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1			0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8			0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7			0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4			0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2411006)									
EM1909131-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2411006) - continued									
EM1909131-001	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1918311-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2411006)									
EM1909131-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1918311-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit

Page : 8 of 15
 Work Order : ES1918356
 Client : KLEINFELDER AUSTRALIA PTY LTD
 Project : 20193820



Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2411006) - continued									
ES1918311-002	Anonymous	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 2411006)									
EM1909131-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.00	No Limit
ES1918311-002	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	1.83	1.65	10.3	0% - 20%

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
	Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
		LCS	Low	High
----	4 pH Unit	100	98	102
----	7 pH Unit	100	98	102
<1	2000 µS/cm	104	95	113
<10	2000 mg/L	97.0	87	109
<10	293 mg/L	99.6	66	126
<10	2000 mg/L	94.8	87	109
<10	293 mg/L	91.3	66	126
<10	2000 mg/L	98.6	87	109
<10	293 mg/L	94.4	66	126
<5	150 mg/L	104	83	129
<5	1000 mg/L	106	82	110
<5	150 mg/L	99.0	83	129
<5	1000 mg/L	94.3	82	110
<5	150 mg/L	103	83	129
<5	1000 mg/L	93.5	82	110
----	200 mg/L	96.5	81	111
----	50 mg/L	107	70	130
<1	25 mg/L	102	82	122
<1	25 mg/L	97.0	82	122
<1	10 mg/L	105	81	127
<1	1000 mg/L	92.0	81	127



Sub-Matrix: **WATER**

Method: Compound				Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
						LCS	Low	High
CAS Number	LOR	Unit						
ED045G: Chloride by Discrete Analyser (QCLot: 2406925) - continued								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	102	81	127
				<1	1000 mg/L	91.8	81	127
ED093F: Dissolved Major Cations (QCLot: 2409648)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	88.7	80	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	97.4	90	116
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	93.4	82	120
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	94.6	85	113
EG020F: Dissolved Metals by ICP-MS (QCLot: 2409647)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	93.6	85	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	90.6	85	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	91.2	82	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	91.6	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	86.7	85	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	89.7	82	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	88.5	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	86.5	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	86.8	82	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	88.3	82	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	91.6	85	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	88.6	83	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	91.0	81	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	97.5	85	115
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	94.0	82	112
EG020F: Dissolved Metals by ICP-MS (QCLot: 2410246)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	92.2	85	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	89.7	85	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	94.5	82	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	93.1	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	91.5	85	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	90.2	82	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	90.2	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	91.3	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	90.1	82	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	90.5	82	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	88.0	85	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	92.5	83	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	89.9	81	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	99.4	85	115



Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result			Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 2410246) - continued								
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	88.4	82	112
EG035F: Dissolved Mercury by FIMS (QCLot: 2409646)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	85.1	83	105
EG035F: Dissolved Mercury by FIMS (QCLot: 2410245)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	85.2	83	105
EK040P: Fluoride by PC Titrator (QCLot: 2407903)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	91.6	82	116
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QCLot: 2407984)								
EP071SG: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	84.4	75	117
EP071SG: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	84.3	81	113
EP071SG: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	74.9	71	117
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 2407984)								
EP071SG: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	99.2	73	119
EP071SG: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	94.3	81	113
EP071SG: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	82.1	65	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2411564)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	82.2	75	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2411564)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	87.5	75	127
EP080: BTEXN (QCLot: 2411564)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	89.8	70	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	96.9	69	123
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	95.4	70	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	108	69	121
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	112	72	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	95.9	70	120
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2411006)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	113	70	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	129	70	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	118	70	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	120	70	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	115	70	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.5 µg/L	124	70	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2411006)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	110	70	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	125	70	130

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result		LCS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2411006) - continued								
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	121	70	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	123	70	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	124	70	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	123	70	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	130	70	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	128	70	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	126	70	130
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	119	70	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	110	70	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2411006)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	105	70	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	110	70	150
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	112	70	150
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	1.25 µg/L	107	70	150
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	122	70	150
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	129	70	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	125	70	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2411006)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	123	70	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	113	70	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	120	70	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	128	70	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2406923)							
ES1918276-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	# Not Determined	70	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2406926)							



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2406926) - continued							
ES1918356-003	BH7	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	105	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 2406924)							
ES1918276-001	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	105	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 2406925)							
ES1918356-003	BH7	ED045G: Chloride	16887-00-6	250 mg/L	111	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2409647)							
ES1918356-002	BH6	EG020A-F: Arsenic	7440-38-2	1.2 mg/L	113	70	130
		EG020A-F: Beryllium	7440-41-7	1.2 mg/L	113	70	130
		EG020A-F: Barium	7440-39-3	1.2 mg/L	114	70	130
		EG020A-F: Cadmium	7440-43-9	0.31 mg/L	110	70	130
		EG020A-F: Chromium	7440-47-3	1.2 mg/L	124	70	130
		EG020A-F: Cobalt	7440-48-4	1.2 mg/L	126	70	130
		EG020A-F: Copper	7440-50-8	1.2 mg/L	121	70	130
		EG020A-F: Lead	7439-92-1	1.2 mg/L	127	70	130
		EG020A-F: Manganese	7439-96-5	1.2 mg/L	126	70	130
		EG020A-F: Nickel	7440-02-0	1.2 mg/L	120	70	130
		EG020A-F: Vanadium	7440-62-2	1.2 mg/L	120	70	130
		EG020A-F: Zinc	7440-66-6	1.2 mg/L	117	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2410246)							
ES1918330-007	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	89.0	70	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	88.6	70	130
		EG020A-F: Barium	7440-39-3	1 mg/L	91.3	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	91.0	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	91.6	70	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	88.2	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	90.6	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	108	70	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	92.7	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	86.8	70	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	90.0	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	90.6	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 2409646)							
ES1918356-003	BH7	EG035F: Mercury	7439-97-6	0.01 mg/L	112	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 2410245)							
ES1918259-007	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	104	70	130
EK040P: Fluoride by PC Titrator (QCLot: 2407903)							
ES1918356-001	MW239S	EK040P: Fluoride	16984-48-8	5 mg/L	90.6	70	130



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2411564)							
ES1918356-001	MW239S	EP080: C6 - C9 Fraction	----	325 µg/L	77.3	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2411564)							
ES1918356-001	MW239S	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	76.3	70	130
EP080: BTEXN (QCLot: 2411564)							
ES1918356-001	MW239S	EP080: Benzene	71-43-2	25 µg/L	94.1	70	130
		EP080: Toluene	108-88-3	25 µg/L	96.2	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	87.6	70	130
		EP080: meta- & para-Xylene	108-38-3	25 µg/L	99.9	70	130
			106-42-3				
		EP080: ortho-Xylene	95-47-6	25 µg/L	98.2	70	130
		EP080: Naphthalene	91-20-3	25 µg/L	79.2	70	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2411006)							
EM1909131-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	118	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.5 µg/L	128	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	118	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	126	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	125	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.5 µg/L	122	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2411006)							
EM1909131-001	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	119	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	126	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	129	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	122	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	128	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	121	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	130	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	128	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	123	50	130
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.5 µg/L	114	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	114	50	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2411006)							
EM1909131-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	126	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	119	50	150
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	118	50	150
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	1.25 µg/L	118	50	150



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2411006) - continued							
EM1909131-001	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	128	50	150
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	128	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	126	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2411006)							
EM1909131-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	128	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	123	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	127	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	128	50	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES1918356	Page	: 1 of 11
Client	: KLEINFELDER AUSTRALIA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Telephone	: +6138549 9630
Project	: 20193820	Date Samples Received	: 14-Jun-2019
Site	: WSS-CABBAGE TREE RD WATER MONITORING	Issue Date	: 20-Jun-2019
Sampler	: DANIEL KOUSBROEK	No. of samples received	: 14
Order number	:	No. of samples analysed	: 14

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers exist - please see following pages for full details.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	ES1918276--001	Anonymous	Sulfate as SO4 - Turbidimetric	14808-79-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method		Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
MW239S,	BH6,	----	----	----	17-Jun-2019	14-Jun-2019	3
BH7,	BH8,						
SW4,	BH1,						
BH2,	BH4,						
BH11,	SW1,						
SW3							

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
TRH - Total Recoverable Hydrocarbons - Silica Gel C	0	16	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Total Recoverable Hydrocarbons - Silica Gel C	0	16	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural (EA005-P)								
MW239S, BH6,	BH6,	14-Jun-2019	----	----	----	17-Jun-2019	14-Jun-2019	✖
BH7, BH8,	BH8,							
SW4, BH1,	BH1,							
BH2, BH4,	BH4,							
BH11, SW1,	BH11,							
SW3	SW3							
EA010P: Conductivity by PC Titrator								
Clear Plastic Bottle - Natural (EA010-P)								
MW239S, BH6,	BH6,	14-Jun-2019	----	----	----	17-Jun-2019	12-Jul-2019	✔
BH7, BH8,	BH8,							
SW4, BH1,	BH1,							
BH2, BH4,	BH4,							
BH11, SW1,	BH11,							
SW3	SW3							
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Clear Plastic Bottle - Natural (EA015H)								
MW239S, BH6,	BH6,	14-Jun-2019	----	----	----	19-Jun-2019	21-Jun-2019	✔
BH7, BH8,	BH8,							
SW4, BH1,	BH1,							
BH2, BH4,	BH4,							
BH11, SW1,	BH11,							
SW3	SW3							
EA025: Total Suspended Solids dried at 104 ± 2°C								
Clear Plastic Bottle - Natural (EA025H)								
MW239S, BH6,	BH6,	14-Jun-2019	----	----	----	19-Jun-2019	21-Jun-2019	✔
BH7, BH8,	BH8,							
SW4, BH1,	BH1,							
BH2, BH4,	BH4,							
BH11, SW1,	BH11,							
SW3	SW3							
EA065: Total Hardness as CaCO3								
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)								
MW239S, BH6,	BH6,	14-Jun-2019	----	----	----	17-Jun-2019	12-Jul-2019	✔
BH7, BH8,	BH8,							
SW4, BH1,	BH1,							
BH2, BH4,	BH4,							
BH11, SW1,	BH11,							
SW3	SW3							



Matrix: **WATER**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P)								
MW239S, BH6,	BH6,	14-Jun-2019	----	----	----	17-Jun-2019	28-Jun-2019	✓
BH7, BH8,	BH8,							
SW4, BH1,	BH1,							
BH2, BH4,	BH4,							
BH11, SW1,	BH11,							
SW3	SW3							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G)								
MW239S, BH6,	BH6,	14-Jun-2019	----	----	----	15-Jun-2019	12-Jul-2019	✓
BH7, BH8,	BH8,							
SW4, BH1,	BH1,							
BH2, BH4,	BH4,							
BH11, SW1,	BH11,							
SW3	SW3							
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G)								
MW239S, BH6,	BH6,	14-Jun-2019	----	----	----	15-Jun-2019	12-Jul-2019	✓
BH7, BH8,	BH8,							
SW4, BH1,	BH1,							
BH2, BH4,	BH4,							
BH11, SW1,	BH11,							
SW3	SW3							
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)								
MW239S, BH6,	BH6,	14-Jun-2019	----	----	----	17-Jun-2019	12-Jul-2019	✓
BH7, BH8,	BH8,							
SW4, BH1,	BH1,							
BH2, BH4,	BH4,							
BH11, SW1,	BH11,							
SW3	SW3							

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)							
MW239S, BH6, BH7, BH8, SW4, BH1, BH2, BH4, BH11, SW1, SW3	14-Jun-2019	----	----	----	17-Jun-2019	11-Dec-2019	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)							
DUP05, RINSATE 05, TRIP BLANK 05	14-Jun-2019	----	----	----	18-Jun-2019	11-Dec-2019	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)							
MW239S, BH6, BH7, BH8, SW4, BH1, BH2, BH4, BH11, SW1, SW3, DUP05, RINSATE 05, TRIP BLANK 05	14-Jun-2019	----	----	----	18-Jun-2019	12-Jul-2019	✓
EK040P: Fluoride by PC Titrator							
Clear Plastic Bottle - Natural (EK040P)							
MW239S, BH6, BH7, BH8, SW4, BH1, BH2, BH4, BH11, SW1, SW3	14-Jun-2019	----	----	----	17-Jun-2019	12-Jul-2019	✓
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup							
Amber Glass Bottle - Unpreserved (EP071SG)							
MW239S, BH6, BH7, BH8, SW4, BH1, BH2, BH4, BH11, SW1, SW3, DUP05, RINSATE 05, TRIP BLANK 05	14-Jun-2019	18-Jun-2019	21-Jun-2019	✓	19-Jun-2019	28-Jul-2019	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup							
Amber Glass Bottle - Unpreserved (EP071SG) MW239S, BH6, BH7, BH8, SW4, BH1, BH2, BH4, BH11, SW1, SW3, DUP05, RINSATE 05, TRIP BLANK 05	14-Jun-2019	18-Jun-2019	21-Jun-2019	✓	19-Jun-2019	28-Jul-2019	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber VOC Vial - Sulfuric Acid (EP080) MW239S, BH6, BH7, BH8, SW4, BH1, BH2, BH4, BH11, SW1, SW3, DUP05, RINSATE 05, TRIP BLANK 05	14-Jun-2019	19-Jun-2019	28-Jun-2019	✓	19-Jun-2019	28-Jun-2019	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber VOC Vial - Sulfuric Acid (EP080) MW239S, BH6, BH7, BH8, SW4, BH1, BH2, BH4, BH11, SW1, SW3, DUP05, RINSATE 05, TRIP BLANK 05	14-Jun-2019	19-Jun-2019	28-Jun-2019	✓	19-Jun-2019	28-Jun-2019	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080) MW239S, BH6, BH7, BH8, SW4, BH1, BH2, BH4, BH11, SW1, SW3, DUP05, RINSATE 05, TRIP BLANK 05	14-Jun-2019	19-Jun-2019	28-Jun-2019	✓	19-Jun-2019	28-Jun-2019	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X) BH6, BH7, BH8, BH4, RINSATE 05, TRIP BLANK 05	14-Jun-2019	18-Jun-2019	11-Dec-2019	✓	18-Jun-2019	11-Dec-2019	✓

Page : 7 of 11
 Work Order : ES1918356
 Client : KLEINFELDER AUSTRALIA PTY LTD
 Project : 20193820



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X)		14-Jun-2019	18-Jun-2019	11-Dec-2019	✔	18-Jun-2019	11-Dec-2019	✔
BH6,	BH7,							
BH8,	BH4,							
RINSATE 05,	TRIP BLANK 05							
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X)		14-Jun-2019	18-Jun-2019	11-Dec-2019	✔	18-Jun-2019	11-Dec-2019	✔
BH6,	BH7,							
BH8,	BH4,							
RINSATE 05,	TRIP BLANK 05							
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X)		14-Jun-2019	18-Jun-2019	11-Dec-2019	✔	18-Jun-2019	11-Dec-2019	✔
BH6,	BH7,							
BH8,	BH4,							
RINSATE 05,	TRIP BLANK 05							
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X)		14-Jun-2019	18-Jun-2019	11-Dec-2019	✔	18-Jun-2019	11-Dec-2019	✔
BH6,	BH7,							
BH8,	BH4,							
RINSATE 05,	TRIP BLANK 05							



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)		Quality Control Specification	
Analytical Methods	Method	QC	Regular	Actual	Expected		Evaluation
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	4	32	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	4	39	10.26	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	11	18.18	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	5	44	11.36	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	5	43	11.63	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	0	16	0.00	10.00	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	32	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	39	5.13	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	6	44	13.64	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	6	43	13.95	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chloride by Discrete Analyser	ED045G	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	32	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	39	5.13	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Method Blanks (MB) - Continued							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	40	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	3	44	6.82	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	3	43	6.98	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	1	16	6.25	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	2	40	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	32	6.25	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	39	5.13	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	11	9.09	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	40	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	0	16	0.00	5.00	✖	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (2013) Schedule B(3)
Calculated TDS (from Electrical Conductivity)	EA016	WATER	In house: Calculation from Electrical Conductivity (APHA 2510 B) using a conversion factor specified in the analytical report. This method is compliant with NEPM (2013) Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of 'non-filterable' residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C. This method is compliant with NEPM (2013) Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM (2013) Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (2013) Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.



Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Fluoride by PC Titrator	EK040P	WATER	In house: Referenced to APHA 4500-F C: CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (2013) Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	WATER	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C36. This method is compliant with NEPM (2013) Schedule B(3) (Method 506.1)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In house: Direct injection analysis of fresh waters after dilution (1:1) with methanol. Analysis by LC-Electrospray-MS-MS, Negative Mode using MRM. Where commercially available, isotopically labelled analogues of the target analytes are used as internal standards for quantification. Where a labelled analogue is not commercially available, the internal standard with similar chemistry and the closest retention time to the target is used for quantification. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. This method complies with the quality control definitions as stated in QSM 5.1. Data is reviewed in line with the DQOs as stated in QSM5.1
Preparation Methods	Method	Matrix	Method Descriptions
Preparation for PFAS in water.	EP231-PR	WATER	Method presumes direct injection without workup. Preparation includes addition of internal standard and surrogate, and filtration prior to analysis.
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : ES1918356

Client : KLEINFELDER AUSTRALIA PTY LTD Contact : DANIEL KOUSBROEK Address : 95 MITCHELL ROAD CARDIFF NSW 2285 E-mail : dkousbroek@kleinfelder.com Telephone : ---- Facsimile : ---- Project : 20193820 Order number : ---- C-O-C number : ---- Site : WSS-CABBAGE TREE RD WATER MONITORING Sampler : DANIEL KOUSBROEK	Laboratory : Environmental Division Sydney Contact : Shirley LeCornu Address : 277-289 Woodpark Road Smithfield NSW Australia 2164 E-mail : shirley.lecornu@Alsglobal.com Telephone : +6138549 9630 Facsimile : +61-2-8784 8500 Page : 1 of 3 Quote number : EM2019ALLENVENG0010 (ME/114/19) QC Level : NEPM 2013 B3 & ALS QC Standard

Dates

Date Samples Received : 14-Jun-2019 15:59	Issue Date : 14-Jun-2019
Client Requested Due : 20-Jun-2019	Scheduled Reporting Date : 20-Jun-2019
Date	

Delivery Details

Mode of Delivery : Undefined	Security Seal : Not Available
No. of coolers/boxes : 1	Temperature : 2.7°C - Ice present
Receipt Detail :	No. of samples received / analysed : 14 / 14

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- **Sample TRI05 to be forwarded to Eurofins as per COC's.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- **Sample(s) requiring volatile organic compound analysis received in airtight containers (ZHE).**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- No sample container / preservation non-compliance exists.

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EG020F Dissolved Metals by ICP/MS	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-12 General Water Suite	WATER - W-03 15 Metals (NEPM Suite)	WATER - W-05 SG TRH/BTEXN/8 Metals inc Silica Gel Clean Up
ES1918356-001	14-Jun-2019 00:00	MW239S	✓	✓	✓		✓	✓	✓
ES1918356-002	14-Jun-2019 00:00	BH6	✓	✓	✓	✓	✓	✓	✓
ES1918356-003	14-Jun-2019 00:00	BH7	✓	✓	✓	✓	✓	✓	✓
ES1918356-004	14-Jun-2019 00:00	BH8	✓	✓	✓	✓	✓	✓	✓
ES1918356-005	14-Jun-2019 00:00	SW4	✓	✓	✓		✓	✓	✓
ES1918356-006	14-Jun-2019 00:00	BH1	✓	✓	✓		✓	✓	✓
ES1918356-007	14-Jun-2019 00:00	BH2	✓	✓	✓		✓	✓	✓
ES1918356-008	14-Jun-2019 00:00	BH4	✓	✓	✓	✓	✓	✓	✓
ES1918356-009	14-Jun-2019 00:00	BH11	✓	✓	✓		✓	✓	✓
ES1918356-010	14-Jun-2019 00:00	SW1	✓	✓	✓		✓	✓	✓
ES1918356-011	14-Jun-2019 00:00	SW3	✓	✓	✓		✓	✓	✓
ES1918356-012	14-Jun-2019 00:00	DUP05			✓			✓	✓
ES1918356-013	14-Jun-2019 00:00	RINSATE 05			✓	✓		✓	✓
ES1918356-014	14-Jun-2019 00:00	TRIP BLANK 05			✓	✓		✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.



Requested Deliverables

DANIEL KOUSBROEK

- *AU Certificate of Analysis - NATA (COA)	Email	dkousbroek@kleinfelder.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	dkousbroek@kleinfelder.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	dkousbroek@kleinfelder.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	dkousbroek@kleinfelder.com
- A4 - AU Tax Invoice (INV)	Email	dkousbroek@kleinfelder.com
- Chain of Custody (CoC) (COC)	Email	dkousbroek@kleinfelder.com
- EDI Format - ENMRG (ENMRG)	Email	dkousbroek@kleinfelder.com
- EDI Format - EQUIS V5 for KLEINFELDER (KLEINFELDER)	Email	dkousbroek@kleinfelder.com
- EDI Format - ESDAT (ESDAT)	Email	dkousbroek@kleinfelder.com

INVOICES

- A4 - AU Tax Invoice (INV)	Email	Aus_Accounts@kleinfelder.com

Newcastle

- *AU Certificate of Analysis - NATA (COA)	Email	newcastle@kleinfelder.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	newcastle@kleinfelder.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	newcastle@kleinfelder.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	newcastle@kleinfelder.com
- A4 - AU Tax Invoice (INV)	Email	newcastle@kleinfelder.com
- Chain of Custody (CoC) (COC)	Email	newcastle@kleinfelder.com
- EDI Format - ENMRG (ENMRG)	Email	newcastle@kleinfelder.com
- EDI Format - EQUIS V5 for KLEINFELDER (KLEINFELDER)	Email	newcastle@kleinfelder.com
- EDI Format - ESDAT (ESDAT)	Email	newcastle@kleinfelder.com

TOM OVERTON

- *AU Certificate of Analysis - NATA (COA)	Email	toverton@kleinfelder.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	toverton@kleinfelder.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	toverton@kleinfelder.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	toverton@kleinfelder.com
- A4 - AU Tax Invoice (INV)	Email	toverton@kleinfelder.com
- Chain of Custody (CoC) (COC)	Email	toverton@kleinfelder.com
- EDI Format - ENMRG (ENMRG)	Email	toverton@kleinfelder.com
- EDI Format - EQUIS V5 for KLEINFELDER (KLEINFELDER)	Email	toverton@kleinfelder.com
- EDI Format - ESDAT (ESDAT)	Email	toverton@kleinfelder.com



Client:		Laboratory:				
Kleinbeller Australia Pty Ltd		ALS				
56 Mitchell Road		5/565 Maitland Rd				
Cardiff,		Mayfield West.				
NSW 2285		Newcastle NSW 2304				
Phone: 02 4549 6200		Phone: (02) 4014 2500				
SITE, COC AND CONTACT DATA						
Site Name:	WSS - Cabbage Tree Rd water monitoring	Sample Name:	Dan Kousbroek			
QUOTE NUMBER	WE/14/19	Contact Number	045 8197 676			
Job No.:	20139920	Contact e-mail:	dkousbroek@kleinbeller.com			
Sequenced TAT	24 hrs	48 hrs	3 days	5 days	7 days	10 days
Default Level	LAB minimum unless specified					
PM e-mail:	ton@kleinbeller.com					

[illegible]

Sample ID	Lab ID	Sample Point	Sample Type	Date	Start Depth	End Depth	Units	# Containers	W-05 9G TRH/BTEXN	LAB OF ORIGIN NEWCASTLE	W-03 Metals - NEPM 15	Iron (dissolved)	General Water Suite	Total Dissolved Solids (TDS)	Total Suspended Solids (TSS)	EP231X PFAS (28 analytes, standard level)	Comments
NW2095	1			14/6				4	X		X	X	X	X	X	X	
BH6	2							4	X		X	X	X	X	X	X	
BH7	3							4	X		X	X	X	X	X	X	
BH8	4							4	X		X	X	X	X	X	X	
SW4	5							4	X		X	X	X	X	X	X	
BH1	6							4	X		X	X	X	X	X	X	
BH2	7							4	X		X	X	X	X	X	X	
BH4	8							4	X		X	X	X	X	X	X	
BH11	9							4	X		X	X	X	X	X	X	
SW1	10							4	X		X	X	X	X	X	X	
SW3	11							4	X		X	X	X	X	X	X	
Trip 05								4	X		X	X	X	X	X	X	
Trip 05	12							4	X		X	X	X	X	X	X	
Re-inspect 05	13							4	X		X	X	X	X	X	X	
Trip 8/6/05	14							4	X		X	X	X	X	X	X	

Environmental Division
Sydney
Work Order Reference
ES191831

Telephone : + 61-2-6784 8555



*Send to Eurochem

Comments

Environmental Division
Sydney
Work Order Reference
ES1918356



Telephone : + 61-2-8784 8555

*Send to Eurofins

W-05 SG - TRH/EXTEN/ 8 Metals Silica Gel Clean Up
NT14 - Extended water suite B
Additional metals analysis to make up NEPM 15

Arsenic (As), Cadmium (Cd), Chromium (Cr), Copper (Cu), Lead (Pb), Mercury (Hg), Nickel (Ni), Zinc (Zn)

Sample Receipt Advice

Company name: **Kleinfelder Aust Pty Ltd (NEWCASTLE)**
Contact name: **Tom Overton**
Project name: **WSS CABBAGE TREE RD WATER MONITORING**
Project ID: **20193820**
COC number: **Not provided**
Turn around time: **5 Day**
Date/Time received: **Jun 17, 2019**
Eurofins | mgt reference: **661102**

Sample information

- ☒ A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- ☒ All samples have been received as described on the above COC.
- ☒ COC has been completed correctly.
- ☒ Attempt to chill was evident.
- ☒ Appropriately preserved sample containers have been used.
- ☒ All samples were received in good condition.
- ☒ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- ☒ Appropriate sample containers have been used.
- ☒ Sample containers for volatile analysis received with zero headspace.
- ☒ Split sample sent to requested external lab.
- ☒ Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

Contact notes

If you have any questions with respect to these samples please contact:

Andrew Black on Phone : (+61) 2 9900 8490 or by e.mail: AndrewBlack@eurofins.com

Results will be delivered electronically via e.mail to Tom Overton - toverton@kleinfelder.com.

Company Name:	Kleinfelder Aust Pty Ltd (NEWCASTLE)	Order No.:		Received:	Jun 17, 2019 12:00 AM
Address:	95 Mitchell Rd	Report #:	661102	Due:	Jun 24, 2019
	Cardiff	Phone:	02 4949 5200	Priority:	5 Day
	NSW 2285	Fax:		Contact Name:	Tom Overton
Project Name:	WSS CABBAGE TREE RD WATER MONITORING				
Project ID:	20193820				
Eurofins mgt Analytical Services Manager : Andrew Black					

Sample Detail						Iron (filtered)	TRH (after Silica Gel cleanup)	Eurofins mg/L Suite B6 (filtered metals)
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217						X	X	X
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
External Laboratory								
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID			
1	TRIP05	Not Provided		Water	S19-Jn18201	X	X	X
Test Counts						1	1	1

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: Tom Overton

Report 661102-W
Project name WSS CABBAGE TREE RD WATER MONITORING
Project ID 20193820
Received Date Jun 17, 2019

Client Sample ID			TRIP05
Sample Matrix			Water
Eurofins mgt Sample No.			S19-Jn18201
Date Sampled			Not Provided
Test/Reference	LOR	Unit	
Total Recoverable Hydrocarbons - 1999 NEPM Fractions			
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 C10-36 (Total)	0.1	mg/L	< 0.1
BTEX			
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	%	109
Total Recoverable Hydrocarbons - 2013 NEPM Fractions			
Naphthalene ^{N02}	0.01	mg/L	< 0.01
TRH C6-C10	0.02	mg/L	< 0.02
TRH C6-C10 less BTEX (F1) ^{N04}	0.02	mg/L	< 0.02
TRH >C10-C16	0.05	mg/L	< 0.05
TRH >C10-C16 less Naphthalene (F2) ^{N01}	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
Heavy Metals			
Arsenic (filtered)	0.001	mg/L	< 0.001
Cadmium (filtered)	0.0002	mg/L	< 0.0002
Chromium (filtered)	0.001	mg/L	0.001
Copper (filtered)	0.001	mg/L	< 0.001
Iron (filtered)	0.05	mg/L	1.6
Lead (filtered)	0.001	mg/L	< 0.001
Mercury (filtered)	0.0001	mg/L	< 0.0001
Nickel (filtered)	0.001	mg/L	0.003
Zinc (filtered)	0.005	mg/L	0.010

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 (regarding both quality and NATA accreditation).

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 B6 (filtered metals)			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Sydney	Jun 17, 2019	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
BTEX	Sydney	Jun 17, 2019	14 Days
- Method: LTM-ORG-2150 VOCs in Soils Liquid and other Aqueous Matrices			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	Jun 17, 2019	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	Jun 17, 2019	
- Method: LTM-ORG-2010 TRH C6-C40			
Metals M8 filtered	Sydney	Jun 17, 2019	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Heavy Metals (filtered)	Sydney	Jun 18, 2019	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			

Company Name: Kleinfelder Aust Pty Ltd (NEWCASTLE)
Address: 95 Mitchell Rd
Cardiff
NSW 2285
Project Name: WSS CABBAGE TREE RD WATER MONITORING
Project ID: 20193820

Order No.:
Report #: 661102
Phone: 02 4949 5200
Fax:

Received: Jun 17, 2019 12:00 AM
Due: Jun 24, 2019
Priority: 5 Day
Contact Name: Tom Overton

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						Iron (filtered)	TRH (after Silica Gel cleanup)	Eurofins mgt Suite B6 (filtered metals)
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217						X	X	X
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
External Laboratory								
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID			
1	TRIP05	Not Provided		Water	S19-Jn18201	X	X	X
Test Counts						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, April 2011 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

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	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.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.2 2018
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	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.
TEQ	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 50-150%-Phenols & PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.2 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
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
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	
Method Blank							
BTEX							
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	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
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	
Method Blank							
Heavy Metals							
Arsenic (filtered)	mg/L	< 0.001			0.001	Pass	
Cadmium (filtered)	mg/L	< 0.0002			0.0002	Pass	
Chromium (filtered)	mg/L	< 0.001			0.001	Pass	
Copper (filtered)	mg/L	< 0.001			0.001	Pass	
Iron (filtered)	mg/L	< 0.05			0.05	Pass	
Lead (filtered)	mg/L	< 0.001			0.001	Pass	
Mercury (filtered)	mg/L	< 0.0001			0.0001	Pass	
Nickel (filtered)	mg/L	< 0.001			0.001	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	75			70-130	Pass	
TRH C10-C14	%	84			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	92			70-130	Pass	
Toluene	%	89			70-130	Pass	
Ethylbenzene	%	86			70-130	Pass	
m&p-Xylenes	%	86			70-130	Pass	
o-Xylene	%	89			70-130	Pass	
Xylenes - Total	%	87			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	85			70-130	Pass	
TRH C6-C10	%	76			70-130	Pass	
TRH >C10-C16	%	85			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic (filtered)	%	74			70-130	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Cadmium (filtered)			%	76			70-130	Pass	
Chromium (filtered)			%	77			70-130	Pass	
Copper (filtered)			%	79			70-130	Pass	
Iron (filtered)			%	81			70-130	Pass	
Lead (filtered)			%	81			70-130	Pass	
Mercury (filtered)			%	79			70-130	Pass	
Nickel (filtered)			%	81			70-130	Pass	
Zinc (filtered)			%	87			70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	S19-Jn13611	NCP	%	100			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	S19-Jn13611	NCP	%	100			70-130	Pass	
Toluene	S19-Jn13611	NCP	%	102			70-130	Pass	
Ethylbenzene	S19-Jn13611	NCP	%	100			70-130	Pass	
m&p-Xylenes	S19-Jn13611	NCP	%	98			70-130	Pass	
o-Xylene	S19-Jn13611	NCP	%	101			70-130	Pass	
Xylenes - Total	S19-Jn13611	NCP	%	99			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	S19-Jn13611	NCP	%	102			70-130	Pass	
TRH C6-C10	S19-Jn13611	NCP	%	96			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic (filtered)	S19-Jn21508	NCP	%	90			70-130	Pass	
Cadmium (filtered)	S19-Jn21508	NCP	%	90			70-130	Pass	
Chromium (filtered)	S19-Jn21508	NCP	%	87			70-130	Pass	
Copper (filtered)	S19-Jn21508	NCP	%	89			70-130	Pass	
Iron (filtered)	S19-Jn21508	NCP	%	83			70-130	Pass	
Lead (filtered)	S19-Jn21508	NCP	%	89			70-130	Pass	
Mercury (filtered)	S19-Jn21508	NCP	%	86			70-130	Pass	
Nickel (filtered)	S19-Jn21508	NCP	%	90			70-130	Pass	
Zinc (filtered)	S19-Jn21508	NCP	%	77			70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	S19-Jn23494	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	S19-Jn23494	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Toluene	S19-Jn23494	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Ethylbenzene	S19-Jn23494	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
m&p-Xylenes	S19-Jn23494	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
o-Xylene	S19-Jn23494	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Xylenes - Total	S19-Jn23494	NCP	mg/L	< 0.003	< 0.003	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	S19-Jn23494	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
TRH C6-C10	S19-Jn23494	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	

Duplicate								
Heavy Metals				Result 1	Result 2	RPD		
Arsenic (filtered)	S19-Jn14272	NCP	mg/L	0.15	0.13	14	30%	Pass
Cadmium (filtered)	S19-Jn14272	NCP	mg/L	0.19	0.17	14	30%	Pass
Chromium (filtered)	S19-Jn14272	NCP	mg/L	2.3	2.4	6.0	30%	Pass
Copper (filtered)	S19-Jn14272	NCP	mg/L	0.78	0.83	6.0	30%	Pass
Iron (filtered)	S19-Jn14272	NCP	mg/L	2600	2500	4.0	30%	Pass
Lead (filtered)	S19-Jn14272	NCP	mg/L	3.6	3.3	9.0	30%	Pass
Mercury (filtered)	S19-Jn14272	NCP	mg/L	0.088	0.089	1.0	30%	Pass
Nickel (filtered)	S19-Jn14272	NCP	mg/L	3.6	3.1	15	30%	Pass
Zinc (filtered)	S19-Jn14272	NCP	mg/L	1300	1300	3.0	30%	Pass

Comments

Sample Integrity

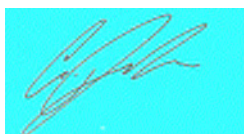
Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	No
Sample correctly preserved	No
Appropriate sample containers have been used	No
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

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.

Authorised By

Andrew Black	Analytical Services Manager
Andrew Sullivan	Senior Analyst-Organic (NSW)
Gabriele Cordero	Senior Analyst-Metal (NSW)



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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APPENDIX B6: JULY 2019

20 August 2019
Document Ref: NCA19R99532

Williamtown Sand Syndicate
PO Box 898
Newcastle, NSW 2300

Attention: Darren Williams

Delivered by email: darren@arbus.com.au

Subject: Monthly water quality monitoring results at Cabbage Tree Road Sand Quarry – July 2019 monitoring

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

1. SCOPE OF SERVICE

The scope of work includes the monthly surface and groundwater monitoring for a combined period of 12 months. **Figure 1** (attached) presents the surface water and groundwater sampling locations.

The July monitoring round was to include 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) and sampling at four surface water locations.

2. SITE WORK

The monitoring round was conducted on 16 July 2019.

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 the gauging each of the HydraSleeves were removed and samples taken.

The July 2019 monitoring round included:

- Gauging of all available monitoring wells (a total of 14 wells);

- 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
General 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)	4	1	1	1	1

* General Water Suite: Ca, Mg, Na, K, pH, EC, Cl, SO₄, Alkalinity, Fluoride, Hardness & TDS (Calc')

** TRH (C6 – C40), BTEXN (Silica Gel)

*** 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), Selenium (Se), Vanadium (V), Zinc (Zn) - note sampling for Iron and no nickel

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 (mBTC)	Groundwater Elevation (mAHD)	Well Total Depth (mBTC)	Comment
BH1	8.64	6.373	2.267	8.12	Slightly cloudy, no apparent odour
BH2	7.79	5.083	2.707	9.02	Dark, cloudy, no odour
BH3	7.57	5.938	1.632	9.03	Data logger attached, Silty material at base. No sample taken.
BH4	3.06	1.617	1.443	5.92	Cloudy, no odour.
BH5	7.36	5.779	1.581	8.71	No odour - No sample taken.

Borehole	Top of Casing (mAHD)	Depth to Water (mBTC)	Groundwater Elevation (mAHD)	Well Total Depth (mBTC)	Comment
BH6	3.62	1.591	2.029	4.52	Slightly cloudy, no odour
BH7	2.98	1.544	1.436	4.51	Slightly cloudy sulfur odour.
BH8	3.88	2.266	1.614	6.18	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	3.348	3.282	5.29	Cloudy no odour
BH12	8.67	6.799	1.871	8.12	Slight acrylic odour. No sample taken.
MW239S	3.04	1.262	1.778	3.89	Cloudy, sulfur odour.
MW239D	3.04	1.239	1.801	20.2	No odour – No sample taken
SW01*	N/A	0.2	2.7	N/A	Dark brown, no odour, slight sheen
SW02*	N/A	Dry	-	N/A	Location was dry.
SW03*	N/A	0.215	1.215	N/A	Water clear, no odour.
SW04*	N/A	0.281	2.281	N/A	Light brown, 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	1145	18.4	122	5.42	51
BH02	1130	18.3	124.5	4.76	88
BH04	1100	17.6	91.5	4.78	88
BH06	1330	17.2	191	4.54	101
BH07	1400	17.2	228	4.58	100
BH08	1430	16.8	347	4.55	101
BH11	1215	16.9	296	4.53	101
MW239S	1315	15.8	37	4.67	94
SW01	1105	9.7	827	4.56	99
SW03	1245	14.6	431	4.27	116
SW04	0930	9.9	371	4.23	116

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**.

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
Physical and Chemical Stressors	Sodium	1	11	10	90	No	Similar
	Sulphate	1	11	4	240	No	Similar
	Chloride	1	11	18	130	No	Similar
	Fluoride	0.1	11	<0.1	0.4	No	Similar
	Reactive ³ Phosphorous	0.01	NA	NA	NA	NA	NA
	Total Phosphorous ³	0.01	NA	NA	NA	NA	NA
	Nitrite ³	0.01	NA	NA	NA	NA	NA
	Nitrate ³	0.01	NA	NA	NA	NA	NA
	Ammonia ³	0.01	NA	NA	NA	NA	NA
	Total Nitrogen ³	0.1	NA	NA	NA	NA	NA
	Total Hardness	1	11	8.0	194	No	Similar
	Total Dissolved Solids	1	11	49	569	No	Similar
	pH	0.01	11	4.42	5.62	All above ANZECC 2000 Trigger range ¹ and drinking water guidelines	Similar
Dissolved Metals	As	0.001	11	<0.001	0.001	No	Similar
	B	0.05	11	<0.005	0.08	No	Similar
	Ba	0.001	11	0.002	0.055	No	Similar
	Be	0.001	11	<0.001	<0.001	No	Similar
	Cd	0.005-0.1	11	<0.0001	0.0001	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
	Cr	0.005-0.1	11	<0.001	0.003	4 above ANZECC 2000 Trigger Values ² (BH1, BH7, BH11 & MW239S)	Similar
	Co	0.001	11	<0.001	0.007	No	Similar
	Cu	0.001	11	<0.001	0.046	7 above ANZECC 2000 Trigger Values ² (BH1, BH2, BH4, BH6, SW1, SW3,0 & SW4)	Similar
	Fe	0.05	11	<0.05	7.35	9 above NHMRC ADWG 6 aesthetics (BH1, BH6, BH7, BH8, BH11, MW239S, SW1, SW3 & SW4)	Similar
	Mn	0.001	11	<0.05	0.59	1 above NHMRC ADWG 6 aesthetics (SW1)	Similar
	Ni	0.001	11	<0.001	0.008	No	Similar
	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
	Zn	0.005-0.1	11	<0.005	0.239	4 above ANZECC 2000 Trigger Values ² (BH1, SW1, SW3 & SW4)	Similar
	Hg	0.0001	11	<0.0001	<0.0001	No	Similar
TRH – Silica Clean up	C ₆ -C ₁₀	0.02	11	<0.02	<0.02	No	Similar
	>C ₁₀ -C ₁₆	0.1	11	<0.1	<0.1	No	Similar
	>C ₁₆ -C ₃₄	0.1	11	<0.1	<0.1	No	Similar
	>C ₃₄ -C ₄₀	0.1	11	<0.1	<0.1	No	Similar
	Total >C ₁₀ -C ₄₀	0.1	11	<0.1	<0.1	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
	C ₆ -C ₁₀ minus BTEX (F1)	0.02	11	<0.02	<0.02	No	Similar
	>C ₁₀ -C ₁₆ 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	4	<0.00001	<0.00001	HEPA NEMP 2018*	Similar
	PFOA	0.00001-0.0001	4	<0.00001	<0.00001	No	Similar
	PFOS/PFHxS	0.00001-0.0001	4	<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.

¹Australian 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)

²ANZECC 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

³Analysis 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 more rainfall in June than the mean leading up to the July monitoring event. July rainfall is trending towards below average rainfall.

Table 4.5 2019 Rainfall data

2019	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1st	2.0	0.8	0	0	0	0	0					
2nd	0	12.8	0	23.8	0	21.2	0					
3rd	0	0.4		0.6	0	0.6	0					
4th	0	0	0	0	20.8	0.4	5.2					
5th	0	0	0	0	0.2	25	1.8					
6th	0	0	0	0	23.2	2.6	1.2					
7th	5.0	0	8.2	0	0.2	1	0.6					
8th	0	0	0	0	0	0	1.6					
9th	0	6.6	0	0	0	0	0.4					
10th	0.2	0	12.0	2.2	0	0	0					
11th	0	0	0	0	0.6	0	0					
12th	3.0	0	0	0	0	0	0					
13th	0	0	0	0	1.4	0	0					
14th	0	0	0	0.2	0	0	0					
15th	0	0	0	1.4	0	0	0					
16th	0	0	4.8	3.6	0	0	0					
17th	0	0	59.4	1.4	0	0						
18th	0	0	2.6	0.2	0	17.8						
19th	0	0	2.2	0.2	0	0						
20th	2.4		0	2.0	0	0						
21st	1.0	1.4	0	0.2	0	0						
22nd	0	1.0	1.2	0.2	0	0.2						
23rd	0	1.4	0	0	0	20						
24th	0	9.2	5.4	0	0	50.6						
25th	0	0	5.2	0	0	15.2						
26th	0	0	0	0	0	1.8						
27th	0	0	0	0	0	0.8						
28th	1.0	0	0	0	0.8	0						
29th	0		0	0	0	0						
30th	0		38.2	0	0	0						
31st	0		6.6		0							
Monthly Total	14.6	33.6	145.8	36.0	47.2	157.2	9.2					
Mean	98.7	117.0	120.5	111.6	109.6	124.7	70.3	72.9	60.4	73.9	82.3	78.6

Based on the long-term rainfall data for the June/July period it is expected that the current groundwater and surface water levels will remain similar compared to current levels.

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

Dkousbroek@kleinfelder.com

Mobile: 0458 197 676

Attached:

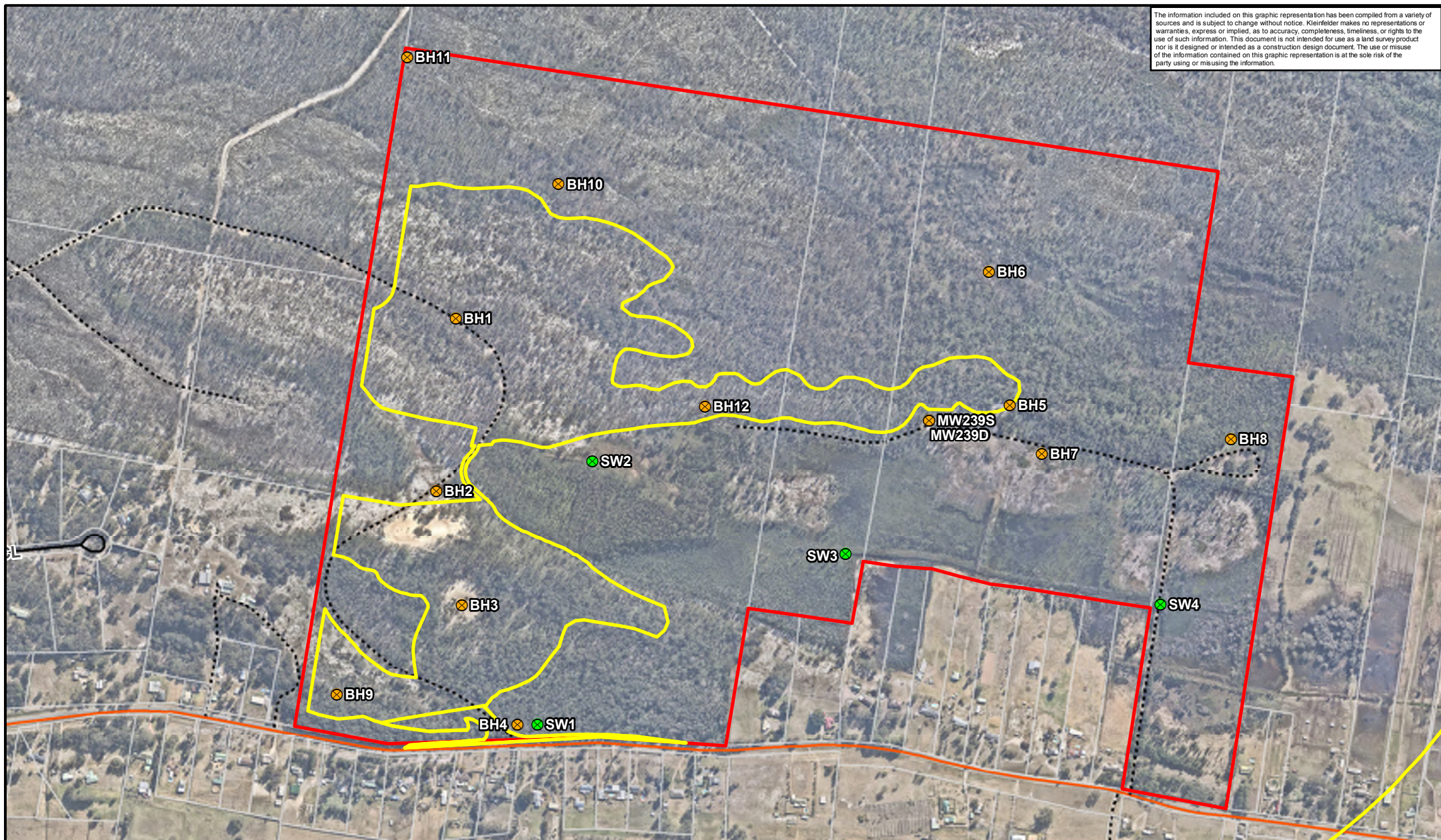
Figure 1

Data Tables

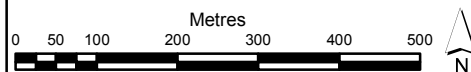
Attachment A – Laboratory reports

FIGURE 1

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



www.kleinfelder.com

PROJECT REFERENCE: 20170448

DATE DRAWN: 13/02/2019 09:48 Version 1

DRAWN BY: gjoyce

DATA SOURCE:
NSW DFSI - 2017
Nearmap - 2018

Water monitoring locations Monitoring

Williamtown Sand Syndicate
Proposed Sand Quarry
Cabbage Tree Road, Williamtown

FIGURE:

1

DATA TABLES



Notes:
 - - Not analysed
 < - Less than laboratory limit of reporting
 µg/L - Micrograms per litre
 BTXIN - Benzene, toluene, ethylbenzene, xylenes, naphthalene

20193820.001A

Table 2
Groundwater Analytical Data - Metals
Williamstown Sand Syndicate



Metals																	
Analyte	Arsenic**	Barium	Beryllium	Boron**	Cadmium**	Chromium** ₁	Cobalt	Copper**	Iron	Lead**	Manganese* ₂	Mercury** ₂	Nickel**	Selenium**	Vanadium	Zinc**	
LOR	0.001	0.001	0.001	0.05	0.0001	0.001	0.001	0.001	0.05	0.001	0.001	0.0001	0.001	0.01	0.01	0.005	
Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	
ANZECC 2000 Trigger Values	0.013	-	-	0.37	0.0002	0.001	-	0.0014	-	0.0034	1.9	0.0006	0.011	0.011	-	0.008	
NHMRC ADWG 6	0.01	-	0.06	4	0.002	0.05	-	2	0.3 ³	0.01	0.5	0.001	0.02	0.01	-	3 ³	
Sample Name	Sample Date																
BH1	15-Mar-19	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.004	< 0.001	< 0.001	13	< 0.001	0.014	< 0.0001	< 0.001	< 0.01	< 0.01	1.27
	23-Apr-19	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.004	< 0.001	0.002	10	0.001	0.015	< 0.0001	0.002	< 0.01	< 0.01	0.363
	16-May-19	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	8.33	< 0.001	0.009	0.016	< 0.0001	0.002	< 0.01	< 0.01	0.132
	14-Jun-19	< 0.001	0.001	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	6.31	< 0.001	0.009	< 0.0001	< 0.001	< 0.001	< 0.01	< 0.01	0.074
	16-Jul-19	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	0.002	7.35	< 0.001	0.01	< 0.0001	0.001	< 0.01	< 0.01	0.116
BH2	22-Feb-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.002	0.14	< 0.001	0.021	< 0.0001	0.015	< 0.01	< 0.01	0.006
	15-Mar-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.003	< 0.05	< 0.001	0.02	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	23-Apr-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.004	0.19	< 0.001	0.018	< 0.0001	0.001	< 0.01	< 0.01	0.008
	16-May-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.001	0.06	< 0.001	0.014	< 0.0001	0.001	< 0.01	< 0.01	< 0.005
	14-Jun-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.004	0.08	< 0.001	0.009	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH3	16-Jul-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.008	0.05	< 0.001	0.013	< 0.0001	0.001	< 0.01	< 0.01	0.006
	21-Feb-19	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.06	< 0.001	0.005	< 0.0001	0.053	< 0.01	< 0.01	< 0.005
	21-Feb-19	< 0.001	0.014	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.002	0.16	< 0.001	0.039	< 0.0001	0.018	< 0.01	< 0.01	0.014
	15-Mar-19	< 0.001	0.014	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.001	< 0.05	< 0.001	0.014	< 0.0001	0.022	< 0.01	< 0.01	0.043
	23-Apr-19	< 0.001	0.013	< 0.001	0.05	< 0.0001	< 0.001	< 0.001	0.002	0.99	< 0.001	0.045	< 0.0001	0.007	< 0.01	< 0.01	0.008
BH4	16-May-19	< 0.001	0.013	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	0.27	< 0.001	0.022	< 0.0001	0.022	< 0.01	< 0.01	0.011
	14-Jun-19	< 0.001	0.012	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.038	< 0.05	< 0.001	0.014	< 0.0001	< 0.001	< 0.01	< 0.01	0.005
	16-Jul-19	< 0.001	0.013	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.046	< 0.05	< 0.001	0.019	< 0.0001	< 0.001	< 0.01	< 0.01	0.007
	22-Feb-19	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	1.4	< 0.001	0.005	< 0.0001	0.003	< 0.01	< 0.01	0.008
	22-Feb-19	< 0.001	0.03	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	1.03	< 0.001	0.014	< 0.0001	0.001	< 0.01	< 0.01	0.019
BH5	14-Mar-19	< 0.001	0.027	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	1.9	< 0.001	0.01	< 0.0001	< 0.001	< 0.01	< 0.01	0.012
	23-Apr-19	< 0.001	0.03	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.001	0.96	< 0.001	0.01	< 0.0001	< 0.001	< 0.01	< 0.01	0.022
	16-May-19	< 0.001	0.029	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	2.57	< 0.001	0.009	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	14-Jun-19	< 0.001	0.027	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.001	2.86	< 0.001	0.008	< 0.0001	< 0.001	< 0.01	< 0.01	0.008
	16-Jul-19	< 0.001	0.026	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.002	2.41	< 0.001	0.008	< 0.0001	< 0.001	< 0.01	< 0.01	0.005
BH6	22-Feb-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.002	0.003	< 0.001	1.8	< 0.001	0.026	< 0.0001	0.004	< 0.01	< 0.01	0.019
	14-Mar-19	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
	23-Apr-19	< 0.001	0.012	< 0.001	< 0.05	< 0.0001	0.002	0.003	< 0.001	2.0	< 0.001	0.026	< 0.0001	0.004	< 0.01	< 0.01	0.01
	16-May-19	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.002	0.003	< 0.001	2.32	< 0.001	0.035	< 0.0001	0.005	< 0.01	< 0.01	0.013
	14-Jun-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	0.002	< 0.001	2.06	< 0.001	0.03	< 0.0001	0.004	< 0.01	< 0.01	0.006
BH7	16-Jul-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	0.002	< 0.001	1.66	< 0.001	0.025	< 0.0001	0.003	< 0.01	< 0.01	< 0.005
	21-Feb-19	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.006
	14-Mar-19	< 0.001	0.006	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	3.25	< 0.001	0.008	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
	23-Apr-19	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	3.2	< 0.001	0.009	< 0.0001	0.002	< 0.01	< 0.01	0.008
	16-May-19	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	3.0	< 0.001	0.01	< 0.0001	0.003	< 0.01	< 0.01	< 0.005
BH8	14-Jun-19	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	2.5	< 0.001	0.005	< 0.0001	0.002	< 0.01	< 0.01	0.006
	16-Jul-19	< 0.001	0.012	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	2.6	< 0.001	0.004	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
	21-Feb-19	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.002	0.001	< 0.001	0.26	< 0.001	0.003	< 0.0001	0.005	< 0.01	< 0.01	0.031
	15-Mar-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	1.49	< 0.001	0.007	< 0.0001	0.037	< 0.01	< 0.01	0.016
	23-Apr-19	< 0.001	0.006	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.98	< 0.001	0.007	< 0.0001	0.07	< 0.01	< 0.01	0.04
BH11	16-May-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.97	< 0.001	0.006	< 0.0001	0.004	< 0.01	< 0.01	0.024
	14-Jun-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	0.98	< 0.001	0.005	< 0.0001	0.001	< 0.01	< 0.01	0.005
	16-Jul-19	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.47	< 0.001	0.003	< 0.0001	0.004	< 0.01	< 0.01	0.007
	22-Feb-19	< 0.001	0.007	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	1.11	< 0.001	0.003	< 0.0001	0.001	< 0.01	< 0.01	0.006
	14-Mar-19	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	1.25	< 0.001	0.005	< 0.0001	0.005	< 0.01	< 0.01	0.008
MW2395	23-Apr-19	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	1.01	< 0.001	0.004	< 0.0001	0.004	< 0.01	< 0.01	0.007
	16-May-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.87	< 0.001	0.003	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
	14-Jun-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.002	0.8	< 0.001	0.003	< 0.0001	0.001	< 0.01	< 0.01	< 0.005
	16-Jul-19	< 0.001	0.006	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.87	< 0.001	0.003	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
	23-Apr-19	< 0.001	0.043	< 0.001	0.14	< 0.0001	< 0.001	0.017	0.002	4.16	< 0.001	0.841	< 0.0001	0.02	< 0.01	< 0.01	0.356
SW1	16-May-19	< 0.001	0.029	< 0.001	0.1	< 0.0001	< 0.001	0.01	0.003	7.25	< 0.001	0.666	< 0.0001	0.012	< 0.01	< 0.01	0.077
	14-Jun-19	< 0.001	0.029	< 0.001	0.09	0.0002	< 0.001	0.009	0.006	2.75	< 0.001	0.595	< 0.0001	0.011	< 0.01	< 0.01	0.535

Notes:
 -- Not analysed
 < - Less than laboratory limit of reporting
 µg/L - Micrograms per litre
 *** 99% Level of protection in freshwater
 † Recreation water

Table 4
Groundwater Analytical Data - Inorganics
Williamson Sand Syncline



Analyte	Anions and Cations															Alkalinity										Inorganics		pH	
	Sodium	Calcium	Magnesium	Potassium	Sulphate	Chloride	Fluoride	Reactive phosphorus as P	Total Phosphorus	Nitrite as N	Nitrate as N	Nitrite + Nitrate as N	Ammonia as N	Total Nitrogen as N	Total Kjeldahl Nitrogen as N	Total Cations	Total Anions	Ionic Balance	Sodium Adsorption Ratio	Bicarbonate Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Hydroxide Alkalinity as CaCO3	Total Alkalinity as CaCO3	Total Hardness as CaCO3	Electrical conductivity @ 25°C	Total Dissolved Solids	Total Dissolved Solids		
	1	1	1	1	1	1	0.1	0.01	0.01	0.01	0.01	0.01	0.01	0.1	0.1	0.01	0.01	%	0.01	1	1	1	1	1	1	1	0.01		
LOE Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	%		mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	
ANZECC 2000 Trigger Values	180*				250*	1.5	0.02*	0.02*	0.02*	3	50	0.5*	0.35*												200*	125-2200	600*		
NHMRC ADWS 6																												6.5-8.0*	
Sample Name	Sample Date																												
BH1	15-Mar-19	11	2.0	1.0	<1.0	25	<0.1	-	-	-	-	-	-	-	-	0.66	0.88	-	-	9.0	<1.0	<1.0	9.0	104	68	129	5.67		
	23-Apr-19	14	1.0	2.0	<1.0	4.0	25	<0.1	-	-	-	-	-	-	-	0.82	0.99	-	-	10	<1.0	<1.0	10	84	58	97	5.83		
	16-May-19	12	<1.0	2.0	<1.0	5.0	25	<0.1	0.03	<0.01	<0.01	<0.01	0.11	0.3	0.3	0.69	1.01	-	1.7	10	<1.0	<1.0	10	8.0	105	68	164	5.82	
	14-Jun-19	10	<1.0	2.0	<1.0	3.0	24	<0.1	-	-	-	-	-	-	-	0.6	0.94	-	-	10	<1.0	<1.0	10	8.0	99	64	72	5.52	
	16-Jul-19	15	<1.0	2.0	<1.0	4.0	23	<0.1	-	-	-	-	-	-	-	0.82	0.95	-	-	11	<1.0	<1.0	11	8.0	102	66	84	5.62	
BH2	22-Feb-19	12	2.0	2.0	<1.0	6.0	22	0.1	<0.01	0.28	<0.01	2.76	2.76	0.05	4.0	1.2	0.74	0.74	-	1.44	<1.0	<1.0	<1.0	<1.0	13	91	128	4.87	
	16-Mar-19	10	3.0	2.0	<1.0	7.0	23	<0.1	-	-	-	-	-	-	-	0.75	0.79	-	-	<1.0	<1.0	<1.0	<1.0	16	101	66	90	4.71	
	23-Apr-19	14	2.0	2.0	<1.0	6.0	22	<0.1	-	-	-	-	-	-	-	0.87	0.77	-	-	<1.0	<1.0	<1.0	<1.0	13	70	46	84	4.62	
	16-May-19	12	2.0	2.0	<1.0	21	22	<0.1	<0.01	0.26	<0.01	0.38	0.38	0.01	1.3	0.9	0.79	1.06	-	1.44	<1.0	<1.0	<1.0	<1.0	13	94	61	144	4.85
	14-Jun-19	11	1.0	2.0	<1.0	8.0	23	<0.1	-	-	-	-	-	-	-	0.69	0.75	-	-	<1.0	<1.0	<1.0	<1.0	11	81	59	51	4.76	
BH3	16-Jul-19	13	2.0	2.0	<1.0	9.0	20	<0.1	-	-	-	-	-	-	-	0.83	0.75	-	-	<1.0	<1.0	<1.0	<1.0	13	90	58	63	4.84	
	21-Feb-19	4.0	4.0	1.0	<1.0	4.0	10	<0.1	<0.01	2.76	<0.01	0.78	0.78	0.3	5.0	5.1	0.46	0.54	-	0.46	9.0	<1.0	<1.0	6.0	14	60	438	5.55	
	21-Feb-19	8.0	2.0	1.0	1.0	8.0	17	<0.1	<0.01	0.19	<0.01	0.35	0.35	0.04	0.6	0.3	0.56	0.7	-	1.15	6.0	<1.0	<1.0	6.0	9.0	73	96	5.4	
	15-Mar-19	9.0	2.0	<1.0	1.0	5.0	18	<0.1	-	-	-	-	-	-	-	0.49	0.61	-	-	<1.0	<1.0	<1.0	<1.0	9.0	77	90	70	5.12	
	23-Apr-19	10	2.0	1.0	1.0	1.0	19	<0.1	-	-	-	-	-	-	-	0.44	0.4	-	-	<1.0	<1.0	<1.0	<1.0	9.0	64	35	61	5.09	
BH4	16-May-19	9.0	2.0	1.0	1.0	22	19	<0.1	<0.01	0.97	<0.01	0.39	0.39	<0.01	1.0	0.7	0.6	0.99	-	1.3	<1.0	<1.0	<1.0	<1.0	9.0	73	47	100	4.99
	14-Jun-19	6.0	1.0	1.0	<1.0	6.0	18	<0.1	-	-	-	-	-	-	-	0.39	0.59	-	-	<1.0	<1.0	<1.0	<1.0	7.0	60	45	36	4.84	
	16-Jul-19	10	2.0	2.0	1.0	6.0	18	<0.1	-	-	-	-	-	-	-	0.72	0.63	-	-	<1.0	<1.0	<1.0	<1.0	13	75	49	42	4.96	
	22-Feb-19	42	<1.0	6.0	1.0	19	69	0.2	<0.01	0.34	<0.01	<0.01	<0.01	0.09	1.0	3.0	2.35	2.34	-	3.59	<1.0	<1.0	<1.0	<1.0	25	250	211	4.37	
	22-Feb-19	26	1.0	4.0	1.0	19	42	<0.1	<0.01	0.39	<0.01	0.09	0.09	0.14	0.5	0.4	1.72	1.75	-	3.49	<1.0	<1.0	<1.0	<1.0	25	259	211	4.37	
BH5	14-Mar-19	23	2.0	4.0	1.0	17	37	<0.1	-	-	-	-	-	-	-	1.46	1.44	-	-	2.0	<1.0	<1.0	<1.0	2.0	21	179	116	146	4.95
	23-Apr-19	28	3.0	4.0	1.0	18	42	<0.1	-	-	-	-	-	-	-	1.59	1.56	-	-	<1.0	<1.0	<1.0	<1.0	24	136	98	115	4.64	
	16-May-19	23	3.0	4.0	1.0	18	45	<0.1	<0.01	0.13	<0.01	<0.01	<0.01	0.14	0.6	0.6	1.5	1.64	-	2.04	<1.0	<1.0	<1.0	<1.0	24	175	114	214	4.88
	14-Jun-19	20	2.0	4.0	1.0	16	42	<0.1	-	-	-	-	-	-	-	1.32	1.52	-	-	<1.0	<1.0	<1.0	<1.0	21	174	112	90	4.82	
	16-Jul-19	23	2.0	4.0	1.0	20	35	<0.1	-	-	-	-	-	-	-	1.46	1.4	-	-	<1.0	<1.0	<1.0	<1.0	21	161	105	82	4.73	
BH6	22-Feb-19	34	<1.0	5.0	2.0	12	64	0.2	<0.01	0.13	<0.01	0.02	0.02	0.34	2.2	2.2	1.94	2.06	-	3.16	<1.0	<1.0	<1.0	<1.0	20	213	196	476	4.76
	14-Mar-19	36	<1.0	6.0	2.0	16	61	<0.1	-	-	-	-	-	-	-	2.11	2.05	-	1.37	<1.0	<1.0	<1.0	<1.0	25	271	176	212	4.79	
	23-Apr-19	38	<1.0	6.0	2.0	17	62	<0.1	-	-	-	-	-	-	-	2.2	2.1	-	-	<1.0	<1.0	<1.0	<1.0	25	205	133	185	4.51	
	16-May-19	35	<1.0	5.0	2.0	15	60	<0.1	<0.01	0.06	<0.01	<0.01	<0.01	0.27	0.9	0.9	1.98	2.23	-	3.26	<1.0	<1.0	<1.0	<1.0	20	225	153	210	4.87
	14-Jun-19	31	<1.0	4.0	2.0	11	56	0.1	-	-	-	-	-	-	-	1.73	1.81	-	-	<1.0	<1.0	<1.0	<1.0	16	213	138	145	4.91	
BH7	16-Jul-19	36	<1.0	5.0	2.0	12	66	<0.1	-	-	-	-	-	-	-	2.03	1.95	-	-	<1.0	<1.0	<1.0	<1.0	20	202	131	164	5.0	
	22-Feb-19	32	<1.0	6.0	<1.0	11	90	<0.1	<0.01	1.97	<0.01	<0.01	<0.01	0.5	2.4	2.4	2.76	2.77	-	4.44	<1.0	<1.0	<1.0	<1.0	25	352	256	4.46	
	14-Mar-19	45	<1.0	6.0	<1.0	6.0	76	<0.1	-	-	-	-	-	-	-	2.45	2.27	-	-	<1.0	<1.0	<1.0	<1.0	25	319	207	253	4.77	
	23-Apr-19	53	<1.0	7.0	<1.0	8.0	80	<0.1	-	-	-	-	-	-	-	2.88	2.68	-	-	<1.0	<1.0	<1.0	<1.0	29	264	172	233	4.76	
	16-May-19	47	<1.0	4.0	<1.0	6.0	81	<0.1	<0.01	<0.01	<0.01	<0.01	0.12	0.4	0.4	2.37	2.43	-	-	4.86	1.0	<1.0	<1.0	<1.0	25	362	196	354	4.9
BH8	14-Jun-19	47	<1.0	5.0	<1.0	4.0	89	<0.1	-	-	-	-	-	-	-	2.44	2.59	-	-	<1.0	<1.0	<1.0	<1.0	27	315	205	154	4.82	
	16-Jul-19	57	<1.0	5.0	<1.0	70	121	0.1	-	-	-	-	-	-	-	2.89	4.87	26	-	<1.0	<1.0	<1.0	<1.0	20	353	229	226	4.78	
	21-Feb-19	48	<1.0	10	<1.0	24	80	0.1	<0.01	0.03	<0.01	0.04	0.04	0.06	1.8	1.8	2.91	2.76	-	3.21	<1.0	<1.0	<1.0	<1.0	41	346	278	4.67	
	14-Mar-19	26	<1.0	2.0	<1.0	2.0	52	<0.1	-	-	-	-	-	-	-	1.3	1.51	-	-	<1.0	<1.0	<1.0	<1.0	8.0	186	121	144	4.82	
	23-Apr-19	32	<1.0	5.0	<1.0	2.0	57	<0.1	-	-	-	-	-	-	-	1.8	1.65	-	-	<1.0	<1.0	<1.0	<1.0	10	150	98	135	4.99	
BH11	16-May-19	29	<1.0	4.0	<1.0	2.0	55	<0.1	<0.01	0.01	<0.01	<0.01	<0.01	0.12	0.4	0.4	1.59	1.59	-	3.0	<1.0	<1.0	<1.0	<1.0	16	188	122	216	4.91
	14-Jun-19	26	<1.0	3.0	<1.0	<1.0	53	<0.1	-	-	-	-	-	-	-	1.38	1.5	-	-	<1.0	<1.0	<1.0	<1.0	12	175	114	107	4.84	
	16-Jul-19	49	<1.0	8.0	<1.0	8.0	73	0.2	-	-	-	-	-	-	-	2.79	2.22	-	-	<1.0	<1.0	<1.0	<1.0	33	318	207	192	4.68	
	22-Feb-19	61	<1.0	6.0	<1.0	5.0	104	<0.1	<0.01	0.56	<0.01	<0.01	<0.01	0.18	3.9	3.9	3.15	3.06	-	5.21	<1.0	<1.0	<1.0	<1.0	25	329	234	4.89	
	14-Mar-19	64	<1.0	6.0	<1.0	2.0	126	<0.1	-	-	-	-	-	-	-	3.28	3.64	5.18	-	2.0	<1.0	<1.0	<1.0	2.0	25	401	266	232	5.02
HW2S5	23-Apr-19	64	<1.0	6.0	<1.0	13	87	<0.1	<0.01	0.43	<0.01	<0.01	<0.01	0.09	1.7	1.7	2.76	2.75	-	4.44	<1.0	<1.0	<1.0	<1.0	25	337	212	320	4.87
	16-May-19	59	<1.0	6.0	<1.0	13	87	<0.1																					

Table 5
Quality Control Sample Analysis - BTEXN
Willamtown Sand Syndicate



Analyte	BTEXN														Total Petroleum Hydrocarbons										Total Petroleum Hydrocarbons - Silica Clean up					Total Recoverable Hydrocarbons										Total Recoverable Hydrocarbons - Silica Clean up																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
	Benzene		Toluene		Ethylbenzene		meta- & para-Xylene		ortho-Xylene		Total Xylenes		Naphthalene		Sum of BTEX		C ₁ - C ₆		C ₁₀ - C ₁₄		C ₁₅ - C ₁₈		C ₁₉ - C ₂₄		C ₂₅ - C ₃₀ sum		C ₁₀ -C ₁₄ -Silica Cleanup		C ₁₅ -C ₁₈ -Silica Cleanup		C ₁₉ -C ₂₄ -Silica Cleanup		C ₂₅ -C ₃₀ Sum - Silica Cleanup		C ₁ - C ₁₀		C ₁ - C ₁₀ minus BTEX (F1)		>C ₁₀ - C ₁₄		minus Naphthalene		>C ₁₄ - C ₁₈		>C ₁₈ - C ₂₄		>C ₂₄ -C ₃₀ -Silica Cleanup		P2 - Silica Cleanup		>C ₁₀ -C ₁₄ -Silica Cleanup		>C ₁₅ -C ₁₈ -Silica Cleanup		>C ₁₉ -C ₂₄ -Silica Cleanup																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	Units	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L

Notes:
 -- Not analysed
 < - Less than laboratory limit of reporting
 NC - Not calculated
 µg/L - Micrograms per litre
 BTEXN - Benzene, toluene, ethylbenzene, xylenes, naphthalene

Table 6
Quality Control Sample Analysis - Metals
Williamstown Sand Syndicate



Analyte			Metals																
			Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Chromium VI	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Nickel	Selenium	Vanadium	Zinc
Units			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Name	Sample Date	Sample Type																	
TRIP BLANK 13022019	13-Feb-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE01 21022019	21-Feb-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH8 21022019	21-Feb-19	Primary	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.005
DUP01 21022019	21-Feb-19	Duplicate	0.001	0.014	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.09	< 0.001	0.012	< 0.0001	0.003	< 0.01	< 0.01	0.015
Relative Percentage Difference			67%	24%	NC	NC	NC	0%	NC	NC	NC	0%	NC	0%	NC	40%	NC	NC	100%
BH8 21022019	21-Feb-19	Primary	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.005
TRIP01 21022019	21-Feb-19	Triplicate	0.001	< 0.02	< 0.001	< 0.05	< 0.0002	< 0.005	< 0.005	< 0.001	< 0.001	4.5	< 0.001	0.012	< 0.0001	0.003	-	< 0.005	0.006
Relative Percentage Difference			67%	10%	NC	NC	NC	86%	NC	NC	NC	9%	NC	0%	NC	40%	NC	NC	18%
TRIP BLANK 130319	13-Mar-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
TRIP BLANK02 150319	15-Mar-19	Trip Blank	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE02 140319	14-Mar-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH7 140319	14-Mar-19	Primary	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	-	0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
DUP02 140319	14-Mar-19	Duplicate	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	-	0.002	< 0.001	2.51	< 0.001	0.021	< 0.0001	0.004	< 0.01	< 0.01	0.007
Relative Percentage Difference			NC	0%	NC	NC	NC	0%	-	40%	NC	33%	NC	5%	NC	0%	NC	NC	25%
BH7 140319	14-Mar-19	Primary	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	-	0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
TRIP02 14032019	14-Mar-19	Triplicate	< 0.001	< 0.02	< 0.001	< 0.05	< 0.0002	0.001	-	0.002	< 0.001	1.7	< 0.001	0.019	< 0.0001	< 0.001	-	< 0.005	< 0.005
Relative Percentage Difference			NC	0%	NC	NC	NC	0%	-	40%	NC	6%	NC	5%	NC	156%	NC	NC	113%
TRIP BLANK 05 14062019	14-Jun-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE 05 14062019	14-Jun-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
SW3 14062019	14-Jun-19	Primary	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.003	< 0.001	1.68	< 0.001	0.038	< 0.0001	0.003	< 0.01	< 0.01	0.016
DUP05 14062019	14-Jun-19	Duplicate	< 0.001	0.036	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.003	< 0.001	1.63	< 0.001	0.039	< 0.0001	0.003	< 0.01	< 0.01	0.013
Relative Percentage Difference			NC	3%	NC	NC	NC	NC	-	0%	NC	3%	NC	3%	NC	0%	NC	NC	21%
SW3 14062019	14-Jun-19	Primary	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.003	< 0.001	1.68	< 0.001	0.038	< 0.0001	0.003	< 0.01	< 0.01	0.016
TRIP05 140619	14-Jun-19	Triplicate	< 0.001	-	-	-	< 0.0002	0.001	-	-	< 0.001	1.6	< 0.001	-	< 0.0001	0.003	-	-	0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	67%	NC	NC	NC	5%	NC	NC	NC	0%	NC	NC	46%
TRIP BLANK 06 16072019	16-Jul-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE06 16072019	16-Jul-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005

Notes:
 - - Not analysed
 < - Less than laboratory limit of reporting
 NC - Not calculated
 mg/L - Milligrams per litre
 Half the laboratory limit of reporting used when calculating RPD
 RPD - Relative Percentage Difference

Notes:
 < - Less than laboratory limit of reporting
 NC - Not calculated
 µg/L - Micrograms per litre

ATTACHMENT A: LABORATORY REPORTS

CERTIFICATE OF ANALYSIS

Work Order : **ES1922172**
Client : **KLEINFELDER AUSTRALIA PTY LTD**
Contact : DANIEL KOUSBROEK
Address : 95 MITCHELL ROAD
 CARDIFF NSW 2285
Telephone : ----
Project : 20193820
Order number :
C-O-C number : ----
Sampler : DK
Site : WSS-CABBAGE TREE RD WATER MONITORING
Quote number : ME/114/19
No. of samples received : 13
No. of samples analysed : 13

Page : 1 of 18
Laboratory : Environmental Division Sydney
Contact : Shirley LeCornu
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +6138549 9630
Date Samples Received : 16-Jul-2019 15:55
Date Analysis Commenced : 16-Jul-2019
Issue Date : 22-Jul-2019 19:07



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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW
Neil Martin	Team Leader - Chemistry	Chemistry, Newcastle West, NSW



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

Ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- EN055: Ionic Balance out of acceptable limits for various samples due to analytes not quantified in this 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

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH1	BH2	BH4	BH6	BH7
Client sampling date / time					16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00
Compound	CAS Number	LOR	Unit		ES1922172-001	ES1922172-002	ES1922172-003	ES1922172-004	ES1922172-005
					Result	Result	Result	Result	Result
EA005: pH									
pH Value	----	0.01	pH Unit		5.62	4.84	4.96	4.73	5.00
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		102	90	75	161	202
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		84	63	42	82	164
EA016: Calculated TDS (from Electrical Conductivity)									
Total Dissolved Solids (Calc.)	----	1	mg/L		66	58	49	105	131
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		26	92	74	23	61
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		8	13	13	21	20
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		11	<1	<1	<1	<1
Total Alkalinity as CaCO3	----	1	mg/L		11	<1	<1	<1	<1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		4	9	6	20	12
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		23	20	18	35	46
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		<1	2	2	2	<1
Magnesium	7439-95-4	1	mg/L		2	2	2	4	5
Sodium	7440-23-5	1	mg/L		15	13	10	23	36
Potassium	7440-09-7	1	mg/L		<1	<1	1	1	2
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	<0.05	<0.05	<0.05
Barium	7440-39-3	0.001	mg/L		0.002	0.004	0.013	0.026	0.005
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	0.002
Chromium	7440-47-3	0.001	mg/L		0.003	<0.001	<0.001	<0.001	0.002

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH1	BH2	BH4	BH6	BH7
Client sampling date / time				16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00	
Compound	CAS Number	LOR	Unit	ES1922172-001	ES1922172-002	ES1922172-003	ES1922172-004	ES1922172-005	
				Result	Result	Result	Result	Result	
EG020F: Dissolved Metals by ICP-MS - Continued									
Copper	7440-50-8	0.001	mg/L	0.002	0.008	0.046	0.002	<0.001	
Manganese	7439-96-5	0.001	mg/L	0.010	0.013	0.019	0.008	0.025	
Nickel	7440-02-0	0.001	mg/L	0.001	0.001	<0.001	<0.001	0.003	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	0.116	0.006	0.007	0.005	<0.005	
Iron	7439-89-6	0.05	mg/L	7.35	0.05	<0.05	2.41	1.66	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	0.95	0.75	0.63	1.40	1.55	
∅ Total Cations	----	0.01	meq/L	0.82	0.83	0.72	1.46	2.03	
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	<50	
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	<100	<100	
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	<50	
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	<50	<50	
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	<100	<100	
>C16 - C34 Fraction	----	100	µg/L	<100	<100	<100	<100	<100	
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	<100	
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100	<100	<100	<100	
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	<100	<100	<100	<100	
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	<20	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	<20	<20	
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	<20	<20	
EP080: BTEXN									



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				BH1	BH2	BH4	BH6	BH7
Client sampling date / time				16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00
Compound	CAS Number	LOR	Unit	ES1922172-001	ES1922172-002	ES1922172-003	ES1922172-004	ES1922172-005
				Result	Result	Result	Result	Result
EP080: BTEXN - Continued								
Benzene	71-43-2	1	µg/L	<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L	<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L	<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L	<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L	<5	<5	<5	<5	<5
EP231A: Perfluoroalkyl Sulfonic Acids								
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
EP231B: Perfluoroalkyl Carboxylic Acids								
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 (PFTTrDA)	72629-94-8	0.02	µg/L	----	----	<0.02	<0.02	<0.02



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH1	BH2	BH4	BH6	BH7
Client sampling date / time					16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00
Compound	CAS Number	LOR	Unit		ES1922172-001	ES1922172-002	ES1922172-003	ES1922172-004	ES1922172-005
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		----	----	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
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
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
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
EP231P: PFAS Sums									
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
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		121	118	86.7	116	116
Toluene-D8	2037-26-5	2	%		131	129	110	124	129



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Client sample ID

				BH1	BH2	BH4	BH6	BH7
Client sampling date / time				16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00
Compound	CAS Number	LOR	Unit	ES1922172-001	ES1922172-002	ES1922172-003	ES1922172-004	ES1922172-005
				Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued								
4-Bromofluorobenzene	460-00-4	2	%	118	119	98.5	113	115
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	----	----	98.6	96.5	98.4
13C8-PFOA	----	0.02	%	----	----	86.9	88.0	81.8



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH8	BH11	SW1	SW3	SW4
Client sampling date / time					16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00
Compound	CAS Number	LOR	Unit		ES1922172-006	ES1922172-007	ES1922172-008	ES1922172-009	ES1922172-010
					Result	Result	Result	Result	Result
EA005: pH									
pH Value	----	0.01	pH Unit		4.78	4.68	4.42	4.47	4.46
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		353	318	876	451	367
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		226	192	568	246	207
EA016: Calculated TDS (from Electrical Conductivity)									
Total Dissolved Solids (Calc.)	----	1	mg/L		229	207	569	293	238
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		145	223	17	7	6
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		20	33	194	69	46
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		<1	<1	<1	<1	<1
Total Alkalinity as CaCO3	----	1	mg/L		<1	<1	<1	<1	<1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		70	8	240	104	67
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		121	73	130	57	56
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		<1	<1	20	8	7
Magnesium	7439-95-4	1	mg/L		5	8	35	12	7
Sodium	7440-23-5	1	mg/L		57	49	90	46	46
Potassium	7440-09-7	1	mg/L		<1	<1	4	<1	<1
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		0.001	<0.001	<0.001	<0.001	<0.001
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	0.08	<0.05	<0.05
Barium	7440-39-3	0.001	mg/L		0.012	0.010	0.032	0.055	0.044
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L		<0.001	<0.001	0.007	0.007	0.002
Chromium	7440-47-3	0.001	mg/L		0.001	0.002	<0.001	<0.001	<0.001



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH8	BH11	SW1	SW3	SW4
Client sampling date / time					16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00
Compound	CAS Number	LOR	Unit		ES1922172-006	ES1922172-007	ES1922172-008	ES1922172-009	ES1922172-010
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued									
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	0.003	0.002	0.002
Manganese	7439-96-5	0.001	mg/L		0.004	0.003	0.590	0.043	0.043
Nickel	7440-02-0	0.001	mg/L		0.002	0.004	0.008	0.006	0.003
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L		<0.005	0.007	0.239	0.029	0.014
Iron	7439-89-6	0.05	mg/L		2.60	0.47	1.86	1.25	0.96
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		0.1	0.2	0.4	0.2	0.2
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L		4.87	2.22	8.66	3.77	2.97
∅ Total Cations	----	0.01	meq/L		2.89	2.79	7.90	3.39	2.93
∅ Ionic Balance	----	0.01	%		25.5	----	4.64	5.38	----
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	<50
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				BH8	BH11	SW1	SW3	SW4
Client sampling date / time				16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00
Compound	CAS Number	LOR	Unit	ES1922172-006	ES1922172-007	ES1922172-008	ES1922172-009	ES1922172-010
				Result	Result	Result	Result	Result
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L	<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L	<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L	<1	<1	<1	<1	<1
Napthalene	91-20-3	5	µg/L	<5	<5	<5	<5	<5
EP231A: Perfluoroalkyl Sulfonic Acids								
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	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	----	----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH8	BH11	SW1	SW3	SW4
Client sampling date / time					16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00
Compound	CAS Number	LOR	Unit		ES1922172-006	ES1922172-007	ES1922172-008	ES1922172-009	ES1922172-010
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
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	----	----	----	----
EP231P: PFAS Sums									
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	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		121	122	114	111	123
Toluene-D8	2037-26-5	2	%		130	127	128	115	126



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Client sample ID

				BH8	BH11	SW1	SW3	SW4
Client sampling date / time				16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00
Compound	CAS Number	LOR	Unit	ES1922172-006	ES1922172-007	ES1922172-008	ES1922172-009	ES1922172-010
				Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued								
4-Bromofluorobenzene	460-00-4	2	%	120	116	115	113	117
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	102	----	----	----	----
13C8-PFOA	----	0.02	%	79.4	----	----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW239S	RINSATE06	TRIP BLANK 06	----	----
Client sampling date / time					16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1922172-011	ES1922172-012	ES1922172-013	-----	-----
					Result	Result	Result	----	----
EA005: pH									
pH Value	----	0.01	pH Unit		4.85	----	----	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		353	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		188	----	----	----	----
EA016: Calculated TDS (from Electrical Conductivity)									
Total Dissolved Solids (Calc.)	----	1	mg/L		229	----	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		70	----	----	----	----
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		29	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		<1	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		<1	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		16	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		73	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		<1	----	----	----	----
Magnesium	7439-95-4	1	mg/L		7	----	----	----	----
Sodium	7440-23-5	1	mg/L		52	----	----	----	----
Potassium	7440-09-7	1	mg/L		1	----	----	----	----
EG020F: Dissolved Metals by ICP-MS									
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		0.006	<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		0.002	<0.001	<0.001	----	----

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW239S	RINSATE06	TRIP BLANK 06	----	----
Client sampling date / time					16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00	----	----
Compound	CAS Number	LOR	Unit	ES1922172-011	ES1922172-012	ES1922172-013	-----	-----	
				Result	Result	Result	----	----	
EG020F: Dissolved Metals by ICP-MS - Continued									
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	----	----	
Manganese	7439-96-5	0.001	mg/L	0.003	<0.001	<0.001	----	----	
Nickel	7440-02-0	0.001	mg/L	0.002	<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	0.87	<0.05	<0.05	----	----	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	----	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	<0.1	----	----	----	----	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	2.39	----	----	----	----	
∅ Total Cations	----	0.01	meq/L	2.86	----	----	----	----	
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
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	----	----	
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	----	----	
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>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	----	----	
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	----	----	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	----	----	
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	----	----	
EP080: BTEXN									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW239S	RINSATE06	TRIP BLANK 06	----	----
Client sampling date / time					16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1922172-011	ES1922172-012	ES1922172-013	-----	-----
					Result	Result	Result	----	----
EP080: BTEXN - Continued									
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	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		----	<0.02	<0.02	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		----	<0.02	<0.02	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		----	<0.02	<0.02	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		----	<0.02	<0.02	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		----	<0.01	<0.01	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		----	<0.02	<0.02	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		----	<0.1	<0.1	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		----	<0.02	<0.02	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		----	<0.02	<0.02	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		----	<0.02	<0.02	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		----	<0.01	<0.01	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		----	<0.02	<0.02	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		----	<0.02	<0.02	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		----	<0.02	<0.02	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		----	<0.02	<0.02	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		----	<0.02	<0.02	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW239S	RINSATE06	TRIP BLANK 06	----	----
Client sampling date / time					16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1922172-011	ES1922172-012	ES1922172-013	-----	-----
					Result	Result	Result	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		----	<0.05	<0.05	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		----	<0.02	<0.02	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		----	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		----	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		----	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		----	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		----	<0.02	<0.02	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		----	<0.02	<0.02	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		----	<0.05	<0.05	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		----	<0.05	<0.05	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		----	<0.05	<0.05	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		----	<0.05	<0.05	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		----	<0.01	<0.01	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		----	<0.01	<0.01	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		----	<0.01	<0.01	----	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		122	131	122	----	----
Toluene-D8	2037-26-5	2	%		127	123	125	----	----



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Client sample ID

				MW239S	RINSATE06	TRIP BLANK 06	----	----
Client sampling date / time				16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00	----	----
Compound	CAS Number	LOR	Unit	ES1922172-011	ES1922172-012	ES1922172-013	-----	-----
				Result	Result	Result	----	----
EP080S: TPH(V)/BTEX Surrogates - Continued								
4-Bromofluorobenzene	460-00-4	2	%	116	121	117	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	----	108	102	----	----
13C8-PFOA	----	0.02	%	----	76.5	74.6	----	----



Surrogate Control Limits

Sub-Matrix: **WATER**

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

QUALITY CONTROL REPORT

Work Order	: ES1922172	Page	: 1 of 14
Client	: KLEINFELDER AUSTRALIA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Contact	: Shirley LeCornu
Address	: 95 MITCHELL ROAD CARDIFF NSW 2285	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +6138549 9630
Project	: 20193820	Date Samples Received	: 16-Jul-2019
Order number	:	Date Analysis Commenced	: 16-Jul-2019
C-O-C number	: ----	Issue Date	: 22-Jul-2019
Sampler	: DK		
Site	: WSS-CABBAGE TREE RD WATER MONITORING		
Quote number	: ME/114/19		
No. of samples received	: 13		
No. of samples analysed	: 13		



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 Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW
Neil Martin	Team Leader - Chemistry	Chemistry, Newcastle West, NSW



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

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 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
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005: pH (QC Lot: 2469956)									
ES1922172-001	BH1	EA005: pH Value	----	0.01	pH Unit	5.62	5.62	0.00	0% - 20%
ES1922172-011	MW239S	EA005: pH Value	----	0.01	pH Unit	4.85	4.81	0.828	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 2469265)									
ES1922084-002	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	146	145	0.974	0% - 20%
ES1922135-002	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	14900	14700	1.73	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 2469270)									
ES1922172-006	BH8	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	353	344	2.66	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 2472613)									
ES1921959-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	300	305	1.82	0% - 20%
ES1922128-004	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	158	130	20.1	0% - 50%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 2472615)									
ES1922172-005	BH7	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	164	156	5.32	0% - 50%
ES1922387-002	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	624	672	7.33	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 2472612)									
ES1921959-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	90	86	5.13	0% - 50%
ES1922128-004	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	<5	<5	0.00	No Limit
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 2472614)									
ES1922172-005	BH7	EA025H: Suspended Solids (SS)	----	5	mg/L	61	56	8.07	0% - 50%
ES1922387-002	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	9	8	14.5	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 2469269)									
ES1922135-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	56	56	0.00	0% - 20%



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 2469269) - continued									
ES1922135-002	Anonymous	ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	56	56	0.00	0% - 20%
ES1922172-006	BH8	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	0.00	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2471507)									
ES1922082-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	14	14	0.00	0% - 50%
ES1922082-010	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	19	17	8.91	0% - 50%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2471509)									
ES1922172-002	BH2	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	9	9	0.00	No Limit
ES1922172-011	MW239S	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	16	18	9.50	0% - 50%
ED045G: Chloride by Discrete Analyser (QC Lot: 2471508)									
ES1922082-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	64	65	0.00	0% - 20%
ES1922082-010	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	104	104	0.00	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 2471510)									
ES1922172-005	BH7	ED045G: Chloride	16887-00-6	1	mg/L	46	46	0.00	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 2474824)									
ES1922172-006	BH8	ED093F: Calcium	7440-70-2	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	5	5	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	57	56	1.98	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.00	No Limit
ES1921898-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	5	5	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	4	4	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	19	19	0.00	0% - 50%
		ED093F: Potassium	7440-09-7	1	mg/L	10	10	0.00	0% - 50%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2474825)									
ES1922172-006	BH8	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.012	0.012	0.00	0% - 50%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.004	0.005	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2474825) - continued									
ES1922172-006	BH8	EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	2.60	2.66	2.10	0% - 20%
ES1921898-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.048	0.047	0.00	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.006	0.007	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.010	0.010	0.00	0% - 50%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.006	0.011	70.3	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	1.61	1.60	0.760	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2476219)									
ES1922095-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.035	0.035	0.00	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.462	0.464	0.388	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.050	0.051	0.00	0% - 20%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.008	0.012	35.7	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	1.35	1.36	0.00	0% - 20%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 2474826)									
ES1922133-002	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.1 µg/L	<0.0001	0.00	No Limit
ES1922172-005	BH7	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 2476220)									
ES1922172-013	TRIP BLANK 06	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 2469266)									

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EK040P: Fluoride by PC Titrator (QC Lot: 2469266) - continued									
ES1922084-002	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.2	<0.1	0.00	No Limit
ES1922135-002	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.2	0.2	0.00	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 2469272)									
ES1922172-006	BH8	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.1	<0.1	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2470517)									
EP1906947-008	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
ES1922172-004	BH6	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2470517)									
EP1906947-008	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES1922172-004	BH6	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 2470517)									
EP1906947-008	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.00	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
ES1922172-004	BH6	EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
		EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.00	No Limit
			106-42-3						
	EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit	
	EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit	
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 2470152)									
EP1906907-001	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.14	0.15	0.00	0% - 50%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.02	0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.22	0.22	0.00	0% - 50%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
ES1922172-006	BH8	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2470152)									



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2470152) - continued									
EP1906907-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.01	0.02	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.05	0.05	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
ES1922172-006	BH8	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2470152)									
EP1906907-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1922172-006	BH8	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2470152) - continued									
ES1922172-006	BH8	EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2470152)									
EP1906907-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1922172-006	BH8	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 2470152)									
EP1906907-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.44	0.46	4.44	0% - 20%
ES1922172-006	BH8	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.00	No Limit



Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EA005: pH (QCLot: 2469956)								
EA005: pH Value	----	----	pH Unit	----	7.6 pH Unit	100	99	102
EA010P: Conductivity by PC Titrator (QCLot: 2469265)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2000 µS/cm	110	95	113
EA010P: Conductivity by PC Titrator (QCLot: 2469270)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2000 µS/cm	103	95	113
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 2472613)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	96.7	87	109
				<10	293 mg/L	100	66	126
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 2472615)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	96.7	87	109
				<10	293 mg/L	98.3	66	126
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 2472612)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	98.7	83	129
				<5	1000 mg/L	103	82	110
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 2472614)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	94.3	83	129
				<5	1000 mg/L	108	82	110
ED037P: Alkalinity by PC Titrator (QCLot: 2469269)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	93.4	81	111
				----	50 mg/L	93.4	70	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2471507)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	104	82	122
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2471509)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	104	82	122
ED045G: Chloride by Discrete Analyser (QCLot: 2471508)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	100	81	127
				<1	1000 mg/L	87.0	81	127
ED045G: Chloride by Discrete Analyser (QCLot: 2471510)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	100	81	127
				<1	1000 mg/L	87.3	81	127
ED093F: Dissolved Major Cations (QCLot: 2474824)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	102	80	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	110	90	116



Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
ED093F: Dissolved Major Cations (QCLot: 2474824) - continued								
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	104	82	120
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	102	85	113
EG020F: Dissolved Metals by ICP-MS (QCLot: 2474825)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	95.6	85	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	95.3	85	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	97.8	82	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	96.9	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	96.9	85	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	93.5	82	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	94.7	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	93.9	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	97.1	82	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	93.5	82	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	94.5	85	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	96.8	83	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	95.5	81	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	92.7	85	115
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	95.7	82	112
EG020F: Dissolved Metals by ICP-MS (QCLot: 2476219)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	95.0	85	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	88.8	85	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	97.0	82	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	95.3	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	93.2	85	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	90.2	82	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	92.6	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	89.2	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	89.9	82	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	95.4	82	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	96.1	85	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	89.1	83	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	91.2	81	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	91.1	85	115
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	91.6	82	112
EG035F: Dissolved Mercury by FIMS (QCLot: 2474826)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	102	83	105
EG035F: Dissolved Mercury by FIMS (QCLot: 2476220)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	101	83	105



Sub-Matrix: **WATER**

Method: Compound				Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
						LCS	Low	High
CAS Number	LOR	Unit						
EK040P: Fluoride by PC Titrator (QCLot: 2469266)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	96.2	82	116
EK040P: Fluoride by PC Titrator (QCLot: 2469272)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	90.6	82	116
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QCLot: 2469985)								
EP071SG: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	62.7	56	112
EP071SG: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	83.0	72	113
EP071SG: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	79.2	56	121
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 2469985)								
EP071SG: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	70.5	58	119
EP071SG: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	82.0	63	110
EP071SG: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	67.8	62	121
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2470517)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	96.3	75	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2470517)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	97.6	75	127
EP080: BTEXN (QCLot: 2470517)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	108	70	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	104	69	123
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	103	70	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	104	69	121
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	108	72	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	103	70	120
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2470152)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	87.2	70	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	93.0	70	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	93.2	70	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	89.8	70	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	90.4	70	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.5 µg/L	77.2	70	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2470152)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	92.2	70	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	99.0	70	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	96.8	70	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	104	70	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	97.8	70	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	108	70	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	97.4	70	130



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2470152) - continued								
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	94.2	70	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	104	70	130
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	96.0	70	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	107	70	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2470152)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	89.2	70	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	98.7	70	150
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	111	70	150
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	1.25 µg/L	101	70	150
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	99.3	70	150
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	89.8	70	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	87.2	70	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2470152)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	89.2	70	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	98.4	70	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	104	70	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	105	70	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number			Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2471507)							
ES1922082-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	129	70	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2471509)							
ES1922172-002	BH2	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	77.6	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 2471508)							
ES1922082-001	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	105	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 2471510)							
ES1922172-005	BH7	ED045G: Chloride	16887-00-6	250 mg/L	103	70	130



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 2474825)							
ES1921898-002	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	95.8	70	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	96.3	70	130
		EG020A-F: Barium	7440-39-3	1 mg/L	98.3	70	130
		EG020A-F: Cadmium	7440-43-9	0.1 mg/L	98.6	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	97.3	70	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	100	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	96.3	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	102	70	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	95.9	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	94.3	70	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	98.0	70	130
		EG020A-F: Zinc	7440-66-6	5 mg/L	96.4	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2476219)							
ES1922172-012	RINSATE06	EG020A-F: Arsenic	7440-38-2	1 mg/L	119	70	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	114	70	130
		EG020A-F: Barium	7440-39-3	1 mg/L	122	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	124	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	128	70	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	129	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	121	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	128	70	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	121	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	123	70	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	119	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	127	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 2474826)							
ES1922133-001	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	89.8	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 2476220)							
ES1922172-012	RINSATE06	EG035F: Mercury	7439-97-6	0.01 mg/L	113	70	130
EK040P: Fluoride by PC Titrator (QCLot: 2469266)							
ES1922084-008	Anonymous	EK040P: Fluoride	16984-48-8	5 mg/L	105	70	130
EK040P: Fluoride by PC Titrator (QCLot: 2469272)							
ES1922172-007	BH11	EK040P: Fluoride	16984-48-8	5 mg/L	90.0	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2470517)							
EP1906947-008	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	110	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2470517)							
EP1906947-008	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	107	70	130



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080: BTEXN (QCLot: 2470517)							
EP1906947-008	Anonymous	EP080: Benzene	71-43-2	25 µg/L	114	70	130
		EP080: Toluene	108-88-3	25 µg/L	108	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	106	70	130
		EP080: meta- & para-Xylene	108-38-3	25 µg/L	108	70	130
			106-42-3				
		EP080: ortho-Xylene	95-47-6	25 µg/L	111	70	130
		EP080: Naphthalene	91-20-3	25 µg/L	110	70	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2470152)							
EP1906907-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	101	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.5 µg/L	107	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	106	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	106	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	110	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.5 µg/L	81.0	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2470152)							
EP1906907-001	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	111	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	110	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	98.6	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	127	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	106	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	118	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	120	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	99.0	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	115	50	130
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.5 µg/L	107	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	128	50	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2470152)							
EP1906907-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	96.2	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	97.2	50	150
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	129	50	150
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	1.25 µg/L	110	50	150
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	111	50	150
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	96.6	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	107	50	130



Sub-Matrix: WATER

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2470152)							
EP1906907-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	108	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	130	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	128	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	116	50	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES1922172	Page	: 1 of 10
Client	: KLEINFELDER AUSTRALIA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Telephone	: +6138549 9630
Project	: 20193820	Date Samples Received	: 16-Jul-2019
Site	: WSS-CABBAGE TREE RD WATER MONITORING	Issue Date	: 22-Jul-2019
Sampler	: DK	No. of samples received	: 13
Order number	:	No. of samples analysed	: 13

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- **NO** Matrix Spike outliers occur.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- **NO** Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers exist - please see following pages for full details.



Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
TRH - Total Recoverable Hydrocarbons - Silica Gel C	0	15	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Total Recoverable Hydrocarbons - Silica Gel C	0	15	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005: pH								
Clear Plastic Bottle - Natural (EA005)		16-Jul-2019	----	----	----	16-Jul-2019	16-Jul-2019	✔
BH1,	BH2,							
BH4,	BH6,							
BH7,	BH8,							
BH11,	SW1,							
SW3,	SW4,							
MW239S								
EA010P: Conductivity by PC Titrator								
Clear Plastic Bottle - Natural (EA010-P)		16-Jul-2019	----	----	----	16-Jul-2019	13-Aug-2019	✔
BH1,	BH2,							
BH4,	BH6,							
BH7,	BH8,							
BH11,	SW1,							
SW3,	SW4,							
MW239S								
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Clear Plastic Bottle - Natural (EA015H)		16-Jul-2019	----	----	----	18-Jul-2019	23-Jul-2019	✔
BH1,	BH2,							
BH4,	BH6,							
BH7,	BH8,							
BH11,	SW1,							
SW3,	SW4,							
MW239S								



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H) BH1, BH2, BH4, BH6, BH7, BH8, BH11, SW1, SW3, SW4, MW239S	16-Jul-2019	----	----	----	18-Jul-2019	23-Jul-2019	✓
EA065: Total Hardness as CaCO3							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH1, BH2, BH4, BH6, BH7, BH8, BH11, SW1, SW3, SW4, MW239S	16-Jul-2019	----	----	----	19-Jul-2019	13-Aug-2019	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P) BH1, BH2, BH4, BH6, BH7, BH8, BH11, SW1, SW3, SW4, MW239S	16-Jul-2019	----	----	----	16-Jul-2019	30-Jul-2019	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G) BH1, BH2, BH4, BH6, BH7, BH8, BH11, SW1, SW3, SW4, MW239S	16-Jul-2019	----	----	----	17-Jul-2019	13-Aug-2019	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G) BH1, BH2, BH4, BH6, BH7, BH8, BH11, SW1, SW3, SW4, MW239S	16-Jul-2019	----	----	----	17-Jul-2019	13-Aug-2019	✓

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Evaluation	Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
ED093F: Dissolved Major Cations									
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)		16-Jul-2019	----	----	----	19-Jul-2019	13-Aug-2019	✓	
BH1, BH4, BH7, BH11, SW3, MW239S	BH2, BH6, BH8, SW1, SW4,								
EG020F: Dissolved Metals by ICP-MS									
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)		16-Jul-2019	----	----	----	19-Jul-2019	12-Jan-2020	✓	
BH1, BH4, BH7, BH11, SW3, MW239S, TRIP BLANK 06	BH2, BH6, BH8, SW1, SW4, RINSATE06,								
EG035F: Dissolved Mercury by FIMS									
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)		16-Jul-2019	----	----	----	19-Jul-2019	13-Aug-2019	✓	
BH1, BH4, BH7, BH11, SW3, MW239S, TRIP BLANK 06	BH2, BH6, BH8, SW1, SW4, RINSATE06,								
EK040P: Fluoride by PC Titrator									
Clear Plastic Bottle - Natural (EK040P)		16-Jul-2019	----	----	----	16-Jul-2019	13-Aug-2019	✓	
BH1, BH4, BH7, BH11, SW3, MW239S	BH2, BH6, BH8, SW1, SW4,								



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup							
Amber Glass Bottle - Unpreserved (EP071SG) BH1, BH2, BH4, BH6, BH7, BH8, BH11, SW1, SW3, SW4, MW239S, RINSATE06, TRIP BLANK 06	16-Jul-2019	18-Jul-2019	23-Jul-2019	✓	20-Jul-2019	27-Aug-2019	✓
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup							
Amber Glass Bottle - Unpreserved (EP071SG) BH1, BH2, BH4, BH6, BH7, BH8, BH11, SW1, SW3, SW4, MW239S, RINSATE06, TRIP BLANK 06	16-Jul-2019	18-Jul-2019	23-Jul-2019	✓	20-Jul-2019	27-Aug-2019	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber VOC Vial - Sulfuric Acid (EP080) BH1, BH2, BH4, BH6, BH7, BH8, BH11, SW1, SW3, SW4, MW239S, RINSATE06, TRIP BLANK 06	16-Jul-2019	19-Jul-2019	30-Jul-2019	✓	19-Jul-2019	30-Jul-2019	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber VOC Vial - Sulfuric Acid (EP080) BH1, BH2, BH4, BH6, BH7, BH8, BH11, SW1, SW3, SW4, MW239S, RINSATE06, TRIP BLANK 06	16-Jul-2019	19-Jul-2019	30-Jul-2019	✓	19-Jul-2019	30-Jul-2019	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080: BTEXN								
Amber VOC Vial - Sulfuric Acid (EP080)		16-Jul-2019	19-Jul-2019	30-Jul-2019	✓	19-Jul-2019	30-Jul-2019	✓
BH1, BH4, BH7, BH11, SW3, MW239S, TRIP BLANK 06	BH2, BH6, BH8, SW1, SW4, RINSATE06,							
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X)		16-Jul-2019	17-Jul-2019	12-Jan-2020	✓	18-Jul-2019	12-Jan-2020	✓
BH4, BH7, RINSATE06,	BH6, BH8, TRIP BLANK 06							
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X)		16-Jul-2019	17-Jul-2019	12-Jan-2020	✓	18-Jul-2019	12-Jan-2020	✓
BH4, BH7, RINSATE06,	BH6, BH8, TRIP BLANK 06							
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X)		16-Jul-2019	17-Jul-2019	12-Jan-2020	✓	18-Jul-2019	12-Jan-2020	✓
BH4, BH7, RINSATE06,	BH6, BH8, TRIP BLANK 06							
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X)		16-Jul-2019	17-Jul-2019	12-Jan-2020	✓	18-Jul-2019	12-Jan-2020	✓
BH4, BH7, RINSATE06,	BH6, BH8, TRIP BLANK 06							
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X)		16-Jul-2019	17-Jul-2019	12-Jan-2020	✓	18-Jul-2019	12-Jan-2020	✓
BH4, BH7, RINSATE06,	BH6, BH8, TRIP BLANK 06							



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	16	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	3	27	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	3	26	11.54	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	3	18	16.67	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	3	25	12.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	3	26	11.54	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	13	15.38	10.00	✓	NEPM 2013 B3 & ALS QC Standard
pH	EA005	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	30	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	4	39	10.26	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	39	10.26	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	0	15	0.00	10.00	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	16	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	27	14.81	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	26	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	18	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	25	8.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	26	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
pH	EA005	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	30	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	4	39	10.26	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	39	10.26	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chloride by Discrete Analyser	ED045G	2	27	7.41	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	26	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	18	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	25	8.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	26	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Method Blanks (MB) - Continued							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	13	7.69	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	30	6.67	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	39	5.13	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	39	5.13	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	1	15	6.67	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	2	27	7.41	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	18	11.11	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	25	8.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	26	7.69	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	13	7.69	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	30	6.67	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	0	15	0.00	5.00	✖	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH	EA005	WATER	In house: Referenced to APHA 4500 H+ B. pH of water samples is determined by ISE either manually or by automated pH meter. This method is compliant with NEPM (2013) Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (2013) Schedule B(3)
Calculated TDS (from Electrical Conductivity)	EA016	WATER	In house: Calculation from Electrical Conductivity (APHA 2510 B) using a conversion factor specified in the analytical report. This method is compliant with NEPM (2013) Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of 'non-filterable' residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C. This method is compliant with NEPM (2013) Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM (2013) Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (2013) Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.



Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Fluoride by PC Titrator	EK040P	WATER	In house: Referenced to APHA 4500-F C: CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (2013) Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	WATER	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C36. This method is compliant with NEPM (2013) Schedule B(3) (Method 506.1)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In house: Direct injection analysis of fresh waters after dilution (1:1) with methanol. Analysis by LC-Electrospray-MS-MS, Negative Mode using MRM. Where commercially available, isotopically labelled analogues of the target analytes are used as internal standards for quantification. Where a labelled analogue is not commercially available, the internal standard with similar chemistry and the closest retention time to the target is used for quantification. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. This method complies with the quality control definitions as stated in QSM 5.1. Data is reviewed in line with the DQOs as stated in QSM5.1
Preparation Methods	Method	Matrix	Method Descriptions
Preparation for PFAS in water.	EP231-PR	WATER	Method presumes direct injection without workup. Preparation includes addition of internal standard and surrogate, and filtration prior to analysis.
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

Client				SITE, COC AND CONTACT DATA				Laboratory					
Kleinfelder Australia Pty Ltd 95 Mitchell Road Cardiff, NSW 2285 Phone: 02 4949 5200				WSS - Cabbage Tree Rd water monitoring Site Name: ME/14/19 QUOTE NUMBER: 20190820 Job No.: 20190820 Required TAT: 24 hrs Date QA level: LAB minimum unless specified.				Dan Kousbroek 045 8197 876 dkousbroek@kleinfelder.com dmccarthy@kleinfelder.com dmccarthy@kleinfelder.com					
Received by (Sgn): Daniel Kousbroek Date / Time: 16/7/19 3:55 PM Notes: ice present / no ice seal intact / no seal				Received by (Sgn): M.M. Date / Time: 16/7/19 3:55 PM Notes: ice present / no ice seal intact / no seal				Received by (Sgn): A.S. Date / Time: 16/7/19 19:30 Notes: ice present / no ice seal intact / no seal					
Sample ID	Lab ID	Sample Point	Sample Type	Date	Start Depth	End Depth	Units	# Containers	W-05 SG TR/H/TEXTN	Organic Analyses	Metals	Other Analyses	Comments
BH1	1			16/07/2019					X		X		
BH2	2			16/07/2019					X		X		
BH4	3			16/07/2019					X		X		
BH6	4			16/07/2019					X		X		
BH7	5			16/07/2019					X		X		
BH8	6			16/07/2019					X		X		
BH11	7			16/07/2019					X		X		
SW1	8			16/07/2019					X		X		
SW3	9			16/07/2019					X		X		
SW4	10			16/07/2019					X		X		
MW239S	11			16/07/2019					X		X		
Pilsate06	12			16/07/2019					X		X		
Trip Blank06	13			16/07/2019					X		X		

W-05 SG - TR/H/TEXTN 8 Metals Silica Gel Clean Up

Arsenic (As), Cadmium (Cd), Chromium (Cr), Copper (Cu), Lead (Pb), Mercury (Hg), Nickel (Ni), Zinc (Zn)
 Boron (B), Barium (Ba), Beryllium (Be), Cobalt (Co), Manganese (Mn), Selenium (Se), Vanadium (V)

Telephone : + 61-2-8794 8565

Environmental Division
 Sydney
 Work Order Reference
ES1922172



PH C 333

APPENDIX B7: AUGUST 2019

10 September 2019
Document Ref: NCA19R100879

Williamtown Sand Syndicate
PO Box 898
Newcastle, NSW 2300

Attention: Darren Williams

Delivered by email: darren@arbus.com.au

Subject: Monthly water quality monitoring results at Cabbage Tree Road Sand Quarry – August 2019 monitoring

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

1. SCOPE OF SERVICE

The scope of work includes the monthly surface and groundwater monitoring for a combined period of 12 months. **Figure 1** (attached) presents the surface water and groundwater sampling locations.

The August monitoring round was to include 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) and sampling at four surface water locations.

2. SITE WORK

The monitoring round was conducted on 14 August 2019.

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 the gauging each of the HydraSleeves were removed and samples taken.

The August 2019 monitoring round included:

- Gauging of all available monitoring wells (a total of 14 wells);

- 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
General Water Suite*	11	0	0	0	0
Hydrocarbons**	11	0	0	1	1
Metals***	11	0	0	1	1
Iron (dissolved)	11	0	0	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)	4	0	0	1	1

* General Water Suite: Ca, Mg, Na, K, pH, EC, Cl, SO₄, Alkalinity, Fluoride, Hardness & TDS (Calc')

** TRH (C6 – C40), BTEXN (Silica Gel)

*** 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), Selenium (Se), Vanadium (V), Zinc (Zn) - note sampling for Iron and no nickel

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 (mBTOC)	Groundwater Elevation (mAHD)	Well Total Depth (mBTOC)	Comment
BH1	8.64	6.453	2.187	8.12	Slightly cloudy, slight sulfur odour
BH2	7.79	5.888	1.902	9.02	Silty Base, dark brown, no odour
BH3	7.57	6.027	1.543	9.03	Data logger attached, Silty material at base. No sample taken.
BH4	3.06	1.736	1.324	5.92	Slightly Cloudy brown
BH5	7.36	5.894	1.466	8.71	No odour - No sample taken.

Borehole	Top of Casing (mAHD)	Depth to Water (mBTC)	Groundwater Elevation (mAHD)	Well Total Depth (mBTC)	Comment
BH6	3.62	1.723	1.897	4.52	Slight brown colour, slight sulfur odour
BH7	2.98	1.649	1.331	4.51	Cloudy brown, sulfur odour
BH8	3.88	2.406	1.474	6.18	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	3.503	3.127	5.29	Cloudy light brown, sulfur odour
BH12	8.67	6.889	1.781	8.12	Slight acrylic odour. No sample taken.
MW239S	3.04	1.352	1.688	3.89	Dark Brown - Slight Sulfur odour.
MW239D	3.04	1.327	1.713	20.2	Slight Sulfur odour, no sample taken
SW01*	N/A	0.15	2.65	N/A	Natural tannin stained brown, sulfur odour
SW02*	N/A	Dry	-	N/A	Location was dry.
SW03*	N/A	0.195	1.195	N/A	Water clear, no odour.
SW04*	N/A	0.18	2.18	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	1145	19.69	165	5.47	103
BH02	1120	19.66	136	4.7	275
BH04	1100	17.96	102	4.76	266
BH06	1330	18.32	277	4.69	140
BH07	1345	17.71	329	4.88	55
BH08	1415	18.2	374	4.66	27
BH11	1215	17.66	261	4.74	126
MW239S	1300	17.99	530	4.75	72.8
SW01	1045	9.52	1205	4.6	263
SW03	1245	11.96	464	4.67	152
SW04	0950	8.07	485	4.17	294

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**.

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
Physical and Chemical Stressors	Sodium	1	11	8	97	No	Similar
	Sulphate	1	11	2	212	No	Similar
	Chloride	1	11	16	134	No	Similar
	Fluoride	0.1	11	<0.1	0.4	No	Similar
	Reactive ³ Phosphorous	0.01	NA	NA	NA	NA	NA
	Total Phosphorous ³	0.01	NA	NA	NA	NA	NA
	Nitrite ³	0.01	NA	NA	NA	NA	NA
	Nitrate ³	0.01	NA	NA	NA	NA	NA
	Ammonia ³	0.01	NA	NA	NA	NA	NA
	Total Nitrogen ³	0.1	NA	NA	NA	NA	NA
	Total Hardness	1	11	8.0	177	No	Similar
	Total Dissolved Solids	1	11	55	528	No	Similar
	pH	0.01	11	4.47	6.22	All above ANZECC 2000 Trigger range ¹ and drinking water guidelines	Similar
Dissolved Metals	As	0.001	11	<0.001	0.001	No	Similar
	B	0.05	11	<0.005	0.09	No	Similar
	Ba	0.001	11	0.002	0.035	No	Similar
	Be	0.001	11	<0.001	<0.001	No	Similar
	Cd	0.005-0.1	11	<0.0001	0.0001	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
	Cr	0.005-0.1	11	<0.001	0.003	4 above ANZECC 2000 Trigger Values ² (BH1, BH7, BH11 & MW239S)	Similar
	Co	0.001	11	<0.001	0.005	No	Similar
	Cu	0.001	11	<0.001	0.026	5 above ANZECC 2000 Trigger Values ² (BH1, BH2, BH4, SW1 & SW3)	Similar
	Fe	0.05	11	<0.05	7.96	9 above NHMRC ADWG 6 aesthetics (BH1, BH6, BH7, BH8, BH11, MW239S, SW1, SW3 & SW4)	Similar
	Mn	0.001	11	0.004	0.482	No	Similar
	Ni	0.001	11	<0.001	0.005	No	Similar
	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
	Zn	0.005-0.1	11	<0.005	0.075	4 above ANZECC 2000 Trigger Values ² (BH1, SW1, SW3 & SW4)	Similar
	Hg	0.0001	11	<0.0001	<0.0001	No	Similar
TRH – Silica Clean up	C ₆ -C ₁₀	0.02	11	<0.02	<0.02	No	Similar
	>C ₁₀ -C ₁₆	0.1	11	<0.1	<0.1	No	Similar
	>C ₁₆ -C ₃₄	0.1	11	<0.1	<0.1	No	Similar
	>C ₃₄ -C ₄₀	0.1	11	<0.1	<0.1	No	Similar
	Total >C ₁₀ -C ₄₀	0.1	11	<0.1	<0.1	No	Similar
	C ₆ -C ₁₀ minus BTEX (F1)	0.02	11	<0.02	<0.02	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
	>C ₁₀ -C ₁₆ 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	4	<0.00001	<0.00001	No	Similar
	PFOA	0.00001-0.0001	4	<0.00001	<0.00001	No	Similar
	PFOS/PFHxS	0.00001-0.0001	4	<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.

¹Australian 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)

²ANZECC 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

³Analysis 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 July than the mean leading up to the August monitoring event. August rainfall is trending towards below average rainfall.

Table 4.5 2019 Rainfall data

2019	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1st	2.0	0.8	0	0	0	0	0	9.6				
2nd	0	12.8	0	23.8	0	21.2	0	0				
3rd	0	0.4		0.6	0	0.6	0	0.2				
4th	0	0	0	0	20.8	0.4	5.2	0				
5th	0	0	0	0	0.2	25	1.8	0.2				
6th	0	0	0	0	23.2	2.6	1.2	0				
7th	5.0	0	8.2	0	0.2	1	0.6	0				
8th	0	0	0	0	0	0	1.6	0				
9th	0	6.6	0	0	0	0	0.4	0				
10th	0.2	0	12.0	2.2	0	0	0	0				
11th	0	0	0	0	0.6	0	0	0				
12th	3.0	0	0	0	0	0	0	0				
13th	0	0	0	0	1.4	0	0	0				
14th	0	0	0	0.2	0	0	0	0				
15th	0	0	0	1.4	0	0	0	0				
16th	0	0	4.8	3.6	0	0	0					
17th	0	0	59.4	1.4	0	0	0					
18th	0	0	2.6	0.2	0	17.8	0					
19th	0	0	2.2	0.2	0	0	0					
20th	2.4		0	2.0	0	0	0					
21st	1.0	1.4	0	0.2	0	0	0					
22nd	0	1.0	1.2	0.2	0	0.2	0					
23rd	0	1.4	0	0	0	20	0					
24th	0	9.2	5.4	0	0	50.6	0					
25th	0	0	5.2	0	0	15.2	2.0					
26th	0	0	0	0	0	1.8	0					
27th	0	0	0	0	0	0.8	0					
28th	1.0	0	0	0	0.8	0	0					
29th	0		0	0	0	0	0					
30th	0		38.2	0	0	0	0.6					
31st	0		6.6		0		10					
Monthly Total	14.6	33.6	145.8	36.0	47.2	157.2	23.4	10.0				
Mean	98.7	117.0	120.5	111.6	109.6	124.7	70.3	72.9	60.4	73.9	82.3	78.6

Based on the long-term rainfall data for the July/August period it is expected that the current groundwater and surface water levels will remain similar compared to current levels.

5. DATA TRENDS

Attachment B provides a graphical representation of data acquired during field sampling and laboratory analysis. Parameters and analytes include; electrical conductivity ($\mu\text{S}/\text{cm}$), groundwater elevation (mAHD), and concentrations of iron, nickel and zinc (mg/L). Where relevant, the Australian Drinking Water Guideline (Aesthetic values) and ANZECC 2000 Guideline have been included to provide a benchmark for any exceedances observed.

6. 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

Dkousbroek@kleinfelder.com

Mobile: 0458 197 676

Attached:

Figure 1

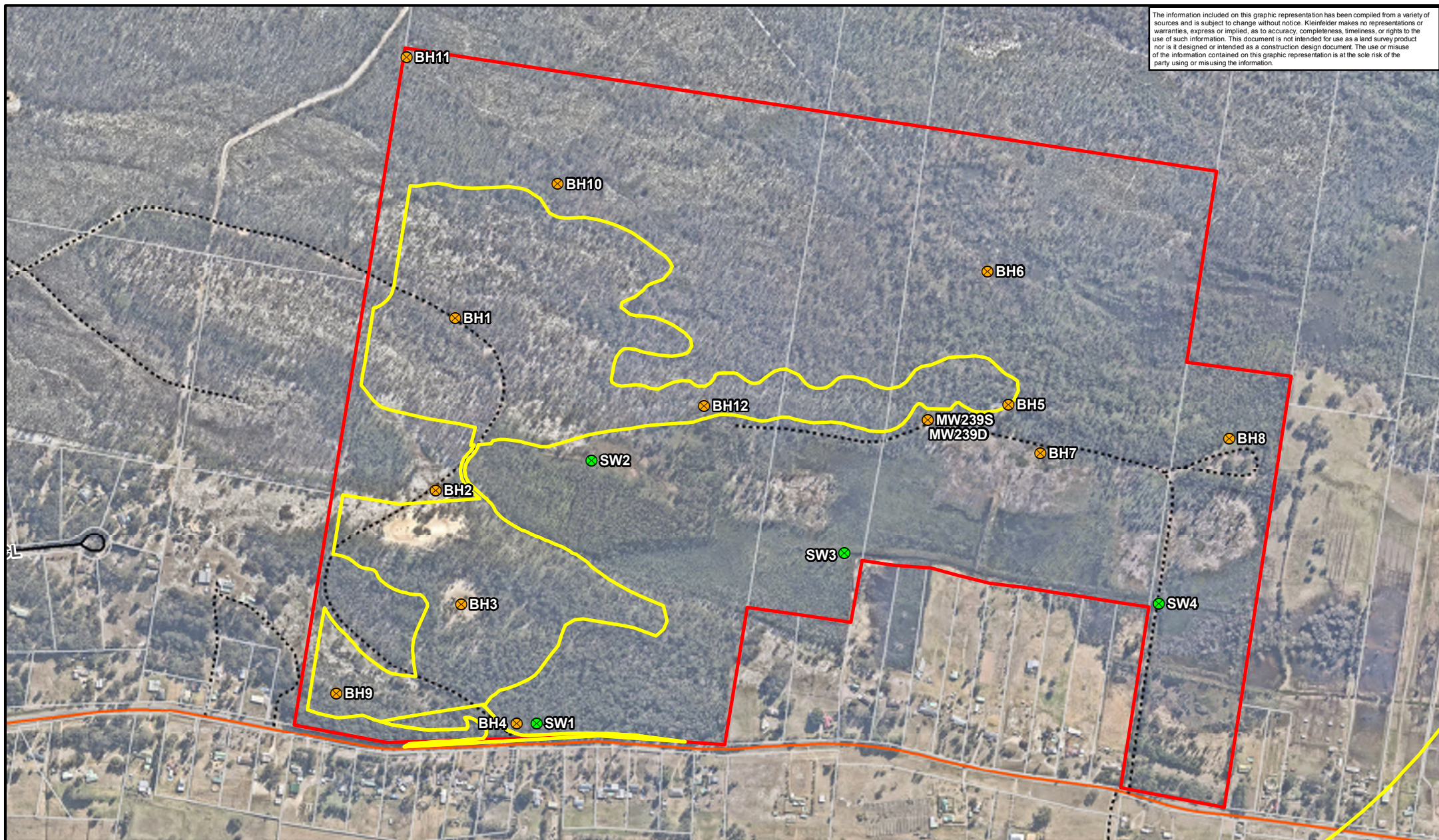
Data Tables

Attachment A – Laboratory reports

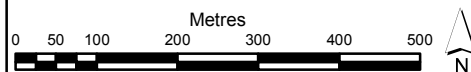
Attachment B – Data Trends

FIGURE 1

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 use of such information. This document is not intended for use as a land survey 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
- ▬ Subject Land Boundary
- ▬ Quarry Project Area
- Arterial Road
- Local Road
- - Track



PROJECT REFERENCE: 20170448
 DATE DRAWN: 13/02/2019 09:48 Version 1
 DRAWN BY: gjoyce
 DATA SOURCE:
 NSW DFSI - 2017
 Nearmap - 2018

Water monitoring locations August 2019 Monitoring

Williamtown Sand Syndicate
 Proposed Sand Quarry
 Cabbage Tree Road, Williamtown

FIGURE:

1

DATA TABLES



KLEINFELDER
Bright People. Right Solutions.

Notes:
 - - Not analysed
 < - Less than laboratory limit of reporting
 µg/L - Micrograms per litre
 BTEXN - Benzene, toluene, ethylbenzene, xylenes, naphthalene
 ** 95% Level of protection in freshwater

Table 2
Groundwater Analytical Data - Metals
Williamstown Sand Syndicate



Metals																	
Analyte	Arsenic**	Barium	Beryllium	Boron**	Cadmium**	Chromium**	Cobalt	Copper**	Iron	Lead**	Manganese*	Mercury**+2	Nickel**	Selenium**	Vanadium	Zinc**	
LOR	0.001	0.001	0.001	0.05	0.0001	0.001	0.001	0.001	0.05	0.001	0.001	0.0001	0.001	0.01	0.01	0.005	
Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	
ANZECC 2000 Trigger Values	0.013	-	0.37	0.0002	0.001	-	-	0.0014	0.0034	1.9	0.0006	0.011	0.011	-	-	0.008	
NHMRIC ADWQ E	0.01	0.06	4	0.002	0.05	-	-	2	0.3 ¹	0.01	0.5	0.001	0.02	0.01	-	3 ²	
Sample Name	Sample Date																
BH1	15-Mar-19	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.004	< 0.001	< 0.001	13	< 0.001	0.014	< 0.0001	< 0.001	< 0.01	< 0.01	1.27
	23-Apr-19	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.004	< 0.001	0.002	10	0.001	0.015	< 0.0001	0.002	< 0.01	< 0.01	0.363
	16-May-19	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	0.001	8.33	< 0.001	0.009	< 0.0001	0.002	< 0.01	< 0.01	0.132
	14-Jun-19	< 0.001	0.001	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.001	6.31	< 0.001	0.009	< 0.0001	< 0.001	< 0.01	< 0.01	0.074
	16-Jul-19	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	0.002	7.35	< 0.001	0.01	< 0.0001	0.001	< 0.01	< 0.01	0.116
BH2	15-Aug-19	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	0.002	7.96	< 0.001	0.008	< 0.0001	< 0.001	< 0.01	< 0.01	0.023
	22-Feb-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.002	0.14	< 0.001	0.021	< 0.0001	0.015	< 0.01	< 0.01	0.006
	15-Mar-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.003	< 0.05	< 0.001	0.02	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	23-Apr-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.004	0.19	< 0.001	0.018	< 0.0001	0.001	< 0.01	< 0.01	0.008
	16-May-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.001	0.06	< 0.001	0.014	< 0.0001	0.001	< 0.01	< 0.01	< 0.005
BH3	14-Jun-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.004	0.08	< 0.001	0.009	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	16-Jul-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.013	0.08	< 0.001	0.008	< 0.0001	< 0.001	< 0.01	< 0.01	0.005
	15-Aug-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.012	0.08	< 0.001	0.011	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	21-Feb-19	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.06	< 0.001	0.005	< 0.0001	0.053	< 0.01	< 0.01	< 0.005
	21-Feb-19	< 0.001	0.014	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.002	0.16	< 0.001	0.039	< 0.0001	0.018	< 0.01	< 0.01	0.014
BH4	15-Mar-19	< 0.001	0.014	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.001	< 0.05	< 0.001	0.014	< 0.0001	0.022	< 0.01	< 0.01	0.043
	23-Apr-19	< 0.001	0.013	< 0.001	0.05	< 0.0001	< 0.001	< 0.001	0.002	0.99	< 0.001	0.045	< 0.0001	0.007	< 0.01	< 0.01	0.008
	16-May-19	< 0.001	0.013	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	0.27	< 0.001	0.022	< 0.0001	0.022	< 0.01	< 0.01	0.011
	14-Jun-19	< 0.001	0.012	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.038	< 0.05	< 0.001	0.014	< 0.0001	< 0.001	< 0.01	< 0.01	0.005
	16-Jul-19	< 0.001	0.013	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.046	< 0.05	< 0.001	0.019	< 0.0001	< 0.001	< 0.01	< 0.01	0.007
BH5	15-Aug-19	< 0.001	0.013	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.026	< 0.05	< 0.001	0.018	< 0.0001	0.001	< 0.01	< 0.01	0.007
	22-Feb-19	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	1.4	< 0.001	0.005	< 0.0001	0.003	< 0.01	< 0.01	0.008
	22-Feb-19	< 0.001	0.03	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	1.03	< 0.001	0.014	< 0.0001	0.001	< 0.01	< 0.01	0.019
	14-Mar-19	< 0.001	0.027	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	1.9	< 0.001	0.01	< 0.0001	< 0.001	< 0.01	< 0.01	0.012
	23-Apr-19	< 0.001	0.03	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.001	0.96	< 0.001	0.01	< 0.0001	< 0.001	< 0.01	< 0.01	0.022
BH6	16-May-19	< 0.001	0.029	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	2.57	< 0.001	0.009	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	14-Jun-19	< 0.001	0.027	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.001	2.86	< 0.001	0.008	< 0.0001	< 0.001	< 0.01	< 0.01	0.008
	16-Jul-19	< 0.001	0.026	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.002	2.41	< 0.001	0.008	< 0.0001	< 0.001	< 0.01	< 0.01	0.005
	15-Aug-19	< 0.001	0.026	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.001	2.19	< 0.001	0.008	< 0.0001	< 0.001	< 0.01	< 0.01	0.007
	22-Feb-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.002	0.003	< 0.001	1.8	< 0.001	0.026	< 0.0001	0.004	< 0.01	< 0.01	0.019
BH7	14-Mar-19	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
	23-Apr-19	< 0.001	0.012	< 0.001	< 0.05	< 0.0001	0.002	0.003	< 0.001	2.0	< 0.001	0.026	< 0.0001	0.004	< 0.01	< 0.01	0.01
	16-May-19	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.002	0.003	< 0.001	2.32	< 0.001	0.035	< 0.0001	0.005	< 0.01	< 0.01	0.013
	14-Jun-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	0.002	< 0.001	1.66	< 0.001	0.02	< 0.0001	0.003	< 0.01	< 0.01	0.006
	16-Jul-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	0.002	< 0.001	1.66	< 0.001	0.025	< 0.0001	0.003	< 0.01	< 0.01	< 0.005
BH8	15-Aug-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	0.002	< 0.001	1.54	< 0.001	0.023	< 0.0001	0.003	< 0.01	< 0.01	< 0.005
	21-Feb-19	0.001 *	0.011	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.006
	14-Mar-19	< 0.001	0.006	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	3.25	< 0.001	0.008	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
	23-Apr-19	0.001	0.008	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	3.2	< 0.001	0.009	< 0.0001	0.002	< 0.01	< 0.01	0.008
	16-May-19	0.003	0.01	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	3.0	< 0.001	0.01	< 0.0001	0.003	< 0.01	< 0.01	< 0.005
BH11	14-Jun-19	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	2.5	< 0.001	0.005	< 0.0001	0.002	< 0.01	< 0.01	0.006
	16-Jul-19	0.001	0.012	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	2.6	< 0.001	0.004	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
	15-Aug-19	0.001	0.008	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	1.72	< 0.001	0.004	< 0.0001	0.001	< 0.01	< 0.01	< 0.005
	21-Feb-19	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.002	0.001	< 0.001	0.26	< 0.001	0.003	< 0.0001	0.005	< 0.01	< 0.01	0.031
	15-Mar-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	1.49	< 0.001	0.007	< 0.0001	0.037	< 0.01	< 0.01	0.016
MW239S	23-Apr-19	< 0.001	0.006	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.98	< 0.001	0.007	< 0.0001	0.07	< 0.01	< 0.01	0.04
	16-May-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	0.98	< 0.001	0.005	< 0.0001	0.001	< 0.01	< 0.01	0.005
	16-Jul-19	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.47	< 0.001	0.003	< 0.0001	0.004	< 0.01	< 0.01	0.007
	15-Aug-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.001	0.87	< 0.001	0.007	< 0.0001	0.001	< 0.01	< 0.01	0.005
	22-Feb-19	< 0.001	0.007	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	1.11	< 0.001	0.012	< 0.0001	0.003	< 0.01	< 0.01	0.008
SW1	14-Mar-19	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	1.25	< 0.001	0.005	< 0.0001	0.005	< 0.01	< 0.01	0.008
	23-Apr-19	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	1.01	< 0.001	0.004	< 0.0001	0.004	< 0.01	< 0.01	0.007
	16-May-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.87	< 0.001						

Notes:
 -- Not analysed
 < - Less than laboratory limit of reporting
 µg/L - Micrograms per litre
 *** 99% Level of protection in freshwater
 † Recreation water

Table 4
Groundwater Analytical Data - Inorganics
Wentworth Seed Syndicate



Analyte	Anions and Cations										Alkalinity										Inorganics		pH						
	Sodium	Calcium	Magnesium	Potassium	Sulphate	Chloride	Fluoride	Reactive phosphorus as P	Total Phosphorus	Nitrite as N	Nitrate as N	Nitrite + Nitrate as N	Ammonia as N	Total Nitrogen as N	Total Kjeldahl Nitrogen as N	Total Cations	Total Anions	Ionic Balance	Sodium Adsorption Ratio	Bicarbonate Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Hydroxide Alkalinity as CaCO3		Total Alkalinity as CaCO3	Total Hardness as CaCO3	Electrical Conductivity @ 25°C*	Total Dissolved Solids	Total Dissolved Solids	
Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	%		mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L		
ANZECC 2000 Trigger Values	180†				250†	250†	1.5	0.02*	0.025*	3	50	0.5†	0.5†							1	1	1	1	1	125-2200	600†		6.5-8.5†	
NHMRC ADWS 6																													
Sample Name	Sample Date																												
BH1	15Mar-19	11	2.0	1.0	<1.0	2.0	25	<0.1	-	-	-	-	-	-	-	0.66	0.88	-	-	9.0	<1.0	<1.0	9.0	104	68	129	5.67		
	23Apr-19	14	1.0	2.0	<1.0	4.0	25	<0.1	-	-	-	-	-	-	-	0.83	0.99	-	-	10	<1.0	<1.0	10	84	65	97	5.83		
	16May-19	12	<1.0	2.0	<1.0	5.0	25	<0.1	0.03	<0.01	<0.01	<0.01	0.11	0.3	0.3	0.69	1.01	-	1.7	10	<1.0	<1.0	10	8.0	105	68	164	5.82	
	14Jun-19	10	<1.0	2.0	<1.0	3.0	24	<0.1	-	-	-	-	-	-	-	0.6	0.94	-	-	10	<1.0	<1.0	10	8.0	99	64	72	5.82	
	16Jul-19	15	<1.0	2.0	<1.0	4.0	23	<0.1	-	-	-	-	-	-	-	0.82	0.95	-	-	11	<1.0	<1.0	<1.0	11	8.0	102	66	84	5.82
BH2	15Aug-19	14	<1.0	2.0	<1.0	2.0	21	<0.1	-	-	-	-	-	-	-	0.77	0.92	-	1.44	14	<1.0	<1.0	<1.0	14	8.0	128	83	82	6.22
	22Feb-19	12	2.0	2.0	<1.0	5.0	12	0.1	<0.01	0.28	<0.01	2.76	2.76	0.05	4.0	1.2	0.79	0.74	-	1.44	<1.0	<1.0	<1.0	<1.0	13	91	128	4.87	
	15Mar-19	10	3.0	2.0	<1.0	7.0	23	<0.1	-	-	-	-	-	-	-	0.75	0.79	-	-	<1.0	<1.0	<1.0	<1.0	16	101	66	90	4.71	
	23Apr-19	14	2.0	2.0	<1.0	6.0	23	<0.1	-	-	-	-	-	-	-	0.87	0.77	-	-	<1.0	<1.0	<1.0	<1.0	13	70	46	84	4.82	
	16May-19	12	2.0	2.0	<1.0	21	22	<0.1	0.26	<0.01	0.38	0.38	0.01	1.3	0.9	0.79	1.06	-	1.44	<1.0	<1.0	<1.0	<1.0	13	94	61	144	4.85	
BH3	14Jun-19	11	1.0	2.0	<1.0	5.0	23	<0.1	-	-	-	-	-	-	-	0.69	0.78	-	-	10	<1.0	<1.0	<1.0	11	91	59	51	4.76	
	16Jul-19	13	2.0	2.0	<1.0	9.0	20	<0.1	-	-	-	-	-	-	-	0.83	0.75	-	-	<1.0	<1.0	<1.0	<1.0	13	90	58	61	4.84	
	15Aug-19	12	1.0	2.0	<1.0	8.0	20	<0.1	-	-	-	-	-	-	-	0.74	0.73	-	-	<1.0	<1.0	<1.0	<1.0	11	110	72	61	5.2	
	22Feb-19	4.0	4.0	1.0	<1.0	4.0	10	<0.1	<0.01	2.76	<0.01	0.78	0.78	0.3	5.9	5.1	0.46	0.54	-	0.46	9.0	<1.0	<1.0	9.0	14	60	439	-	5.35
	23Apr-19	8.0	2.0	1.0	1.0	5.0	17	<0.1	<0.01	0.19	<0.01	0.35	0.35	1.04	0.6	0.3	0.66	0.7	-	1.15	6.0	<1.0	<1.0	6.0	7	71	96	-	5.4
BH4	15Mar-19	9.0	2.0	<1.0	<1.0	5.0	18	<0.1	-	-	-	-	-	-	-	0.49	0.61	-	-	10	<1.0	<1.0	<1.0	5.0	77	30	70	5.12	
	23Apr-19	10	2.0	1.0	1.0	3.0	19	<0.1	-	-	-	-	-	-	-	0.64	0.6	-	-	10	<1.0	<1.0	<1.0	5.0	64	35	61	5.05	
	16May-19	9.0	2.0	1.0	1.0	22	19	<0.1	0.97	<0.01	0.29	0.29	<0.01	1.0	0.7	0.6	0.99	-	1.3	10	<1.0	<1.0	<1.0	9.0	77	47	100	4.99	
	14Jun-19	6.0	1.0	1.0	<1.0	4.0	18	<0.1	-	-	-	-	-	-	-	0.39	0.59	-	-	<1.0	<1.0	<1.0	<1.0	7.0	69	45	36	4.84	
	16Jul-19	10	2.0	2.0	1.0	6.0	18	<0.1	-	-	-	-	-	-	-	0.72	0.63	-	-	<1.0	<1.0	<1.0	<1.0	13	79	49	42	4.96	
BH5	15Aug-19	8.0	2.0	1.0	1.0	5.0	16	<0.1	-	-	-	-	-	-	-	0.56	0.56	-	-	10	<1.0	<1.0	<1.0	<1.0	9.0	86	35	49	5.01
	22Feb-19	42	<1.0	6.0	1.0	19	69	0.2	<0.01	0.34	<0.01	<0.01	<0.01	0.09	3.0	3.0	2.35	2.54	3.59	20	<1.0	<1.0	<1.0	<1.0	25	250	211	25	4.87
	23Apr-19	28	3.0	4.0	1.0	28	42	<0.1	<0.01	0.05	<0.01	0.09	0.09	0.14	0.5	0.4	1.72	1.77	-	2.49	10	<1.0	<1.0	<1.0	24	177	144	437	
	14Jun-19	23	2.0	4.0	1.0	17	37	<0.1	-	-	-	-	-	-	-	1.46	1.44	-	-	2.0	<1.0	<1.0	<1.0	2.0	21	179	116	4.95	
	23Apr-19	25	3.0	4.0	1.0	18	42	<0.1	-	-	-	-	-	-	-	1.59	1.56	-	-	10	<1.0	<1.0	<1.0	24	136	88	115	4.64	
BH6	16May-19	23	3.0	4.0	1.0	18	45	<0.1	<0.01	0.13	<0.01	<0.01	<0.01	0.14	0.6	0.6	1.5	1.64	-	2.04	10	<1.0	<1.0	<1.0	24	175	114	214	4.88
	14Jun-19	20	2.0	4.0	1.0	16	42	<0.1	-	-	-	-	-	-	-	1.32	1.52	-	-	10	<1.0	<1.0	<1.0	21	174	113	90	4.82	
	16Jul-19	23	2.0	4.0	1.0	20	35	<0.1	-	-	-	-	-	-	-	1.46	1.4	-	-	10	<1.0	<1.0	<1.0	21	161	105	82	4.73	
	23Apr-19	28	3.0	4.0	1.0	21	38	<0.1	-	-	-	-	-	-	-	1.37	1.51	-	-	10	<1.0	<1.0	<1.0	17	201	132	104	4.87	
	22Feb-19	34	<1.0	5.0	2.0	12	64	0.2	<0.01	0.13	<0.01	0.02	0.02	0.34	2.2	2.2	1.94	2.06	-	3.16	10	<1.0	<1.0	<1.0	20	213	196	-	4.76
BH7	14Mar-19	36	<1.0	6.0	2.0	16	61	<0.1	-	-	-	-	-	-	-	2.11	2.05	1.37	-	10	<1.0	<1.0	<1.0	25	271	176	212	4.71	
	23Apr-19	38	<1.0	6.0	2.0	17	62	<0.1	-	-	-	-	-	-	-	2.5	2.1	-	-	10	<1.0	<1.0	<1.0	25	205	131	185	4.81	
	16May-19	35	<1.0	5.0	2.0	15	68	0.2	<0.01	0.06	<0.01	<0.01	<0.01	0.27	0.9	0.9	1.98	2.23	-	3.26	10	<1.0	<1.0	<1.0	20	235	153	310	4.87
	14Jun-19	31	<1.0	4.0	2.0	11	56	0.1	-	-	-	-	-	-	-	1.73	1.81	-	-	10	<1.0	<1.0	<1.0	16	213	136	145	4.91	
	16Jul-19	36	<1.0	5.0	2.0	12	46	<0.1	-	-	-	-	-	-	-	2.03	1.55	-	-	10	<1.0	<1.0	<1.0	20	202	131	164	5.0	
BH8	23Apr-19	52	<1.0	4.0	2.0	15	49	0.1	-	-	-	-	-	-	-	1.77	1.85	-	-	10	<1.0	<1.0	<1.0	16	232	151	168	5.33	
	15Mar-19	52	<1.0	6.0	<1.0	11	90	<0.1	<0.01	1.97	<0.01	<0.01	<0.01	0.5	2.4	2.4	2.76	2.77	-	4.44	10	<1.0	<1.0	<1.0	25	352	258	446	
	14Mar-19	45	<1.0	6.0	<1.0	6.0	76	<0.1	-	-	-	-	-	-	-	2.45	2.27	-	-	10	<1.0	<1.0	<1.0	25	319	207	253	4.77	
	23Apr-19	53	<1.0	7.0	<1.0	6.0	89	<0.1	-	-	-	-	-	-	-	2.88	2.68	-	-	10	<1.0	<1.0	<1.0	29	264	172	213	4.76	
	16May-19	47	<1.0	4.0	<1.0	6.0	81	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01	0.12	0.4	0.4	2.37	2.43	-	4.86	1.0	<1.0	<1.0	1.0	16	302	196	394	4.9
BH11	14Jun-19	47	<1.0	5.0	<1.0	4.0	89	<0.1	-	-	-	-	-	-	-	2.46	2.59	-	-	10	<1.0	<1.0	<1.0	20	315	205	194	4.83	
	16Jul-19	57	<1.0	5.0	<1.0	7.0	121	0.1	-	-	-	-	-	-	-	2.89	4.87	26	-	10	<1.0	<1.0	<1.0	20	353	220	226	4.78	
	15Aug-19	42	<1.0	3.0	<1.0	4.0	63	<0.1	-	-	-	-	-	-	-	2.87	1.86	-	-	10	<1.0	<1.0	<1.0	12	260	169	140	5.0	
	23Apr-19	48	<1.0	10	<1.0	24	80	0.1	<0.01	0.03	<0.01	0.04	0.04	0.06	1.8	1.8	2.07	2.86	-	3.21	10	<1.0	<1.0	<1.0	41	346	275	459	
	15Mar-19	26	<1.0	2.0	<1.0	2.0	52	<0.1	-	-	-	-	-	-	-	1.3	1.51	-	-	10	<1.0	<1.0	<1.0	10	186	121	144	4.82	
MW2955	23Apr-19	32	<1.0	5.0	<1.0	5.0	57	<0.1	-	-	-	-	-	-	-	1.8	1.65	-	-	10	<1.0	<1.0	<1.0	20	150	98	135	4.89	
	16May-19	29	<1.0	4.0	<1.0	2.0	55	<0.1	<0.01	0.01	<0.01	<0.01	<0.01	0.12	0.4	0.4	1.59	1.59	-	3.0	<1.0	<1.0	<1.0	<1.0	16	188	122	216	4.91
	14Jun-19	26	<1.0	4.0																									

Table 5
Quality Control Sample Analysis - BTEXN
Willamtown Sand Syndicate



Analyte	BTEXN								Total Petroleum Hydrocarbons								Total Petroleum Hydrocarbons - Silica Clean up				Total Recoverable Hydrocarbons								Total Recoverable Hydrocarbons - Silica Clean up					
	Benzene		Toluene	Ethylbenzene	meta- & para-Xylene		ortho-Xylene	Total Xylenes	Naphthalene	Sum of BTEX	C ₆ + C ₈	C ₁₀ + C ₁₂	C ₁₄ + C ₁₆	C ₁₈ + C ₂₀	C ₂₂ + C ₂₄	C ₂₆ + C ₂₈	C ₃₀ + C ₃₂	C ₃₄ + C ₃₆	C ₃₈ + C ₄₀	C ₄₂ + C ₄₄	C ₄₆ + C ₄₈	C ₅₀ + C ₅₂	C ₅₄ + C ₅₆	C ₅₈ + C ₆₀	C ₆₂ + C ₆₄	C ₆₆ + C ₆₈	C ₇₀ + C ₇₂	C ₇₄ + C ₇₆	C ₇₈ + C ₈₀	C ₈₂ + C ₈₄	C ₈₆ + C ₈₈	C ₉₀ + C ₉₂	C ₉₄ + C ₉₆	C ₉₈ + C ₁₀₀
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Units	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Sample Name	Sample Date	Sample Type																																
TRIP BLANK 1402/2019	13-Feb-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
RINGATE01_2102/2019	21-Feb-19	Rinate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
BW8_2102/2019	21-Feb-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
DUP01_2102/2019	21-Feb-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
BW8_2102/2019	21-Feb-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
TRIP01_2102/2019	21-Feb-19	Triplate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 100	< 50	< 100	< 50	< 100	< 20	< 20	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK 1403/19	14-Mar-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
RINGATE02_1403/19	14-Mar-19	Rinate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
BW7_1403/19	14-Mar-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
DUP01_1403/19	14-Mar-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK 05_1406/2019	14-Jun-19	Triplate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
RINGATE 05_1406/2019	14-Jun-19	Rinate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
SW3_1406/2019	14-Jun-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
DUP05_1406/2019	14-Jun-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
SW3_1406/2019	14-Jun-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
TRIP01_1406/19	14-Jun-19	Triplate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK 06_1607/2019	16-Jul-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
RINGATE06_1607/2019	16-Jul-19	Rinate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
RINGATE07	15-Aug-19	Rinate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 100	< 50	< 100	< 50	< 100	< 20	< 20	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100

Notes:
 -- Not analysed
 < - Less than laboratory limit of reporting
 NC - Not calculated
 µg/L - Micrograms per litre
 BTEXN - Benzene, toluene, ethylbenzene, xylenes, naphthalene

Table 6
Quality Control Sample Analysis - Metals
Williamstown Sand Syndicate



Analyte			Metals																
			Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Chromium VI	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Nickel	Selenium	Vanadium	Zinc
Units			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Name	Sample Date	Sample Type																	
TRIP BLANK 13022019	13-Feb-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE01 21022019	21-Feb-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH8 21022019	21-Feb-19	Primary	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.005
DUP01 21022019	21-Feb-19	Duplicate	0.001	0.014	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.09	< 0.001	0.012	< 0.0001	0.003	< 0.01	< 0.01	0.015
Relative Percentage Difference			67%	24%	NC	NC	NC	0%	NC	NC	NC	0%	NC	0%	NC	40%	NC	NC	100%
BH8 21022019	21-Feb-19	Primary	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.005
TRIP01 21022019	21-Feb-19	Triplicate	0.001	< 0.02	< 0.001	< 0.05	< 0.0002	< 0.005	< 0.005	< 0.001	< 0.001	4.5	< 0.001	0.012	< 0.0001	0.003	-	< 0.005	0.006
Relative Percentage Difference			67%	10%	NC	NC	NC	86%	NC	NC	NC	9%	NC	0%	NC	40%	NC	NC	18%
TRIP BLANK 130319	13-Mar-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
TRIP BLANK02 150319	15-Mar-19	Trip Blank	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE02 140319	14-Mar-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH7 140319	14-Mar-19	Primary	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	-	0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
DUP02 140319	14-Mar-19	Duplicate	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	-	0.002	< 0.001	2.51	< 0.001	0.021	< 0.0001	0.004	< 0.01	< 0.01	0.007
Relative Percentage Difference			NC	0%	NC	NC	NC	0%	-	40%	NC	33%	NC	5%	NC	0%	NC	NC	25%
BH7 140319	14-Mar-19	Primary	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	-	0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
TRIP02 14032019	14-Mar-19	Triplicate	< 0.001	< 0.02	< 0.001	< 0.05	< 0.0002	0.001	-	0.002	< 0.001	1.7	< 0.001	0.019	< 0.0001	< 0.001	-	< 0.005	< 0.005
Relative Percentage Difference			NC	0%	NC	NC	NC	0%	-	40%	NC	6%	NC	5%	NC	156%	NC	NC	113%
TRIP BLANK 05 14062019	14-Jun-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE 05 14062019	14-Jun-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
SW3 14062019	14-Jun-19	Primary	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.003	< 0.001	1.68	< 0.001	0.038	< 0.0001	0.003	< 0.01	< 0.01	0.016
DUP05 14062019	14-Jun-19	Duplicate	< 0.001	0.036	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.003	< 0.001	1.63	< 0.001	0.039	< 0.0001	0.003	< 0.01	< 0.01	0.013
Relative Percentage Difference			NC	3%	NC	NC	NC	NC	NC	0%	NC	3%	NC	3%	NC	0%	NC	NC	21%
SW3 14062019	14-Jun-19	Primary	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.003	< 0.001	1.68	< 0.001	0.038	< 0.0001	0.003	< 0.01	< 0.01	0.016
TRIP05 140619	14-Jun-19	Triplicate	< 0.001	-	-	-	< 0.0002	0.001	-	-	< 0.001	1.6	< 0.001	-	< 0.0001	0.003	-	-	0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	67%	NC	NC	NC	5%	NC	NC	NC	0%	NC	NC	46%
TRIP BLANK 06 16072019	16-Jul-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE06 16072019	16-Jul-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE07	15-Aug-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005

Notes:
 - - Not analysed
 < - Less than laboratory limit of reporting
 NC - Not calculated
 mg/L - Milligrams per litre
 Half the laboratory limit of reporting used when calculating RPD
 RPD - Relative Percentage Difference

Notes:
 < - Less than laboratory limit of reporting
 NC - Not calculated
 µg/L - Micrograms per litre

ATTACHMENT A: LABORATORY REPORTS

CERTIFICATE OF ANALYSIS

Work Order : **ES1925986**
Client : **KLEINFELDER AUSTRALIA PTY LTD**
Contact : DANIEL KOUSBROEK
Address : 95 MITCHELL ROAD
 CARDIFF NSW 2285
Telephone : ----
Project : 20193820
Order number :
C-O-C number : ----
Sampler : DANIEL KOUSBROEK
Site : WSS-CABBAGE TREE RD WATER MONITORING
Quote number : ME/114/19
No. of samples received : 12
No. of samples analysed : 12

Page : 1 of 18
Laboratory : Environmental Division Sydney
Contact : Shirley LeCornu
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +6138549 9630
Date Samples Received : 15-Aug-2019 15:57
Date Analysis Commenced : 16-Aug-2019
Issue Date : 21-Aug-2019 18:02



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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Dian Dao		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



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

ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- 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

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH1	BH2	BH4	BH6	BH7
Client sampling date / time					15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00
Compound	CAS Number	LOR	Unit		ES1925986-001	ES1925986-002	ES1925986-003	ES1925986-004	ES1925986-005
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		6.22	5.20	5.01	4.87	5.53
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		128	110	85	201	232
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		82	61	49	104	168
EA016: Calculated TDS (from Electrical Conductivity)									
Total Dissolved Solids (Calc.)	----	1	mg/L		83	72	55	131	151
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		181	310	30	16	44
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		8	11	9	17	16
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		14	<1	<1	<1	8
Total Alkalinity as CaCO3	----	1	mg/L		14	<1	<1	<1	8
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		2	8	5	21	15
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		21	20	16	38	49
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		<1	1	2	2	<1
Magnesium	7439-95-4	1	mg/L		2	2	1	3	4
Sodium	7440-23-5	1	mg/L		14	12	8	23	32
Potassium	7440-09-7	1	mg/L		<1	<1	1	1	2
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	<0.05	<0.05	<0.05
Barium	7440-39-3	0.001	mg/L		0.002	0.004	0.013	0.026	0.005
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	0.002
Chromium	7440-47-3	0.001	mg/L		0.003	<0.001	<0.001	<0.001	0.002

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH1	BH2	BH4	BH6	BH7
Client sampling date / time				15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00	
Compound	CAS Number	LOR	Unit	ES1925986-001	ES1925986-002	ES1925986-003	ES1925986-004	ES1925986-005	
				Result	Result	Result	Result	Result	
EG020F: Dissolved Metals by ICP-MS - Continued									
Copper	7440-50-8	0.001	mg/L	0.002	0.012	0.026	0.001	<0.001	
Manganese	7439-96-5	0.001	mg/L	0.008	0.011	0.018	0.008	0.023	
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.001	<0.001	0.003	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	0.023	<0.005	0.007	0.007	<0.005	
Iron	7439-89-6	0.05	mg/L	7.96	0.08	<0.05	2.19	1.54	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	0.1	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	0.91	0.73	0.56	1.51	1.85	
∅ Total Cations	----	0.01	meq/L	0.77	0.74	0.56	1.37	1.77	
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	<50	
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	<100	<100	
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	<50	
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	<50	<50	
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	<100	<100	
>C16 - C34 Fraction	----	100	µg/L	<100	<100	<100	<100	<100	
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	<100	
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100	<100	<100	<100	
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	<100	<100	<100	<100	
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	<20	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	<20	<20	
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	<20	<20	
EP080: BTEXN									



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				BH1	BH2	BH4	BH6	BH7
Client sampling date / time				15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00
Compound	CAS Number	LOR	Unit	ES1925986-001	ES1925986-002	ES1925986-003	ES1925986-004	ES1925986-005
				Result	Result	Result	Result	Result
EP080: BTEXN - Continued								
Benzene	71-43-2	1	µg/L	<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L	<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L	<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L	<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L	<5	<5	<5	<5	<5
EP231A: Perfluoroalkyl Sulfonic Acids								
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
EP231B: Perfluoroalkyl Carboxylic Acids								
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 (PFTTrDA)	72629-94-8	0.02	µg/L	----	----	<0.02	<0.02	<0.02



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH1	BH2	BH4	BH6	BH7
Client sampling date / time					15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00
Compound	CAS Number	LOR	Unit		ES1925986-001	ES1925986-002	ES1925986-003	ES1925986-004	ES1925986-005
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		----	----	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
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
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
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
EP231P: PFAS Sums									
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
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		88.3	83.3	85.9	86.2	84.1
Toluene-D8	2037-26-5	2	%		104	99.0	102	104	100



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Client sample ID

				BH1	BH2	BH4	BH6	BH7
Client sampling date / time				15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00
Compound	CAS Number	LOR	Unit	ES1925986-001	ES1925986-002	ES1925986-003	ES1925986-004	ES1925986-005
				Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued								
4-Bromofluorobenzene	460-00-4	2	%	118	112	117	116	115
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	----	----	99.4	99.5	95.4
13C8-PFOA	----	0.02	%	----	----	106	97.2	94.6



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH8	BH11	MW239S	SW1	SW3
Client sampling date / time					15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00
Compound	CAS Number	LOR	Unit		ES1925986-006	ES1925986-007	ES1925986-008	ES1925986-009	ES1925986-010
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		5.00	4.88	4.83	4.53	4.47
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		260	197	359	813	338
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		140	135	195	548	192
EA016: Calculated TDS (from Electrical Conductivity)									
Total Dissolved Solids (Calc.)	----	1	mg/L		169	128	233	528	220
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		98	303	363	5	<5
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		12	12	29	177	44
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		<1	<1	<1	<1	<1
Total Alkalinity as CaCO3	----	1	mg/L		<1	<1	<1	<1	<1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		4	4	11	212	54
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		63	47	88	134	56
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		<1	<1	<1	18	6
Magnesium	7439-95-4	1	mg/L		3	3	7	32	7
Sodium	7440-23-5	1	mg/L		42	28	54	97	38
Potassium	7440-09-7	1	mg/L		<1	<1	<1	4	<1
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		0.001	<0.001	<0.001	<0.001	<0.001
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	<0.05	0.09	<0.05
Barium	7440-39-3	0.001	mg/L		0.008	0.004	0.006	0.027	0.035
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L		<0.001	<0.001	<0.001	0.005	0.003
Chromium	7440-47-3	0.001	mg/L		0.001	0.002	0.002	<0.001	<0.001



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Client sample ID

				BH8	BH11	MW239S	SW1	SW3
Client sampling date / time				15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00
Compound	CAS Number	LOR	Unit	ES1925986-006	ES1925986-007	ES1925986-008	ES1925986-009	ES1925986-010
				Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued								
Copper	7440-50-8	0.001	mg/L	<0.001	0.001	<0.001	0.003	0.002
Manganese	7439-96-5	0.001	mg/L	0.004	0.007	0.004	0.482	0.036
Nickel	7440-02-0	0.001	mg/L	0.001	0.001	<0.001	0.005	0.003
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L	<0.005	0.005	<0.005	0.075	0.013
Iron	7439-89-6	0.05	mg/L	1.72	0.87	1.00	2.15	1.16
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	<0.1	0.4	0.1
EN055: Ionic Balance								
∅ Total Anions	----	0.01	meq/L	1.86	1.41	2.71	8.19	2.70
∅ Total Cations	----	0.01	meq/L	2.07	1.46	2.92	7.85	2.53
∅ Ionic Balance	----	0.01	%	----	----	----	2.12	----
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup								
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	<50	<50
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	<100	<100	<100	<100
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	<20
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	<20	<20



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				BH8	BH11	MW239S	SW1	SW3
Client sampling date / time				15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00
Compound	CAS Number	LOR	Unit	ES1925986-006	ES1925986-007	ES1925986-008	ES1925986-009	ES1925986-010
				Result	Result	Result	Result	Result
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L	<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L	<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L	<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L	<5	<5	<5	<5	<5
EP231A: Perfluoroalkyl Sulfonic Acids								
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	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	----	----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH8	BH11	MW239S	SW1	SW3
Client sampling date / time					15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00
Compound	CAS Number	LOR	Unit		ES1925986-006	ES1925986-007	ES1925986-008	ES1925986-009	ES1925986-010
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
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	----	----	----	----
EP231P: PFAS Sums									
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	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		83.1	84.3	84.5	85.8	87.0
Toluene-D8	2037-26-5	2	%		108	100	102	103	105



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Client sample ID

				BH8	BH11	MW239S	SW1	SW3
Client sampling date / time				15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00
Compound	CAS Number	LOR	Unit	ES1925986-006	ES1925986-007	ES1925986-008	ES1925986-009	ES1925986-010
				Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued								
4-Bromofluorobenzene	460-00-4	2	%	120	113	114	114	117
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	96.1	----	----	----	----
13C8-PFOA	----	0.02	%	98.6	----	----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW4	RINSATE07	----	----	----
Client sampling date / time					15-Aug-2019 00:00	15-Aug-2019 00:00	----	----	----
Compound	CAS Number	LOR	Unit		ES1925986-011	ES1925986-012	-----	-----	-----
					Result	Result	----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		4.48	----	----	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		308	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		160	----	----	----	----
EA016: Calculated TDS (from Electrical Conductivity)									
Total Dissolved Solids (Calc.)	----	1	mg/L		200	----	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		<5	----	----	----	----
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		33	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		<1	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		<1	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		43	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		55	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		5	----	----	----	----
Magnesium	7439-95-4	1	mg/L		5	----	----	----	----
Sodium	7440-23-5	1	mg/L		40	----	----	----	----
Potassium	7440-09-7	1	mg/L		<1	----	----	----	----
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	----	----	----
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	----	----	----
Barium	7440-39-3	0.001	mg/L		0.040	<0.001	----	----	----
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	----	----	----
Cobalt	7440-48-4	0.001	mg/L		0.001	<0.001	----	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	----	----	----

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW4	RINSATE07	----	----	----
Client sampling date / time				15-Aug-2019 00:00	15-Aug-2019 00:00	----	----	----	
Compound	CAS Number	LOR	Unit	ES1925986-011	ES1925986-012	-----	-----	-----	
				Result	Result	----	----	----	
EG020F: Dissolved Metals by ICP-MS - Continued									
Copper	7440-50-8	0.001	mg/L	0.001	<0.001	----	----	----	
Manganese	7439-96-5	0.001	mg/L	0.032	<0.001	----	----	----	
Nickel	7440-02-0	0.001	mg/L	0.002	<0.001	----	----	----	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	----	----	----	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	----	----	----	
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	----	----	----	
Zinc	7440-66-6	0.005	mg/L	0.009	<0.005	----	----	----	
Iron	7439-89-6	0.05	mg/L	0.57	<0.05	----	----	----	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	----	----	----	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	0.1	----	----	----	----	
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L	2.45	----	----	----	----	
ø Total Cations	----	0.01	meq/L	2.40	----	----	----	----	
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L	<50	<50	----	----	----	
C15 - C28 Fraction	----	100	µg/L	<100	<100	----	----	----	
C29 - C36 Fraction	----	50	µg/L	<50	<50	----	----	----	
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	----	----	----	
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L	<100	<100	----	----	----	
>C16 - C34 Fraction	----	100	µg/L	<100	<100	----	----	----	
>C34 - C40 Fraction	----	100	µg/L	<100	<100	----	----	----	
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100	----	----	----	
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	<100	----	----	----	
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L	<20	<20	----	----	----	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	----	----	----	
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	----	----	----	
EP080: BTEXN									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW4	RINSATE07	----	----	----
Client sampling date / time					15-Aug-2019 00:00	15-Aug-2019 00:00	----	----	----
Compound	CAS Number	LOR	Unit		ES1925986-011	ES1925986-012	-----	-----	-----
					Result	Result	----	----	----
EP080: BTEXN - Continued									
Benzene	71-43-2	1	µg/L		<1	<1	----	----	----
Toluene	108-88-3	2	µg/L		<2	<2	----	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	----	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	----	----	----
^ Total Xylenes	----	2	µg/L		<2	<2	----	----	----
^ Sum of BTEX	----	1	µg/L		<1	<1	----	----	----
Naphthalene	91-20-3	5	µg/L		<5	<5	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
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	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		----	<0.02	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		----	<0.1	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		----	<0.02	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		----	<0.02	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		----	<0.02	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		----	<0.01	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		----	<0.02	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		----	<0.02	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		----	<0.02	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		----	<0.02	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		----	<0.02	----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW4	RINSATE07	----	----	----
Client sampling date / time					15-Aug-2019 00:00	15-Aug-2019 00:00	----	----	----
Compound	CAS Number	LOR	Unit		ES1925986-011	ES1925986-012	-----	-----	-----
					Result	Result	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		----	<0.05	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		----	<0.02	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		----	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		----	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		----	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		----	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		----	<0.02	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		----	<0.02	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
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	----	----	----
EP231P: PFAS Sums									
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	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		89.8	81.1	----	----	----
Toluene-D8	2037-26-5	2	%		108	95.5	----	----	----



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Client sample ID

				SW4	RINSATE07	----	----	----
Client sampling date / time				15-Aug-2019 00:00	15-Aug-2019 00:00	----	----	----
Compound	CAS Number	LOR	Unit	ES1925986-011	ES1925986-012	-----	-----	-----
				Result	Result	----	----	----
EP080S: TPH(V)/BTEX Surrogates - Continued								
4-Bromofluorobenzene	460-00-4	2	%	117	109	----	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	----	92.4	----	----	----
13C8-PFOA	----	0.02	%	----	101	----	----	----



Surrogate Control Limits

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

QUALITY CONTROL REPORT

Work Order	: ES1925986	Page	: 1 of 17
Client	: KLEINFELDER AUSTRALIA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Contact	: Shirley LeCornu
Address	: 95 MITCHELL ROAD CARDIFF NSW 2285	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +6138549 9630
Project	: 20193820	Date Samples Received	: 15-Aug-2019
Order number	:	Date Analysis Commenced	: 16-Aug-2019
C-O-C number	: ----	Issue Date	: 21-Aug-2019
Sampler	: DANIEL KOUSBROEK		
Site	: WSS-CABBAGE TREE RD WATER MONITORING		
Quote number	: ME/114/19		
No. of samples received	: 12		
No. of samples analysed	: 12		



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 Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Dian Dao		Sydney Inorganics, Smithfield, NSW
Edwandy Fadjjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW



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

Key :
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 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
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 2529124)									
ES1925494-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	6.94	6.95	0.144	0% - 20%
ES1925986-001	BH1	EA005-P: pH Value	----	0.01	pH Unit	6.22	5.87	5.79	0% - 20%
EA005P: pH by PC Titrator (QC Lot: 2529126)									
ES1925986-005	BH7	EA005-P: pH Value	----	0.01	pH Unit	5.53	5.12	7.70	0% - 20%
ES1926052-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	5.57	5.36	3.84	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 2529121)									
ES1925494-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	28900	28800	0.325	0% - 20%
ES1925986-001	BH1	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	128	125	2.32	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 2529125)									
ES1925986-005	BH7	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	232	231	0.00	0% - 20%
ES1926052-002	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	7360	7370	0.123	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 2533173)									
ES1925982-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	5540	5080	8.60	0% - 20%
ES1925982-011	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	2310	2390	3.21	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 2533176)									
ES1925986-009	SW1	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	548	564	2.97	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 2533174)									
ES1925982-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	<5	<5	0.00	No Limit
ES1925982-011	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	8	8	0.00	No Limit
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 2533175)									
ES1925986-009	SW1	EA025H: Suspended Solids (SS)	----	5	mg/L	5	<5	0.00	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 2529123)									
ES1925494-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 2529123) - continued									
ES1925494-001	Anonymous	ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	284	296	4.15	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	284	296	4.15	0% - 20%
ES1925986-001	BH1	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	14	10	31.9	0% - 50%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	14	10	31.9	0% - 50%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2529953)									
ES1925986-001	BH1	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2	2	0.00	No Limit
ES1925986-010	SW3	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	54	54	0.00	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 2529954)									
ES1925986-001	BH1	ED045G: Chloride	16887-00-6	1	mg/L	21	22	0.00	0% - 20%
ES1925986-010	SW3	ED045G: Chloride	16887-00-6	1	mg/L	56	56	0.00	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 2529026)									
ES1925901-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	3	3	0.00	No Limit
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.00	No Limit
ES1925982-005	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	34	34	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	78	77	1.58	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	891	872	2.23	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	10	10	0.00	0% - 50%
ED093F: Dissolved Major Cations (QC Lot: 2529028)									
ES1925986-005	BH7	ED093F: Calcium	7440-70-2	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	4	5	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	32	32	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	2	2	0.00	No Limit
ET1902477-002	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	159	161	1.04	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	454	459	0.964	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	118	119	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	13	13	0.00	0% - 50%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2529025)									
ES1925901-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.004	0.005	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2529025) - continued									
ES1925901-001	Anonymous	EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.005	0.005	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.006	0.006	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.12	0.12	0.00	No Limit
ES1925982-005	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.026	0.026	0.00	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.117	0.116	0.877	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.14	0.13	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.05	0.05	0.00	No Limit
		EG020F: Dissolved Metals by ICP-MS (QC Lot: 2529030)							
ES1925986-005	BH7	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.005	0.005	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.023	0.023	0.00	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	1.54	1.56	1.32	0% - 20%
ET1902477-002	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	0.510	0.502	1.46	0% - 20%



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2529030) - continued									
ET1902477-002	Anonymous	EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.136	0.135	1.13	0% - 20%
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	0.147	0.150	1.75	0% - 20%
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.006	0.004	45.8	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	2.40	2.38	0.706	0% - 20%
		EG020A-F: Copper	7440-50-8	0.001	mg/L	160	161	0.599	0% - 20%
		EG020A-F: Lead	7439-92-1	0.001	mg/L	0.007	0.007	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	65.6	66.3	1.000	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	1.13	1.12	0.713	0% - 20%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	84.7	83.6	1.29	0% - 20%
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	0.30	0.30	0.00	0% - 20%
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	22.2	22.1	0.379	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2532085)									
ES1925986-012	RINSATE07	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
ES1926125-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0010	<0.0010	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.046	0.036	23.6	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.106	0.110	3.53	0% - 50%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.010	<0.010	0.00	No Limit

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2532085) - continued									
ES1926125-001	Anonymous	EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.050	<0.050	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.10	<0.10	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.10	<0.10	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	2.62	2.40	8.72	0% - 20%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.10	<0.10	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 2529027)									
ES1925901-004	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.0001	0.00	No Limit
ES1925982-004	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 2529029)									
ES1925986-004	BH6	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ET1902477-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 2532086)									
ES1926015-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES1926090-003	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 2529122)									
ES1925494-001	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.3	0.3	0.00	No Limit
ES1925986-001	BH1	EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2529856)									
ES1925983-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
ES1925986-008	MW239S	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2529856)									
ES1925983-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES1925986-008	MW239S	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 2529856)									
ES1925983-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
ES1925986-008	MW239S	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 2527476)									



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 2527476) - continued									
EP1908075-070	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
ES1926034-001	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2527476)									
EP1908075-070	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		ES1926034-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3			0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4			0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9			0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231X: Perfluorononanoic acid (PFNA)	375-95-1			0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2			0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8			0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1			0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8			0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7			0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4			0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2527476)									
EP1908075-070	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2527476) - continued									
EP1908075-070	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1926034-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2527476)							
EP1908075-070	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1926034-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 2527476)									



Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231P: PFAS Sums (QC Lot: 2527476) - continued									
EP1908075-070	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.00	No Limit
ES1926034-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.00	No Limit



Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) LowHigh	
Method: Compound	CAS Number	LOR	Unit	Result				
EA005P: pH by PC Titrator (QCLot: 2529124)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98	102
				----	7 pH Unit	100	98	102
EA005P: pH by PC Titrator (QCLot: 2529126)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98	102
				----	7 pH Unit	100	98	102
EA010P: Conductivity by PC Titrator (QCLot: 2529121)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2100 µS/cm	# 91.4	95	113
EA010P: Conductivity by PC Titrator (QCLot: 2529125)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2100 µS/cm	# 92.1	95	113
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 2533173)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	90.8	87	109
				<10	293 mg/L	111	66	126
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 2533176)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	90.3	87	109
				<10	293 mg/L	104	66	126
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 2533174)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	98.3	83	129
				<5	1000 mg/L	90.8	82	110
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 2533175)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	101	83	129
				<5	1000 mg/L	97.6	82	110
ED037P: Alkalinity by PC Titrator (QCLot: 2529123)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	83.2	81	111
				----	50 mg/L	93.1	70	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2529953)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	104	82	122
				<1	500 mg/L	106	82	122
ED045G: Chloride by Discrete Analyser (QCLot: 2529954)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	101	81	127
				<1	1000 mg/L	99.3	81	127
ED093F: Dissolved Major Cations (QCLot: 2529026)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	95.4	80	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	104	90	116



Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result			Low	High
ED093F: Dissolved Major Cations (QCLot: 2529026) - continued								
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	99.6	82	120
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	96.3	85	113
ED093F: Dissolved Major Cations (QCLot: 2529028)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	95.7	80	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	102	90	116
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	98.7	82	120
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	97.1	85	113
EG020F: Dissolved Metals by ICP-MS (QCLot: 2529025)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	93.0	85	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	94.3	85	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	94.7	82	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	92.5	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	91.8	85	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	91.3	82	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	90.6	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	90.9	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	92.6	82	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	89.8	82	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	92.8	85	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	90.8	83	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	92.8	81	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	96.0	85	115
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	92.3	82	112
EG020F: Dissolved Metals by ICP-MS (QCLot: 2529030)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	95.6	85	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	96.4	85	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	95.6	82	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	92.4	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	91.9	85	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	92.2	82	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	92.2	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	92.0	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	92.6	82	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	93.2	82	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	93.7	85	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	91.0	83	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	93.8	81	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	93.8	85	115



Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EG020F: Dissolved Metals by ICP-MS (QCLot: 2529030) - continued								
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	91.4	82	112
EG020F: Dissolved Metals by ICP-MS (QCLot: 2532085)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	96.2	85	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	95.3	85	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	96.9	82	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	94.9	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	97.6	85	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	95.0	82	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	95.3	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	91.5	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	99.9	82	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	91.4	82	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	98.9	85	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	98.0	83	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	97.2	81	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	97.8	85	115
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	97.5	82	112
EG035F: Dissolved Mercury by FIMS (QCLot: 2529027)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	84.2	83	105
EG035F: Dissolved Mercury by FIMS (QCLot: 2529029)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	93.8	83	105
EG035F: Dissolved Mercury by FIMS (QCLot: 2532086)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	87.8	83	105
EK040P: Fluoride by PC Titrator (QCLot: 2529122)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	102	82	116
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QCLot: 2528024)								
EP071SG: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	61.4	56	112
EP071SG: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	88.8	72	113
EP071SG: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	69.3	56	121
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 2528024)								
EP071SG: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	63.7	58	119
EP071SG: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	72.3	63	110
EP071SG: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	77.6	62	121
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2529856)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	94.3	75	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2529856)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	95.3	75	127

Method Blank (MB) Report

Spike

Spike Recovery (%)

Recovery Limits (%)

CAS Number

LOR

Unit

Result

Concentration

LCS

Low

High

EP080: BTEXN (QCLot: 2529856)

EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	92.3	70	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	107	69	123
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	107	70	120
EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	10 µg/L	106	69	121
	106-42-3							
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	108	72	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	87.6	70	120

EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2527476)

EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	83.2	70	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	85.6	70	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	88.4	70	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	89.6	70	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	85.8	70	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.5 µg/L	87.4	70	130

EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2527476)

EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	110	70	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	76.8	70	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	98.0	70	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	88.8	70	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	99.2	70	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	103	70	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	102	70	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	101	70	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	97.4	70	130
EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	91.2	70	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	92.5	70	150

EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2527476)

EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	116	70	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	79.0	70	150
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	77.5	70	150
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	1.25 µg/L	70.3	70	150
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	101	70	150
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	72.8	70	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	105	70	130

EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2527476)



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) LowHigh	
Method: Compound	CAS Number	LOR	Unit	Result				
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2527476) - continued								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	98.4	70	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	95.4	70	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	121	70	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	100	70	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2529953)							
ES1925986-001	BH1	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	119	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 2529954)							
ES1925986-001	BH1	ED045G: Chloride	16887-00-6	250 mg/L	102	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2529025)							
ES1925901-002	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	128	70	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	120	70	130
		EG020A-F: Barium	7440-39-3	1 mg/L	117	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	128	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	129	70	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	120	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	126	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	120	70	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	128	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	126	70	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	128	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	128	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2529030)							
ES1925986-006	BH8	EG020A-F: Arsenic	7440-38-2	1 mg/L	112	70	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	112	70	130
		EG020A-F: Barium	7440-39-3	1 mg/L	112	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	108	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	106	70	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	114	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	108	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	112	70	130



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 2529030) - continued							
ES1925986-006	BH8	EG020A-F: Manganese	7439-96-5	1 mg/L	108	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	108	70	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	105	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	109	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2532085)							
ES1925998-001	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	116	70	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	111	70	130
		EG020A-F: Barium	7440-39-3	1 mg/L	117	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	111	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	112	70	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	116	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	112	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	110	70	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	# Not Determined	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	112	70	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	116	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	111	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 2529027)							
ES1925901-003	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	72.9	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 2529029)							
ES1925986-003	BH4	EG035F: Mercury	7439-97-6	0.01 mg/L	80.5	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 2532086)							
ES1926013-001	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	78.8	70	130
EK040P: Fluoride by PC Titrator (QCLot: 2529122)							
ES1925494-002	Anonymous	EK040P: Fluoride	16984-48-8	5 mg/L	# 62.0	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2529856)							
ES1925983-001	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	110	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2529856)							
ES1925983-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	112	70	130
EP080: BTEXN (QCLot: 2529856)							
ES1925983-001	Anonymous	EP080: Benzene	71-43-2	25 µg/L	93.5	70	130
		EP080: Toluene	108-88-3	25 µg/L	114	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	124	70	130
		EP080: meta- & para-Xylene	108-38-3	25 µg/L	122	70	130
			106-42-3				



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080: BTEXN (QCLot: 2529856) - continued							
ES1925983-001	Anonymous	EP080: ortho-Xylene	95-47-6	25 µg/L	128	70	130
		EP080: Naphthalene	91-20-3	25 µg/L	111	70	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2527476)							
EP1908075-070	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	90.4	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.5 µg/L	94.8	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	98.0	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	102	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	98.0	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.5 µg/L	100	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2527476)							
EP1908075-070	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	80.9	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	76.2	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	102	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	102	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	114	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	111	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	114	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	112	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	118	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5 µg/L	111	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	68.4	50	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2527476)							
EP1908075-070	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	121	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	70.1	50	150
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	89.2	50	150
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	1.25 µg/L	82.8	50	150
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	105	50	150
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	114	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	99.8	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2527476)							
EP1908075-070	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	105	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	100	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	76.6	50	130



Sub-Matrix: WATER

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2527476) - continued							
EP1908075-070	Anonymous	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	111	50	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES1925986	Page	: 1 of 11
Client	: KLEINFELDER AUSTRALIA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Telephone	: +6138549 9630
Project	: 20193820	Date Samples Received	: 15-Aug-2019
Site	: WSS-CABBAGE TREE RD WATER MONITORING	Issue Date	: 21-Aug-2019
Sampler	: DANIEL KOUSBROEK	No. of samples received	: 12
Order number	:	No. of samples analysed	: 12

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- Laboratory Control outliers exist - please see following pages for full details.
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers exist - please see following pages for full details.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Laboratory Control Spike (LCS) Recoveries							
EA010P: Conductivity by PC Titrator	QC-MRG2-25291210	----	Electrical Conductivity @ 25°C	----	91.4 %	95-113%	Recovery less than lower control limit
EA010P: Conductivity by PC Titrator	QC-MRG2-25291250	----	Electrical Conductivity @ 25°C	----	92.1 %	95-113%	Recovery less than lower control limit
Matrix Spike (MS) Recoveries							
EG020F: Dissolved Metals by ICP-MS	ES1925998--001	Anonymous	Manganese	7439-96-5	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EK040P: Fluoride by PC Titrator	ES1925494--002	Anonymous	Fluoride	16984-48-8	62.0 %	70-130%	Recovery less than lower data quality objective

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method		Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
BH1, BH4, BH7, BH11, SW1, SW4	BH2, BH6, BH8, MW239S, SW3,	----	----	----	16-Aug-2019	15-Aug-2019	1

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	0	13	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	0	13	0.00	5.00	NEPM 2013 B3 & ALS QC Standard



Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural (EA005-P)		15-Aug-2019	----	----	----	16-Aug-2019	15-Aug-2019	✘
BH1,	BH2,							
BH4,	BH6,							
BH7,	BH8,							
BH11,	MW239S,							
SW1,	SW3,							
SW4								
EA010P: Conductivity by PC Titrator								
Clear Plastic Bottle - Natural (EA010-P)		15-Aug-2019	----	----	----	16-Aug-2019	12-Sep-2019	✔
BH1,	BH2,							
BH4,	BH6,							
BH7,	BH8,							
BH11,	MW239S,							
SW1,	SW3,							
SW4								
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Clear Plastic Bottle - Natural (EA015H)		15-Aug-2019	----	----	----	20-Aug-2019	22-Aug-2019	✔
BH1,	BH2,							
BH4,	BH6,							
BH7,	BH8,							
BH11,	MW239S,							
SW1,	SW3,							
SW4								
EA025: Total Suspended Solids dried at 104 ± 2 °C								
Clear Plastic Bottle - Natural (EA025H)		15-Aug-2019	----	----	----	20-Aug-2019	22-Aug-2019	✔
BH1,	BH2,							
BH4,	BH6,							
BH7,	BH8,							
BH11,	MW239S,							
SW1,	SW3,							
SW4								

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation				Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation		Date analysed	Due for analysis	Evaluation
EA065: Total Hardness as CaCO3									
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)		15-Aug-2019	----	----	----		16-Aug-2019	12-Sep-2019	✓
BH1, BH4, BH7, BH11, SW1, SW4	BH2, BH6, BH8, MW239S, SW3,								
ED037P: Alkalinity by PC Titrator									
Clear Plastic Bottle - Natural (ED037-P)		15-Aug-2019	----	----	----		16-Aug-2019	29-Aug-2019	✓
BH1, BH4, BH7, BH11, SW1, SW4	BH2, BH6, BH8, MW239S, SW3,								
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Clear Plastic Bottle - Natural (ED041G)		15-Aug-2019	----	----	----		16-Aug-2019	12-Sep-2019	✓
BH1, BH4, BH7, BH11, SW1, SW4	BH2, BH6, BH8, MW239S, SW3,								
ED045G: Chloride by Discrete Analyser									
Clear Plastic Bottle - Natural (ED045G)		15-Aug-2019	----	----	----		16-Aug-2019	12-Sep-2019	✓
BH1, BH4, BH7, BH11, SW1, SW4	BH2, BH6, BH8, MW239S, SW3,								
ED093F: Dissolved Major Cations									
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)		15-Aug-2019	----	----	----		16-Aug-2019	12-Sep-2019	✓
BH1, BH4, BH7, BH11, SW1, SW4	BH2, BH6, BH8, MW239S, SW3,								

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) BH1, BH4, BH7, BH11, SW1, SW4	BH2, BH6, BH8, MW239S, SW3,	15-Aug-2019	----	----	----	16-Aug-2019	11-Feb-2020	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) RINSATE07		15-Aug-2019	----	----	----	19-Aug-2019	11-Feb-2020	✓
EG035F: Dissolved Mercury by FIMS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) BH1, BH4, BH7, BH11, SW1, SW4	BH2, BH6, BH8, MW239S, SW3,	15-Aug-2019	----	----	----	19-Aug-2019	12-Sep-2019	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) RINSATE07		15-Aug-2019	----	----	----	20-Aug-2019	12-Sep-2019	✓
EK040P: Fluoride by PC Titrator								
Clear Plastic Bottle - Natural (EK040P) BH1, BH4, BH7, BH11, SW1, SW4	BH2, BH6, BH8, MW239S, SW3,	15-Aug-2019	----	----	----	16-Aug-2019	12-Sep-2019	✓
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup								
Amber Glass Bottle - Unpreserved (EP071SG) BH1, BH4, BH7, BH11, SW1, SW4,	BH2, BH6, BH8, MW239S, SW3, RINSATE07	15-Aug-2019	19-Aug-2019	22-Aug-2019	✓	21-Aug-2019	28-Sep-2019	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
Amber Glass Bottle - Unpreserved (EP071SG)		15-Aug-2019	19-Aug-2019	22-Aug-2019	✓	21-Aug-2019	28-Sep-2019	✓
BH1, BH4, BH7, BH11, SW1, SW4,	BH2, BH6, BH8, MW239S, SW3, RINSATE07							
EP080/071: Total Petroleum Hydrocarbons								
Amber VOC Vial - Sulfuric Acid (EP080)		15-Aug-2019	19-Aug-2019	29-Aug-2019	✓	19-Aug-2019	29-Aug-2019	✓
BH1, BH4, BH7, BH11, SW1, SW4,	BH2, BH6, BH8, MW239S, SW3, RINSATE07							
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Amber VOC Vial - Sulfuric Acid (EP080)		15-Aug-2019	19-Aug-2019	29-Aug-2019	✓	19-Aug-2019	29-Aug-2019	✓
BH1, BH4, BH7, BH11, SW1, SW4,	BH2, BH6, BH8, MW239S, SW3, RINSATE07							
EP080: BTEXN								
Amber VOC Vial - Sulfuric Acid (EP080)		15-Aug-2019	19-Aug-2019	29-Aug-2019	✓	19-Aug-2019	29-Aug-2019	✓
BH1, BH4, BH7, BH11, SW1, SW4,	BH2, BH6, BH8, MW239S, SW3, RINSATE07							
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X)		15-Aug-2019	16-Aug-2019	11-Feb-2020	✓	16-Aug-2019	11-Feb-2020	✓
BH4, BH7, RINSATE07	BH6, BH8,							
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X)		15-Aug-2019	16-Aug-2019	11-Feb-2020	✓	16-Aug-2019	11-Feb-2020	✓
BH4, BH7, RINSATE07	BH6, BH8,							

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X) BH4, BH7, RINSATE07	BH6, BH8,	15-Aug-2019	16-Aug-2019	11-Feb-2020	✓	16-Aug-2019	11-Feb-2020	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X) BH4, BH7, RINSATE07	BH6, BH8,	15-Aug-2019	16-Aug-2019	11-Feb-2020	✓	16-Aug-2019	11-Feb-2020	✓
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X) BH4, BH7, RINSATE07	BH6, BH8,	15-Aug-2019	16-Aug-2019	11-Feb-2020	✓	16-Aug-2019	11-Feb-2020	✓



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)		Quality Control Specification	
Analytical Methods	Method	QC	Regular	Actual	Expected		Evaluation
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	6	52	11.54	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	6	54	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	15	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	3	29	10.34	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	3	29	10.34	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	0	13	0.00	10.00	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	3	52	5.77	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	3	54	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	4	29	13.79	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	29	13.79	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chloride by Discrete Analyser	ED045G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	3	52	5.77	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	3	54	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Method Blanks (MB) - Continued							
Fluoride by PC Titrator	EK040P	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	40	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	15	6.67	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	29	6.90	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	29	6.90	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	1	13	7.69	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	3	52	5.77	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	3	54	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	15	6.67	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	0	13	0.00	5.00	✖	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (2013) Schedule B(3)
Calculated TDS (from Electrical Conductivity)	EA016	WATER	In house: Calculation from Electrical Conductivity (APHA 2510 B) using a conversion factor specified in the analytical report. This method is compliant with NEPM (2013) Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of 'non-filterable' residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C. This method is compliant with NEPM (2013) Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM (2013) Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (2013) Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.

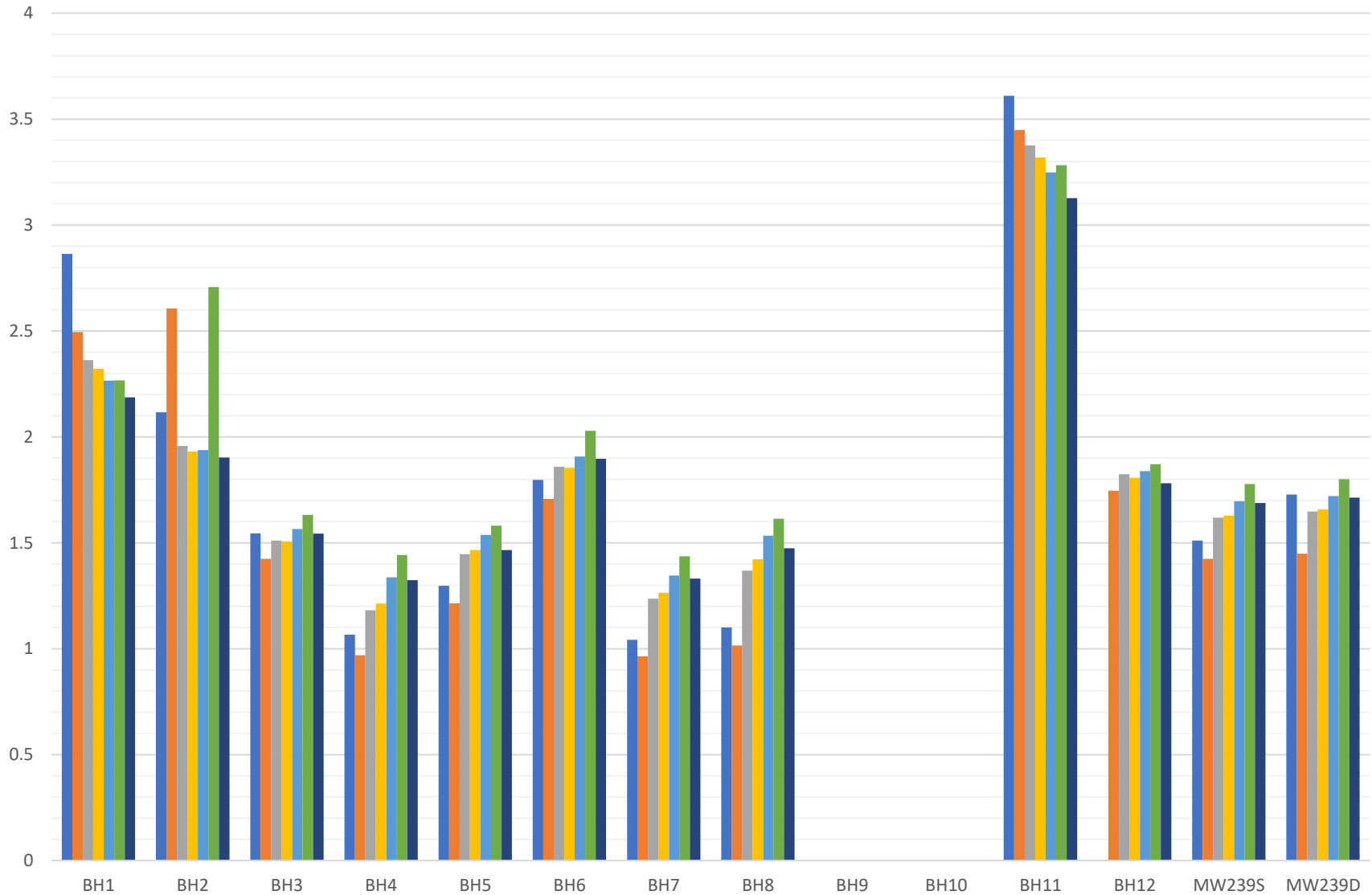


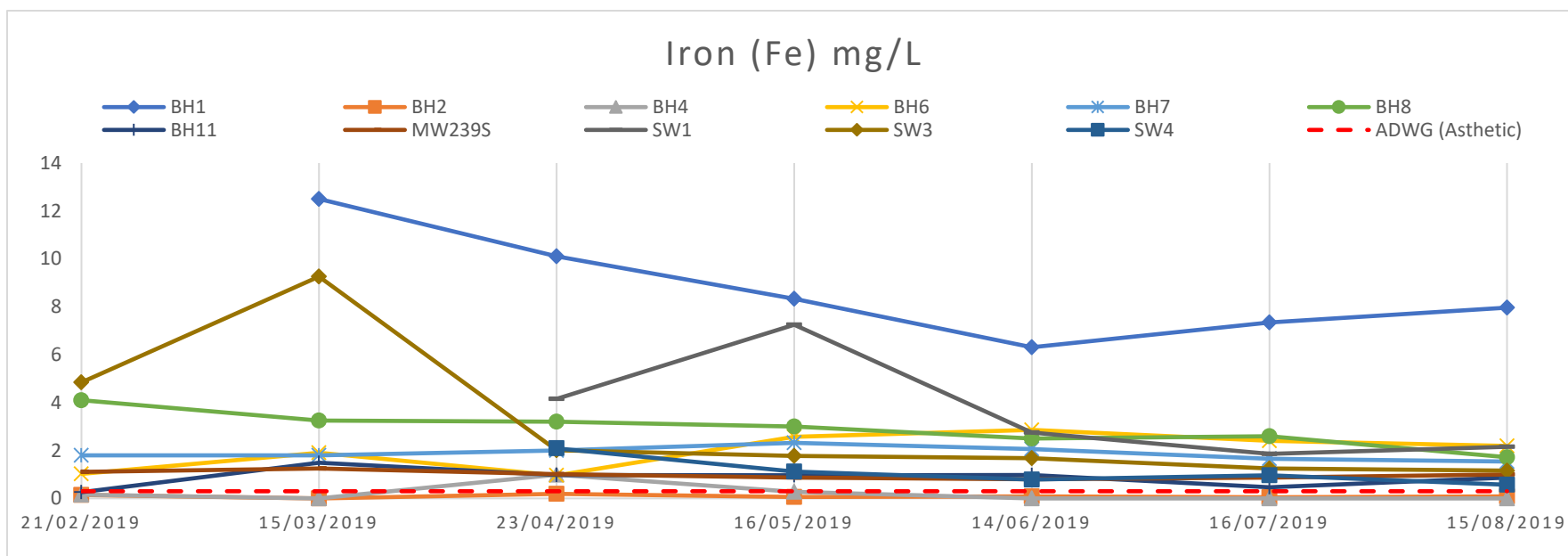
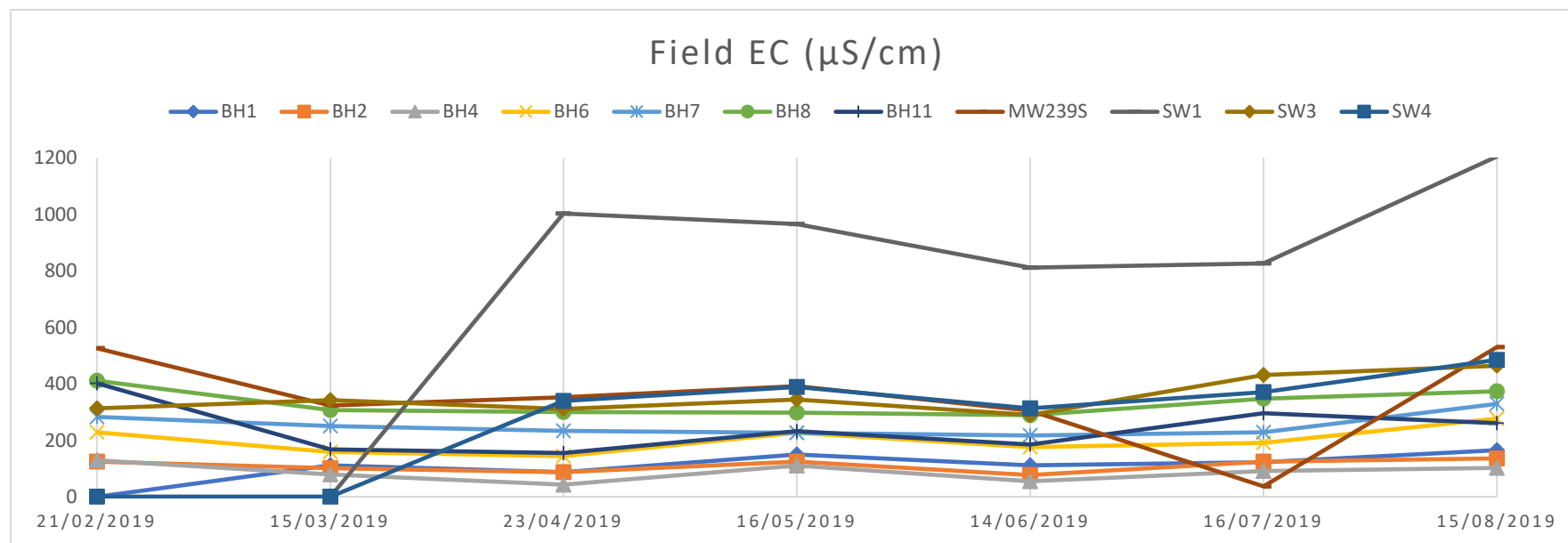
Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Fluoride by PC Titrator	EK040P	WATER	In house: Referenced to APHA 4500-F C: CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (2013) Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	WATER	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C36. This method is compliant with NEPM (2013) Schedule B(3) (Method 506.1)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In house: Direct injection analysis of fresh waters after dilution (1:1) with methanol. Analysis by LC-Electrospray-MS-MS, Negative Mode using MRM. Where commercially available, isotopically labelled analogues of the target analytes are used as internal standards for quantification. Where a labelled analogue is not commercially available, the internal standard with similar chemistry and the closest retention time to the target is used for quantification. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. This method complies with the quality control definitions as stated in QSM 5.1. Data is reviewed in line with the DQOs as stated in QSM5.1
Preparation Methods	Method	Matrix	Method Descriptions
Preparation for PFAS in water.	EP231-PR	WATER	Method presumes direct injection without workup. Preparation includes addition of internal standard and surrogate, and filtration prior to analysis.
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

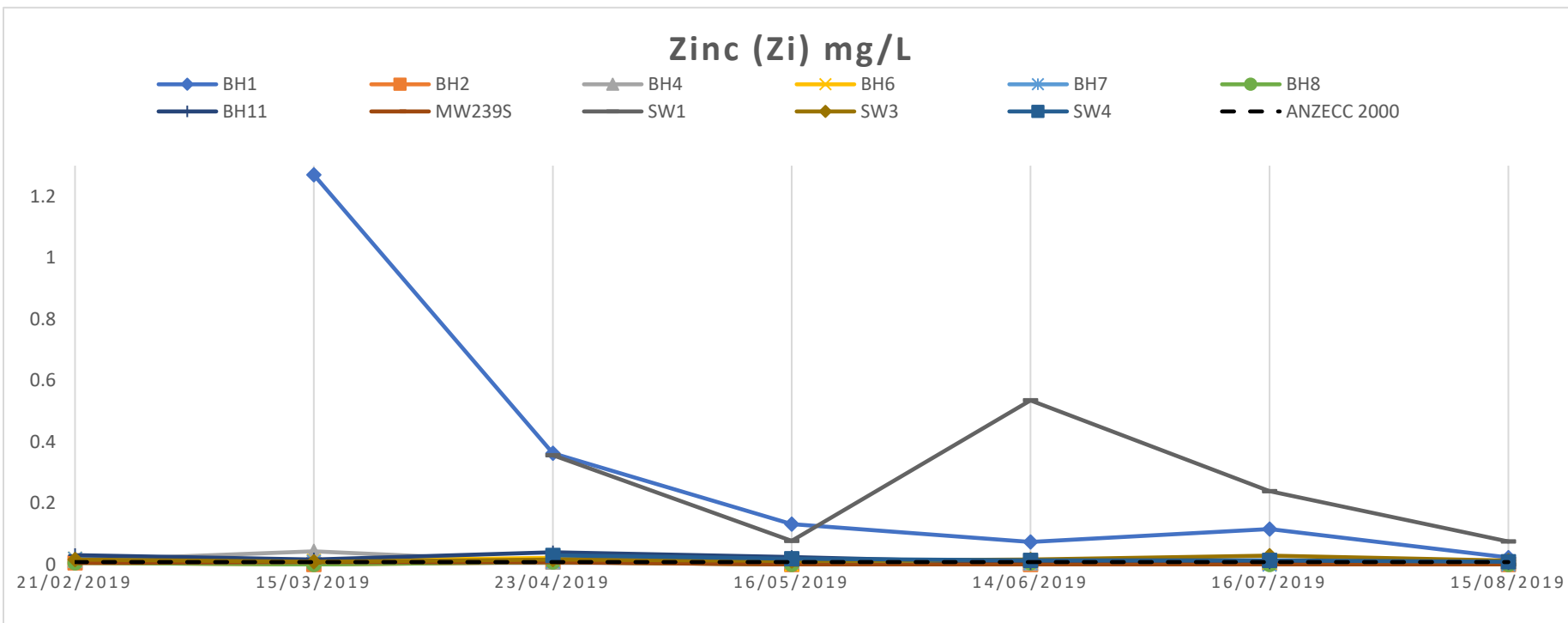
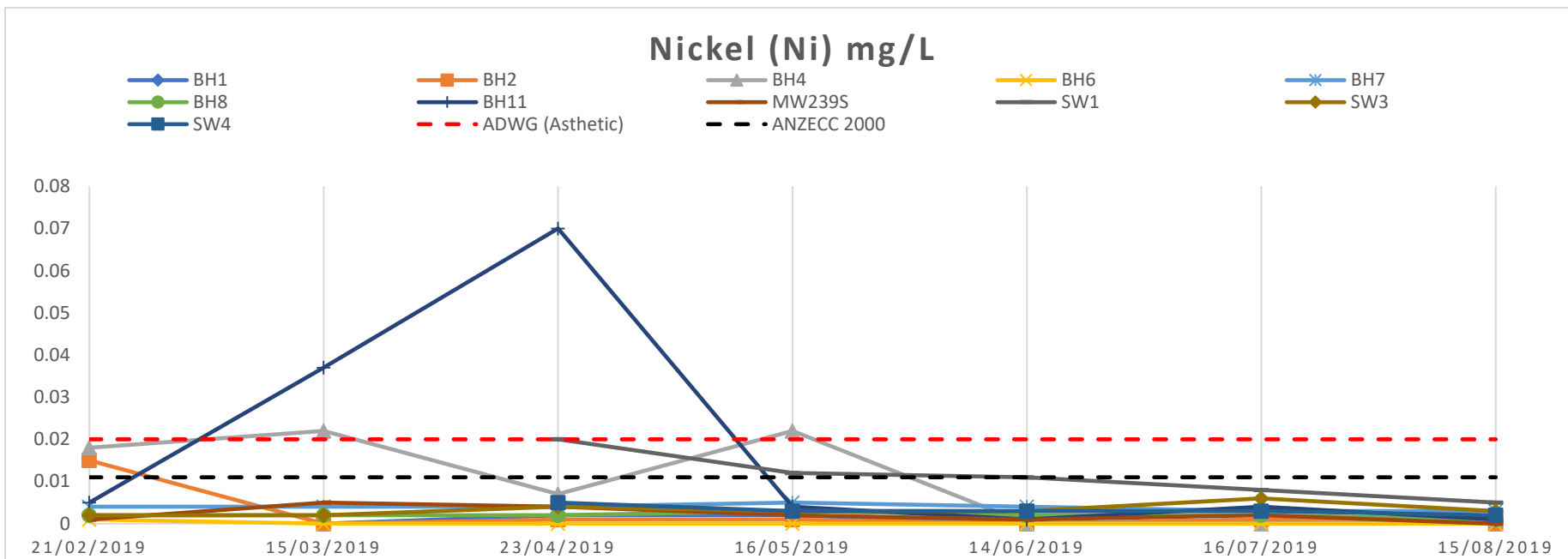
ATTACHMENT B: DATA TRENDS

Groundwater Elevation (mAHD)

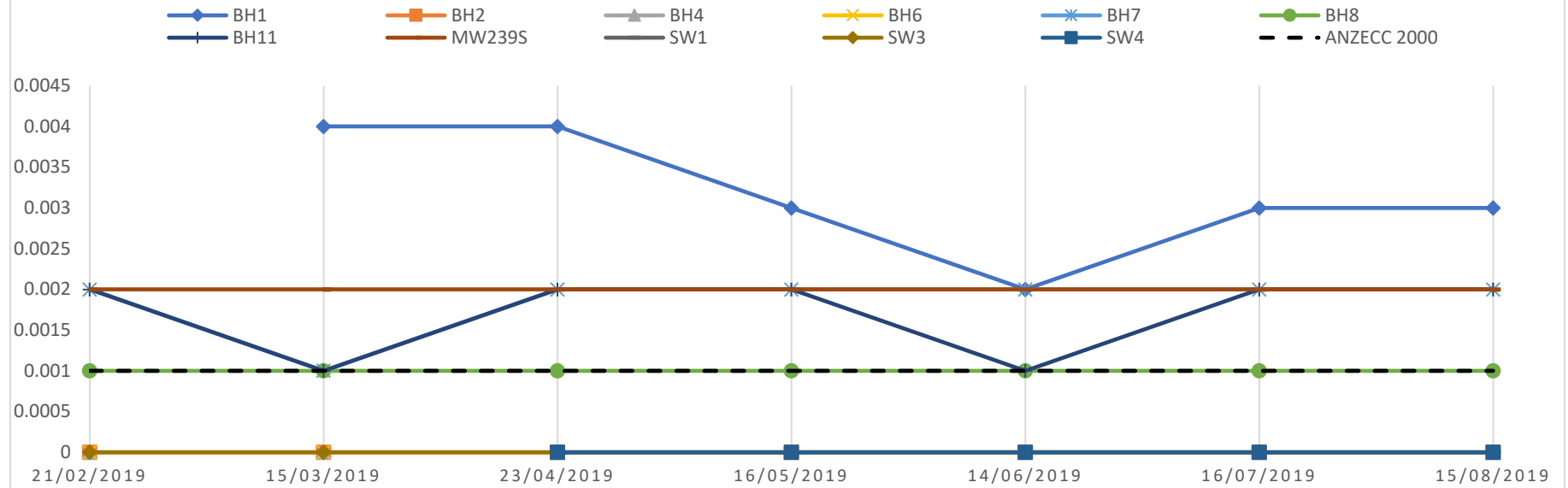
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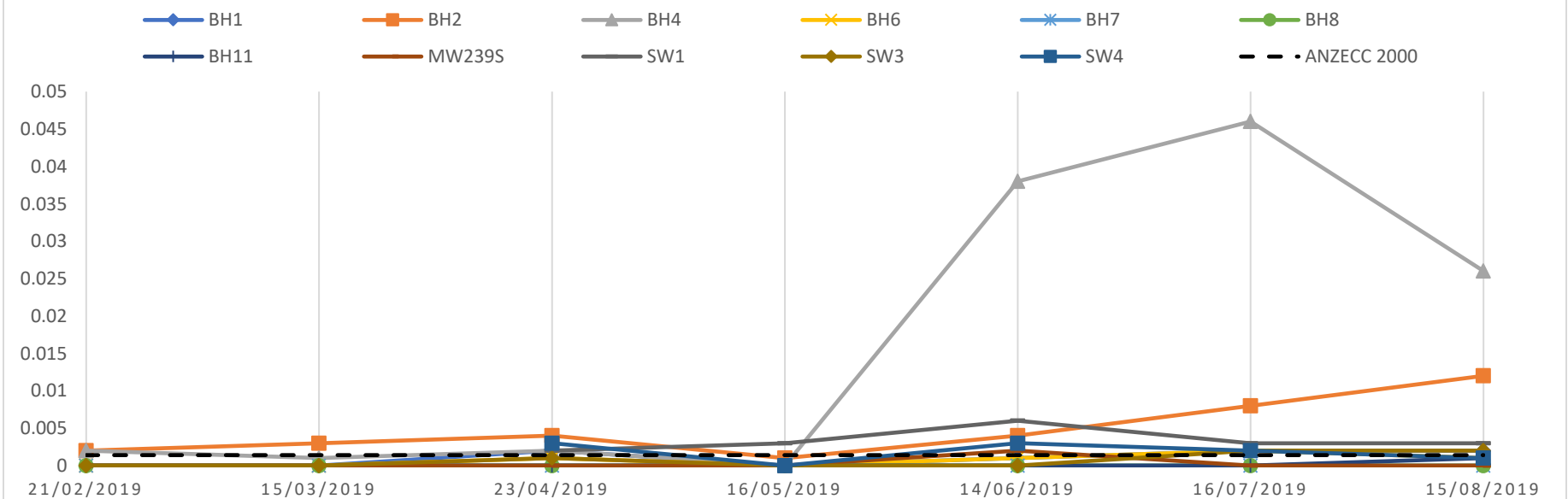




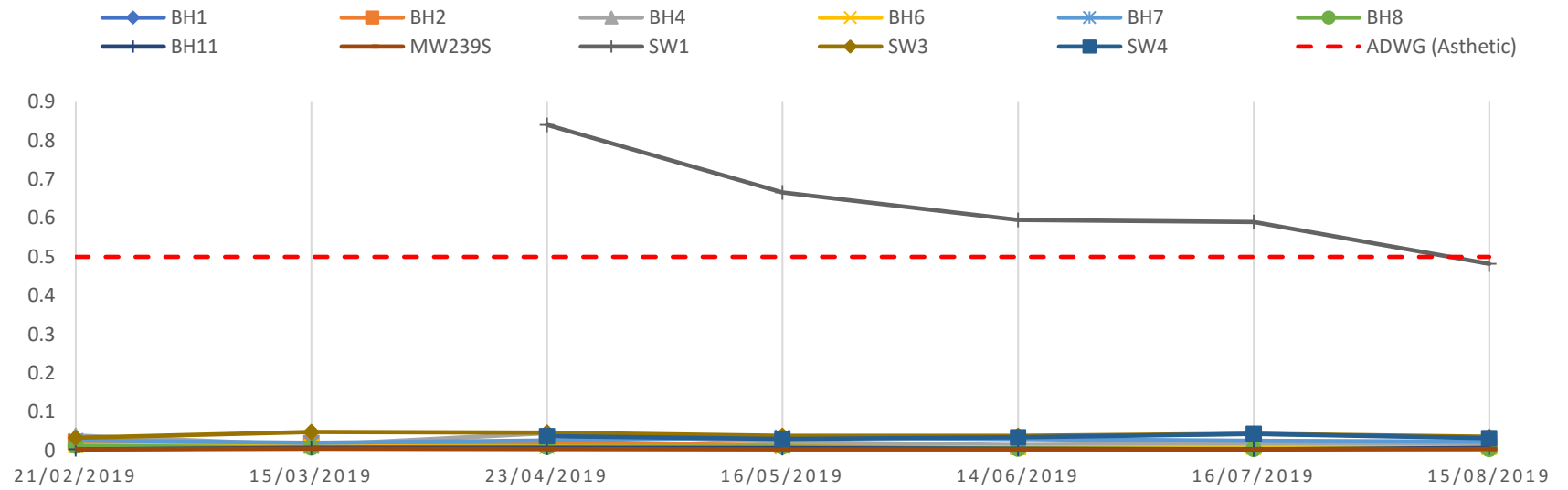
Chromium (Cr) mg/L



Copper (Cu) mg/L



Manganese (Mg) mg/L



APPENDIX B8: SEPTEMBER 2019

19 September 2019
Document Ref: NCA19R101344

Williamtown Sand Syndicate
PO Box 898
Newcastle, NSW 2300

Attention: Darren Williams

Delivered by email: darren@arbus.com.au

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

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

1. SCOPE OF SERVICE

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

The September monitoring round was to include 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 monitoring round was conducted on 16 September 2019. Additional sampling for PFAS took place on 25 September 2019 following an irregular detection of PFAS at BH4 and SW4. A summary of these results are presented in **Table 3.4**

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 the gauging each of the HydraSleeves were removed and samples taken.

The September 2019 monitoring round included:

- Gauging of all available monitoring wells (a total of 14 wells);
- 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, SO₄, 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), Selenium (Se), Vanadium (V), Zinc (Zn) - note sampling for Iron and no nickel

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 (mBTOC)	Groundwater Elevation (mAHD)	Well Total Depth (mBTOC)	Comment
BH1	8.64	6.428	2.212	8.28	Slightly cloudy brown, no odour
BH2	7.79	5.796	1.994	9.08	Dark brown, slight sulfur odour
BH3					Well Decommissioned
BH4	3.06	1.604	1.456	6.11	Clear, no odour
BH5	7.36	5.786	1.574	8.71	No odour - No sample taken.

Borehole	Top of Casing (mAHD)	Depth to Water (mBTC)	Groundwater Elevation (mAHD)	Well Total Depth (mBTC)	Comment
BH6	3.62	1.647	1.973	4.62	Clear, slight odour
BH7	2.98	1.542	1.438	4.61	Light brown, sulfur odour
BH8	3.88	2.282	1.598	6.27	Dark brown cloudy, sulfur odour
BH9	17.75	Dry	-	16.01	Well was dry.
BH10	6.69	Dry	-	3.58	Well was dry.
BH11	6.63	3.546	3.084	5.39	Cloudy light brown, sulfur odour
BH12	8.67	6.827	1.843	8.2	No sample taken.
MW239S	3.04	1.269	1.771	3.89	Cloudy Brown, Sulfur odour.
MW239D	3.04	1.248	1.792	20.2	Slight Sulfur odour, no sample taken
SW01*	N/A	0.26	2.76	N/A	Natural tannin stained brown, sulfur odour
SW02*	N/A	Dry		N/A	Location was dry.
SW03*	N/A	0.24	1.24	N/A	Water clear, no odour.
SW04*	N/A	0.29	2.29	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	1130	21.02	125	5.43	101
BH02	1100	21.61	111	4.7	263
BH04	1245	20.53	96	4.27	251
BH06	1515	18.66	215	4.61	57
BH07	1415	18.34	232	4.73	-22
BH08	1330	18.64	300	4.72	-10
BH11	1200	20.26	195	4.64	31.2
MW239S	1430	17.56	397	4.61	-11
SW01	1300	16.59	1138	4.21	323
SW03	1445	17.05	449	5.02	86.7
SW04	1030	14.8	371	4.19	360

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 data acquired during field sampling and laboratory analysis. Parameters and analytes include; electrical conductivity (µs/cm), groundwater elevation (mAHD), and concentrations of iron, nickel and zinc (mg/L). Where

relevant, the Australian Drinking Water Guideline (Aesthetic values) and ANZECC 2000 Guideline have been included to provide a benchmark for any exceedances observed.

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 Appendix B)
Physical and Chemical Stressors	Sodium	1	11	11	117	No	Similar
	Sulphate	1	11	2	244	No	Similar
	Chloride	1	11	18	193	No	Similar
	Fluoride	0.1	11	<0.1	0.7	No	Similar
	Reactive ³ Phosphorous	0.01	11	<0.01	<0.01	No	Similar
	Total Phosphorous ³	0.01	11	<0.01	0.43	9 above ANZECC 2000 Trigger range ¹	Mostly similar across all sample locations with a notable reduction at BH8
	Nitrite ³	0.01	11	<0.01	<0.01	No	Similar
	Nitrate ³	0.01	11	<0.01	1.07	1 above ANZECC 2000 Trigger range ¹	Similar
	Ammonia ³	0.01	11	<0.01	0.2	No	Similar
	Total Nitrogen ³	0.1	11	0.1	2.7	8 above ANZECC 2000 Trigger range ¹ (BH2, BH4, BH6, BH7, BH8, BH11, MW239S & SW1)	Mostly similar across all sample locations with a slight increase present at BH2 compared to previous round.
	Total Hardness	1	11	8.0	213	1 above NHMRC ADWG 6 aesthetics (SW1)	SW1 historically indicates concentrations exceeding or at criteria
	Total Dissolved Solids	1	11	55	528	1 above NHMRC ADWG 6 aesthetics (SW1)	SW1 historically indicates concentrations exceeding or at criteria
Dissolved Metals	pH	0.01	11	4.3	5.44	All outside ANZECC 2000 Trigger range ¹ and drinking water guidelines	Similar
	As	0.001	11	<0.001	0.001	No	Similar
	B	0.05	11	<0.005	0.09	No	Similar
	Ba	0.001	11	0.002	0.056	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 Appendix B)
	Be	0.001	11	<0.001	<0.001	No	Similar
	Cd	0.005-0.1	11	<0.0001	0.0002	No	Similar
	Cr	0.005-0.1	11	<0.001	0.004	4 above ANZECC 2000 Trigger Values ² (BH1, BH7, BH8 & MW239S)	Similar
	Co	0.001	11	<0.001	0.008	No	Similar
	Cu	0.001	11	<0.001	0.051	8 above ANZECC 2000 Trigger Values ² (BH2, BH4, BH6, BH7, MW238S, SW1, SW3 & SW4)	Notable increases in copper observed at BH4, BH6, BH7, SW1, SW3 and SW4
	Fe	0.05	11	0.19	8.84	9 above NHMRC ADWG 6 aesthetics (BH1, BH6, BH7, BH8, BH11, MW239S, SW1, SW3 & SW4)	Similar
	Mn	0.001	11	0.005	0.587	1 above NHMRC ADWG 6 aesthetics (SW1)	Similar
	Ni	0.001	11	<0.001	0.02	4 above ANZECC 2000 Trigger Values ² (BH7, SW1, SW3 & SW4)	Increase of Nickel across most sample locations with the exception of BH1, BH2, BH8 and BH11 showing similar results to previous sample events.
	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
	Zn	0.005-0.1	11	<0.005	0.282	8 above ANZECC 2000 Trigger Values ² (BH1, SW1, SW3 & SW4)	Slight increase of Zinc
	Hg	0.0001	11	<0.0001	<0.0001	No	Similar
TRH – Silica Clean up	C ₆ -C ₁₀	0.02	11	<0.02	<0.02	No	Similar
	>C ₁₀ -C ₁₆	0.1	11	<0.1	<0.1	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 Appendix B)
	>C ₁₆ -C ₃₄	0.1	11	<0.1	0.14	No	Similar
	>C ₃₄ -C ₄₀	0.1	11	<0.1	<0.1	No	Similar
	Total >C ₁₀ -C ₄₀	0.1	11	<0.1	0.14	No	Similar
	C ₆ -C ₁₀ minus BTEX (F1)	0.02	11	<0.02	<0.02	No	Similar
	>C ₁₀ -C ₁₆ 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	0.00003 (0.00005)	No	It is noted that an irregular detection of PFOS was identified at SW4. Follow up sampling (25/9/19) resulted in increased values of 0.00005
	PFOA	0.00001-0.0001	7	<0.00001	<0.00001	No	Similar
	PFOS/PFHxS	0.00001-0.0001	7	<0.00001	0.00003 (0.00005)	No	It is noted that an irregular detection of PFOS was identified at SW4. Follow up sampling (25/9/19) resulted in increased values of 0.00005

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 Appendix B)
	PFDS	0.00001-0.0001	7	<0.00001	0.00002	No	It is noted that an irregular detection of PFDS was identified at BH4. Follow up sampling (25/9/19) resulted in a non-detect.

* 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.

¹Australian 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)

²ANZECC 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

³Analysis 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 more rainfall in August than the mean leading up to the September monitoring event. September rainfall is trending towards above average rainfall. An additional 63.4mm of rainfall was recorded in the period between the initial September sampling event (16 September 2019) and the additional PFAS sampling (25 September 2019).

Table 4.5 2019 Rainfall data

2019	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1st	2.0	0.8	0	0	0	0	0	9.6	7.4			
2nd	0	12.8	0	23.8	0	21.2	0	0	0.2			
3rd	0	0.4		0.6	0	0.6	0	0.2	0			
4th	0	0	0	0	20.8	0.4	5.2	0	0			
5th	0	0	0	0	0.2	25	1.8	0.2	0			
6th	0	0	0	0	23.2	2.6	1.2	0	0			
7th	5.0	0	8.2	0	0.2	1	0.6	0	1			
8th	0	0	0	0	0	0	1.6	0	0			
9th	0	6.6	0	0	0	0	0.4	0	0			
10th	0.2	0	12.0	2.2	0	0	0	0	0.6			
11th	0	0	0	0	0.6	0	0	0	2.8			
12th	3.0	0	0	0	0	0	0	0	0			
13th	0	0	0	0	1.4	0	0	0	0			
14th	0	0	0	0.2	0	0	0	0	0			
15th	0	0	0	1.4	0	0	0	0	0			
16th	0	0	4.8	3.6	0	0	0	0	0			
17th	0	0	59.4	1.4	0	0	0	0	16.8			
18th	0	0	2.6	0.2	0	17.8	0	0	39.4			
19th	0	0	2.2	0.2	0	0	0	0	7.2			
20th	2.4		0	2.0	0	0	0	0	0			
21st	1.0	1.4	0	0.2	0	0	0	0	0			
22nd	0	1.0	1.2	0.2	0	0.2	0	0	0			
23rd	0	1.4	0	0	0	20	0	0				
24th	0	9.2	5.4	0	0	50.6	0	0	0			
25th	0	0	5.2	0	0	15.2	2.0	0	0			
26th	0	0	0	0	0	1.8	0	0				
27th	0	0	0	0	0	0.8	0	0				
28th	1.0	0	0	0	0.8	0	0	0				
29th	0		0	0	0	0	0	0				
30th	0		38.2	0	0	0	0.6	21.2				
31st	0		6.6		0		10	67.4				

Monthly Total	14.6	33.6	145.8	36.0	47.2	157.2	23.4	98.6	75.4			
Mean	98.7	117.0	120.5	111.6	109.6	124.7	70.3	73.2	60.6	73.9	82.3	78.6

Based on the long-term rainfall data for the August/September period it is expected that the current groundwater and surface water levels will slightly elevated compared to current levels.
 Data Trends

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

Dkousbroek@kleinfelder.com

Mobile: 0458 197 676

Attached:

Figure 1

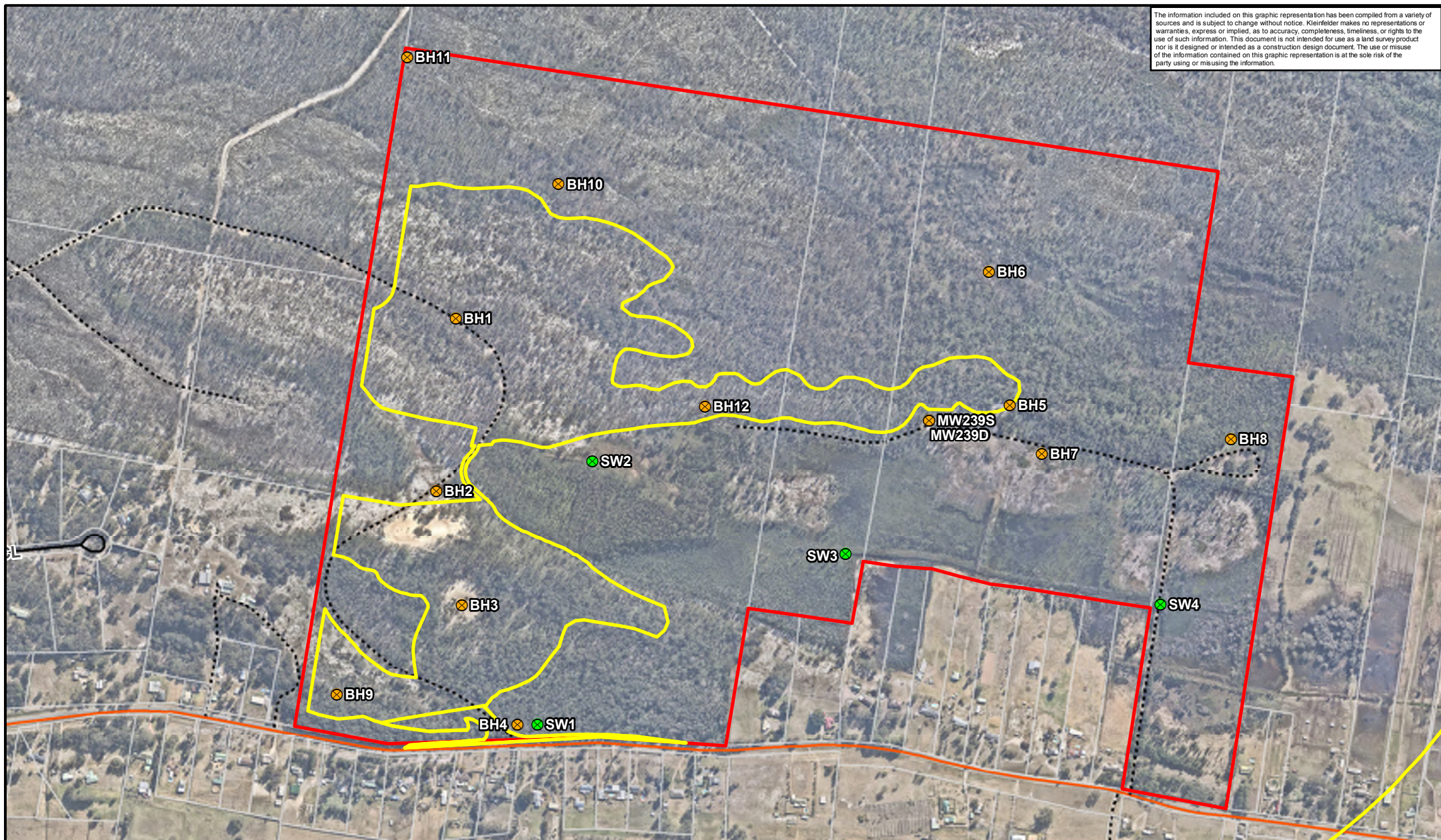
Data Tables

Attachment A – Laboratory reports

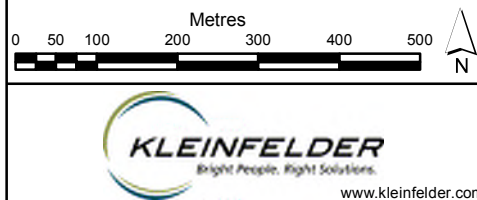
Attachment B – Data Trends

FIGURE 1

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 use of such information. This document is not intended for use as a land survey 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
- ▬ Subject Land Boundary
- ▬ Quarry Project Area
- Arterial Road
- Local Road
- - Track



PROJECT REFERENCE: 20170448

DATE DRAWN: 13/02/2019 09:48 Version 1

DRAWN BY: gjoyce

DATA SOURCE:
NSW DFSI - 2017
Nearmap - 2018

Water monitoring locations September 2019 Monitoring

Williamtown Sand Syndicate
Proposed Sand Quarry
Cabbage Tree Road, Williamtown

FIGURE:

1

DATA TABLES

Notes:
 - - Not analysed
 < - Less than laboratory limit of reporting
 µg/L - Micrograms per litre
 BTEXN - Benzene, toluene, ethylbenzene, xylenes, naphthalene
 ** 95% Level of protection in freshwater

Table 2
Groundwater Analytical Data - Metals
Williamstown Sand Syndicate



Metals																
Analyte	Arsenic**	Barium	Beryllium	Boron**	Cadmium**	Chromium**	Cobalt	Copper**	Iron	Lead**	Manganese*	Mercury**+2	Nickel**	Selenium**	Vanadium	Zinc**
LOR	0.001	0.001	0.001	0.05	0.0001	0.001	0.001	0.001	0.05	0.001	0.001	0.0001	0.001	0.01	0.01	0.005
Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ANZECC 2000 Trigger Values	0.013	-	-	0.37	0.0002	0.001	-	0.0014	-	0.0034	1.9	0.0006	0.011	0.011	-	0.008
INHERIC ADWIG 6	0.01	-	0.06	4	0.002	0.05	-	2	0.3	0.01	0.5	0.001	0.02	0.01	-	3
Sample Name	Sample Date															
BH1	15-Mar-19	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.004	< 0.001	< 0.001	13	< 0.001	0.014	< 0.0001	< 0.001	< 0.01	1.27
	23-Apr-19	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.004	< 0.001	0.002	10	0.001	0.015	< 0.0001	0.002	< 0.01	0.363
	16-May-19	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	< 0.001	8.33	< 0.001	0.009	< 0.0001	0.002	< 0.01	0.132
	14-Jun-19	< 0.001	0.001	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.001	6.31	< 0.001	0.009	< 0.0001	< 0.001	< 0.01	0.074
	16-Jul-19	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	0.002	7.35	< 0.001	0.01	< 0.0001	0.001	< 0.01	0.116
	15-Aug-19	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	0.002	7.96	< 0.001	0.008	< 0.0001	< 0.001	< 0.01	0.023
BH2	16-Sep-19	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.004	< 0.001	0.001	8.84	< 0.001	0.009	< 0.0001	< 0.001	< 0.01	0.034
	22-Feb-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.002	0.14	< 0.001	0.021	< 0.0001	0.015	< 0.01	0.006
	15-Mar-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.001	< 0.05	< 0.001	0.014	< 0.0001	0.022	< 0.01	0.043
	23-Apr-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.004	0.19	< 0.001	0.018	< 0.0001	0.001	< 0.01	0.008
	16-May-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.001	0.06	< 0.001	0.014	< 0.0001	0.001	< 0.01	< 0.005
	14-Jun-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.004	0.08	< 0.001	0.009	< 0.0001	< 0.001	< 0.01	< 0.005
BH3	16-Jul-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.008	0.05	< 0.001	0.013	< 0.0001	0.001	< 0.01	0.006
	15-Aug-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.012	0.08	< 0.001	0.011	< 0.0001	< 0.001	< 0.01	< 0.005
	16-Sep-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.008	0.26	< 0.001	0.014	< 0.0001	0.001	< 0.01	0.007
	21-Feb-19	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.06	< 0.001	0.005	< 0.0001	0.053	< 0.01	< 0.005
	21-Feb-19	< 0.001	0.014	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.002	0.16	< 0.001	0.039	< 0.0001	0.018	< 0.01	0.014
	15-Mar-19	< 0.001	0.014	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.001	< 0.05	< 0.001	0.014	< 0.0001	0.022	< 0.01	0.043
BH4	23-Apr-19	< 0.001	0.013	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.002	0.99	< 0.001	0.045	< 0.0001	0.007	< 0.01	0.008
	16-May-19	< 0.001	0.013	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	0.27	< 0.001	0.022	< 0.0001	0.022	< 0.01	0.011
	14-Jun-19	< 0.001	0.012	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.038	< 0.05	< 0.001	0.014	< 0.0001	< 0.001	< 0.01	0.005
	16-Jul-19	< 0.001	0.013	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.046	< 0.05	< 0.001	0.019	< 0.0001	< 0.001	< 0.01	0.007
	15-Aug-19	< 0.001	0.013	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.026	< 0.05	< 0.001	0.018	< 0.0001	0.001	< 0.01	0.007
	16-Sep-19	< 0.001	0.012	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.051	0.19	< 0.001	0.026	< 0.0001	0.002	< 0.01	0.005
BH5	22-Feb-19	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	1.4	< 0.001	0.005	< 0.0001	0.003	< 0.01	0.008
	22-Feb-19	< 0.001	0.03	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	1.03	< 0.001	0.014	< 0.0001	0.001	< 0.01	0.019
	14-Mar-19	< 0.001	0.027	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	1.9	< 0.001	0.01	< 0.0001	< 0.001	< 0.01	0.012
	23-Apr-19	< 0.001	0.025	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.06	< 0.001	0.01	< 0.0001	< 0.001	< 0.01	< 0.01	0.005
	16-May-19	< 0.001	0.029	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	2.57	< 0.001	0.009	< 0.0001	< 0.001	< 0.01	< 0.005
	14-Jun-19	< 0.001	0.027	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.001	2.86	< 0.001	0.008	< 0.0001	< 0.001	< 0.01	0.008
BH6	16-Jul-19	< 0.001	0.026	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.002	2.41	< 0.001	0.008	< 0.0001	< 0.001	< 0.01	0.005
	15-Aug-19	< 0.001	0.026	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.001	2.19	< 0.001	0.008	< 0.0001	< 0.001	< 0.01	0.007
	16-Sep-19	< 0.001	0.034	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.008	2.08	< 0.001	0.012	< 0.0001	0.007	< 0.01	0.035
	22-Feb-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.002	0.003	< 0.001	1.8	< 0.001	0.026	< 0.0001	0.004	< 0.01	0.019
	14-Mar-19	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	0.009
	23-Apr-19	< 0.001	0.012	< 0.001	< 0.05	< 0.0001	0.002	0.003	< 0.001	2.0	< 0.001	0.026	< 0.0001	0.004	< 0.01	0.01
BH7	16-May-19	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.002	0.003	< 0.001	2.32	< 0.001	0.035	< 0.0001	0.005	< 0.01	0.013
	14-Jun-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	0.002	< 0.001	0.96	< 0.001	0.03	< 0.0001	0.004	< 0.01	0.006
	16-Jul-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	0.002	< 0.001	1.66	< 0.001	0.025	< 0.0001	0.003	< 0.01	< 0.005
	15-Aug-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	0.002	< 0.001	1.54	< 0.001	0.023	< 0.0001	0.003	< 0.01	< 0.005
	16-Sep-19	< 0.001	0.016	< 0.001	0.06	< 0.0001	0.002	0.002	< 0.001	1.42	0.001	0.024	< 0.0001	0.02	< 0.01	0.005
	21-Feb-19	0.001*	0.011	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	0.006
BH8	14-Mar-19	< 0.001	0.006	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	3.25	< 0.001	0.008	< 0.0001	0.002	< 0.01	< 0.005
	23-Apr-19	0.001	0.008	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	3.2	< 0.001	0.009	< 0.0001	0.002	< 0.01	0.008
	16-May-19	0.003	0.01	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	3.0	< 0.001	0.01	< 0.0001	0.003	< 0.01	< 0.005
	14-Jun-19	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	2.5	< 0.001	0.005	< 0.0001	0.002	< 0.01	0.006
	16-Jul-19	0.001	0.012	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	2.6	< 0.001	0.004	< 0.0001	0.001	< 0.01	< 0.005
	15-Aug-19	0.001	0.008	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	1.72	< 0.001	0.004	< 0.0001	0.001	< 0.01	< 0.005
BH11	16-Sep-19	0.001	0.01	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	2.06	< 0.001	0.005	< 0.0001	0.002	< 0.01	< 0.005
	21-Feb-19	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.002	0.001	< 0.001	0.26	< 0.001	0.003	< 0.0001	0.005	< 0.01	0.031
	15-Mar-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	1.49	< 0.001	0.007	< 0.0001	0.037	< 0.01	0.016
	23-Apr-19	< 0.001	0.006	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.98	< 0.001	0.007	< 0.0001	0.07	< 0.01	0.04
	16-May-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.97	< 0.001	0.006	< 0.0001	0.004	< 0.01	0.024
	14-Jun-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	0.98	< 0.001	0.005	< 0.0001	0.001	< 0.01	0.005
MW239S	16-Jul-19	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.47	< 0.001	0.003	< 0.0001	0.004	< 0.01	0.007
	15-Aug-19	< 0.001	0.004	< 0.001	< 0.05	< 0.000										

Notes:
 - - Not analysed
 < - Less than laboratory limit of reporting
 µg/L - Micrograms per litre
 *** 99% Level of protection in freshwater
 † Recreation water

Table 4
Groundwater Analytical Data - Inorganics
Wellnessen Sand Syncline



Analyte	Anions and Cations										Alkalinity										Inorganics		pH						
	Sodium	Calcium	Magnesium	Potassium	Sulphate	Chloride	Fluoride	Reactive phosphorus as P	Total Phosphorus	Nitrite as N	Nitrate as N	Nitrite + Nitrate as N	Ammonia as N	Total Nitrogen as N	Total Kjeldahl Nitrogen as N	Total Cations	Total Anions	Ionic Balance %	Sodium Adsorption Ratio	Bicarbonate Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Hydroxide Alkalinity as CaCO3		Total Alkalinity as CaCO3	Total Hardness as CaCO3	Electrical Conductivity @ 25°C*	Total Dissolved Solids	Total Dissolved Solids	
Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	%		mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L		
ANZECC 2000 Trigger Values	180†				250†	1.5		0.02*	0.02*	3	50		0.5†						0.01	1	1	1	1	1	125-2200	600†			
NHMRC ADWG 6																								200†					
Sample Name	Sample Date																												
BH1	15-Mar-10	11	2.0	1.0	<1.0	2.0	25	<0.1	-	-	-	-	-	-	-	0.66	0.88	-	-	9.0	<1.0	<1.0	9.0	9.0	104	68	129	5.67	
	23-Apr-10	14	1.0	2.0	<1.0	4.0	25	<0.1	-	-	-	-	-	-	-	0.83	0.99	-	-	10	<1.0	<1.0	10	84	65	97	5.83		
	16-May-10	12	<1.0	2.0	<1.0	5.0	25	<0.1	0.03	<0.01	<0.01	<0.01	0.11	0.3	0.3	0.69	1.01	-	1.7	10	<1.0	<1.0	10	8.0	105	68	164	5.82	
	14-Jun-10	10	<1.0	2.0	<1.0	3.0	24	<0.1	-	-	-	-	-	-	-	0.6	0.94	-	-	10	<1.0	<1.0	10	8.0	99	68	72	5.82	
	16-Jul-10	15	<1.0	2.0	<1.0	4.0	23	<0.1	-	-	-	-	-	-	-	0.82	0.95	-	-	11	<1.0	<1.0	11	8.0	102	66	84	5.82	
BH2	15-Aug-10	14	<1.0	2.0	<1.0	2.0	21	<0.1	-	-	-	-	-	-	-	0.77	0.91	-	-	14	<1.0	<1.0	14	8.0	128	83	82	6.22	
	16-Sep-10	12	<1.0	2.0	<1.0	3.0	20	<0.1	0.05	<0.01	<0.01	<0.01	0.12	0.3	0.3	0.72	0.92	-	1.84	8.0	<1.0	<1.0	8.0	102	66	58	5.94		
	22-Feb-10	12	2.0	2.0	<1.0	6.0	22	0.1	<0.01	0.28	<0.01	2.76	2.76	0.05	4.0	1.2	0.79	0.74	-	1.44	<1.0	<1.0	<1.0	<1.0	13	91	126	58	4.87
	15-Mar-10	10	3.0	2.0	<1.0	7.0	23	<0.1	-	-	-	-	-	-	-	0.75	0.79	-	-	<1.0	<1.0	<1.0	<1.0	16	101	66	80	4.71	
	23-Apr-10	14	2.0	2.0	<1.0	6.0	23	<0.1	-	-	-	-	-	-	-	0.87	0.77	-	-	<1.0	<1.0	<1.0	<1.0	13	79	46	84	4.82	
BH3	16-May-10	12	2.0	2.0	<1.0	21	22	<0.01	0.26	<0.01	0.38	0.38	0.01	1.3	0.9	0.79	1.06	-	1.44	<1.0	<1.0	<1.0	<1.0	13	144	144	485		
	14-Jun-10	11	1.0	2.0	<1.0	5.0	23	<0.1	-	-	-	-	-	-	-	0.69	0.75	-	-	<1.0	<1.0	<1.0	<1.0	11	91	59	51	4.76	
	16-Jul-10	13	2.0	2.0	<1.0	9.0	20	<0.1	-	-	-	-	-	-	-	0.83	0.75	-	-	<1.0	<1.0	<1.0	<1.0	13	90	58	63	4.84	
	15-Aug-10	12	2.0	2.0	<1.0	6.0	18	<0.1	-	-	-	-	-	-	-	0.74	0.72	-	-	<1.0	<1.0	<1.0	<1.0	11	110	72	61	4.72	
	16-Sep-10	11	2.0	2.0	<1.0	6.0	18	<0.01	0.38	<0.01	1.07	1.07	0.04	2.7	1.6	0.74	0.67	-	1.32	<1.0	<1.0	<1.0	<1.0	15	95	62	60	4.72	
BH4	21-Feb-10	4.0	4.0	1.0	<1.0	4.0	10	<0.1	<0.01	2.76	<0.01	0.78	0.78	0.3	5.9	5.1	0.46	0.54	-	0.46	9.0	<1.0	<1.0	9.0	14	69	438	-	5.35
	23-Apr-10	10	2.0	1.0	1.0	5.0	19	<0.1	<0.01	0.19	<0.01	0.35	0.35	0.04	0.6	0.3	0.56	0.7	-	1.15	6.0	<1.0	<1.0	6.0	5.0	73	96	-	5.4
	15-May-10	9.0	2.0	<1.0	1.0	5.0	18	<0.1	-	-	-	-	-	-	-	0.49	0.61	-	-	<1.0	<1.0	<1.0	<1.0	9.0	77	90	70	5.12	
	23-Apr-10	10	2.0	1.0	1.0	5.0	19	<0.1	-	-	-	-	-	-	-	0.64	0.6	-	-	<1.0	<1.0	<1.0	<1.0	9.0	54	35	61	5.05	
	16-May-10	9.0	2.0	1.0	1.0	22	19	<0.1	<0.01	0.97	<0.01	0.29	0.29	<0.01	1.0	0.7	0.6	0.99	-	1.3	<1.0	<1.0	<1.0	<1.0	9.0	73	47	100	4.99
BH5	14-Jun-10	9.0	1.0	1.0	<1.0	4.0	18	<0.1	-	-	-	-	-	-	-	0.39	0.59	-	-	<1.0	<1.0	<1.0	<1.0	7.0	69	45	36	4.84	
	16-Jul-10	10	2.0	2.0	1.0	4.0	18	<0.1	-	-	-	-	-	-	-	0.72	0.63	-	-	<1.0	<1.0	<1.0	<1.0	75	49	42	4.86		
	15-Aug-10	8.0	2.0	1.0	1.0	5.0	16	<0.1	-	-	-	-	-	-	-	0.56	0.56	-	-	<1.0	<1.0	<1.0	<1.0	8.0	85	55	49	5.01	
	16-Sep-10	11	3.0	2.0	<1.0	6.0	19	<0.01	0.4	<0.01	0.24	0.24	0.02	0.6	0.4	0.56	0.56	-	1.32	<1.0	<1.0	<1.0	<1.0	10	95	61	58	5.03	
	22-Feb-10	42	<1.0	6.0	1.0	19	69	0.2	<0.01	0.34	<0.01	<0.01	0.09	3.0	3.0	2.35	2.34	-	1.59	<1.0	<1.0	<1.0	<1.0	25	250	211	487		
BH6	22-Feb-10	28	3.0	4.0	1.0	28	42	<0.1	<0.01	0.05	<0.01	0.09	0.09	0.14	0.5	0.4	1.72	1.77	-	2.49	<1.0	<1.0	<1.0	<1.0	24	177	144	437	
	14-Mar-10	23	2.0	4.0	1.0	17	37	<0.1	-	-	-	-	-	-	-	1.46	1.49	-	2.49	<1.0	<1.0	<1.0	<1.0	24	179	116	146	4.95	
	23-Apr-10	25	3.0	4.0	1.0	18	42	<0.1	-	-	-	-	-	-	-	1.59	1.56	-	-	<1.0	<1.0	<1.0	<1.0	24	135	88	115	4.64	
	16-May-10	29	3.0	4.0	1.0	18	45	<0.01	0.13	<0.01	<0.01	<0.01	0.14	0.6	0.6	1.32	1.52	-	2.04	<1.0	<1.0	<1.0	<1.0	24	175	114	144	4.88	
	14-Jun-10	20	2.0	4.0	1.0	16	42	<0.1	-	-	-	-	-	-	-	1.32	1.52	-	-	<1.0	<1.0	<1.0	<1.0	21	174	113	90	4.82	
BH7	16-Jul-10	23	2.0	3.0	1.0	20	35	<0.1	-	-	-	-	-	-	-	1.46	1.51	-	-	<1.0	<1.0	<1.0	<1.0	21	161	105	104	4.79	
	15-Aug-10	25	3.0	3.0	1.0	21	38	<0.1	<0.01	0.15	<0.01	0.07	0.07	0.19	0.8	0.7	1.51	1.55	-	2.44	2.0	<1.0	<1.0	2.0	20	127	128	124	4.68
	22-Feb-10	34	<1.0	5.0	2.0	12	64	0.2	<0.01	0.13	<0.01	0.52	0.52	0.34	2.2	2.2	1.94	2.05	-	3.16	<1.0	<1.0	<1.0	<1.0	20	213	195	186	4.76
	14-Mar-10	36	<1.0	6.0	2.0	16	61	<0.1	-	-	-	-	-	-	-	3.11	2.05	-	1.37	<1.0	<1.0	<1.0	<1.0	25	271	176	212	4.73	
	23-Apr-10	35	<1.0	6.0	2.0	17	62	<0.1	-	-	-	-	-	-	-	3.2	2.1	-	-	<1.0	<1.0	<1.0	<1.0	25	265	153	185	4.61	
BH8	16-May-10	35	<1.0	5.0	2.0	15	68	0.2	<0.01	0.06	<0.01	<0.01	0.27	0.9	0.9	1.98	2.23	-	3.26	<1.0	<1.0	<1.0	<1.0	20	235	153	310	4.87	
	14-Jun-10	31	<1.0	4.0	2.0	11	56	0.1	-	-	-	-	-	-	-	1.73	1.81	-	-	<1.0	<1.0	<1.0	<1.0	16	213	138	145	4.91	
	16-Jul-10	36	<1.0	5.0	2.0	12	46	<0.1	-	-	-	-	-	-	-	1.03	1.95	-	-	<1.0	<1.0	<1.0	<1.0	20	202	131	164	5.0	
	15-Aug-10	32	<1.0	4.0	2.0	15	49	0.1	-	-	-	-	-	-	-	1.77	1.85	-	-	8.0	<1.0	<1.0	<1.0	16	232	151	168	5.53	
	16-Sep-10	27	<1.0	4.0	2.0	13	53	<0.01	0.09	<0.01	0.06	0.06	0.2	1.2	1.1	1.53	1.86	-	3.79	5.0	<1.0	<1.0	<1.0	16	222	144	181	5.07	
BH9	22-Feb-10	52	<1.0	6.0	<1.0	11	90	<0.1	<0.01	1.97	<0.01	<0.01	0.5	2.4	2.4	2.76	2.77	-	4.44	<1.0	<1.0	<1.0	<1.0	25	352	258	288	4.46	
	14-Mar-10	45	<1.0	6.0	<1.0	6.0	76	<0.1	-	-	-	-	-	-	-	2.45	2.27	-	-	<1.0	<1.0	<1.0	<1.0	25	319	207	253	4.77	
	23-Apr-10	53	<1.0	7.0	<1.0	8.0	89	<0.1	-	-	-	-	-	-	-	2.88	2.69	-	-	<1.0	<1.0	<1.0	<1.0	26	264	172	233	4.76	
	16-May-10	47	<1.0	4.0	<1.0	6.0	81	<0.1	<0.01	<0.01	<0.01	<0.01	0.12	0.4	0.4	2.37	2.43	-	4.86	1.0	<1.0	<1.0	<1.0	1.0	362	196	364	4.9	
	14-Jun-10	47	<1.0	5.0	<1.0	4.0	89	<0.1	<0.01	<0.01	<0.01	<0.01	0.12	0.4	0.4	2.46	2.59	-	-	<1.0	<1.0	<1.0	<1.0	1.0	315	205	194	4.83	
BH11	16-Jul-10	57	<1.0	5.0	<1.0	70	121	0.1	-	-	-	-	-	-	-	2.89	4.87	26	-	<1.0	<1.0								

Table 5
Quality Control Sample Analysis - BTEXN
Willamtown Sand Syncline



BTEXN										Total Petroleum Hydrocarbons										Total Petroleum Hydrocarbons - Silica Cleanup										Total Recoverable Hydrocarbons										Total Recoverable Hydrocarbons - Silica Cleanup									
Analyte			Benzene	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene	Total Xylene	Naphthalene	Sum of BTEX	C ₁ - C ₆	C ₁₀ - C ₁₄	C ₁₅ - C ₁₈	C ₁₉ - C ₂₄	C ₂₅ - C ₃₀ sum	C ₁₀ -C ₄₀ Silica Cleanup	C ₁₀ -C ₄₀ Silica Cleanup	C ₁₀ -C ₄₀ Silica Cleanup	C ₁₀ -C ₄₀ Silica Cleanup	C ₁ - C ₁₀	C ₁ - C ₁₀ minus BTEX (F1)	>C ₁₀ - C ₁₄	minus Naphthalene	>C ₁₄ - C ₁₈	>C ₁₈ - C ₂₄	>C ₂₄ -C ₄₀ Silica Cleanup	P2 - Silica Cleanup	>C ₁₀ -C ₄₀ Silica Cleanup	>C ₁₀ -C ₄₀ Silica Cleanup	>C ₁₀ -C ₄₀ Silica Cleanup																			
Units			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L																		
Sample Name	Sample Date	Sample Type	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100																		
TRIP BLANK_11022019	13-Feb-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100																		
RUNGATE01_21022019	21-Feb-19	Rinate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100																		
BW8_21022019	21-Feb-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100																		
DUP01_21022019	21-Feb-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100																		
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC																		
BW8_21022019	21-Feb-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100																		
TRIP01_21022019	21-Feb-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 1.0	< 1.0	< 20	< 50	< 100	< 100	< 100	< 50	< 100	< 50	< 400	< 20	< 20	< 50	< 50	< 100	< 100	< 100	< 50	< 100	< 100	< 100	< 100																			
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC																		
TRIP BLANK_130319	13-Mar-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100																		
RINGATE02_140319	14-Mar-19	Rinate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100																		
BW7_140319	14-Mar-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100																		
DUP01_140319	14-Mar-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100																		
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC																		
TRIP BLANK_05_14062019	14-Jun-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100																		
RINGATE 05_14062019	14-Jun-19	Rinate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100																		
SW3_14062019	14-Jun-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100																		
DUP05_14062019	14-Jun-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100																		
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC																		
SW3_14062019	14-Jun-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100																		
TRIP05_140619	14-Jun-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 1.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 50	< 100	< 100	< 100	< 100	< 100																		
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC																		
TRIP BLANK_06_16072019	16-Jul-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100																		
RINGATE07_16072019	16-Jul-19	Rinate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100																		
RINGATE07	15-Aug-19	Rinate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100																			
TRIP BLANK_08_16092019	16-Sep-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100																		
RINGATE 08_16092019	16-Sep-19	Rinate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100																		
SW4_16092019	16-Sep-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100																		
DUP08_16092019	16-Sep-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100																		
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC																		
SW4_16092019	16-Sep-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	-	< 100	< 100	< 100	< 100	< 100	< 100																		
TRIP08_16092019	16-Sep-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 1.0	< 1.0	< 20	200	400	200	800	< 50	< 100	< 400	< 20	< 20	< 20	180	400	100	< 50	< 100	< 100	< 100	< 100	< 100	< 100	< 100																		
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC																		

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
NC - Not calculated
µg/L - Micrograms per litre
BTEXN - Benzene, toluene, ethylbenzene, xylenes, naphthalene

Table 6
Quality Control Sample Analysis - Metals
Williamstown Sand Syndicate



Analyte			Metals																
			Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Chromium VI	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Nickel	Selenium	Vanadium	Zinc
Units			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Name	Sample Date	Sample Type																	
TRIP BLANK 13022019	13-Feb-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE01 21022019	21-Feb-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH8 21022019	21-Feb-19	Primary	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.005
DUP01 21022019	21-Feb-19	Duplicate	0.001	0.014	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.09	< 0.001	0.012	< 0.0001	0.003	< 0.01	< 0.01	0.015
Relative Percentage Difference			67%	24%	NC	NC	NC	0%	NC	NC	NC	0%	NC	0%	NC	40%	NC	NC	100%
BH8 21022019	21-Feb-19	Primary	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.005
TRIP01 21022019	21-Feb-19	Triplicate	0.001	< 0.02	< 0.001	< 0.05	< 0.0002	< 0.005	< 0.005	< 0.001	< 0.001	4.5	< 0.001	0.012	< 0.0001	0.003	-	< 0.005	0.006
Relative Percentage Difference			67%	10%	NC	NC	NC	86%	NC	NC	NC	9%	NC	0%	NC	40%	NC	NC	18%
TRIP BLANK 130319	13-Mar-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
TRIP BLANK02 150319	15-Mar-19	Trip Blank	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE02 140319	14-Mar-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH7 140319	14-Mar-19	Primary	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	-	0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
DUP02 140319	14-Mar-19	Duplicate	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	-	0.002	< 0.001	2.51	< 0.001	0.021	< 0.0001	0.004	< 0.01	< 0.01	0.007
Relative Percentage Difference			NC	0%	NC	NC	NC	0%	-	40%	NC	33%	NC	5%	NC	0%	NC	NC	25%
BH7 140319	14-Mar-19	Primary	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	-	0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
TRIP02 14032019	14-Mar-19	Triplicate	< 0.001	< 0.02	< 0.001	< 0.05	< 0.0002	0.001	-	0.002	< 0.001	1.7	< 0.001	0.019	< 0.0001	< 0.001	-	< 0.005	< 0.005
Relative Percentage Difference			NC	0%	NC	NC	NC	0%	-	40%	NC	6%	NC	5%	NC	156%	NC	NC	113%
TRIP BLANK 05 14062019	14-Jun-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE 05 14062019	14-Jun-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
SW3 14062019	14-Jun-19	Primary	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.003	< 0.001	1.68	< 0.001	0.038	< 0.0001	0.003	< 0.01	< 0.01	0.016
DUP05 14062019	14-Jun-19	Duplicate	< 0.001	0.036	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.003	< 0.001	1.63	< 0.001	0.039	< 0.0001	0.003	< 0.01	< 0.01	0.013
Relative Percentage Difference			NC	3%	NC	NC	NC	NC	-	0%	NC	3%	NC	3%	NC	0%	NC	NC	21%
SW3 14062019	14-Jun-19	Primary	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.003	< 0.001	1.68	< 0.001	0.038	< 0.0001	0.003	< 0.01	< 0.01	0.016
TRIP05 140619	14-Jun-19	Triplicate	< 0.001	-	-	-	< 0.0002	0.001	-	-	< 0.001	1.6	< 0.001	-	< 0.0001	0.003	-	-	0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	67%	NC	NC	NC	5%	NC	NC	NC	0%	NC	NC	46%
TRIP BLANK 06 16072019	16-Jul-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE06 16072019	16-Jul-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE07	15-Aug-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
TRIP BLANK 08 16092019	16-Sep-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE 08 16092019	16-Sep-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
SW4 16092019	16-Sep-19	Primary	< 0.001	0.046	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.002	0.02	0.7	0.001	0.039	< 0.0001	0.017	< 0.01	< 0.01	0.085
DUP08 16092019	16-Sep-19	Duplicate	< 0.001	0.041	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.002	< 0.001	0.76	< 0.001	0.036	< 0.0001	0.003	< 0.01	< 0.01	0.012
Relative Percentage Difference			NC	11%	NC	NC	NC	NC	-	0%	190%	8%	67%	8%	NC	140%	NC	NC	151%
SW4 16092019	16-Sep-19	Primary	< 0.001	0.046	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.002	0.02	0.7	0.001	0.039	< 0.0001	0.017	< 0.01	< 0.01	0.085
TRIP08 16092019	16-Sep-19	Triplicate	< 0.001	0.04	< 0.001	< 0.05	< 0.0002	< 0.001	< 0.005	0.002	< 0.001	0.69	< 0.001	0.037	< 0.0001	0.003	-	< 0.005	0.012
Relative Percentage Difference			NC	14%	NC	NC	NC	NC	NC	0%	190%	1%	67%	5%	NC	140%	NC	NC	151%

Notes:
 - - Not analysed
 < - Less than laboratory limit of reporting
 NC - Not calculated
 mg/L - Milligrams per litre
 Half the laboratory limit of reporting used when calculating RPD
 RPD - Relative Percentage Difference

Notes:
 < - Less than laboratory limit of reporting
 NC - Not calculated
 µg/L - Micrograms per litre

ATTACHMENT A: LABORATORY REPORTS

CERTIFICATE OF ANALYSIS

Work Order : **ES1929844**
Client : **KLEINFELDER AUSTRALIA PTY LTD**
Contact : **DANIEL KOUSBROEK**
Address : **95 MITCHELL ROAD**
CARDIFF NSW 2285
Telephone : **----**
Project : **20193820**
Order number : **----**
C-O-C number : **----**
Sampler : **DANIEL KOUSBROEK**
Site : **WSS-CABBAGE TREE RD WATER MONITORING**
Quote number : **ME/114/19**
No. of samples received : **14**
No. of samples analysed : **14**

Page : 1 of 18
Laboratory : Environmental Division Sydney
Contact : Shirley LeCornu
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +6138549 9630
Date Samples Received : 16-Sep-2019 16:29
Date Analysis Commenced : 17-Sep-2019
Issue Date : 23-Sep-2019 18:52



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
Celine Conceicao	Senior Spectroscopist	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
Neil Martin	Team Leader - Chemistry	Chemistry, Newcastle West, NSW



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

Ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- EP231X: PFAS results for sample #6, #11 confirmed by re-extraction and re-analysis
- TDS by method EA-015 may bias high for sample 9 due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- 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

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH7	BH6	BH8	MW239S	SW3
Client sampling date / time					16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00
Compound	CAS Number	LOR	Unit		ES1929844-001	ES1929844-002	ES1929844-003	ES1929844-004	ES1929844-005
					Result	Result	Result	Result	Result
EA005: pH									
pH Value	----	0.01	pH Unit		5.07	4.68	4.85	4.66	4.30
EA006: Sodium Adsorption Ratio (SAR)									
^ Sodium Adsorption Ratio	----	0.01	-		2.79	2.44	5.43	4.70	2.57
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		222	197	293	373	374
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		181	124	206	224	201
EA016: Calculated TDS (from Electrical Conductivity)									
Total Dissolved Solids (Calc.)	----	1	mg/L		144	128	190	242	243
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		44	71	79	179	7
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		16	20	12	25	50
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		5	2	<1	<1	<1
Total Alkalinity as CaCO3	----	1	mg/L		5	2	<1	<1	<1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		13	21	4	14	48
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		53	38	70	85	57
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		<1	3	<1	<1	7
Magnesium	7439-95-4	1	mg/L		4	3	3	6	8
Sodium	7440-23-5	1	mg/L		27	25	46	55	42
Potassium	7440-09-7	1	mg/L		1	1	<1	1	<1
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	0.001	<0.001	<0.001
Boron	7440-42-8	0.05	mg/L		0.06	<0.05	<0.05	<0.05	<0.05
Barium	7440-39-3	0.001	mg/L		0.016	0.034	0.010	0.010	0.045
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH7	BH6	BH8	MW239S	SW3
Client sampling date / time					16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00
Compound	CAS Number	LOR	Unit		ES1929844-001	ES1929844-002	ES1929844-003	ES1929844-004	ES1929844-005
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued									
Cobalt	7440-48-4	0.001	mg/L		0.002	<0.001	<0.001	<0.001	0.004
Chromium	7440-47-3	0.001	mg/L		0.002	<0.001	0.002	0.002	<0.001
Copper	7440-50-8	0.001	mg/L		0.007	0.008	<0.001	0.002	0.020
Manganese	7439-96-5	0.001	mg/L		0.024	0.012	0.005	0.006	0.036
Nickel	7440-02-0	0.001	mg/L		0.020	0.007	0.002	0.006	0.017
Lead	7439-92-1	0.001	mg/L		0.001	<0.001	<0.001	<0.001	0.001
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L		0.085	0.035	<0.005	0.032	0.094
Iron	7439-89-6	0.05	mg/L		1.42	2.08	2.06	0.94	0.69
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		<0.1	<0.1	<0.1	<0.1	0.1
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		0.20	0.19	0.13	0.10	0.01
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		0.06	0.07	<0.01	<0.01	<0.01
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		0.06	0.07	<0.01	<0.01	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		1.1	0.7	1.1	1.4	0.1
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		1.2	0.8	1.1	1.4	0.1
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		0.09	0.15	0.43	0.32	<0.01
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L		1.86	1.55	2.06	2.69	2.61
∅ Total Cations	----	0.01	meq/L		1.53	1.51	2.25	2.91	2.83



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH7	BH6	BH8	MW239S	SW3
Client sampling date / time					16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00
Compound	CAS Number	LOR	Unit		ES1929844-001	ES1929844-002	ES1929844-003	ES1929844-004	ES1929844-005
					Result	Result	Result	Result	Result
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	<50
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID				
Client sampling date / time				BH7	BH6	BH8	MW239S	SW3
16-Sep-2019 00:00				16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00
Compound	CAS Number	LOR	Unit	ES1929844-001	ES1929844-002	ES1929844-003	ES1929844-004	ES1929844-005
Result				Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued								
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	----	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	----	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	----	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	<0.02	----	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	<0.02	----	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	----	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	<0.01	----	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	----	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	----	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	----	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	----	<0.02
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	----	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	----	<0.05
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	----	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	----	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	----	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	----	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<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	----	<0.02



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH7	BH6	BH8	MW239S	SW3
Client sampling date / time					16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00
Compound	CAS Number	LOR	Unit		ES1929844-001	ES1929844-002	ES1929844-003	ES1929844-004	ES1929844-005
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<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	----	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<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	----	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<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	----	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	----	<0.01
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		111	107	108	110	111
Toluene-D8	2037-26-5	2	%		119	101	114	114	98.9
4-Bromofluorobenzene	460-00-4	2	%		118	102	115	113	101
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		108	100	100	----	100
13C8-PFOA	----	0.02	%		103	106	100	----	88.9



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW4	RINSATE 08	TRIP BLANK 08	BH1	BH4
Client sampling date / time					16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00
Compound	CAS Number	LOR	Unit		ES1929844-006	ES1929844-007	ES1929844-008	ES1929844-009	ES1929844-010
					Result	Result	Result	Result	Result
EA005: pH									
pH Value	----	0.01	pH Unit		4.47	----	----	5.44	4.83
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		4.35	----	----	----	----
EA006: Sodium Adsorption Ratio (SAR)									
^ Sodium Adsorption Ratio	----	0.01	-		3.01	----	----	1.84	1.32
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		360	----	----	102	95
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		208	----	----	88	58
EA016: Calculated TDS (from Electrical Conductivity)									
Total Dissolved Solids (Calc.)	----	1	mg/L		234	----	----	66	62
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		<5	----	----	108	49
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		42	----	----	8	13
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		<1	----	----	8	<1
Total Alkalinity as CaCO3	----	1	mg/L		<1	----	----	8	<1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		45	----	----	2	8
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		58	----	----	20	19
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		7	----	----	<1	2
Magnesium	7439-95-4	1	mg/L		6	----	----	2	2
Sodium	7440-23-5	1	mg/L		45	----	----	13	11
Potassium	7440-09-7	1	mg/L		<1	----	----	<1	<1
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	<0.05	<0.05	<0.05
Barium	7440-39-3	0.001	mg/L		0.046	<0.001	<0.001	0.002	0.012

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW4	RINSATE 08	TRIP BLANK 08	BH1	BH4
Client sampling date / time				16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	
Compound	CAS Number	LOR	Unit	ES1929844-006	ES1929844-007	ES1929844-008	ES1929844-009	ES1929844-010	
				Result	Result	Result	Result	Result	
EG020F: Dissolved Metals by ICP-MS - Continued									
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Cobalt	7440-48-4	0.001	mg/L	0.002	<0.001	<0.001	<0.001	<0.001	
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	0.004	<0.001	
Copper	7440-50-8	0.001	mg/L	0.020	<0.001	<0.001	0.001	0.051	
Manganese	7439-96-5	0.001	mg/L	0.039	<0.001	<0.001	0.009	0.026	
Nickel	7440-02-0	0.001	mg/L	0.017	<0.001	<0.001	<0.001	0.002	
Lead	7439-92-1	0.001	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	0.085	<0.005	<0.005	0.034	0.005	
Iron	7439-89-6	0.05	mg/L	0.70	<0.05	<0.05	8.84	0.19	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	0.1	----	----	<0.1	<0.1	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	<0.01	----	----	0.12	0.02	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	----	----	<0.01	<0.01	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	<0.01	----	----	<0.01	0.24	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	----	----	<0.01	0.24	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.1	----	----	0.3	0.4	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	0.1	----	----	0.3	0.6	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.01	----	----	0.06	0.40	
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	----	----	<0.01	<0.01	
EN055: Ionic Balance									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW4	RINSATE 08	TRIP BLANK 08	BH1	BH4
Client sampling date / time					16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00
Compound	CAS Number	LOR	Unit		ES1929844-006	ES1929844-007	ES1929844-008	ES1929844-009	ES1929844-010
					Result	Result	Result	Result	Result
EN055: Ionic Balance - Continued									
∅ Total Anions	----	0.01	meq/L		2.57	----	----	0.76	0.70
∅ Total Cations	----	0.01	meq/L		2.80	----	----	0.73	0.74
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	130
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	130
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	140
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	140
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				SW4	RINSATE 08	TRIP BLANK 08	BH1	BH4
Client sampling date / time				16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00
Compound	CAS Number	LOR	Unit	ES1929844-006	ES1929844-007	ES1929844-008	ES1929844-009	ES1929844-010
				Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued								
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	<0.02	----	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	----	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.01	<0.01	<0.01	----	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	----	0.02
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	----	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	<0.02	----	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	<0.02	----	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	----	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	<0.01	----	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	----	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	----	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	----	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	----	<0.02
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	----	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	----	<0.05
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	----	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	----	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	----	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	----	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	----	<0.05



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW4	RINSATE 08	TRIP BLANK 08	BH1	BH4
Client sampling date / time					16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00
Compound	CAS Number	LOR	Unit		ES1929844-006	ES1929844-007	ES1929844-008	ES1929844-009	ES1929844-010
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<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	----	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<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	----	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<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	----	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		0.01	<0.01	<0.01	----	0.02
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		0.01	<0.01	<0.01	----	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		0.01	<0.01	<0.01	----	<0.01
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		110	107	106	110	108
Toluene-D8	2037-26-5	2	%		99.2	101	100	98.3	99.1
4-Bromofluorobenzene	460-00-4	2	%		100	103	100	99.3	99.3
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		93.5	97.3	98.8	----	96.3
13C8-PFOA	----	0.02	%		93.5	92.3	93.2	----	89.5



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	DUP08	SW1	BH11	BH2	----
Client sampling date / time					16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	----
Compound	CAS Number	LOR	Unit		ES1929844-011	ES1929844-012	ES1929844-013	ES1929844-014	-----
					Result	Result	Result	Result	----
EA005: pH									
pH Value	----	0.01	pH Unit		----	4.32	4.66	4.72	----
EA006: Sodium Adsorption Ratio (SAR)									
^ Sodium Adsorption Ratio	----	0.01	-		----	3.49	3.18	1.32	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		----	1080	195	96	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		----	689	140	60	----
EA016: Calculated TDS (from Electrical Conductivity)									
Total Dissolved Solids (Calc.)	----	1	mg/L		----	702	127	62	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		----	15	533	216	----
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		----	213	12	13	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		----	<1	<1	<1	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		----	<1	<1	<1	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		----	<1	<1	<1	----
Total Alkalinity as CaCO3	----	1	mg/L		----	<1	<1	<1	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		----	244	5	8	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		----	193	46	18	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		----	21	<1	2	----
Magnesium	7439-95-4	1	mg/L		----	39	3	2	----
Sodium	7440-23-5	1	mg/L		----	117	27	11	----
Potassium	7440-09-7	1	mg/L		----	4	<1	<1	----
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Boron	7440-42-8	0.05	mg/L		<0.05	0.09	<0.05	<0.05	----
Barium	7440-39-3	0.001	mg/L		0.041	0.056	0.005	0.004	----
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	0.0002	<0.0001	<0.0001	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	DUP08	SW1	BH11	BH2	----
Client sampling date / time					16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	----
Compound	CAS Number	LOR	Unit		ES1929844-011	ES1929844-012	ES1929844-013	ES1929844-014	-----
					Result	Result	Result	Result	----
EG020F: Dissolved Metals by ICP-MS - Continued									
Cobalt	7440-48-4	0.001	mg/L		0.002	0.008	<0.001	<0.001	----
Chromium	7440-47-3	0.001	mg/L		<0.001	0.001	0.001	<0.001	----
Copper	7440-50-8	0.001	mg/L		<0.001	0.012	<0.001	0.008	----
Manganese	7439-96-5	0.001	mg/L		0.036	0.587	0.008	0.014	----
Nickel	7440-02-0	0.001	mg/L		0.003	0.014	0.002	0.001	----
Lead	7439-92-1	0.001	mg/L		<0.001	0.001	<0.001	<0.001	----
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	----
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	----
Zinc	7440-66-6	0.005	mg/L		0.012	0.282	0.012	0.007	----
Iron	7439-89-6	0.05	mg/L		0.76	2.45	0.79	0.26	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	----
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		----	0.7	<0.1	<0.1	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		----	<0.01	0.15	0.04	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		----	<0.01	<0.01	<0.01	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		----	0.02	<0.01	1.07	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		----	0.02	<0.01	1.07	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		----	1.2	0.7	1.6	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		----	1.2	0.7	2.7	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		----	0.05	0.12	0.28	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		----	<0.01	<0.01	<0.01	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		----	10.5	1.40	0.67	----
ø Total Cations	----	0.01	meq/L		----	9.45	1.42	0.74	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	DUP08	SW1	BH11	BH2	----
Client sampling date / time					16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	----
Compound	CAS Number	LOR	Unit		ES1929844-011	ES1929844-012	ES1929844-013	ES1929844-014	-----
					Result	Result	Result	Result	----
EN055: Ionic Balance - Continued									
Ø Ionic Balance	----	0.01	%		----	5.38	----	----	----
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	----
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	----
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	----
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	----
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	----
^ Total Xylenes	----	2	µg/L		<2	<2	<2	<2	----
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	----
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	DUP08	SW1	BH11	BH2	----
Client sampling date / time					16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	----
Compound	CAS Number	LOR	Unit		ES1929844-011	ES1929844-012	ES1929844-013	ES1929844-014	-----
					Result	Result	Result	Result	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		0.01	<0.01	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	DUP08	SW1	BH11	BH2	----
Client sampling date / time					16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	----
Compound	CAS Number	LOR	Unit		ES1929844-011	ES1929844-012	ES1929844-013	ES1929844-014	-----
					Result	Result	Result	Result	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		0.01	<0.01	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		0.01	<0.01	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		0.01	<0.01	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		106	106	116	102	----
Toluene-D8	2037-26-5	2	%		96.3	96.2	108	94.9	----
4-Bromofluorobenzene	460-00-4	2	%		97.5	99.2	103	97.8	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		96.7	96.4	----	----	----
13C8-PFOA	----	0.02	%		93.3	84.7	----	----	----



Surrogate Control Limits

Sub-Matrix: **WATER**

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

QUALITY CONTROL REPORT

Work Order	: ES1929844	Page	: 1 of 16
Client	: KLEINFELDER AUSTRALIA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Contact	: Shirley LeCornu
Address	: 95 MITCHELL ROAD CARDIFF NSW 2285	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +6138549 9630
Project	: 20193820	Date Samples Received	: 16-Sep-2019
Order number	: ----	Date Analysis Commenced	: 17-Sep-2019
C-O-C number	: ----	Issue Date	: 23-Sep-2019
Sampler	: DANIEL KOUSBROEK		
Site	: WSS-CABBAGE TREE RD WATER MONITORING		
Quote number	: ME/114/19		
No. of samples received	: 14		
No. of samples analysed	: 14		



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 Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Neil Martin	Team Leader - Chemistry	Chemistry, Newcastle West, NSW



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

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 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
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005: pH (QC Lot: 2587556)									
ES1929844-001	BH7	EA005: pH Value	----	0.01	pH Unit	5.07	4.94	2.60	0% - 20%
ES1929802-001	Anonymous	EA005: pH Value	----	0.01	pH Unit	5.52	5.53	0.181	0% - 20%
EA005: pH (QC Lot: 2587557)									
ES1929855-001	Anonymous	EA005: pH Value	----	0.01	pH Unit	7.69	7.80	1.42	0% - 20%
WN1906820-001	Anonymous	EA005: pH Value	----	0.01	pH Unit	5.02	4.99	0.599	0% - 20%
EA005P: pH by PC Titrator (QC Lot: 2588437)									
ES1929801-003	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	6.89	6.99	1.44	0% - 20%
ES1929844-006	SW4	EA005-P: pH Value	----	0.01	pH Unit	4.35	4.39	0.915	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 2588439)									
ES1929844-012	SW1	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	1080	1080	0.0931	0% - 20%
ES1929844-006	SW4	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	360	361	0.286	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 2590822)									
ES1929551-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	7790	7390	5.32	0% - 20%
ES1929819-004	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	151	155	2.62	0% - 50%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 2590824)									
ES1929844-006	SW4	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	208	217	4.24	0% - 20%
EW1904011-006	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	122	126	3.42	0% - 50%
EA025: Total Suspended Solids dried at 104 ± 2 °C (QC Lot: 2590821)									
ES1929551-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	6	5	26.1	No Limit
ES1929819-004	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	<5	<5	0.00	No Limit
EA025: Total Suspended Solids dried at 104 ± 2 °C (QC Lot: 2590823)									
ES1929844-006	SW4	EA025H: Suspended Solids (SS)	----	5	mg/L	<5	<5	0.00	No Limit
EW1904011-006	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	<5	<5	0.00	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 2588435)									
ES1929801-003	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	45	47	3.92	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	45	47	3.92	0% - 20%
ES1929844-006	SW4	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	0.00	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2588694)									
ES1929844-001	BH7	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	13	13	0.00	0% - 50%
ES1929844-013	BH11	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	5	5	0.00	No Limit
ED045G: Chloride by Discrete Analyser (QC Lot: 2588697)									
ES1929844-001	BH7	ED045G: Chloride	16887-00-6	1	mg/L	53	53	0.00	0% - 20%
ES1929844-013	BH11	ED045G: Chloride	16887-00-6	1	mg/L	46	46	0.00	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 2589435)									
ES1929844-014	BH2	ED093F: Calcium	7440-70-2	1	mg/L	2	2	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	2	2	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	11	11	0.00	0% - 50%
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.00	No Limit
ES1929844-003	BH8	ED093F: Calcium	7440-70-2	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	3	3	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	46	46	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2589432)									
ES1929827-003	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0010	<0.0010	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.015	0.018	14.5	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.012	0.011	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.050	<0.050	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.10	<0.10	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.10	<0.10	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	4.21	4.56	8.00	0% - 20%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.10	<0.10	0.00	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2589432) - continued									
ES1929827-012	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.055	0.056	2.42	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.038	0.037	3.78	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.19	0.20	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2589437)									
ES1929844-014	BH2	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.004	0.004	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.008	0.009	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.014	0.014	0.00	0% - 50%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.001	0.002	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.007	0.006	24.7	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.26	0.25	0.00	No Limit
ES1929844-003	BH8	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.010	0.010	0.00	0% - 50%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.005	0.005	0.00	No Limit



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2589437) - continued									
ES1929844-003	BH8	EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.002	0.003	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	2.06	2.10	2.07	0% - 20%
EG035F: Dissolved Mercury by FIMS (QC Lot: 2589433)									
ES1929827-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.0002	0.00	No Limit
ES1929827-011	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 2589436)									
ES1929844-004	MW239S	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES1929844-012	SW1	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 2588436)									
ES1929801-003	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.4	0.3	0.00	No Limit
ES1929844-006	SW4	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.1	0.1	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 2588661)									
ES1929664-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.04	0.04	0.00	No Limit
ES1929801-012	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	0.01	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 2588662)									
EW1904011-006	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	<0.01	0.00	No Limit
ES1929844-010	BH4	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.02	0.05	65.5	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 2588696)									
ES1929844-001	BH7	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
ES1929844-013	BH11	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 2588660)									
ES1929631-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.80	0.70	13.6	0% - 20%
ES1929801-012	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 2588663)									
EW1904011-006	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.01	0.03	63.4	No Limit
ES1929844-010	BH4	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.24	0.24	0.00	0% - 20%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 2588656)									
ES1929631-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	6.2	6.0	2.23	0% - 20%
ES1929801-003	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.5	0.5	0.00	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 2588659)									
ES1929844-004	MW239S	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.4	1.3	0.00	No Limit
EW1904011-003	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	<0.1	0.00	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 2588657)									
ES1929631-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.06	0.06	0.00	No Limit



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 2588657) - continued									
ES1929801-003	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	0.03	89.5	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 2588658)									
ES1929844-004	MW239S	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.32	0.27	17.9	0% - 50%
EW1904011-003	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 2588695)									
ES1929844-001	BH7	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
ES1929844-013	BH11	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2591332)									
ES1929844-002	BH6	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
ES1929844-007	RINSATE 08	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2591332)									
ES1929844-002	BH6	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES1929844-007	RINSATE 08	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 2591332)									
ES1929844-002	BH6	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
ES1929844-007	RINSATE 08	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 2586805)									
ES1929819-001	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	3.46	3.46	0.00	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.06	0.06	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.06	0.06	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	1.06	1.07	0.00	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.06	0.07	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
ES1929844-008	TRIP BLANK 08	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 2586805) - continued									
ES1929844-008	TRIP BLANK 08	EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2586805)									
ES1929819-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.09	0.09	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.12	0.12	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.34	0.34	0.00	0% - 50%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.06	0.06	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
ES1929844-008	TRIP BLANK 08	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2586805)									
ES1929819-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1929844-008	TRIP BLANK 08	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2586805) - continued									
ES1929844-008	TRIP BLANK 08	EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2586805)									
ES1929819-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	0.22	0.22	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1929844-008	TRIP BLANK 08	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 2586805)									
ES1929819-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	5.53	5.55	0.361	0% - 20%
ES1929844-008	TRIP BLANK 08	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.00	No Limit



Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EA005: pH (QCLot: 2587556)								
EA005: pH Value	----	----	pH Unit	----	7.6 pH Unit	99.3	98.5	102
EA005: pH (QCLot: 2587557)								
EA005: pH Value	----	----	pH Unit	----	7.6 pH Unit	99.3	98.5	102
EA005P: pH by PC Titrator (QCLot: 2588437)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98.0	102
				----	7 pH Unit	100	98.0	102
EA010P: Conductivity by PC Titrator (QCLot: 2588439)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2100 µS/cm	# 92.5	95.0	113
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 2590822)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	99.4	87.0	109
				<10	293 mg/L	116	66.0	126
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 2590824)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	103	87.0	109
				<10	293 mg/L	113	66.0	126
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 2590821)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	105	83.0	129
				<5	1000 mg/L	97.0	82.0	110
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 2590823)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	101	83.0	129
				<5	1000 mg/L	96.0	82.0	110
ED037P: Alkalinity by PC Titrator (QCLot: 2588435)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	85.7	81.0	111
				----	50 mg/L	96.5	70.0	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2588694)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	100	82.0	122
				<1	500 mg/L	90.8	82.0	122
ED045G: Chloride by Discrete Analyser (QCLot: 2588697)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	81.0	80.9	127
				<1	1000 mg/L	110	80.9	127
ED093F: Dissolved Major Cations (QCLot: 2589435)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	97.3	80.0	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	103	90.0	116
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	102	82.0	120

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) LowHigh	
Method: Compound	CAS Number	LOR	Unit	Result				
ED093F: Dissolved Major Cations (QCLot: 2589435) - continued								
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	99.9	85.0	113
EG020F: Dissolved Metals by ICP-MS (QCLot: 2589432)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	97.8	85.0	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	91.8	85.0	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	98.9	82.0	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	92.8	84.0	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	95.0	85.0	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	93.6	82.0	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	95.6	81.0	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	94.6	83.0	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	98.4	82.0	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	94.0	82.0	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	93.9	85.0	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	102	83.0	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	101	81.0	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	92.3	85.0	115
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	95.4	82.0	112
EG020F: Dissolved Metals by ICP-MS (QCLot: 2589437)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	103	85.0	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	86.0	85.0	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	107	82.0	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	95.9	84.0	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	94.6	85.0	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	93.6	82.0	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	95.4	81.0	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	97.6	83.0	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	97.2	82.0	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	95.1	82.0	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	103	85.0	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	95.7	83.0	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	98.5	81.0	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	87.2	85.0	115
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	95.4	82.0	112
EG035F: Dissolved Mercury by FIMS (QCLot: 2589433)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	90.3	83.0	105
EG035F: Dissolved Mercury by FIMS (QCLot: 2589436)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	92.3	83.0	105
EK040P: Fluoride by PC Titrator (QCLot: 2588436)								



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EK040P: Fluoride by PC Titrator (QCLot: 2588436) - continued								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	104	82.0	116
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2588661)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	103	90.0	114
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2588662)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	100	90.0	114
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2588696)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	101	82.0	114
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2588660)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	99.6	91.0	113
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2588663)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	98.8	91.0	113
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2588656)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	81.6	69.0	101
				<0.1	1 mg/L	73.5	70.0	118
				<0.1	5 mg/L	78.5	74.0	118
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2588659)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	84.2	69.0	101
				<0.1	1 mg/L	85.6	70.0	118
				<0.1	5 mg/L	91.5	74.0	118
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2588657)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	85.6	71.0	101
				<0.01	0.442 mg/L	88.5	72.0	108
				<0.01	1 mg/L	91.2	78.0	118
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2588658)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	82.5	71.0	101
				<0.01	0.442 mg/L	85.7	72.0	108
				<0.01	1 mg/L	88.8	78.0	118
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2588695)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	104	85.0	117
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QCLot: 2587268)								
EP071SG: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	76.1	55.8	112
EP071SG: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	86.2	71.6	113
EP071SG: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	56.6	56.0	121
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 2587268)								
EP071SG: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	102	57.9	119
EP071SG: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	69.3	62.5	110
EP071SG: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	80.0	61.5	121



Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result			Low	High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2591332)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	90.5	75.0	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2591332)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	96.0	75.0	127
EP080: BTEXN (QCLot: 2591332)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	94.8	70.0	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	102	69.0	123
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	102	70.0	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	103	69.0	121
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	98.4	72.0	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	96.9	70.0	120
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2586805)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	97.0	70.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	95.0	70.0	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	103	70.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	108	70.0	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	106	70.0	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.5 µg/L	110	70.0	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2586805)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	105	70.0	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	106	70.0	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	115	70.0	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	107	70.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	112	70.0	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	102	70.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	105	70.0	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	111	70.0	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	114	70.0	130
EP231X: Perfluorotridecanoic acid (PFTriDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	114	70.0	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	102	70.0	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2586805)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	110	70.0	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	116	70.0	150
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	100	70.0	150
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	1.25 µg/L	109	70.0	150
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	115	70.0	150



Sub-Matrix: **WATER**

Method: Compound				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
						LCS	Low	High
CAS Number	LOR	Unit	Result					
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2586805) - continued								
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	110	70.0	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	104	70.0	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2586805)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	109	70.0	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	103	70.0	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	104	70.0	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	122	70.0	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2588694)							
ES1929844-001	BH7	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	114	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 2588697)							
ES1929844-001	BH7	ED045G: Chloride	16887-00-6	250 mg/L	123	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2589432)							
ES1929827-004	Anonymous	EG020A-F: Arsenic	7440-38-2	10 mg/L	91.5	70.0	130
		EG020A-F: Beryllium	7440-41-7	10 mg/L	88.2	70.0	130
		EG020A-F: Barium	7440-39-3	10 mg/L	91.6	70.0	130
		EG020A-F: Cadmium	7440-43-9	2.5 mg/L	85.1	70.0	130
		EG020A-F: Chromium	7440-47-3	10 mg/L	86.6	70.0	130
		EG020A-F: Cobalt	7440-48-4	10 mg/L	89.0	70.0	130
		EG020A-F: Copper	7440-50-8	10 mg/L	87.3	70.0	130
		EG020A-F: Lead	7439-92-1	10 mg/L	84.1	70.0	130
		EG020A-F: Manganese	7439-96-5	10 mg/L	85.6	70.0	130
		EG020A-F: Nickel	7440-02-0	10 mg/L	86.0	70.0	130
		EG020A-F: Vanadium	7440-62-2	10 mg/L	91.7	70.0	130
		EG020A-F: Zinc	7440-66-6	10 mg/L	87.4	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2589437)							
ES1929844-004	MW239S	EG020A-F: Arsenic	7440-38-2	1 mg/L	85.5	70.0	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	80.2	70.0	130
		EG020A-F: Barium	7440-39-3	1 mg/L	91.2	70.0	130

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 2589437) - continued							
ES1929844-004	MW239S	EG020A-F: Cadmium	7440-43-9	0.25 mg/L	85.3	70.0	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	82.6	70.0	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	85.3	70.0	130
		EG020A-F: Copper	7440-50-8	1 mg/L	85.7	70.0	130
		EG020A-F: Lead	7439-92-1	1 mg/L	86.0	70.0	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	85.4	70.0	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	84.1	70.0	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	85.3	70.0	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	94.7	70.0	130
EG035F: Dissolved Mercury by FIMS (QCLot: 2589433)							
ES1929827-002	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	83.5	70.0	130
EG035F: Dissolved Mercury by FIMS (QCLot: 2589436)							
ES1929844-003	BH8	EG035F: Mercury	7439-97-6	0.01 mg/L	81.2	70.0	130
EK040P: Fluoride by PC Titrator (QCLot: 2588436)							
ES1929784-010	Anonymous	EK040P: Fluoride	16984-48-8	5 mg/L	81.0	70.0	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2588661)							
ES1929664-001	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	108	70.0	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2588662)							
ES1929844-010	BH4	EK055G: Ammonia as N	7664-41-7	1 mg/L	110	70.0	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2588696)							
ES1929844-001	BH7	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	109	70.0	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2588660)							
ES1929631-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	96.7	70.0	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2588663)							
ES1929844-010	BH4	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	98.4	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2588656)							
ES1929664-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	50 mg/L	87.6	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2588659)							
ES1929844-005	SW3	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	88.3	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2588657)							
ES1929664-001	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	93.3	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2588658)							
ES1929844-005	SW3	EK067G: Total Phosphorus as P	----	1 mg/L	102	70.0	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2588695)							



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2588695) - continued							
ES1929844-001	BH7	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	103	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2591332)							
ES1929844-002	BH6	EP080: C6 - C9 Fraction	----	325 µg/L	88.0	70.0	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2591332)							
ES1929844-002	BH6	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	86.0	70.0	130
EP080: BTEXN (QCLot: 2591332)							
ES1929844-002	BH6	EP080: Benzene	71-43-2	25 µg/L	93.7	70.0	130
		EP080: Toluene	108-88-3	25 µg/L	96.7	70.0	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	97.5	70.0	130
		EP080: meta- & para-Xylene	108-38-3	25 µg/L	95.9	70.0	130
			106-42-3				
		EP080: ortho-Xylene	95-47-6	25 µg/L	98.7	70.0	130
		EP080: Naphthalene	91-20-3	25 µg/L	95.8	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2586805)							
ES1929819-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	107	50.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.5 µg/L	109	50.0	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	95.6	50.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	115	50.0	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	# Not Determined	50.0	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.5 µg/L	123	50.0	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2586805)							
ES1929819-001	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	112	50.0	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	103	50.0	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	130	50.0	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	118	50.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	119	50.0	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	117	50.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	113	50.0	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	117	50.0	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	118	50.0	130
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.5 µg/L	121	50.0	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	97.0	50.0	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2586805)							
ES1929819-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	123	50.0	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	119	50.0	150

Page : 16 of 16
 Work Order : ES1929844
 Client : KLEINFELDER AUSTRALIA PTY LTD
 Project : 20193820



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2586805) - continued							
ES1929819-001	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	106	50.0	150
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	1.25 µg/L	123	50.0	150
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	122	50.0	150
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	120	50.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	120	50.0	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2586805)							
ES1929819-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	118	50.0	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	113	50.0	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	120	50.0	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	118	50.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES1929844	Page	: 1 of 15
Client	: KLEINFELDER AUSTRALIA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Telephone	: +6138549 9630
Project	: 20193820	Date Samples Received	: 16-Sep-2019
Site	: WSS-CABBAGE TREE RD WATER MONITORING	Issue Date	: 23-Sep-2019
Sampler	: DANIEL KOUSBROEK	No. of samples received	: 14
Order number	: ----	No. of samples analysed	: 14

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- Laboratory Control outliers exist - please see following pages for full details.
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers exist - please see following pages for full details.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Laboratory Control Spike (LCS) Recoveries							
EA010P: Conductivity by PC Titrator	QC-2588439-002	----	Electrical Conductivity @ 25°C	----	92.5 %	95.0-113%	Recovery less than lower control limit
Matrix Spike (MS) Recoveries							
EP231A: Perfluoroalkyl Sulfonic Acids	ES1929819--001	Anonymous	Perfluorooctane sulfonic acid (PFOS)	1763-23-1	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method		Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005: pH							
Clear Plastic Bottle - Natural							
BH7, BH8, SW3, BH1, SW1, BH2	BH6, MW239S, SW4, BH4, BH11,	----	----	----	17-Sep-2019	16-Sep-2019	1
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
SW4		----	----	----	17-Sep-2019	16-Sep-2019	1

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	0	14	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	0	14	0.00	5.00	NEPM 2013 B3 & ALS QC Standard



Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA005: pH								
Clear Plastic Bottle - Natural (EA005) BH7, BH8, SW3, BH1, SW1, BH2	BH6, MW239S, SW4, BH4, BH11,	16-Sep-2019	----	----	----	17-Sep-2019	16-Sep-2019	✖
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural (EA005-P) SW4		16-Sep-2019	----	----	----	17-Sep-2019	16-Sep-2019	✖
EA006: Sodium Adsorption Ratio (SAR)								
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH7, BH8, SW3, BH1, SW1, BH2	BH6, MW239S, SW4, BH4, BH11,	16-Sep-2019	----	----	----	18-Sep-2019	14-Oct-2019	✔
EA010P: Conductivity by PC Titrator								
Clear Plastic Bottle - Natural (EA010-P) BH7, BH8, SW3, BH1, SW1, BH2	BH6, MW239S, SW4, BH4, BH11,	16-Sep-2019	----	----	----	17-Sep-2019	14-Oct-2019	✔



Matrix: **WATER**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Clear Plastic Bottle - Natural (EA015H)		16-Sep-2019	----	----	----	18-Sep-2019	23-Sep-2019	✓
BH7, BH8, SW3, BH1, SW1, BH2	BH6, MW239S, SW4, BH4, BH11,							
EA025: Total Suspended Solids dried at 104 ± 2 °C								
Clear Plastic Bottle - Natural (EA025H)		16-Sep-2019	----	----	----	18-Sep-2019	23-Sep-2019	✓
BH7, BH8, SW3, BH1, SW1, BH2	BH6, MW239S, SW4, BH4, BH11,							
EA065: Total Hardness as CaCO3								
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)		16-Sep-2019	----	----	----	18-Sep-2019	14-Oct-2019	✓
BH7, BH8, SW3, BH1, SW1, BH2	BH6, MW239S, SW4, BH4, BH11,							
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P)		16-Sep-2019	----	----	----	17-Sep-2019	30-Sep-2019	✓
BH7, BH8, SW3, BH1, SW1, BH2	BH6, MW239S, SW4, BH4, BH11,							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G)		16-Sep-2019	----	----	----	17-Sep-2019	14-Oct-2019	✓
BH7, BH8, SW3, BH1, SW1, BH2	BH6, MW239S, SW4, BH4, BH11,							



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G) BH7, BH8, SW3, BH1, SW1, BH2	BH6, MW239S, SW4, BH4, BH11,	16-Sep-2019	----	----	----	17-Sep-2019	14-Oct-2019	✓
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH7, BH8, SW3, BH1, SW1, BH2	BH6, MW239S, SW4, BH4, BH11,	16-Sep-2019	----	----	----	18-Sep-2019	14-Oct-2019	✓
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) BH7, BH8, SW3, RINSATE 08, BH1, DUP08, BH11,	BH6, MW239S, SW4, TRIP BLANK 08, BH4, SW1, BH2	16-Sep-2019	----	----	----	18-Sep-2019	14-Mar-2020	✓
EG035F: Dissolved Mercury by FIMS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) BH7, BH8, SW3, RINSATE 08, BH1, DUP08, BH11,	BH6, MW239S, SW4, TRIP BLANK 08, BH4, SW1, BH2	16-Sep-2019	----	----	----	18-Sep-2019	14-Oct-2019	✓
EK040P: Fluoride by PC Titrator								
Clear Plastic Bottle - Natural (EK040P) BH7, BH8, SW3, BH1, SW1, BH2	BH6, MW239S, SW4, BH4, BH11,	16-Sep-2019	----	----	----	17-Sep-2019	14-Oct-2019	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK055G: Ammonia as N by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK055G)		16-Sep-2019	----	----	----	17-Sep-2019	14-Oct-2019	✓
BH7, BH8, SW3, BH1, SW1, BH2	BH6, MW239S, SW4, BH4, BH11,							
EK057G: Nitrite as N by Discrete Analyser								
Clear Plastic Bottle - Natural (EK057G)		16-Sep-2019	----	----	----	17-Sep-2019	18-Sep-2019	✓
BH7, BH8, SW3, BH1, SW1, BH2	BH6, MW239S, SW4, BH4, BH11,							
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK059G)		16-Sep-2019	----	----	----	17-Sep-2019	14-Oct-2019	✓
BH7, BH8, SW3, BH1, SW1, BH2	BH6, MW239S, SW4, BH4, BH11,							
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK061G)		16-Sep-2019	17-Sep-2019	14-Oct-2019	✓	17-Sep-2019	14-Oct-2019	✓
BH7, BH8, SW3, BH1, SW1, BH2	BH6, MW239S, SW4, BH4, BH11,							
EK067G: Total Phosphorus as P by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK067G)		16-Sep-2019	17-Sep-2019	14-Oct-2019	✓	17-Sep-2019	14-Oct-2019	✓
BH7, BH8, SW3, BH1, SW1, BH2	BH6, MW239S, SW4, BH4, BH11,							



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK071G: Reactive Phosphorus as P by discrete analyser								
Clear Plastic Bottle - Natural (EK071G)		16-Sep-2019	----	----	----	17-Sep-2019	18-Sep-2019	✓
BH7, BH8, SW3, BH1, SW1, BH2	BH6, MW239S, SW4, BH4, BH11,							
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup								
Amber Glass Bottle - Unpreserved (EP071SG)		16-Sep-2019	18-Sep-2019	23-Sep-2019	✓	19-Sep-2019	28-Oct-2019	✓
BH7, BH8, SW3, RINSATE 08, BH1, DUP08, BH11,	BH6, MW239S, SW4, TRIP BLANK 08, BH4, SW1, BH2							
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
Amber Glass Bottle - Unpreserved (EP071SG)		16-Sep-2019	18-Sep-2019	23-Sep-2019	✓	19-Sep-2019	28-Oct-2019	✓
BH7, BH8, SW3, RINSATE 08, BH1, DUP08, BH11,	BH6, MW239S, SW4, TRIP BLANK 08, BH4, SW1, BH2							
EP080/071: Total Petroleum Hydrocarbons								
Amber VOC Vial - Sulfuric Acid (EP080)		16-Sep-2019	20-Sep-2019	30-Sep-2019	✓	20-Sep-2019	30-Sep-2019	✓
BH7, BH8, SW3, RINSATE 08, BH1, DUP08, BH11,	BH6, MW239S, SW4, TRIP BLANK 08, BH4, SW1, BH2							



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Amber VOC Vial - Sulfuric Acid (EP080)		16-Sep-2019	20-Sep-2019	30-Sep-2019	✓	20-Sep-2019	30-Sep-2019	✓
BH7, BH8, SW3, RINSATE 08, BH1, DUP08, BH11,	BH6, MW239S, SW4, TRIP BLANK 08, BH4, SW1, BH2							
EP080: BTEXN								
Amber VOC Vial - Sulfuric Acid (EP080)		16-Sep-2019	20-Sep-2019	30-Sep-2019	✓	20-Sep-2019	30-Sep-2019	✓
BH7, BH8, SW3, RINSATE 08, BH1, DUP08, BH11,	BH6, MW239S, SW4, TRIP BLANK 08, BH4, SW1, BH2							
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X)		16-Sep-2019	17-Sep-2019	14-Mar-2020	✓	17-Sep-2019	14-Mar-2020	✓
BH7, BH8, SW4, TRIP BLANK 08, DUP08,	BH6, SW3, RINSATE 08, BH4, SW1							
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X)		16-Sep-2019	17-Sep-2019	14-Mar-2020	✓	17-Sep-2019	14-Mar-2020	✓
BH7, BH8, SW4, TRIP BLANK 08, DUP08,	BH6, SW3, RINSATE 08, BH4, SW1							
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X)		16-Sep-2019	17-Sep-2019	14-Mar-2020	✓	17-Sep-2019	14-Mar-2020	✓
BH7, BH8, SW4, TRIP BLANK 08, DUP08,	BH6, SW3, RINSATE 08, BH4, SW1							

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X)		16-Sep-2019	17-Sep-2019	14-Mar-2020	✓	17-Sep-2019	14-Mar-2020	✓
BH7,	BH6,							
BH8,	SW3,							
SW4,	RINSATE 08,							
TRIP BLANK 08,	BH4,							
DUP08,	SW1							
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X)		16-Sep-2019	17-Sep-2019	14-Mar-2020	✓	17-Sep-2019	14-Mar-2020	✓
BH7,	BH6,							
BH8,	SW3,							
SW4,	RINSATE 08,							
TRIP BLANK 08,	BH4,							
DUP08,	SW1							



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	4	35	11.43	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	14	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	14	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	4	32	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	4	39	10.26	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	4	33	12.12	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	14	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	14	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
pH	EA005	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	7	28.57	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	12	16.67	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	14	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	4	39	10.26	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	39	10.26	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	4	38	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	4	38	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	0	14	0.00	10.00	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	2	35	5.71	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	14	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	32	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	39	5.13	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	33	6.06	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
pH	EA005	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	7	28.57	10.00	✓	NEPM 2013 B3 & ALS QC Standard



Matrix: **WATER**

Evaluation: * = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)		Quality Control Specification	
Analytical Methods	Method	QC	Regular	Actual	Expected		Evaluation
Laboratory Control Samples (LCS) - Continued							
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	14	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	4	39	10.26	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	39	10.26	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	6	38	15.79	15.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	6	38	15.79	15.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	2	35	5.71	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	32	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	39	5.13	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	33	6.06	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	39	5.13	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	39	5.13	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	38	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	38	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	2	35	5.71	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	32	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	39	5.13	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	33	6.06	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Page : 12 of 15
 Work Order : ES1929844
 Client : KLEINFELDER AUSTRALIA PTY LTD
 Project : 20193820



Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Matrix Spikes (MS) - Continued							
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	38	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	38	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	0	14	0.00	5.00	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH	EA005	WATER	In house: Referenced to APHA 4500 H+ B. pH of water samples is determined by ISE either manually or by automated pH meter. This method is compliant with NEPM (2013) Schedule B(3)
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (2013) Schedule B(3)
Calculated TDS (from Electrical Conductivity)	EA016	WATER	In house: Calculation from Electrical Conductivity (APHA 2510 B) using a conversion factor specified in the analytical report. This method is compliant with NEPM (2013) Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of 'non-filterable' residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C. This method is compliant with NEPM (2013) Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM (2013) Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (2013) Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)



Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Fluoride by PC Titrator	EK040P	WATER	In house: Referenced to APHA 4500-F C: CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH ₃ G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO ₂ - B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO ₃ - F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined separately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NO _x) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO ₃ - F. Combined oxidised Nitrogen (NO ₂ +NO ₃) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO ₃ -. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with orthophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Ionic Balance by PCT DA and Turbi SO ₄ DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM (2013) Schedule B(3)



Analytical Methods	Method	Matrix	Method Descriptions
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	WATER	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C36. This method is compliant with NEPM (2013) Schedule B(3) (Method 506.1)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In house: Direct injection analysis of fresh waters after dilution (1:1) with methanol. Analysis by LC-Electrospray-MS-MS, Negative Mode using MRM. Where commercially available, isotopically labelled analogues of the target analytes are used as internal standards for quantification. Where a labelled analogue is not commercially available, the internal standard with similar chemistry and the closest retention time to the target is used for quantification. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. This method complies with the quality control definitions as stated in QSM 5.1. Data is reviewed in line with the DQOs as stated in QSM5.1

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Preparation for PFAS in water.	EP231-PR	WATER	Method presumes direct injection without workup. Preparation includes addition of internal standard and surrogate, and filtration prior to analysis.
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.



Environmental

CERTIFICATE OF ANALYSIS

Work Order : **ES1931069**
Client : **KLEINFELDER AUSTRALIA PTY LTD**
Contact : **DANIEL KOUSBROEK**
Address : **95 MITCHELL ROAD**
CARDIFF NSW 2285
Telephone : **----**
Project : **20193820**
Order number : **----**
C-O-C number : **----**
Sampler : **DANIEL KOUSBROEK**
Site : **WSS-CABBAGE TREE RD WATER MONITORING**
Quote number : **ME/114/19 ALS Compass**
No. of samples received : **4**
No. of samples analysed : **4**

Page : 1 of 5
Laboratory : Environmental Division Sydney
Contact : Shirley LeCornu
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +6138549 9630
Date Samples Received : 25-Sep-2019 10:40
Date Analysis Commenced : 27-Sep-2019
Issue Date : 01-Oct-2019 16:15



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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW



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
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW4	BH4	RINSATE 09	TRIP BLANK 09	----
Client sampling date / time					25-Sep-2019 00:00	25-Sep-2019 00:00	25-Sep-2019 00:00	25-Sep-2019 00:00	----
Compound	CAS Number	LOR	Unit		ES1931069-001	ES1931069-002	ES1931069-003	ES1931069-004	-----
					Result	Result	Result	Result	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		0.05	<0.01	<0.01	<0.01	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW4	BH4	RINSATE 09	TRIP BLANK 09	----
Client sampling date / time					25-Sep-2019 00:00	25-Sep-2019 00:00	25-Sep-2019 00:00	25-Sep-2019 00:00	----
Compound	CAS Number	LOR	Unit		ES1931069-001	ES1931069-002	ES1931069-003	ES1931069-004	-----
					Result	Result	Result	Result	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<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	<0.02	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<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	<0.05	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<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	<0.05	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		0.05	<0.01	<0.01	<0.01	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		0.05	<0.01	<0.01	<0.01	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		0.05	<0.01	<0.01	<0.01	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		96.1	101	102	98.7	----
13C8-PFOA	----	0.02	%		96.7	101	102	95.7	----



Surrogate Control Limits

Sub-Matrix: **WATER**

		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

QUALITY CONTROL REPORT

Work Order	: ES1931069	Page	: 1 of 7
Client	: KLEINFELDER AUSTRALIA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Contact	: Shirley LeCornu
Address	: 95 MITCHELL ROAD CARDIFF NSW 2285	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +6138549 9630
Project	: 20193820	Date Samples Received	: 25-Sep-2019
Order number	: ----	Date Analysis Commenced	: 27-Sep-2019
C-O-C number	: ----	Issue Date	: 01-Oct-2019
Sampler	: DANIEL KOUSBROEK		
Site	: WSS-CABBAGE TREE RD WATER MONITORING		
Quote number	: ME/114/19 ALS Compass		
No. of samples received	: 4		
No. of samples analysed	: 4		



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 Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW



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

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 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
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 2609456)									
EB1924576-012	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
ES1931069-004	TRIP BLANK 09	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2609456)									
EB1924576-012	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTriDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		ES1931069-004	TRIP BLANK 09	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2609456) - continued									
ES1931069-004	TRIP BLANK 09	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2609456)									
EB1924576-012	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1931069-004	TRIP BLANK 09	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2609456)									
EB1924576-012	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit

Page : 4 of 7
 Work Order : ES1931069
 Client : KLEINFELDER AUSTRALIA PTY LTD
 Project : 20193820



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2609456) - continued									
EB1924576-012	Anonymous	EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1931069-004	TRIP BLANK 09	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 2609456)									
EB1924576-012	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.00	No Limit
ES1931069-004	TRIP BLANK 09	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.00	No Limit



Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2609456)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	81.8	70.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	90.8	70.0	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	78.8	70.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	88.6	70.0	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	86.0	70.0	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.5 µg/L	73.8	70.0	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2609456)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	102	70.0	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	103	70.0	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	91.6	70.0	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	102	70.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	96.0	70.0	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	88.4	70.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	91.4	70.0	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	94.0	70.0	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	75.8	70.0	130
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	81.4	70.0	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	79.7	70.0	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2609456)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	108	70.0	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	94.3	70.0	150
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	80.6	70.0	150
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	1.25 µg/L	101	70.0	150
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	97.4	70.0	150
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	90.0	70.0	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	107	70.0	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2609456)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	89.8	70.0	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	91.8	70.0	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	93.2	70.0	130



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
						LCS	Low	High
Method: Compound	CAS Number	LOR	Unit	Result				
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2609456) - continued								
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	77.0	70.0	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2609456)							
EB1924576-012	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	91.2	50.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.5 µg/L	101	50.0	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	83.8	50.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	98.4	50.0	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	96.4	50.0	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.5 µg/L	86.2	50.0	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2609456)							
EB1924576-012	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	114	50.0	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	114	50.0	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	104	50.0	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	114	50.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	113	50.0	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	101	50.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	103	50.0	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	111	50.0	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	103	50.0	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5 µg/L	91.6	50.0	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	93.1	50.0	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2609456)							
EB1924576-012	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	123	50.0	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	112	50.0	150
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	91.0	50.0	150
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	1.25 µg/L	114	50.0	150
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	124	50.0	150
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	104	50.0	130



Sub-Matrix: WATER

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2609456) - continued							
EB1924576-012	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	126	50.0	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2609456)							
EB1924576-012	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	96.8	50.0	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	104	50.0	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	112	50.0	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	106	50.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES1931069	Page	: 1 of 4
Client	: KLEINFELDER AUSTRALIA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Telephone	: +6138549 9630
Project	: 20193820	Date Samples Received	: 25-Sep-2019
Site	: WSS-CABBAGE TREE RD WATER MONITORING	Issue Date	: 01-Oct-2019
Sampler	: DANIEL KOUSBROEK	No. of samples received	: 4
Order number	: ----	No. of samples analysed	: 4

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- **NO** Matrix Spike outliers occur.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- **NO** Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- **NO** Quality Control Sample Frequency Outliers exist.



Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X) SW4, RINSATE 09,	BH4, TRIP BLANK 09	25-Sep-2019	27-Sep-2019	23-Mar-2020	✓	30-Sep-2019	23-Mar-2020	✓
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X) SW4, RINSATE 09,	BH4, TRIP BLANK 09	25-Sep-2019	27-Sep-2019	23-Mar-2020	✓	30-Sep-2019	23-Mar-2020	✓
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X) SW4, RINSATE 09,	BH4, TRIP BLANK 09	25-Sep-2019	27-Sep-2019	23-Mar-2020	✓	30-Sep-2019	23-Mar-2020	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X) SW4, RINSATE 09,	BH4, TRIP BLANK 09	25-Sep-2019	27-Sep-2019	23-Mar-2020	✓	30-Sep-2019	23-Mar-2020	✓
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X) SW4, RINSATE 09,	BH4, TRIP BLANK 09	25-Sep-2019	27-Sep-2019	23-Mar-2020	✓	30-Sep-2019	23-Mar-2020	✓



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	11	18.18	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In house: Direct injection analysis of fresh waters after dilution (1:1) with methanol. Analysis by LC-Electrospray-MS-MS, Negative Mode using MRM. Where commercially available, isotopically labelled analogues of the target analytes are used as internal standards for quantification. Where a labelled analogue is not commercially available, the internal standard with similar chemistry and the closest retention time to the target is used for quantification. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. This method complies with the quality control definitions as stated in QSM 5.1. Data is reviewed in line with the DQOs as stated in QSM5.1
Preparation Methods	Method	Matrix	Method Descriptions
Preparation for PFAS in water.	EP231-PR	WATER	Method presumes direct injection without workup. Preparation includes addition of internal standard and surrogate, and filtration prior to analysis.



Client: Kleinfelder Australia Pty Ltd 95 Mitchell Road Cardiff, NSW 2285 Phone: 02 4949 5200		SITE, COC AND CONTACT DATA		Laboratory: ALS 5/585 Maitland Rd Mayfield West, Newcastle NSW 2304 Phone: (02) 4014 5200	
Site Name:	WSS - Cabotage Tree Rd water monitoring	Sampler Name:	Dan Kousbroek		
QUOTE NUMBER	ME114/19	Contact Number:	045 8197 676		
Job No.	201905620	Contact e-mail:	d.kousbroek@kleinfelder.com		
Required TAT:	24 hrs	PM name (if not sampler):	Tom Overton		
Lab QA level	LAB minimum unless specified	PM e-mail:	tom@kleinfelder.com		

Send Results to:

95 Mitchell Road
Cardiff, NSW 2285
newcastle@kleinfelder.com
Phone: 02 4949 5200

CHAIN OF CUSTODY		Requested by (print):		Received by (print):		Requested by (sign):		Received by (sign):	
Date / Time:	Temp. (°C):	Date / Time:	Temp. (°C):	Date / Time:	Temp. (°C):	Date / Time:	Temp. (°C):	Date / Time:	Temp. (°C):
25/4	0.5	25/9/19 10:59	0.5	25/9/19 17:00	25.9.19				
Notes:		Notes:		Notes:		Notes:		Notes:	
ice present / no ice		ice present / no ice		ice present / no ice		ice present / no ice		ice present / no ice	
seals intact / no seal		seals intact / no seal		seals intact / no seal		seals intact / no seal		seals intact / no seal	
Sample ID	Lab ID	Sample Point	Sample Type	Date	Start Depth	End Depth	Units	# Containers	W-05 SG
SW4	1			25/4				1	
SW4	2							1	
SW4	3							1	
SW4	4							1	
Additional Metals to make up NEPM 15									
Iron (dissolved)									
General Water Suite									
Total Dissolved Solids (TDS)									
Total Suspended Solids (TSS)									
PFAS (28 analytes, standard level)									
Comments									

Telephone : + 61-2-9784 9555



Environmental Division
Sydney
Work Order Reference
ES1931063

W-05 SG - TRITIBTEXN/3 Metals Silica Gel Clean Up
NT14 - Extended water suite B
Additional metals analysis to make up NEPM 15

Arsenic (As), Cadmium (Cd), Chromium (Cr), Copper (Cu), Lead (Pb), Mercury (Hg), Nickel (Ni), Zinc (Zn)
Boron (B), Barium (Ba), Beryllium (Be), Cobalt (Co), Manganese (Mn), Selenium (Se), Vanadium (V)

MAILED

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : ES1929844

Client : KLEINFELDER AUSTRALIA PTY LTD Contact : DANIEL KOUSBROEK Address : 95 MITCHELL ROAD CARDIFF NSW 2285 E-mail : dkousbroek@kleinfelder.com Telephone : ---- Facsimile : ---- Project : 20193820 Order number : ---- C-O-C number : ---- Site : WSS-CABBAGE TREE RD WATER MONITORING Sampler : DANIEL KOUSBROEK	Laboratory : Environmental Division Sydney Contact : Shirley LeCornu Address : 277-289 Woodpark Road Smithfield NSW Australia 2164 E-mail : shirley.lecornu@Alsglobal.com Telephone : +6138549 9630 Facsimile : +61-2-8784 8500 Page : 1 of 3 Quote number : EM2019ALLENVENG0010 (ME/114/19) QC Level : NEPM 2013 B3 & ALS QC Standard

Dates

Date Samples Received : 16-Sep-2019 16:29	Issue Date : 16-Sep-2019
Client Requested Due Date : 20-Sep-2019	Scheduled Reporting Date : 20-Sep-2019

Delivery Details

Mode of Delivery : Undefined	Security Seal : Not Available
No. of coolers/boxes : 1	Temperature : 3.8°C - Ice present
Receipt Detail :	No. of samples received / analysed : 14 / 14

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- **Sample TRIP08 to be forwarded to Eurofins as per COC's.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- **Sample(s) requiring volatile organic compound analysis received in airtight containers (ZHE).**
- **pH analysis will be conducted by ALS Newcastle-Water.**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- No sample container / preservation non-compliance exists.

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EG020F Dissolved Metals by ICP/MS	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-14 Extended Water Suite B	WATER - W-03 15 Metals (NEPM Suite)	WATER - W-05 SG TRH/BTEXN/8 Metals inc Silica Gel Clean Up
ES1929844-001	16-Sep-2019 00:00	BH7	✓	✓	✓	✓	✓	✓	✓
ES1929844-002	16-Sep-2019 00:00	BH6	✓	✓	✓	✓	✓	✓	✓
ES1929844-003	16-Sep-2019 00:00	BH8	✓	✓	✓	✓	✓	✓	✓
ES1929844-004	16-Sep-2019 00:00	MW239S	✓	✓	✓		✓	✓	✓
ES1929844-005	16-Sep-2019 00:00	SW3	✓	✓	✓	✓	✓	✓	✓
ES1929844-006	16-Sep-2019 00:00	SW4	✓	✓	✓	✓	✓	✓	✓
ES1929844-007	16-Sep-2019 00:00	RINSATE 08			✓	✓		✓	✓
ES1929844-008	16-Sep-2019 00:00	TRIP BLANK 08			✓	✓		✓	✓
ES1929844-009	16-Sep-2019 00:00	BH1	✓	✓	✓		✓	✓	✓
ES1929844-010	16-Sep-2019 00:00	BH4	✓	✓	✓	✓	✓	✓	✓
ES1929844-011	16-Sep-2019 00:00	DUP08			✓	✓		✓	✓
ES1929844-012	16-Sep-2019 00:00	SW1	✓	✓	✓	✓	✓	✓	✓
ES1929844-013	16-Sep-2019 00:00	BH11	✓	✓	✓		✓	✓	✓
ES1929844-014	16-Sep-2019 00:00	BH2	✓	✓	✓		✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EA005: pH
ES1929844-001	16-Sep-2019 00:00	BH7	✓
ES1929844-002	16-Sep-2019 00:00	BH6	✓
ES1929844-003	16-Sep-2019 00:00	BH8	✓
ES1929844-004	16-Sep-2019 00:00	MW239S	✓
ES1929844-005	16-Sep-2019 00:00	SW3	✓
ES1929844-006	16-Sep-2019 00:00	SW4	✓
ES1929844-009	16-Sep-2019 00:00	BH1	✓
ES1929844-010	16-Sep-2019 00:00	BH4	✓
ES1929844-012	16-Sep-2019 00:00	SW1	✓
ES1929844-013	16-Sep-2019 00:00	BH11	✓



			WATER - EA005: pH pH
ES1929844-014	16-Sep-2019 00:00	BH2	

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

DANIEL KOUSBROEK

- *AU Certificate of Analysis - NATA (COA)	Email	dkousbroek@kleinfelder.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	dkousbroek@kleinfelder.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	dkousbroek@kleinfelder.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	dkousbroek@kleinfelder.com
- A4 - AU Tax Invoice (INV)	Email	dkousbroek@kleinfelder.com
- Chain of Custody (CoC) (COC)	Email	dkousbroek@kleinfelder.com
- EDI Format - ENMRG (ENMRG)	Email	dkousbroek@kleinfelder.com
- EDI Format - EQUIS V5 for KLEINFELDER (KLEINFELDER)	Email	dkousbroek@kleinfelder.com
- EDI Format - ESDAT (ESDAT)	Email	dkousbroek@kleinfelder.com

INVOICES

- A4 - AU Tax Invoice (INV)	Email	Aus_Accounts@kleinfelder.com

Newcastle

- *AU Certificate of Analysis - NATA (COA)	Email	newcastle@kleinfelder.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	newcastle@kleinfelder.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	newcastle@kleinfelder.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	newcastle@kleinfelder.com
- A4 - AU Tax Invoice (INV)	Email	newcastle@kleinfelder.com
- Chain of Custody (CoC) (COC)	Email	newcastle@kleinfelder.com
- EDI Format - ENMRG (ENMRG)	Email	newcastle@kleinfelder.com
- EDI Format - EQUIS V5 for KLEINFELDER (KLEINFELDER)	Email	newcastle@kleinfelder.com
- EDI Format - ESDAT (ESDAT)	Email	newcastle@kleinfelder.com

TOM OVERTON

- *AU Certificate of Analysis - NATA (COA)	Email	toverton@kleinfelder.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	toverton@kleinfelder.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	toverton@kleinfelder.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	toverton@kleinfelder.com
- Chain of Custody (CoC) (COC)	Email	toverton@kleinfelder.com
- EDI Format - ENMRG (ENMRG)	Email	toverton@kleinfelder.com
- EDI Format - EQUIS V5 for KLEINFELDER (KLEINFELDER)	Email	toverton@kleinfelder.com
- EDI Format - ESDAT (ESDAT)	Email	toverton@kleinfelder.com

Sample Receipt Advice

Company name: **Kleinfelder Aust Pty Ltd (NEWCASTLE)**
Contact name: Tom Overton
Project name: WSS - CABBAGE TREE RD WATER MONITORING
Project ID: 20193820
COC number: Not provided
Turn around time: 5 Day
Date/Time received: Sep 17, 2019 4:45 PM
Eurofins reference: **677582**

Sample information

- ☒ A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- ☒ All samples have been received as described on the above COC.
- ☒ COC has been completed correctly.
- ☒ Attempt to chill was evident.
- ☒ Appropriately preserved sample containers have been used.
- ☒ All samples were received in good condition.
- ☒ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- ☒ Appropriate sample containers have been used.
- ☒ Sample containers for volatile analysis received with zero headspace.
- ☒ Split sample sent to requested external lab.
- ☒ Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

Contact notes

If you have any questions with respect to these samples please contact:

Andrew Black on Phone : (+61) 2 9900 8490 or by e.mail: AndrewBlack@eurofins.com

Results will be delivered electronically via e.mail to Tom Overton - toverton@kleinfelder.com.

Company Name: Kleinfelder Aust Pty Ltd (NEWCASTLE)
Address: 95 Mitchell Rd
Cardiff
NSW 2285
Project Name: WSS - CABBAGE TREE RD WATER MONITORING
Project ID: 20193820

Order No.:
Report #: 677582
Phone: 02 4949 5200
Fax:

Received: Sep 17, 2019 4:45 PM
Due: Sep 24, 2019
Priority: 5 Day
Contact Name: Tom Overton

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Iron (filtered)	Metals M8 filtered	BTEX and Naphthalene	TRH (after Silica Gel cleanup)	Total Recoverable Hydrocarbons	NEPM 1999 Metals : Metals M15 (Filtered)	Per - and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254 & 14271												
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X	
Brisbane Laboratory - NATA Site # 20794												X
Perth Laboratory - NATA Site # 23736												
External Laboratory												
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID							
1	TRIP08	Sep 16, 2019		Water	S19-Se27286	X	X	X	X	X	X	X
Test Counts						1	1	1	1	1	1	1

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: Tom Overton

Report 677582-W
Project name WSS - CABBAGE TREE RD WATER MONITORING
Project ID 20193820
Received Date Sep 17, 2019

Client Sample ID			TRIP08
Sample Matrix			Water
Eurofins Sample No.			S19-Se27286
Date Sampled			Sep 16, 2019
Test/Reference	LOR	Unit	
Total Recoverable Hydrocarbons - 1999 NEPM Fractions			
TRH C6-C9	0.02	mg/L	< 0.02
TRH C10-C14	0.05	mg/L	0.20
TRH C15-C28	0.1	mg/L	0.4
TRH C29-C36	0.1	mg/L	0.2
TRH C10-C36 (Total)	0.1	mg/L	0.8
BTEX			
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	%	147
Total Recoverable Hydrocarbons - 2013 NEPM Fractions			
Naphthalene ^{N02}	0.01	mg/L	< 0.01
TRH C6-C10	0.02	mg/L	< 0.02
TRH C6-C10 less BTEX (F1) ^{N04}	0.02	mg/L	< 0.02
TRH >C10-C16	0.05	mg/L	0.18
TRH >C10-C16 less Naphthalene (F2) ^{N01}	0.05	mg/L	0.18
TRH >C16-C34	0.1	mg/L	0.4
TRH >C34-C40	0.1	mg/L	0.1
TRH >C10-C40 (total)*	0.1	mg/L	0.68
TRH - 2013 NEPM Fractions (after silica gel clean-up)			
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
TRH - 1999 NEPM Fractions (after silica gel clean-up)			
TRH C10-C36 (Total) (after silica gel clean-up)	0.4	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

Client Sample ID			TRIP08
Sample Matrix			Water
Eurofins Sample No.			S19-Se27286
Date Sampled			Sep 16, 2019
Test/Reference	LOR	Unit	
Heavy Metals			
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	0.002
Copper (filtered)	0.001	mg/L	< 0.001
Iron (filtered)	0.05	mg/L	0.69
Lead (filtered)	0.001	mg/L	< 0.001
Manganese (filtered)	0.005	mg/L	0.037
Mercury (filtered)	0.0001	mg/L	< 0.0001
Nickel (filtered)	0.001	mg/L	0.003
Vanadium (filtered)	0.005	mg/L	< 0.005
Zinc (filtered)	0.005	mg/L	0.012
Perfluoroalkyl carboxylic acids (PFCAs)			
Perfluorobutanoic acid (PFBA) ^{N11}	0.05	ug/L	< 0.05
Perfluoropentanoic acid (PFPeA) ^{N11}	0.01	ug/L	< 0.01
Perfluorohexanoic acid (PFHxA) ^{N11}	0.01	ug/L	< 0.01
Perfluoroheptanoic acid (PFHpA) ^{N11}	0.01	ug/L	< 0.01
Perfluorooctanoic acid (PFOA) ^{N11}	0.01	ug/L	< 0.01
Perfluorononanoic acid (PFNA) ^{N11}	0.01	ug/L	< 0.01
Perfluorodecanoic acid (PFDA) ^{N11}	0.01	ug/L	< 0.01
Perfluoroundecanoic acid (PFUnDA) ^{N11}	0.01	ug/L	< 0.01
Perfluorododecanoic acid (PFDoDA) ^{N11}	0.01	ug/L	< 0.01
Perfluorotridecanoic acid (PFTeDA) ^{N15}	0.01	ug/L	< 0.01
Perfluorotetradecanoic acid (PFTeDA) ^{N11}	0.01	ug/L	< 0.01
13C4-PFBA (surr.)	1	%	65
13C5-PFPeA (surr.)	1	%	61
13C5-PFHxA (surr.)	1	%	77
13C4-PFHpA (surr.)	1	%	85
13C8-PFOA (surr.)	1	%	87
13C5-PFNA (surr.)	1	%	93
13C6-PFDA (surr.)	1	%	89
13C2-PFUnDA (surr.)	1	%	77
13C2-PFDoDA (surr.)	1	%	72
13C2-PFTeDA (surr.)	1	%	78
Perfluoroalkyl sulfonamido substances			
Perfluorooctane sulfonamide (FOSA) ^{N11}	0.05	ug/L	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) ^{N11}	0.05	ug/L	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) ^{N11}	0.05	ug/L	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE) ^{N11}	0.05	ug/L	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE) ^{N11}	0.05	ug/L	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) ^{N11}	0.05	ug/L	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) ^{N11}	0.05	ug/L	< 0.05
13C8-FOSA (surr.)	1	%	79

Client Sample ID			TRIP08
Sample Matrix			Water
Eurofins Sample No.			S19-Se27286
Date Sampled			Sep 16, 2019
Test/Reference	LOR	Unit	
Perfluoroalkyl sulfonamido substances			
D3-N-MeFOSA (surr.)	1	%	61
D5-N-EtFOSA (surr.)	1	%	66
D7-N-MeFOSE (surr.)	1	%	91
D9-N-EtFOSE (surr.)	1	%	79
D5-N-EtFOSAA (surr.)	1	%	90
D3-N-MeFOSAA (surr.)	1	%	70
Perfluoroalkyl sulfonic acids (PFASs)			
Perfluorobutanesulfonic acid (PFBS) ^{N11}	0.01	ug/L	< 0.01
Perfluorononanesulfonic acid (PFNS) ^{N15}	0.01	ug/L	< 0.01
Perfluoropropanesulfonic acid (PFPrS) ^{N15}	0.01	ug/L	< 0.01
Perfluoropentanesulfonic acid (PFPeS) ^{N15}	0.01	ug/L	< 0.01
Perfluorohexanesulfonic acid (PFHxS) ^{N11}	0.01	ug/L	< 0.01
Perfluoroheptanesulfonic acid (PFHpS) ^{N15}	0.01	ug/L	< 0.01
Perfluorooctanesulfonic acid (PFOS) ^{N11}	0.01	ug/L	^{N09} 0.03
Perfluorodecanesulfonic acid (PFDS) ^{N15}	0.01	ug/L	< 0.01
13C3-PFBS (surr.)	1	%	130
18O2-PFHxS (surr.)	1	%	125
13C8-PFOS (surr.)	1	%	113
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA) ^{N11}	0.01	ug/L	< 0.01
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA) ^{N11}	0.05	ug/L	< 0.05
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA) ^{N11}	0.01	ug/L	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA) ^{N15}	0.01	ug/L	< 0.01
13C2-4:2 FTSA (surr.)	1	%	66
13C2-6:2 FTSA (surr.)	1	%	111
13C2-8:2 FTSA (surr.)	1	%	87
PFASs Summations			
Sum (PFHxS + PFOS)*	0.01	ug/L	0.03
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	0.03
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	0.03
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
Total Recoverable Hydrocarbons - 1999 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Sydney	Sep 17, 2019	7 Days
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Sydney	Sep 17, 2019	7 Days
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Sydney	Sep 17, 2019	
BTEX - Method: LTM-ORG-2010 TRH C6-C40	Sydney	Sep 17, 2019	14 Days
TRH - 2013 NEPM Fractions (after silica gel clean-up) - Method: LTM-ORG-2010 TRH C6-C40	Sydney	Sep 17, 2019	7 Days
TRH - 1999 NEPM Fractions (after silica gel clean-up) - Method: LTM-ORG-2010 TRH C6-C40	Sydney	Sep 17, 2019	7 Days
NEPM 1999 Metals : Metals M15 (Filtered)			
Chromium (hexavalent) - Method: E057 Total Speciated Chromium	Sydney	Sep 17, 2019	28 Days
Chromium (trivalent filtered) - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Sydney	Sep 17, 2019	28 Days
Metals M8 filtered - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Sydney	Sep 17, 2019	28 Days
Heavy Metals (filtered) - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Sydney	Sep 18, 2019	180 Days
Per- and Polyfluoroalkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs) - Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)	Brisbane	Sep 19, 2019	14 Days
Perfluoroalkyl sulfonamido substances - Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)	Brisbane	Sep 19, 2019	14 Days
Perfluoroalkyl sulfonic acids (PFASs) - Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)	Brisbane	Sep 19, 2019	14 Days
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs) - Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)	Brisbane	Sep 19, 2019	14 Days

Company Name: Kleinfelder Aust Pty Ltd (NEWCASTLE)
Address: 95 Mitchell Rd
Cardiff
NSW 2285
Project Name: WSS - CABBAGE TREE RD WATER MONITORING
Project ID: 20193820

Order No.:
Report #: 677582
Phone: 02 4949 5200
Fax:

Received: Sep 17, 2019 4:45 PM
Due: Sep 24, 2019
Priority: 5 Day
Contact Name: Tom Overton

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Iron (filtered)	Metals M8 filtered	BTEX and Naphthalene	TRH (after Silica Gel cleanup)	Total Recoverable Hydrocarbons	NEPM 1999 Metals : Metals M15 (Filtered)	Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254 & 14271												
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X	
Brisbane Laboratory - NATA Site # 20794												X
Perth Laboratory - NATA Site # 23736												
External Laboratory												
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID							
1	TRIP08	Sep 16, 2019		Water	S19-Se27286	X	X	X	X	X	X	X
Test Counts						1	1	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

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	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.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	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.
TEQ	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
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
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	
Method Blank							
BTEX							
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	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
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	
Method Blank							
TRH - 2013 NEPM Fractions (after silica gel clean-up)							
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	
Method Blank							
TRH - 1999 NEPM Fractions (after silica gel clean-up)							
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	
Method Blank							
Chromium (hexavalent)	mg/L	< 0.005			0.005	Pass	
Method Blank							
Heavy Metals							
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	
Iron (filtered)	mg/L	< 0.05			0.05	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	
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs)							

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluorobutanoic acid (PFBA)	ug/L	< 0.05			0.05	Pass	
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	
Method Blank							
Perfluoroalkyl sulfonamido substances							
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	
Method Blank							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	ug/L	< 0.01			0.01	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/L	< 0.01			0.01	Pass	
Perfluoropropanesulfonic acid (PFPrS)	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	
Perfluorooctanesulfonic acid (PFOS)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/L	< 0.01			0.01	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic 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	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	102			70-130	Pass	
TRH C10-C14	%	120			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	109			70-130	Pass	
Toluene	%	110			70-130	Pass	
Ethylbenzene	%	110			70-130	Pass	
m&p-Xylenes	%	110			70-130	Pass	
o-Xylene	%	112			70-130	Pass	
Xylenes - Total	%	111			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	120			70-130	Pass	
TRH C6-C10	%	101			70-130	Pass	
TRH >C10-C16	%	108			70-130	Pass	
LCS - % Recovery							

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
TRH - 2013 NEPM Fractions (after silica gel clean-up)							
TRH >C10-C16 (after silica gel clean-up)	%	71			70-130	Pass	
LCS - % Recovery							
TRH - 1999 NEPM Fractions (after silica gel clean-up)							
TRH C10-C14 (after silica gel clean-up)	%	71			70-130	Pass	
LCS - % Recovery							
Chromium (hexavalent)	%	96			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic (filtered)	%	97			70-130	Pass	
Barium (filtered)	%	93			70-130	Pass	
Beryllium (filtered)	%	96			70-130	Pass	
Boron (filtered)	%	80			70-130	Pass	
Cadmium (filtered)	%	109			70-130	Pass	
Chromium (filtered)	%	98			70-130	Pass	
Cobalt (filtered)	%	96			70-130	Pass	
Copper (filtered)	%	95			70-130	Pass	
Iron (filtered)	%	95			70-130	Pass	
Lead (filtered)	%	96			70-130	Pass	
Manganese (filtered)	%	95			70-130	Pass	
Mercury (filtered)	%	94			70-130	Pass	
Nickel (filtered)	%	97			70-130	Pass	
Vanadium (filtered)	%	96			70-130	Pass	
Zinc (filtered)	%	94			70-130	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	%	95			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	79			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	98			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	91			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	92			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	91			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	103			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	101			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	104			50-150	Pass	
Perfluorotridecanoic acid (PFTriDA)	%	83			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	110			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	%	103			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	102			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	99			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	%	90			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	%	103			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	%	108			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	%	111			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	%	97			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	%	110			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	%	94			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	%	103			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	%	86			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	%	69			50-150	Pass	

Test				Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluorooctanesulfonic acid (PFOS)				%	93			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)				%	103			50-150	Pass	
LCS - % Recovery										
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)										
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)				%	91			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)				%	142			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)				%	103			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)				%	108			50-150	Pass	
Test	Lab Sample ID	QA Source		Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery										
Total Recoverable Hydrocarbons - 1999 NEPM Fractions					Result 1					
TRH C6-C9	S19-Se28681	NCP	%		72			70-130	Pass	
Spike - % Recovery										
BTEX					Result 1					
Benzene	S19-Se28681	NCP	%		82			70-130	Pass	
Toluene	S19-Se28681	NCP	%		83			70-130	Pass	
Ethylbenzene	S19-Se28681	NCP	%		85			70-130	Pass	
m&p-Xylenes	S19-Se28681	NCP	%		84			70-130	Pass	
o-Xylene	S19-Se28681	NCP	%		84			70-130	Pass	
Xylenes - Total	S19-Se28681	NCP	%		84			70-130	Pass	
Spike - % Recovery										
Total Recoverable Hydrocarbons - 2013 NEPM Fractions					Result 1					
Naphthalene	S19-Se28681	NCP	%		85			70-130	Pass	
TRH C6-C10	S19-Se28681	NCP	%		71			70-130	Pass	
Spike - % Recovery										
					Result 1					
Chromium (hexavalent)	S19-Se29873	NCP	%		36			70-130	Fail	Q08
Spike - % Recovery										
Heavy Metals					Result 1					
Arsenic (filtered)	S19-Se26165	NCP	%		92			70-130	Pass	
Barium (filtered)	S19-Se26165	NCP	%		89			70-130	Pass	
Beryllium (filtered)	S19-Se26165	NCP	%		119			70-130	Pass	
Boron (filtered)	S19-Se26165	NCP	%		82			70-130	Pass	
Cadmium (filtered)	S19-Se26165	NCP	%		107			70-130	Pass	
Chromium (filtered)	S19-Se26165	NCP	%		93			70-130	Pass	
Cobalt (filtered)	S19-Se26165	NCP	%		91			70-130	Pass	
Copper (filtered)	S19-Se26165	NCP	%		92			70-130	Pass	
Iron (filtered)	S19-Se26165	NCP	%		84			70-130	Pass	
Lead (filtered)	S19-Se26165	NCP	%		94			70-130	Pass	
Manganese (filtered)	S19-Se26165	NCP	%		78			70-130	Pass	
Mercury (filtered)	S19-Se26165	NCP	%		87			70-130	Pass	
Nickel (filtered)	S19-Se26165	NCP	%		93			70-130	Pass	
Vanadium (filtered)	S19-Se26165	NCP	%		92			70-130	Pass	
Zinc (filtered)	S19-Se26165	NCP	%		91			70-130	Pass	
Spike - % Recovery										
Perfluoroalkyl carboxylic acids (PFCAs)					Result 1					
Perfluorobutanoic acid (PFBA)	S19-Se28429	NCP	%		106			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	S19-Se28429	NCP	%		63			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	S19-Se28429	NCP	%		76			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	S19-Se28429	NCP	%		108			50-150	Pass	
Perfluorooctanoic acid (PFOA)	S19-Se28429	NCP	%		83			50-150	Pass	
Perfluorononanoic acid (PFNA)	S19-Se28429	NCP	%		100			50-150	Pass	
Perfluorodecanoic acid (PFDA)	S19-Se28429	NCP	%		95			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluoroundecanoic acid (PFUnDA)	S19-Se28429	NCP	%	99			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	S19-Se28429	NCP	%	97			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	S19-Se28429	NCP	%	94			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	S19-Se28429	NCP	%	110			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonamido substances				Result 1					
Perfluorooctane sulfonamide (FOSA)	S19-Se28429	NCP	%	96			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	S19-Se28429	NCP	%	93			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	S19-Se28429	NCP	%	87			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	S19-Se28429	NCP	%	85			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	S19-Se28429	NCP	%	86			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	S19-Se28429	NCP	%	102			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	S19-Se28429	NCP	%	102			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonic acids (PFSA's)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	S19-Se28429	NCP	%	94			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	S19-Se28429	NCP	%	95			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	S19-Se28429	NCP	%	87			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	S19-Se28429	NCP	%	102			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	S19-Se28429	NCP	%	96			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	S19-Se28429	NCP	%	83			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	S19-Se28429	NCP	%	100			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	S19-Se28429	NCP	%	80			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	S19-Se28429	NCP	%	101			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	S19-Se28429	NCP	%	106			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	S19-Se28429	NCP	%	115			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	S19-Se28429	NCP	%	117			50-150	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	S19-Se28680	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	

Duplicate								
BTX				Result 1	Result 2	RPD		
Benzene	S19-Se28680	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Toluene	S19-Se28680	NCP	mg/L	0.010	0.009	8.0	30%	Pass
Ethylbenzene	S19-Se28680	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
m&p-Xylenes	S19-Se28680	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass
o-Xylene	S19-Se28680	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Xylenes - Total	S19-Se28680	NCP	mg/L	< 0.003	< 0.003	<1	30%	Pass
Duplicate								
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD		
Naphthalene	S19-Se28680	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass
TRH C6-C10	S19-Se28680	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass
Duplicate								
				Result 1	Result 2	RPD		
Chromium (hexavalent)	S19-Se29644	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Duplicate								
Heavy Metals				Result 1	Result 2	RPD		
Arsenic (filtered)	S19-Se27286	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Barium (filtered)	S19-Se27286	CP	mg/L	0.04	0.04	1.0	30%	Pass
Beryllium (filtered)	S19-Se27286	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Boron (filtered)	S19-Se27286	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass
Cadmium (filtered)	S19-Se27286	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass
Chromium (filtered)	S19-Se27286	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Cobalt (filtered)	S19-Se27286	CP	mg/L	0.002	0.002	1.0	30%	Pass
Copper (filtered)	S19-Se27286	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Iron (filtered)	S19-Se27286	CP	mg/L	0.69	0.69	<1	30%	Pass
Lead (filtered)	S19-Se27286	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Manganese (filtered)	S19-Se27286	CP	mg/L	0.037	0.036	2.0	30%	Pass
Mercury (filtered)	S19-Se27286	CP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass
Nickel (filtered)	S19-Se27286	CP	mg/L	0.003	0.003	6.0	30%	Pass
Vanadium (filtered)	S19-Se27286	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Zinc (filtered)	S19-Se27286	CP	mg/L	0.012	0.011	5.0	30%	Pass
Duplicate								
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD		
Perfluorobutanoic acid (PFBA)	M19-Se27052	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
Perfluoropentanoic acid (PFPeA)	M19-Se27052	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorohexanoic acid (PFHxA)	M19-Se27052	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoroheptanoic acid (PFHpA)	M19-Se27052	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorooctanoic acid (PFOA)	M19-Se27052	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorononanoic acid (PFNA)	M19-Se27052	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorodecanoic acid (PFDA)	M19-Se27052	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoroundecanoic acid (PFUnDA)	M19-Se27052	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorododecanoic acid (PFDoDA)	M19-Se27052	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorotridecanoic acid (PFTTrDA)	M19-Se27052	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorotetradecanoic acid (PFTeDA)	M19-Se27052	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Duplicate								
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD		
Perfluorooctane sulfonamide (FOSA)	M19-Se27052	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M19-Se27052	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M19-Se27052	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	M19-Se27052	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass

Duplicate								
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD		
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	M19-Se27052	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M19-Se27052	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M19-Se27052	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
Duplicate								
Perfluoroalkyl sulfonic acids (PFSA's)				Result 1	Result 2	RPD		
Perfluorobutanesulfonic acid (PFBS)	M19-Se27052	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorononanesulfonic acid (PFNS)	M19-Se27052	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoropropanesulfonic acid (PFPrS)	M19-Se27052	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoropentanesulfonic acid (PFPeS)	M19-Se27052	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorohexanesulfonic acid (PFHxS)	M19-Se27052	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoroheptanesulfonic acid (PFHpS)	M19-Se27052	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorooctanesulfonic acid (PFOS)	M19-Se27052	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorodecanesulfonic acid (PFDS)	M19-Se27052	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Duplicate								
n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)				Result 1	Result 2	RPD		
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	M19-Se27052	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	M19-Se27052	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	M19-Se27052	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	M19-Se27052	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass

Comments

Sample Integrity

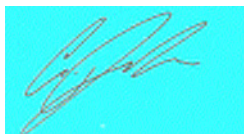
Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	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.
N09	Quantification of linear and branched isomers has been conducted as a single total response using the relative response factor for the corresponding linear/branched standard.
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).
Q08	The matrix spike recovery is outside of the recommended acceptance criteria. An acceptable recovery was obtained for the laboratory control sample indicating a sample matrix interference

Authorised By

Andrew Black	Analytical Services Manager
Andrew Sullivan	Senior Analyst-Organic (NSW)
Bryan Wilson	Senior Analyst-PFAS (QLD)
Gabriele Cordero	Senior Analyst-Inorganic (NSW)
Gabriele Cordero	Senior Analyst-Metal (NSW)



Glenn Jackson General Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

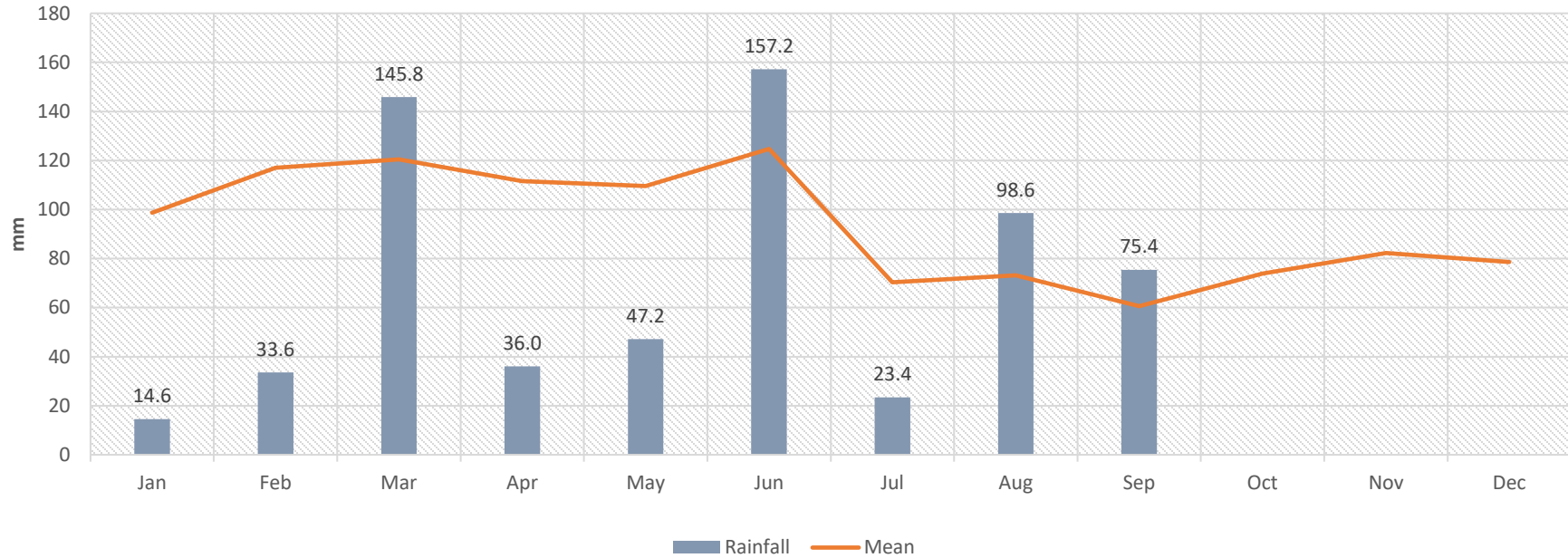
* Indicates NATA accreditation does not cover the performance of this service

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

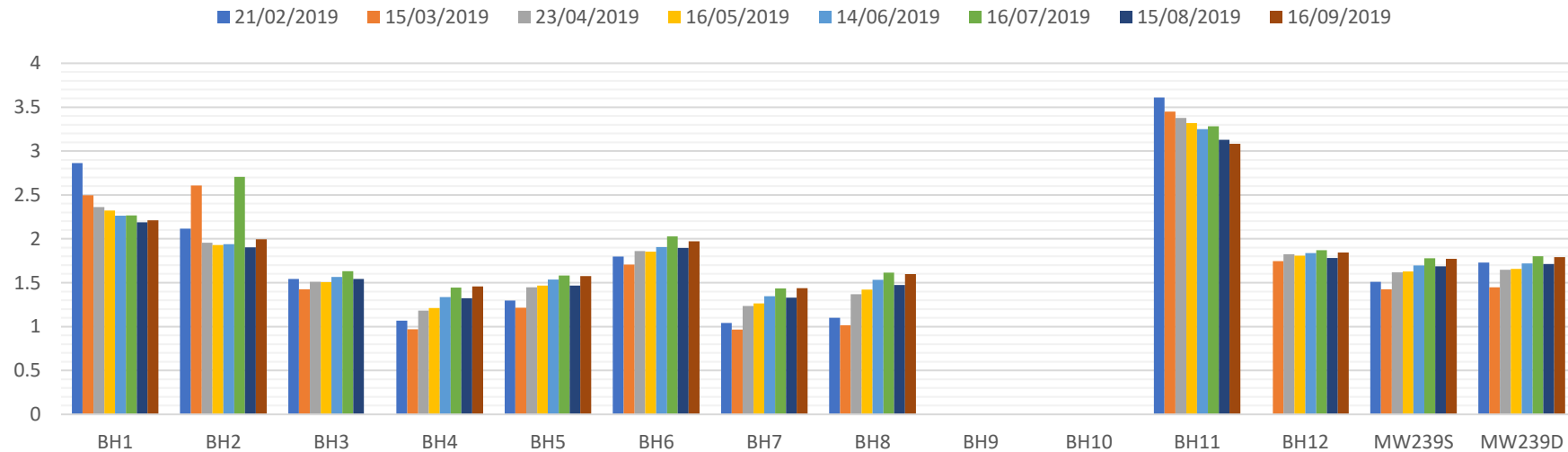
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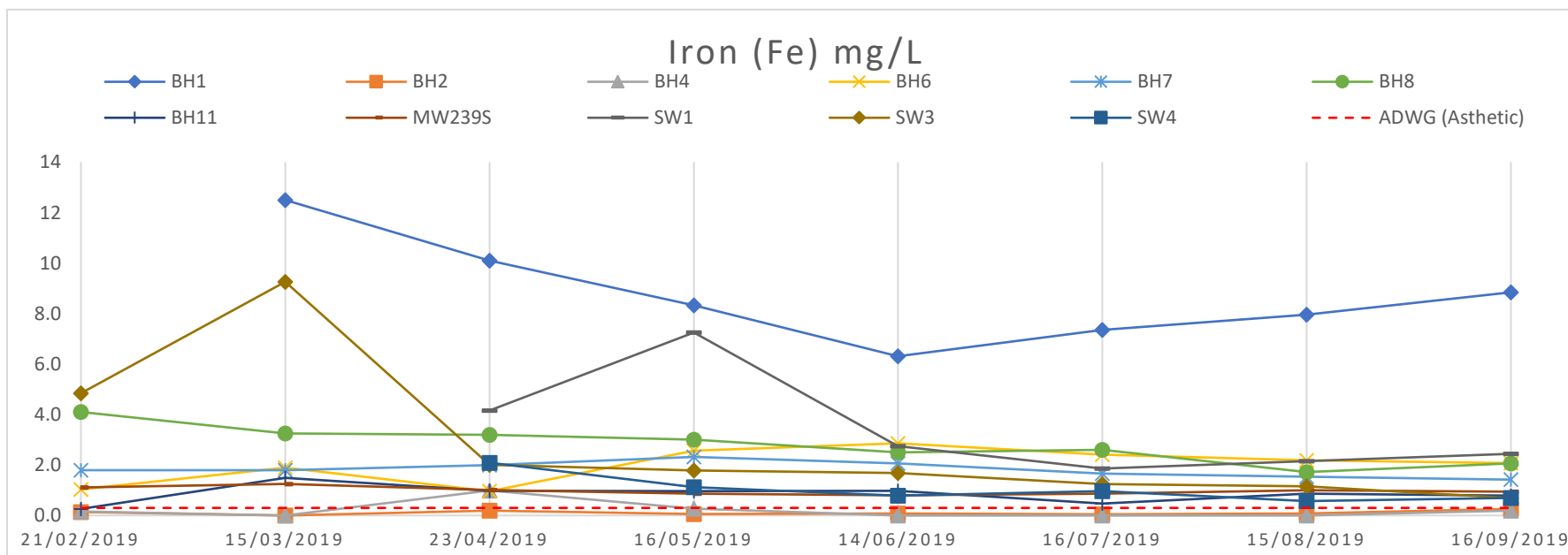
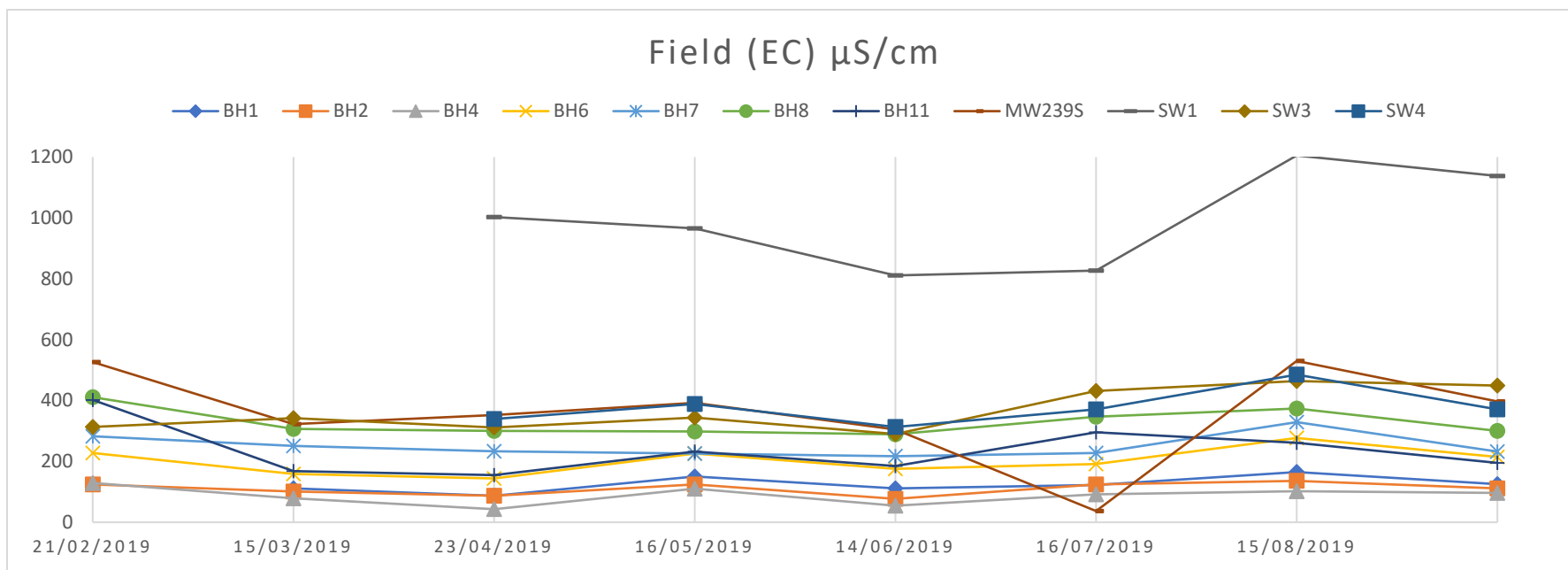
APPENDIX B: TREND DATA

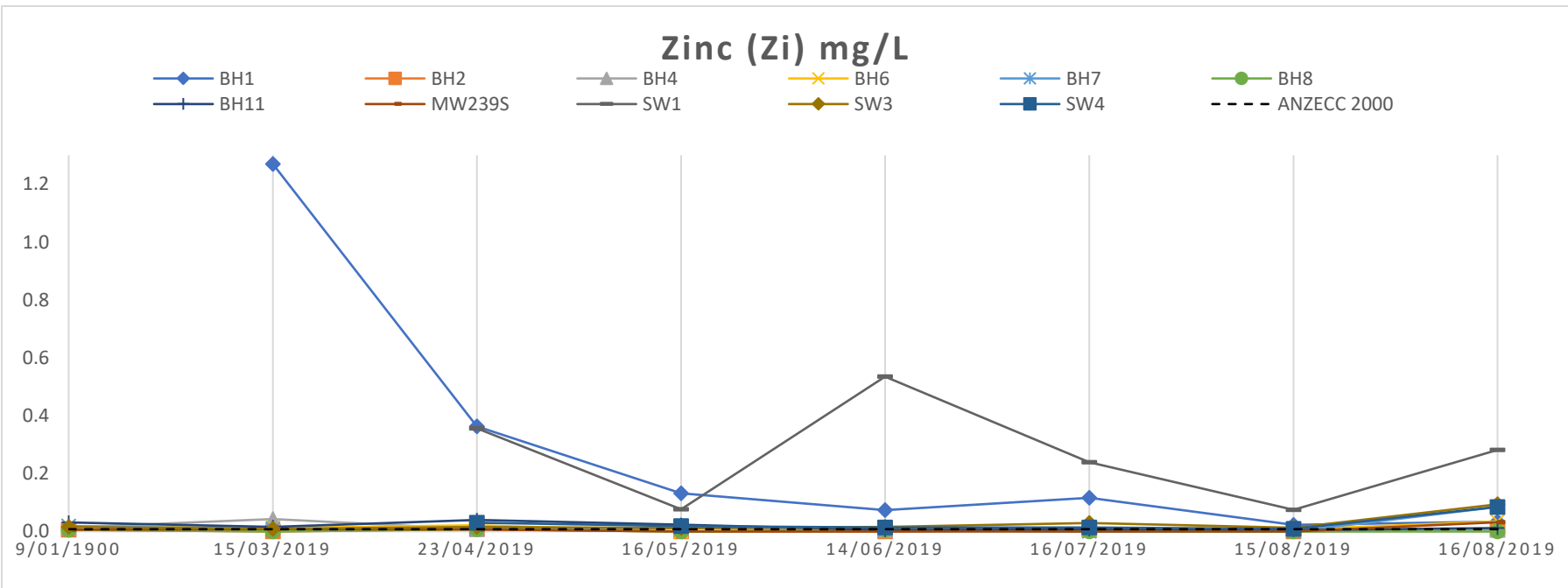
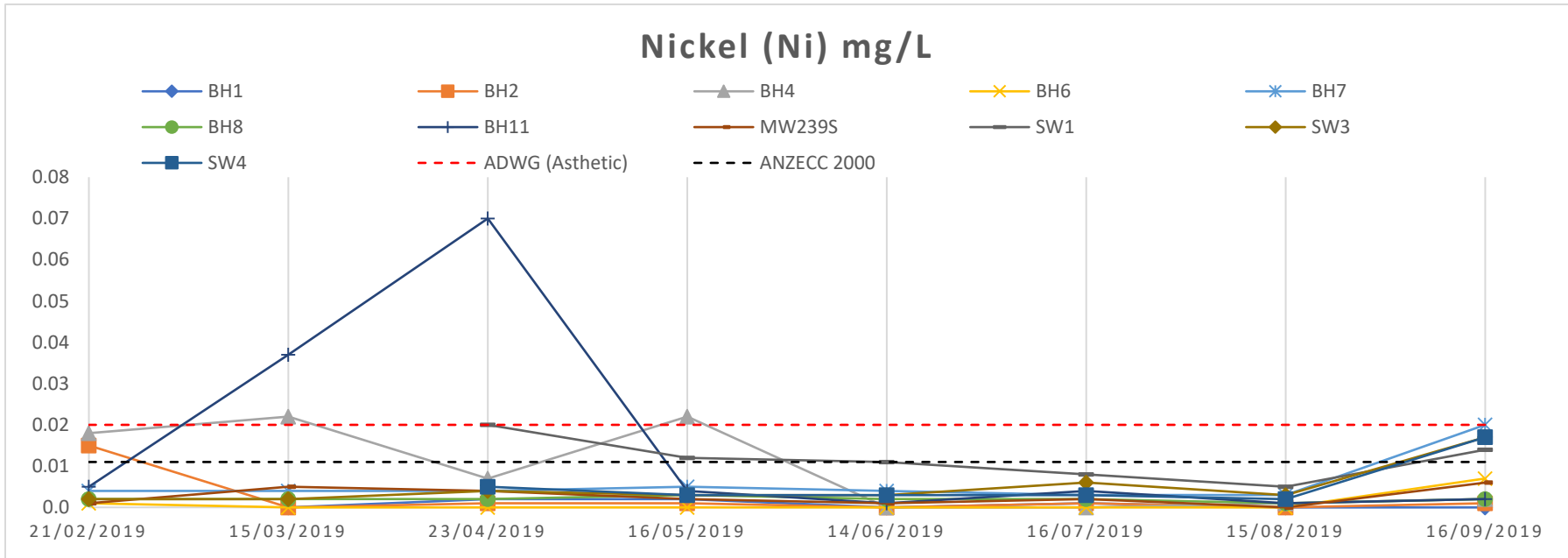
Monthly Rainfall Totals (mm)

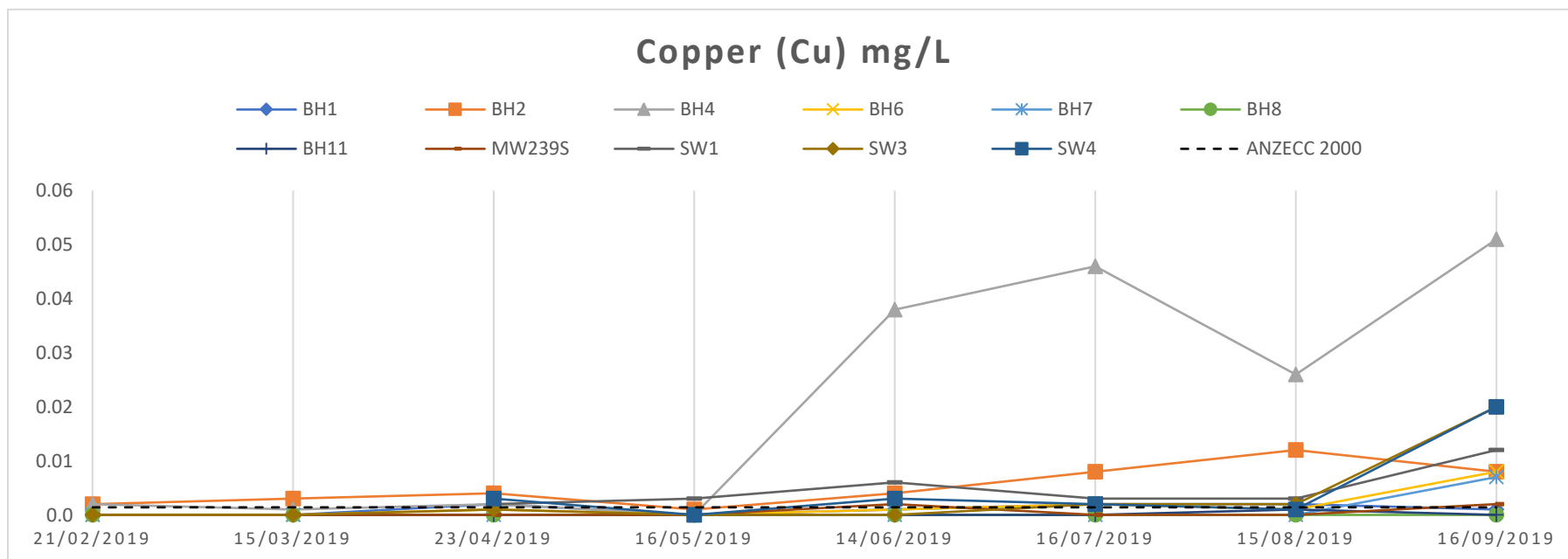
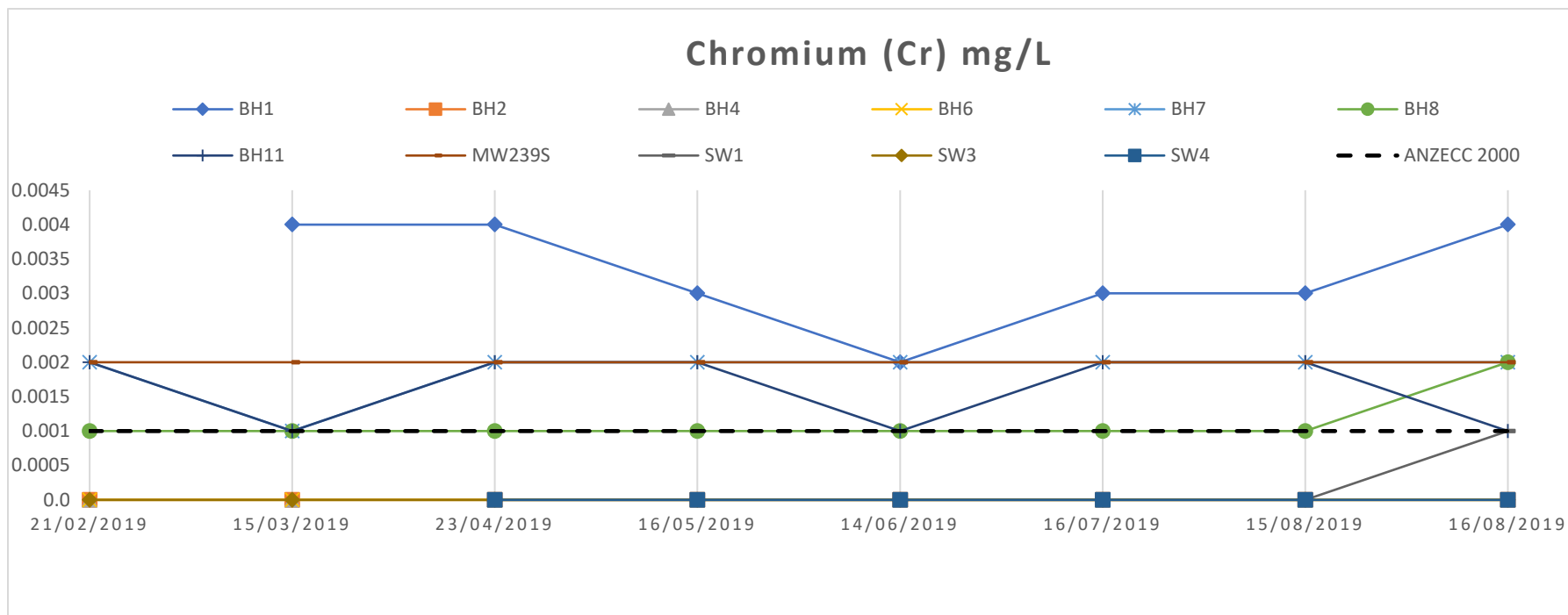


Groundwater Elevation (mAHD)

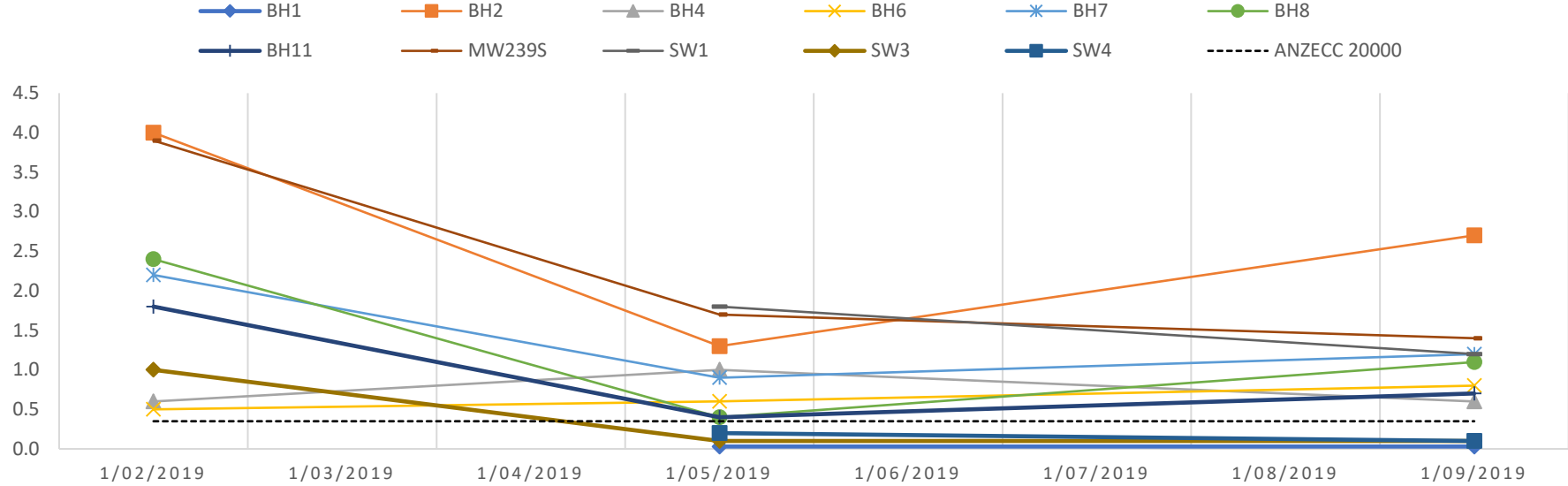




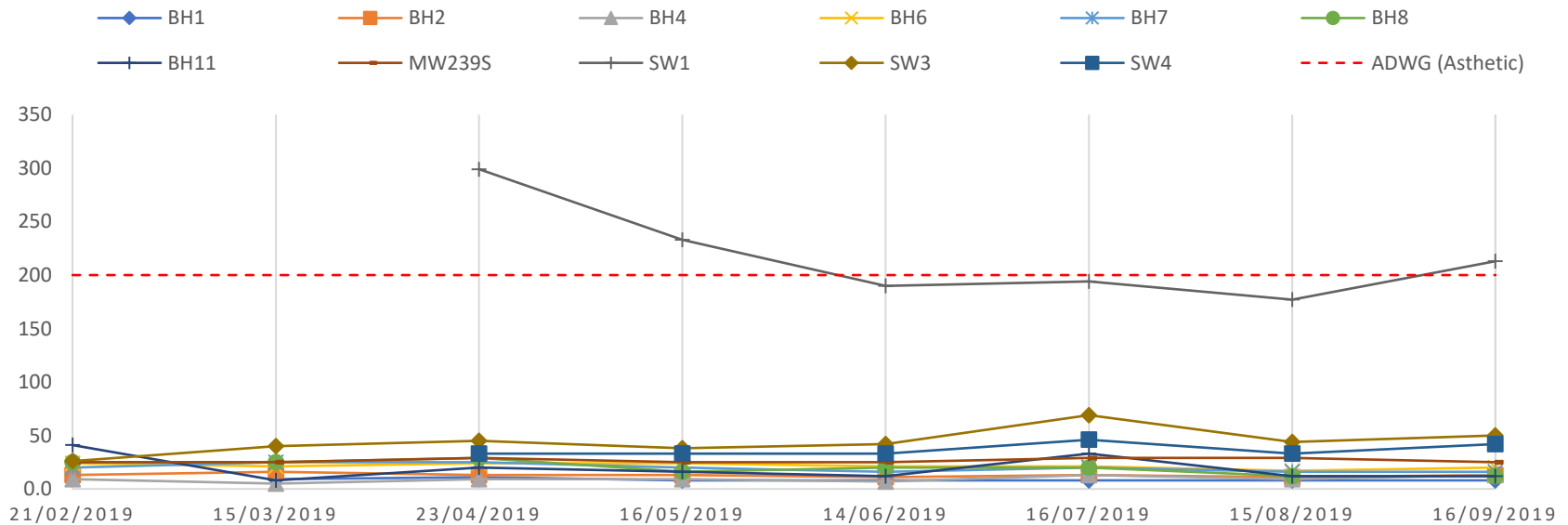




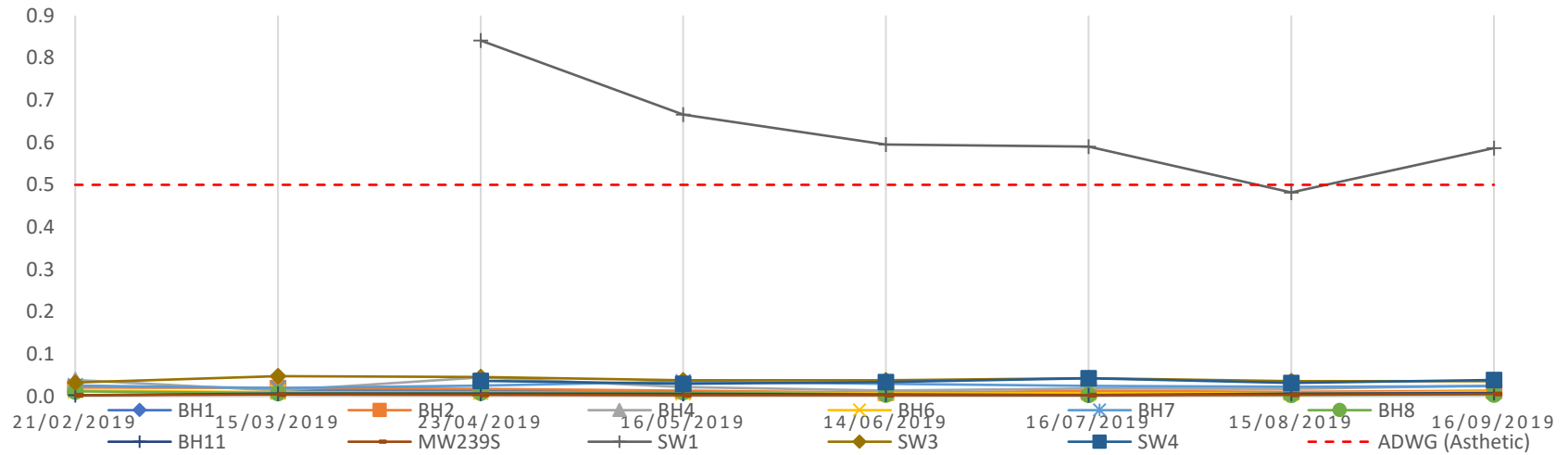
Total Nitrogen (N) mg/L



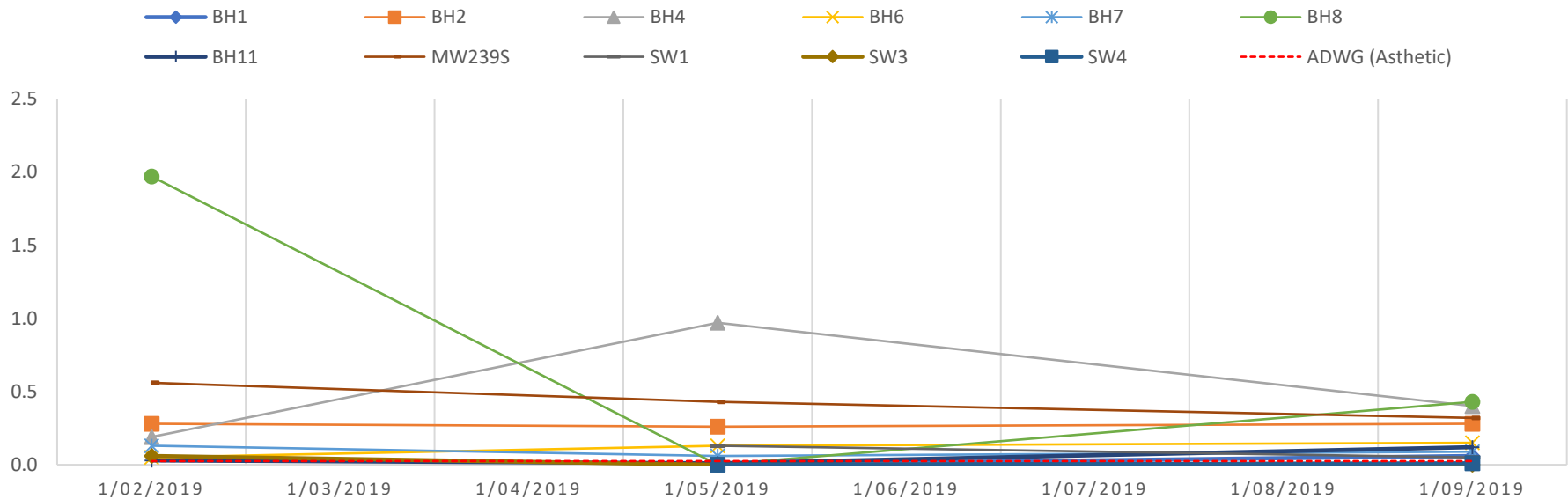
Total Hardness (CaCO₃) mg/L



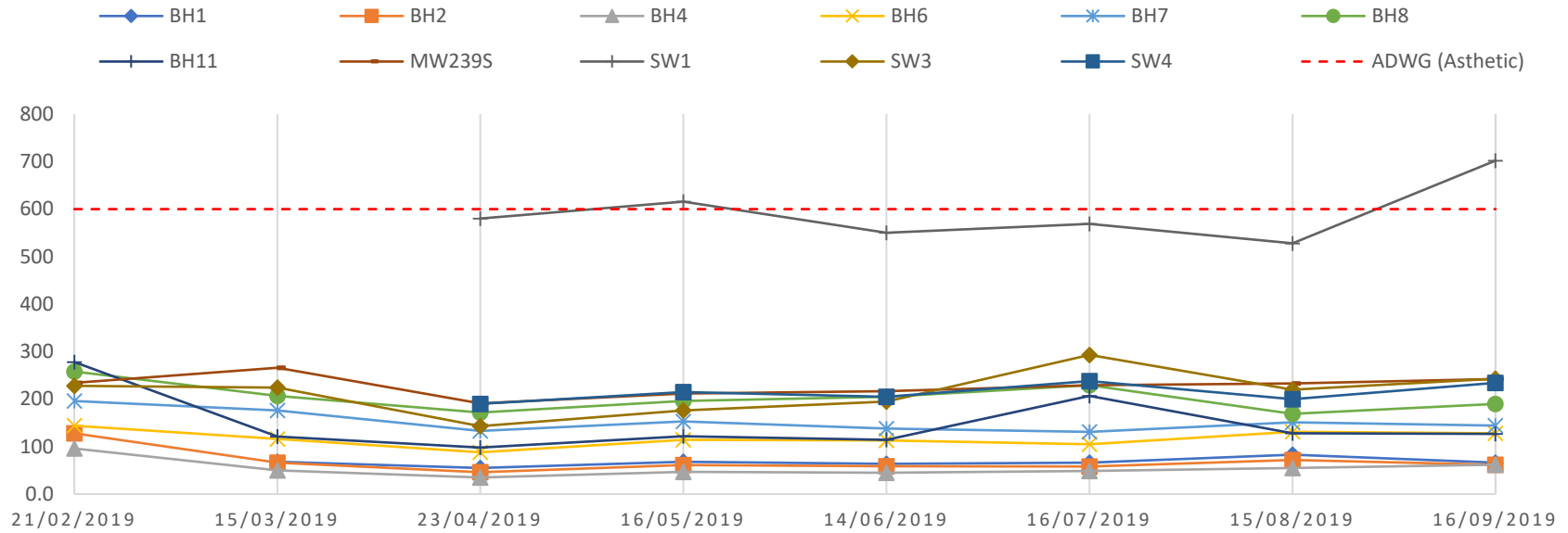
Manganese (Mg) mg/L



Total Phosphorus mg/L



Total Dissolved Solids (TDS) mg/L



APPENDIX B9: OCTOBER 2019

25 October 2019
Document Ref: NCA19R102873

Williamtown Sand Syndicate
PO Box 898
Newcastle, NSW 2300

Attention: Darren Williams

Delivered by email: darren@arbus.com.au

Subject: Monthly water quality monitoring results at Cabbage Tree Road Sand Quarry – October 2019 monitoring

Please find enclosed the Monthly water quality monitoring results at Cabbage Tree Road Sand Quarry for the October 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 October monitoring round was to include 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 monitoring round was conducted on 15 October 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 October 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
General Water Suite*	11	0	0	0	0
Hydrocarbons**	11	0	0	1	1
Metals***	11	0	0	1	1
Iron (dissolved)	11	0	0	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)	4	0	0	1	1

* General Water Suite: Ca, Mg, Na, K, pH, EC, Cl, SO₄, Alkalinity, Fluoride, Hardness & TDS (Calc').

** 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 (mBTC)	Groundwater Elevation (mAHD)	Well Total Depth (mBTC)	Comment
BH1	8.64	6.427	2.213	8.28	Slightly cloudy brown, no odour
BH2	7.79	5.769	2.021	9.03	Dark brown, slight sulfur odour
BH3					Well Decommissioned
BH4	3.06	1.531	1.529	6.11	Clear, no odour
BH5	7.36	5.767	1.593	8.8	No odour - No sample taken.

Borehole	Top of Casing (mAHD)	Depth to Water (mBTC)	Groundwater Elevation (mAHD)	Well Total Depth (mBTC)	Comment
BH6	3.62	1.628	1.992	4.62	Slight brown colour, slight sulfur odour
BH7	2.98	1.514	1.466	4.61	Slightly Cloudy, light brown, slight sulfur odour.
BH8	3.88	2.233	1.647	6.28	Dark brown cloudy, sulfur odour
BH9	17.75	Dry	-	16.01	Well was dry.
BH10	6.69	Dry	-	3.58	Well was dry.
BH11	6.63	3.586	3.044	5.39	Cloudy light brown, sulfur odour
BH12	8.67	6.881	1.789	8.2	No sample taken.
MW239S	3.04	1.248	1.792	4.06	Cloudy Brown, Sulfur odour.
MW239D	3.04	1.226	1.814	20.32	Slight Sulfur odour, no sample taken
SW01*	N/A	0.29	2.79	N/A	Natural tannin stained brown, sulfur odour
SW02*	N/A	Dry		N/A	Location was dry.
SW03*	N/A	0.29	1.29	N/A	Water clear, no odour.
SW04*	N/A	0.35	2.35	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	1140	21.12	18	5.5	78
BH02	1115	20.76	48	4.83	223
BH04	1030	19.18	8	4.93	221
BH06	1530	21.09	110	5.05	-144
BH07	1350	21.79	183	4.89	-139
BH08	1415	20.44	224	4.89	-160
BH11	1205	19.93	124	4.83	-117
MW239S	1300	20.87	331	4.81	-132
SW01	1045	16.56	857	4.35	339
SW03	1230	18.77	313	4.36	315
SW04	0945	16.45	325	4.36	370

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	10	124	No	Similar
	Sulphate	1	11	2	127	No	Slight decrease in concentrations across all sites
	Chloride	1	11	18	191	No	Similar
	Fluoride	0.1	11	<0.1	0.6	No	Similar
	Reactive ³ Phosphorous	0.01	0				
	Total Phosphorous ³	0.01	0				
	Nitrite ³	0.01	0				
	Nitrate ³	0.01	0				
	Ammonia ³	0.01	0				
	Total Nitrogen ³	0.1	0				
	Total Hardness	1	11	7.0	168	1 above NHMRC ADWG 6 aesthetics (SW1)	SW1 historically indicates concentrations exceeding or at criteria
	Total Dissolved Solids	1	11	55	528	No	SW1 indicates concentrations exceeding or at criteria
Dissolved Metals	pH	0.01	11	4.48	5.5	All outside ANZECC 2000 Trigger range ¹ and drinking water guidelines	Similar
	As	0.001	11	<0.001	<0.001	No	Similar
	B	0.05	11	<0.005	0.07	No	Similar
	Ba	0.001	11	0.004	0.037	No	Similar
	Be	0.001	11	<0.001	<0.001	No	Similar
	Cd	0.005-0.1	11	<0.0001	<0.0001	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)
	Cr	0.005-0.1	11	<0.001	0.003	4 above ANZECC 2000 Trigger Values ² (BH1, BH7, BH11 & MW239S)	Similar
	Co	0.001	11	<0.001	0.005	No	Similar
	Cu	0.001	11	<0.001	0.011	10 above ANZECC 2000 Trigger Values ² (BH1, BH2, BH4, BH7, BH9, BH11, MW238S, SW1, SW3 & SW4)	General decrease in concentrations following a spike in September 2019.
	Fe	0.05	11	0.31	4.32	All above NHMRC ADWG 6 aesthetics	General decrease in concentrations over time
	Mn	0.001	11	0.004	0.383	No	Similar
	Ni	0.001	11	<0.001	0.005	No	General decrease in concentrations following a spike in September 2019.
	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
	Zn	0.005-0.1	11	0.006	0.055	9 above ANZECC 2000 Trigger Values ² (BH1, BH4, BH7, BH8, BH11, MW239S, SW1, SW3 & SW4)	General decrease in concentrations following a spike in September 2019.
	Hg	0.0001	11	<0.0001	<0.0001	No	Similar
TRH – Silica Clean up	C ₆ -C ₁₀	0.02	11	<0.02	<0.02	No	Similar
	>C ₁₀ -C ₁₆	0.1	11	<0.1	<0.1	No	Similar
	>C ₁₆ -C ₃₄	0.1	11	<0.1	<0.1	No	Results compared to previous month have returned to Non-detect at all sample locations
	>C ₃₄ -C ₄₀	0.1	11	<0.1	<0.1	No	Similar
	Total >C ₁₀ -C ₄₀	0.1	11	<0.1	<0.1	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)
	C ₆ -C ₁₀ minus BTEX (F1)	0.02	11	<0.02	<0.02	No	Similar
	>C ₁₀ -C ₁₆ 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	Results compared to previous month have returned to Non-detect at all sample locations
	PFOA	0.00001-0.0001	7	<0.00001	<0.00001	No	Similar
	PFOS/PFHxS	0.00001-0.0001	7	<0.00001	<0.00001	No	Results compared to previous month have returned to Non-detect at all sample locations
	PFDS	0.00001-0.0001	7	<0.00001	<0.00001	No	Results compared to previous month have returned to Non-detect at all sample locations

* 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.

¹Australian 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)

²ANZECC 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

³Analysis 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 more rainfall in September than the mean leading up to the October monitoring event. October rainfall is trending towards below average rainfall. Based on current rainfall data (mean and monthly totals) for October 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
1st	2.0	0.8	0	0	0	0	0	9.6	7.4	0		
2nd	0	12.8	0	23.8	0	21.2	0	0	0.2	0		
3rd	0	0.4		0.6	0	0.6	0	0.2	0	0		
4th	0	0	0	0	20.8	0.4	5.2	0	0	0		
5th	0	0	0	0	0.2	25	1.8	0.2	0	0		
6th	0	0	0	0	23.2	2.6	1.2	0	0	6.8		
7th	5.0	0	8.2	0	0.2	1	0.6	0	1	0		
8th	0	0	0	0	0	0	1.6	0	0	0		
9th	0	6.6	0	0	0	0	0.4	0	0	0.8		
10th	0.2	0	12.0	2.2	0	0	0	0	0.6	1.4		
11th	0	0	0	0	0.6	0	0	0	2.8	4		
12th	3.0	0	0	0	0	0	0	0	0	23		
13th	0	0	0	0	1.4	0	0	0	0	8.8		
14th	0	0	0	0.2	0	0	0	0	0	0		
15th	0	0	0	1.4	0	0	0	0	0			
16th	0	0	4.8	3.6	0	0	0	0	0			
17th	0	0	59.4	1.4	0	0	0	0	16.8			
18th	0	0	2.6	0.2	0	17.8	0	0	39.4			
19th	0	0	2.2	0.2	0	0	0	0	7.2			
20th	2.4		0	2.0	0	0	0	0	0			
21st	1.0	1.4	0	0.2	0	0	0	0	0			
22nd	0	1.0	1.2	0.2	0	0.2	0	0	0			
23rd	0	1.4	0	0	0	20	0	0				
24th	0	9.2	5.4	0	0	50.6	0	0	0			
25th	0	0	5.2	0	0	15.2	2.0	0	0			
26th	0	0	0	0	0	1.8	0	0	0			
27th	0	0	0	0	0	0.8	0	0	0			
28th	1.0	0	0	0	0.8	0	0	0	0			
29th	0		0	0	0	0	0	0	0			
30th	0		38.2	0	0	0	0.6	21.2	0			
31st	0		6.6		0		10	67.4				
Total	14.6	33.6	145.8	36.0	47.2	157.2	23.4	98.6	75.4	44.8		
Mean	98.7	117.0	120.5	111.6	109.6	124.7	70.3	73.2	60.6	73.9	82.3	78.6

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

Dkousbroek@kleinfelder.com

Mobile: 0458 197 676

Attached:

Figure 1

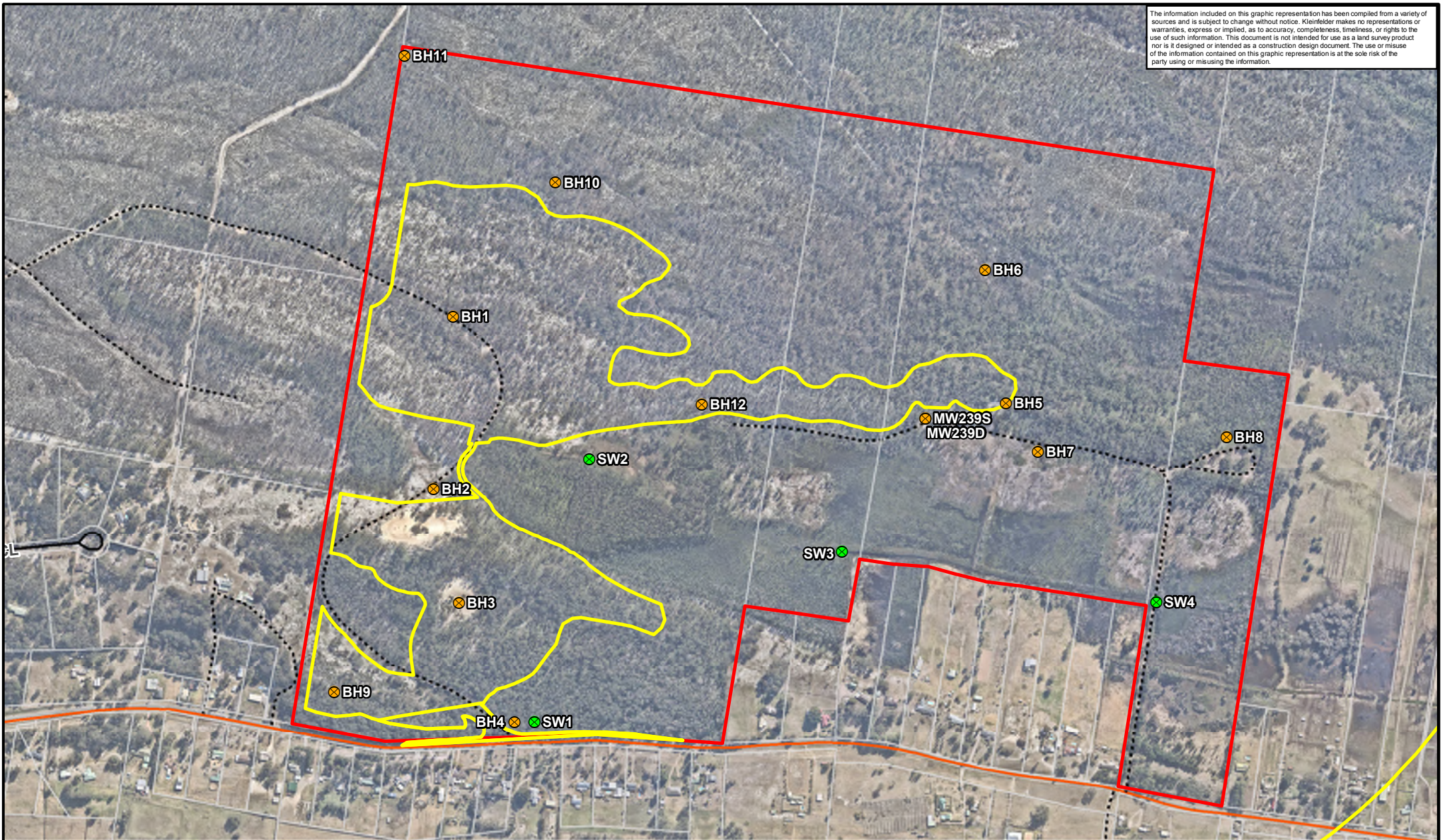
Data Tables

Attachment A – Laboratory reports

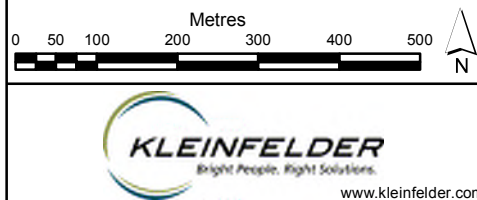
Attachment B – Data Trends

FIGURE 1

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 use of such information. This document is not intended for use as a land survey 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
- ▬ Subject Land Boundary
- ▬ Quarry Project Area
- ▬ Arterial Road
- ▬ Local Road
- - Track



PROJECT REFERENCE: 20170448

DATE DRAWN: 13/02/2019 09:48 Version 1

DRAWN BY: gjoyce

DATA SOURCE:
NSW DFSI - 2017
Nearmap - 2018

Water monitoring locations October 2019 Monitoring

Williamtown Sand Syndicate
Proposed Sand Quarry
Cabbage Tree Road, Williamtown

FIGURE:

1

DATA TABLES



Analyte		BTEXN								Total Petroleum Hydrocarbons	Total Petroleum Hydrocarbons - Silica Clean up				Total Recoverable Hydrocarbons	
		Benzene**	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene**	Total Xylenes	Naphthalene **	Sum of BTEX	C ₆ - C ₉	C ₁₀ -C ₁₄ - Silica Cleanup	C ₁₅ -C ₂₈ - Silica Cleanup	C ₂₉ -C ₃₆ - Silica Cleanup	C ₁₀ -C ₃₆ Sum - Silica Cleanup	C ₆ - C ₁₀	C ₆ - C ₁₀ minus BTEX (F1)
LOR	1	2	2	2	2	2	5	1	20	50	100	50	50	20	20	
Units	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	
ANZECC 2000 Trigger Values		950	-	-	-	350	16	-	-	-	-	-	-	-	-	
NHMRC ADWG 6		1	800	300	-	350	600	-	-	-	-	-	-	-	-	
Sample Name	Sample Date															
BH1	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	1,710	< 50	< 100	< 50	< 50	1,690	1,690	
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	40	< 50	< 100	< 50	< 50	30	30	
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	
BH11	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	
	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	
	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	
BH2	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	
	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	
	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	
BH3	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	
	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	
	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	
BH4	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	
BH5	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	
	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	
	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	
BH6	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	
	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	
BH7	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	
	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	

20193820.001A



KLEINFELDER
Bright People. Right Solutions.

Notes:

- - Not analysed
- < - Less than laboratory limit of reporting

µg/L - Micrograms per litre

BTEXN - Benzene, toluene, ethylbenzene, xylenes, naphthalene

**** 95% Level of protection in freshwater**

20193820.001A

Table 2
Groundwater Analytical Data - Metals
Williamstown Sand Syndicate



Analyte		Metals															
		Arsenic**	Barium	Beryllium	Boron**	Cadmium**	Chromium** ¹	Cobalt	Copper**	Iron	Lead**	Manganese* *	Mercury** ²	Nickel***	Selenium**	Vanadium	Zinc**
LOR		0.001	0.001	0.001	0.05	0.0001	0.001	0.001	0.001	0.05	0.001	0.001	0.0001	0.001	0.01	0.01	0.005
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ANZECC 2000 Trigger Values		0.013	-	-	0.37	0.0002	0.001	-	0.0014	-	0.0034	1.9	0.0006	0.011	0.011	-	0.008
NHMRC ADWG 6		0.01	-	0.06	4	0.002	0.05	-	2	0.3 ³	0.01	0.5	0.001	0.02	0.01	-	3 ³
Sample Name	Sample Date																
BH1	15-Mar-19	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.004	< 0.001	< 0.001	13	< 0.001	0.014	< 0.0001	< 0.001	< 0.01	< 0.01	1.27
	23-Apr-19	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.004	< 0.001	0.002	10	0.001	0.015	< 0.0001	0.002	< 0.01	< 0.01	0.363
	16-May-19	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	< 0.001	8.33	< 0.001	0.009	< 0.0001	0.002	< 0.01	< 0.01	0.132
	14-Jun-19	< 0.001	0.001	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.001	6.31	< 0.001	0.009	< 0.0001	< 0.001	< 0.01	< 0.01	0.074
	16-Jul-19	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	0.002	7.35	< 0.001	0.01	< 0.0001	0.001	< 0.01	< 0.01	0.116
	15-Aug-19	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	0.002	7.96	< 0.001	0.008	< 0.0001	< 0.001	< 0.01	< 0.01	0.023
	16-Sep-19	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.004	< 0.001	0.001	8.84	< 0.001	0.009	< 0.0001	< 0.001	< 0.01	< 0.01	0.034
BH11	15-Oct-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	0.006	4.32	< 0.001	0.007	< 0.0001	< 0.001	< 0.01	< 0.01	0.037
	21-Feb-19	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.002	0.001	< 0.001	0.26	< 0.001	0.003	< 0.0001	0.005	< 0.01	< 0.01	0.031
	15-Mar-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	1.49	< 0.001	0.007	< 0.0001	0.037	< 0.01	< 0.01	0.016
	23-Apr-19	< 0.001	0.006	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.98	< 0.001	0.007	< 0.0001	0.07	< 0.01	< 0.01	0.04
	16-May-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.97	< 0.001	0.006	< 0.0001	0.004	< 0.01	< 0.01	0.024
	14-Jun-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	0.98	< 0.001	0.005	< 0.0001	0.001	< 0.01	< 0.01	0.005
	16-Jul-19	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.47	< 0.001	0.003	< 0.0001	0.004	< 0.01	< 0.01	0.007
BH2	15-Aug-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.001	0.87	< 0.001	0.007	< 0.0001	0.001	< 0.01	< 0.01	0.005
	16-Sep-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	0.79	< 0.001	0.008	< 0.0001	0.002	< 0.01	< 0.01	0.012
	15-Oct-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.004	0.74	< 0.001	0.006	< 0.0001	0.003	< 0.01	< 0.01	0.016
	22-Feb-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.002	0.14	< 0.001	0.021	< 0.0001	0.015	< 0.01	< 0.01	0.006
	15-Mar-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.003	< 0.05	< 0.001	0.02	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	23-Apr-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.004	0.19	< 0.001	0.018	< 0.0001	0.001	< 0.01	< 0.01	0.008
	16-May-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.001	0.06	< 0.001	0.014	< 0.0001	0.001	< 0.01	< 0.01	< 0.005
BH3	14-Jun-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.004	0.08	< 0.001	0.009	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	16-Jul-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.008	0.05	< 0.001	0.013	< 0.0001	0.001	< 0.01	< 0.01	0.006
	15-Aug-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.012	0.08	< 0.001	0.011	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	16-Sep-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.008	0.26	< 0.001	0.014	< 0.0001	0.001	< 0.01	< 0.01	0.007
	15-Oct-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.006	0.46	< 0.001	0.011	< 0.0001	< 0.001	< 0.01	< 0.01	0.007
	21-Feb-19	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.06	< 0.001	0.005	< 0.0001	0.053	< 0.01	< 0.01	< 0.005
	22-Feb-19	< 0.001	0.014	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.002	0.16	< 0.001	0.039	< 0.0001	0.018	< 0.01	< 0.01	0.014
BH4	15-Mar-19	< 0.001	0.014	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.001	< 0.05	< 0.001	0.014	< 0.0001	0.022	< 0.01	< 0.01	0.043
	23-Apr-19	< 0.001	0.013	< 0.001	0.05	< 0.0001	< 0.001	< 0.001	0.002	0.99	< 0.001	0.045	< 0.0001	0.007	< 0.01	< 0.01	0.008
	16-May-19	< 0.001	0.013	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	0.27	< 0.001	0.022	< 0.0001	0.022	< 0.01	< 0.01	0.011
	14-Jun-19	< 0.001	0.012	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.038	< 0.05	< 0.001	0.014	< 0.0001	< 0.001	< 0.01	< 0.01	0.005
	16-Jul-19	< 0.001	0.013	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.046	< 0.05	< 0.001	0.019	< 0.0001	< 0.001	< 0.01	< 0.01	0.007
	15-Aug-19	< 0.001	0.013	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.026	< 0.05	< 0.001	0.018	< 0.0001	0.001	< 0.01	< 0.01	0.007
	16-Sep-19	< 0.001	0.012	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.051	0.19	< 0.001	0.026	< 0.0001	0.002	< 0.01	< 0.01	0.005
BH5	15-Oct-19	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.011	0.31	< 0.001	0.136	< 0.0001	0.002	< 0.01	< 0.01	0.014
	22-Feb-19	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	1.4	< 0.001	0.005	< 0.0001	0.003	< 0.01	< 0.01	0.008
BH6	22-Feb-19	< 0.001	0.03	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	1.03	< 0.001	0.014	< 0.0001	0.001	< 0.01	< 0.01	0.019
	14-Mar-19	< 0.001	0.027	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	1.9	< 0.001	0.01	< 0.0001	< 0.001	< 0.01	< 0.01	0.012
	23-Apr-19	< 0.001	0.03	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.001	0.96	< 0.001	0.01	< 0.0001	< 0.001	< 0.01	< 0.01	0.022
	16-May-19	< 0.001	0.029	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	2.57	< 0.001	0.009	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	14-Jun-19	< 0.001	0.027	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.001	2.86	< 0.001	0.008	< 0.0001	< 0.001	< 0.01	< 0.01	0.008
	16-Jul-19	< 0.001	0.026	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.002	2.41	< 0.001	0.008	< 0.0001	< 0.001	< 0.01	< 0.01	0.005
	15-Aug-19	< 0.001	0.026	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.001	2.19	< 0.001	0.008	< 0.0001	< 0.001	< 0.01	< 0.01	0.007
BH7	16-Sep-19	< 0.001	0.034	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.008	2.08	< 0.001	0.012	< 0.0001	0.007	< 0.01	< 0.01	0.035
	15-Oct-19	< 0.001	0.026	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	1.95	< 0.001	0.009	< 0.0001	< 0.001	< 0.01	< 0.01	0.006
	22-Feb-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.002	0.003	< 0.001	1.8	< 0.001	0.026	< 0.0001	0.004	< 0.01	< 0.01	0.019
	14-Mar-19	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	0.003	< 0.001	1.8							

Table 2
Groundwater Analytical Data - Metals
Williamstown Sand Syndicate



BH8	21-Feb-19	0.001 *	0.011	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.006
	14-Mar-19	< 0.001	0.006	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	3.25	< 0.001	0.008	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
	23-Apr-19	0.001	0.008	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	3.2	< 0.001	0.009	< 0.0001	0.002	< 0.01	< 0.01	0.008
	16-May-19	0.003	0.01	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	3.0	< 0.001	0.01	< 0.0001	0.003	< 0.01	< 0.01	< 0.005
	14-Jun-19	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	2.5	< 0.001	0.005	< 0.0001	0.002	< 0.01	< 0.01	0.006
	16-Jul-19	0.001	0.012	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	2.6	< 0.001	0.004	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
	15-Aug-19	0.001	0.008	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	1.72	< 0.001	0.004	< 0.0001	0.001	< 0.01	< 0.01	< 0.005
	16-Sep-19	0.001	0.01	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	2.06	< 0.001	0.005	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
	15-Oct-19	< 0.001	0.007	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	0.002	2.08	< 0.001	0.009	< 0.0001	0.002	< 0.01	< 0.01	0.011
MW239S	22-Feb-19	< 0.001	0.007	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	1.11	< 0.001	0.003	< 0.0001	0.001	< 0.01	< 0.01	0.006
	14-Mar-19	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	1.25	< 0.001	0.005	< 0.0001	0.005	< 0.01	< 0.01	0.008
	23-Apr-19	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	1.01	< 0.001	0.004	< 0.0001	0.004	< 0.01	< 0.01	0.007
	16-May-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.87	< 0.001	0.003	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
	14-Jun-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.002	0.8	< 0.001	0.003	< 0.0001	0.001	< 0.01	< 0.01	< 0.005
	16-Jul-19	< 0.001	0.006	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.87	< 0.001	0.003	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
	15-Aug-19	< 0.001	0.006	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	1.0	< 0.001	0.004	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	16-Sep-19	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.002	0.94	< 0.001	0.006	< 0.0001	0.006	< 0.01	< 0.01	0.032
	15-Oct-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.003	0.68	< 0.001	0.004	< 0.0001	0.002	< 0.01	< 0.01	0.011
SW1	23-Apr-19	< 0.001	0.043	< 0.001	0.14	< 0.0001	< 0.001	0.017	0.002	4.16	< 0.001	0.841	< 0.0001	0.02	< 0.01	< 0.01	0.356
	16-May-19	< 0.001	0.029	< 0.001	0.1	< 0.0001	< 0.001	0.01	0.003	7.25	< 0.001	0.666	< 0.0001	0.012	< 0.01	< 0.01	0.077
	14-Jun-19	< 0.001	0.029	< 0.001	0.09	0.0002	< 0.001	0.009	0.006	2.75	< 0.001	0.595	< 0.0001	0.011	< 0.01	< 0.01	0.535
	16-Jul-19	< 0.001	0.032	< 0.001	0.08	0.0001	< 0.001	0.007	0.003	1.86	< 0.001	0.59	< 0.0001	0.008	< 0.01	< 0.01	0.239
	15-Aug-19	< 0.001	0.027	< 0.001	0.09	< 0.0001	< 0.001	0.005	0.003	2.15	< 0.001	0.482	< 0.0001	0.005	< 0.01	< 0.01	0.075
	16-Sep-19	< 0.001	0.056	< 0.001	0.09	0.0002	0.001	0.008	0.012	2.45	0.001	0.587	< 0.0001	0.014	< 0.01	< 0.01	0.282
	15-Oct-19	< 0.001	0.036	< 0.001	0.07	< 0.0001	< 0.001	0.005	0.003	1.61	< 0.001	0.383	< 0.0001	0.005	< 0.01	< 0.01	0.055
	22-Feb-19	0.003	0.075	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	4.84	< 0.001	0.033	< 0.0001	0.002	< 0.01	< 0.01	0.016
	14-Mar-19	0.006	0.08	< 0.001	< 0.05	< 0.0001	< 0.001	0.003	< 0.001	9.26	< 0.001	0.048	< 0.0001	0.002	< 0.01	< 0.01	0.009
SW3	23-Apr-19	< 0.001	0.043	< 0.001	< 0.05	< 0.0001	< 0.001	0.003	0.001	2.01	< 0.001	0.046	< 0.0001	0.004	< 0.01	< 0.01	0.016
	16-May-19	< 0.001	0.034	< 0.001	< 0.05	< 0.0001	< 0.001	0.002	< 0.001	1.78	< 0.001	0.038	< 0.0001	0.003	< 0.01	< 0.01	0.012
	14-Jun-19	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	0.001 *	0.003	< 0.001	1.68	< 0.001	0.038	< 0.0001	0.003	< 0.01	< 0.01	0.016
	16-Jul-19	< 0.001	0.055	< 0.001	< 0.05	< 0.0001	< 0.001	0.007	0.002	1.25	< 0.001	0.043	< 0.0001	0.006	< 0.01	< 0.01	0.029
	15-Aug-19	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	< 0.001	0.003	0.002	1.16	< 0.001	0.036	< 0.0001	0.003	< 0.01	< 0.01	0.013
	16-Sep-19	< 0.001	0.045	< 0.001	< 0.05	< 0.0001	< 0.001	0.004	0.02	0.69	0.001	0.036	< 0.0001	0.017	< 0.01	< 0.01	0.094
	15-Oct-19	< 0.001	0.034	< 0.001	< 0.05	< 0.0001	< 0.001	0.005	0.002	1.7	< 0.001	0.027	< 0.0001	0.005	< 0.01	< 0.01	0.022
	23-Apr-19	< 0.001	0.059	< 0.001	< 0.05	< 0.0001	< 0.001	0.003	0.003	2.09	< 0.001	0.037	< 0.0001	0.005	< 0.01	< 0.01	0.03
	16-May-19	< 0.001	0.047	< 0.001	< 0.05	< 0.0001	< 0.001	0.002	< 0.001	1.12	< 0.001	0.03	< 0.0001	0.003	< 0.01	< 0.01	0.019
SW4	14-Jun-19	< 0.001	0.041	< 0.001	< 0.05	< 0.0001	< 0.001	0.002	0.003	0.79	< 0.001	0.034	< 0.0001	0.003	< 0.01	< 0.01	0.014
	16-Jul-19	< 0.001	0.044	< 0.001	< 0.05	< 0.0001	< 0.001	0.002	0.002	0.96	< 0.001	0.043	< 0.0001	0.003	< 0.01	< 0.01	0.014
	15-Aug-19	< 0.001	0.04	< 0.001	< 0.05	< 0.0001	< 0.001	0.001	0.001	0.57	< 0.001	0.032	< 0.0001	0.002	< 0.01	< 0.01	0.009
	16-Sep-19	< 0.001	0.046	< 0.001	< 0.05	< 0.0001	< 0.001	0.002	0.02	0.7	0.001	0.039	< 0.0001	0.017	< 0.01	< 0.01	0.085
	15-Oct-19	< 0.001	0.037	< 0.001	< 0.05	< 0.0001	< 0.001	0.002	0.004	0.66	< 0.001	0.031	< 0.0001	0.003	< 0.01	< 0.01	0.018

Notes:

-- Not analysed

< - Less than laboratory limit of reporting

mg/L - Milligrams per litre

Bold indicates a detection above the laboratory limit of reporting

"*" denotes duplicate/triplicate sample result adopted for analytical use due to RPD >50%

RPD - Relative Percentage Difference

** 95% Level of protection in freshwater

¹ value for CR VI

² as inorganic

³ Aesthetic



Notes:
 - - Not analysed
 < - Less than laboratory limit of reporting
 µg/L - Micrograms per litre
 *** 99% Level of protection in freshwater
 4 Recreation water

20193820.001A



KLEINFELDER
Bright People. Right Solutions.

20193820.001A

Table 4
Groundwater Analytical Data - Inorganics
Wentworth Sand Syncline



Analyte	Anions and Cations															Alkalinity										Inorganics				pH																									
	Sodium	Calcium	Magnesium	Potassium	Sulphate	Chloride	Fluoride	Reactive phosphorus as P	Total Phosphorus	Nitrite as N	Nitrate as N	Nitrite + Nitrate as N	Ammonia as N	Total Nitrogen as N	Total Kjeldahl Nitrogen as N	Total Cations	Total Anions	Ionic Balance	Sodium Adsorption Ratio	Bicarbonate Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Hydroxide Alkalinity as CaCO3	Total Alkalinity as CaCO3	Total Hardness as CaCO3	Electrical Conductivity @ 25°C	Total Dissolved Solids	Total Dissolved Solids																												
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	mg/L																												
ANZCC 2000 Trigger values																														180 ^a				250 ^a	250 ^a	1.5	0.01 ^a	0.03 ^a	3	50	0.3 ^a	0.3 ^a	0.01	0.01	%	0.01	1	1	1	1	1	125/200	1	10	0.01
ADWG 6																														180 ^b				250 ^b	250 ^b	1.5	0.01 ^b	0.03 ^b	3	50	0.3 ^b	0.3 ^b	0.01	0.01	%	0.01	1	1	1	1	1	125/200	1	10	0.01
Sample Name																														Sample Date																								6.5-8.5 ^c	
BH1	15-Mar-19	11	2.0	1.0	< 1.0	< 1.0	25	< 0.1	-	-	-	-	-	-	-	0.66	0.88	-	-	9.0	< 1.0	< 1.0	< 1.0	9.0	104	68	129	5.67																											
	15-Mar-19	14	1.0	2.0	< 1.0	4.0	25	< 0.1	-	-	-	-	-	-	-	0.82	0.99	-	-	10	< 1.0	< 1.0	< 1.0	10	81	58	97	5.83																											
	16-May-19	12	< 1.0	2.0	< 1.0	5.0	25	< 0.1	0.03	< 0.01	< 0.01	< 0.01	0.11	0.3	0.3	0.89	1.01	-	1.7	10	< 1.0	< 1.0	< 1.0	10	8.0	105	68	164	5.82																										
	16-Jun-19	10	< 1.0	2.0	< 1.0	2.0	24	< 0.1	-	-	-	-	-	-	-	0.6	0.94	-	-	10	< 1.0	< 1.0	< 1.0	10	8.0	99	64	72	5.82																										
	16-Jun-19	15	< 1.0	2.0	< 1.0	4.0	23	< 0.1	-	-	-	-	-	-	-	0.82	0.95	-	-	11	< 1.0	< 1.0	< 1.0	11	8.0	102	66	84	5.82																										
	15-Aug-19	14	< 1.0	2.0	< 1.0	2.0	21	< 0.1	-	-	-	-	-	-	-	0.77	0.91	-	-	14	< 1.0	< 1.0	< 1.0	14	8.0	128	83	82	6.22																										
	15-Sep-19	13	< 1.0	2.0	< 1.0	2.0	20	< 0.1	0.06	< 0.01	< 0.01	< 0.01	0.12	0.3	0.3	0.72	0.95	-	1.64	8.0	< 1.0	< 1.0	< 1.0	8.0	102	66	86	5.44																											
	15-Oct-19	13	< 1.0	2.0	< 1.0	2.0	21	< 0.1	-	-	-	-	-	-	-	0.77	0.91	-	-	4.0	< 1.0	< 1.0	< 1.0	4.0	8.0	98	64	5.5																											
	21-Feb-19	48	< 1.0	2.0	< 1.0	2.0	80	< 0.1	0.03	< 0.01	0.04	0.04	0.06	1.8	1.8	2.91	2.76	-	3.21	< 1.0	< 1.0	< 1.0	< 1.0	246	278	447																													
	15-Mar-19	26	< 1.0	2.0	< 1.0	2.0	52	< 0.1	-	-	-	-	-	-	-	1.3	1.51	-	-	< 1.0	< 1.0	< 1.0	< 1.0	186	121	144	4.82																												
BH11	23-Apr-19	32	< 1.0	5.0	< 1.0	2.0	57	< 0.1	-	-	-	-	-	-	-	1.8	1.65	-	-	< 1.0	< 1.0	< 1.0	< 1.0	20	150	98	135	4.99																											
	16-Mar-19	29	< 1.0	4.0	< 1.0	< 1.0	53	< 0.1	< 0.01	< 0.01	< 0.01	< 0.01	0.12	0.4	0.4	1.59	1.59	-	3.0	< 1.0	< 1.0	< 1.0	< 1.0	188	122	116	4.91																												
	14-Jun-19	26	< 1.0	3.0	< 1.0	< 1.0	53	< 0.1	-	-	-	-	-	-	-	1.39	1.5	-	-	< 1.0	< 1.0	< 1.0	< 1.0	175	114	107	4.84																												
	16-Jul-19	49	< 1.0	5.0	< 1.0	6.0	73	0.2	-	-	-	-	-	-	-	2.79	2.22	-	-	< 1.0	< 1.0	< 1.0	< 1.0	318	207	192	4.68																												
	15-Aug-19	28	< 1.0	3.0	< 1.0	4.0	47	< 0.1	-	-	-	-	-	-	-	1.46	1.41	-	-	< 1.0	< 1.0	< 1.0	< 1.0	197	128	135	4.88																												
	16-Sep-19	27	< 1.0	3.0	< 1.0	5.0	46	< 0.1	0.12	< 0.01	< 0.01	< 0.01	0.15	0.7	0.7	1.42	1.4	-	3.18	< 1.0	< 1.0	< 1.0	< 1.0	127	140	146	4.66																												
	15-Oct-19	28	< 1.0	3.0	< 1.0	3.0	44	< 0.1	-	-	-	-	-	-	-	1.46	1.3	-	-	< 1.0	< 1.0	< 1.0	< 1.0	194	126	126	4.92																												
	22-Feb-19	12	2.0	2.0	< 1.0	6.0	22	0.1	< 0.01	0.28	< 0.01	2.76	2.76	0.05	0.7	1.2	0.79	0.74	-	1.44	< 1.0	< 1.0	< 1.0	< 1.0	91	128	91	4.87																											
	15-Mar-19	10	3.0	2.0	< 1.0	7.0	23	< 0.1	-	-	-	-	-	-	-	0.75	0.79	-	-	< 1.0	< 1.0	< 1.0	< 1.0	101	66	90	4.71																												
	23-Apr-19	14	2.0	2.0	< 1.0	6.0	23	< 0.1	-	-	-	-	-	-	-	0.87	0.77	-	-	< 1.0	< 1.0	< 1.0	< 1.0	13	70	46	84	4.82																											
BH2	16-May-19	12	2.0	2.0	< 1.0	21	22	< 0.1	0.26	< 0.01	0.38	0.38	0.01	1.3	0.9	0.79	1.06	-	1.44	< 1.0	< 1.0	< 1.0	< 1.0	94	61	144	4.85																												
	14-Jun-19	11	1.0	2.0	< 1.0	9.0	23	< 0.1	-	-	-	-	-	-	-	0.69	0.75	-	-	< 1.0	< 1.0	< 1.0	< 1.0	11	91	59	91	4.76																											
	16-Jul-19	13	2.0	2.0	< 1.0	9.0	20	< 0.1	-	-	-	-	-	-	-	0.83	0.75	-	-	< 1.0	< 1.0	< 1.0	< 1.0	13	90	58	63	4.84																											
	15-Aug-19	12	1.0	2.0	< 1.0	9.0	20	< 0.1	-	-	-	-	-	-	-	0.74	0.73	-	-	< 1.0	< 1.0	< 1.0	< 1.0	110	72	61	5.2																												
	16-Sep-19	11	2.0	2.0	< 1.0	8.0	18	< 0.1	0.28	< 0.01	1.07	1.07	0.04	2.7	1.6	0.74	0.67	-	1.32	< 1.0	< 1.0	< 1.0	< 1.0	96	62	60	4.72																												
	15-Oct-19	11	2.0	2.0	< 1.0	8.0	18	< 0.1	-	-	-	-	-	-	-	0.75	0.75	-	-	< 1.0	< 1.0	< 1.0	< 1.0	102	66	60	4.72																												
	21-Feb-19	4.0	1.0	1.0	< 1.0	4.0	10	< 0.01	2.76	< 0.01	0.78	0.78	0.3	5.9	5.1	0.46	0.54	-	0.46	< 1.0	< 1.0	< 1.0	< 1.0	9	40	438	-	5.55																											
	15-Mar-19	8.0	2.0	1.0	1.0	5.0	17	< 0.1	0.19	< 0.01	0.35	0.35	0.04	0.6	0.3	0.56	0.7	-	1.15	6.0	< 1.0	< 1.0	< 1.0	6.0	73	96	5.14																												
	15-Mar-19	9.0	2.0	< 1.0	< 1.0	5.0	18	< 0.1	0.43	< 0.01	0.6	0.6	0.3	5.12	4.6	0.61	0.6	-	1.15	6.0	< 1.0	< 1.0	< 1.0	77	96	5.12	70	5.12																											
	23-Apr-19	10	2.0	1.0	1.0	3.0	19	< 0.1	-	-	-	-	-	-	-	0.64	0.6	-	-	< 1.0	< 1.0	< 1.0	< 1.0	54	35	61	5.05																												
BH4	15-May-19	10	2.0	1.0	1.0	3.0	19	< 0.1	0.97	< 0.01	0.25	0.25	< 0.01	1.0	0.7	0.64	0.6	-	1.3	< 1.0	< 1.0	< 1.0	< 1.0	54	35	61	5.05																												
	14-Jun-19	6.0	1.0	1.0	< 1.0	4.0	18	< 0.1	-	-	-	-	-	-	-	0.39	0.59	-	-	< 1.0	< 1.0	< 1.0	< 1.0	7.0	49	45	36	4.84																											
	16-Jul-19	10	2.0	2.0	1.0	6.0	18	< 0.1	-	-	-	-	-	-	-	0.72	0.63	-	-	< 1.0	< 1.0	< 1.0	< 1.0	13	75	49	42	4.86																											
	15-Aug-19	8.0	2.0	1.0	1.0	5.0	16	< 0.1	0.36	< 0.01	0.6	0.6	0.3	5.06	4.6	0.66	0.56	-	< 1.0	< 1.0	< 1.0	< 1.0	89	55	49	5.01																													
	16-Sep-19	11	2.0	2.0	< 1.0	8.0	19	< 0.1	0.4	< 0.01	0.24	0.24	0.02	0.6	0.4	0.74	0.7	-	1.32	< 1.0	< 1.0	< 1.0	< 1.0	95	62	58	4.83																												
	15-Oct-19	10	1.0	1.0	< 1.0	8.0	19	< 0.1	-	-	-	-	-	-	-	0.75	0.75	-	-	< 1.0	< 1.0	< 1.0	< 1.0	95	62	58	4.83																												
	22-Feb-19	42	< 1.0	6.0	1.0	19	69	0.2	< 0.01	0.34	< 0.01	0.01	< 0.01	0.09	3.0	3.0	2.35	2.34	-	2.59	< 1.0	< 1.0	< 1.0	< 1.0	25	230	211	-	4.87																										
	22-Feb-19	42	< 1.0	6.0	1.0	28	42	< 0.1	0.05	< 0.01	0.09	0.09	0.14	0.5	0.4	1.72	1.77	-	1.49	< 1.0	< 1.0	< 1.0	< 1.0	24	177	144	-	4.97																											
	14-Mar-19	23	< 1.0	4.0	1.0	17	37	< 0.1	-	-	-	-	-	-	-	1.46	1.44	-	2.0	< 1.0	< 1.0	< 1.0	< 1.0	24	179	116	146	4.95																											
	23-Apr-19	23	< 1.0	4.0	1.0	18	42	< 0.1	-	-	-	-	-	-	-	1.59	1.56	-	-	< 1.0	< 1.0	< 1.0	< 1.0	24	136	88	115	4.64																											
BH6	16-Mar-19	23	< 1.0	4.0	1.0	18	42	< 0.1	0.13	< 0.01	< 0.01	< 0.01	0.14	0.6	0.6	1.46	1.46	-	2.04	< 1.0	< 1.0	< 1.0	< 1.0	26	136	116	146	4.88																											
	14-Jun-19	20	2.0	4.0	1.0	16	42	< 0.1	-	-	-	-	-	-	-	1.32	1.52	-	-	< 1.0	< 1.0	< 1.0	< 1.0	21	194	103	90	4.82																											
	16-Jul-19	23	2.0	4.0	1.0	28	35	< 0.1	-	-	-	-	-	-	-	1.46	1.4	-	-	< 1.0	< 1.0	< 1.0	< 1.0	24	161	103	90	4.82																											
	15-Aug-19	23	2.0	3.0	1.0	21	38	< 0.1	-	-	-	-	-	-	-	1.37	1.51	-	-	< 1.0	< 1.0																																		

Table 5
Quality Control Sample Analysis - BTEXN
Williamstown Sand Syndicate



Analyte			BTEXN								C ₆ - C ₉
			Benzene	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene	Total Xylenes	Naphthalene	Sum of BTEX	
Units			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Sample Name	Sample Date	Sample Type									
TRIP BLANK_13022019	13-Feb-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
RINSATE01_21022019	21-Feb-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
BH8_21022019	21-Feb-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
DUP01_21022019	21-Feb-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC
BH8_21022019	21-Feb-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
TRIP01_21022019	21-Feb-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	-	< 20
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK_130319	13-Mar-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
RINSATE02_140319	14-Mar-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
BH7_140319	14-Mar-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
DUP02_140319	14-Mar-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK 05_14062019	14-Jun-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
RINSATE 05_14062019	14-Jun-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
SW3_14062019	14-Jun-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
DUP05_14062019	14-Jun-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC
SW3_14062019	14-Jun-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
TRIP05_140619	14-Jun-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	-	< 20
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK 06_16072019	16-Jul-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
RINSATE06_16072019	16-Jul-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
RINSATE07	15-Aug-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
TRIP BLANK 08_16092019	16-Sep-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
RINSATE 08_16092019	16-Sep-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
SW4_16092019	16-Sep-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
DUP08_16092019	16-Sep-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC
SW4_16092019	16-Sep-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
TRIP08_16092019	16-Sep-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	-	< 20
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK_15102019	15-Oct-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
RINSATE_15102019	15-Oct-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20

Notes:

-- Not analysed

< - Less than laboratory limit of reporting

NC - Not calculated

µg/L - Micrograms per litre

BTEXN - Benzene, toluene, ethylbenzene, xylenes, naphthalene

Table 5
Quality Control Sample Analysis - BTEXN
Williamstown Sand Syndicate



Total Petroleum Hydrocarbons				Total Petroleum Hydrocarbons - Silica Clean up				Total Recoverable		
C ₁₀ - C ₁₄	C ₁₅ - C ₂₈	C ₂₉ - C ₃₆	C ₁₀ - C ₃₆ sum	C ₁₀ -C ₁₄ - Silica Cleanup	C ₁₅ -C ₂₈ - Silica Cleanup	C ₂₉ -C ₃₆ - Silica Cleanup	C ₁₀ -C ₃₆ Sum - Silica Cleanup	C ₆ - C ₁₀	C ₆ - C ₁₀ minus BTEX (F1)	>C ₁₀ - C ₁₆
µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
< 50	< 100	< 100	< 100	< 50	< 100	< 100	< 400	< 20	< 20	< 50
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
-	-	-	-	-	-	-	-	< 20	< 20	
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
-	-	-	-	< 50	< 100	< 100	< 100	< 20	< 20	-
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
< 50	< 100	< 50	< 50	-	-	-	-	< 20	< 20	< 100
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
200	400	200	800	< 50	< 100	< 100	< 400	< 20	< 20	180
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-

Table 5
Quality Control Sample Analysis - BTEXN
Williamstown Sand Syndicate



Hydrocarbons			Total Recoverable Hydrocarbons - Silica Clean up				
>C ₁₀ - C ₁₆ minus Naphthalene (F2)	>C ₁₆ - C ₃₄	>C ₃₄ - C ₄₀	>C ₁₀ -C ₁₆ - Silica Cleanup	F2 - Silica Cleanup	>C ₁₆ -C ₃₄ - Silica Cleanup	>C ₃₄ -C ₄₀ - Silica Cleanup	>C ₁₀ -C ₄₀ - Silica Cleanup
µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
-	-	-	< 100	< 100	< 100	< 100	< 100
-	-	-	< 100	< 100	< 100	< 100	< 100
-	-	-	< 100	< 100	< 100	< 100	< 100
-	-	-	< 100	< 100	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC
-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 100	< 100	< 50	-	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC
			-	-	-	-	-
			< 100	< 100	< 100	< 100	< 100
			< 100	< 100	< 100	< 100	< 100
			< 100	< 100	< 100	< 100	< 100
			NC	NC	NC	NC	NC
-	-	-	< 100	< 100	< 100	< 100	< 100
-	-	-	< 100	< 100	< 100	< 100	< 100
-	-	-	< 100	< 100	< 100	< 100	< 100
-	-	-	< 100	< 100	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC
-	-	-	< 100	< 100	< 100	< 100	< 100
-	-	-	< 50	< 50	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC
-	-	-	< 100	< 100	< 100	< 100	< 100
-	-	-	< 100	< 100	< 100	< 100	< 100
< 100	< 100	< 100	-	-	-	-	-
-	-	-	< 100	< 100	< 100	< 100	< 100
-	-	-	< 100	< 100	< 100	< 100	< 100
-	-	-	< 100	< 100	< 100	< 100	< 100
-	-	-	< 100	< 100	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC
-	-	-	< 100	< 100	< 100	< 100	< 100
180	400	100	< 50	-	< 100	< 100	-
NC	NC	NC	NC	NC	NC	NC	NC
-	-	-	< 100	< 100	< 100	< 100	< 100
-	-	-	< 100	< 100	< 100	< 100	< 100

Table 6
Quality Control Sample Analysis - Metals
Williamstown Sand Syndicate



Analyte			Metals																
			Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Chromium VI	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Nickel	Selenium	Vanadium	Zinc
Units			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Name	Sample Date	Sample Type																	
TRIP BLANK 13022019	13-Feb-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE01 21022019	21-Feb-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH8 21022019	21-Feb-19	Primary	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.005
DUP01 21022019	21-Feb-19	Duplicate	0.001	0.014	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.09	< 0.001	0.012	< 0.0001	0.003	< 0.01	< 0.01	0.015
Relative Percentage Difference			67%	24%	NC	NC	NC	0%	NC	NC	NC	0%	NC	0%	NC	40%	NC	NC	100%
BH8 21022019	21-Feb-19	Primary	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.005
TRIP01 21022019	21-Feb-19	Triplicate	0.001	< 0.02	< 0.001	< 0.05	< 0.0002	< 0.005	< 0.005	< 0.001	< 0.001	4.5	< 0.001	0.012	< 0.0001	0.003	-	< 0.005	0.006
Relative Percentage Difference			67%	10%	NC	NC	NC	86%	NC	NC	NC	9%	NC	0%	NC	40%	NC	NC	18%
TRIP BLANK 130319	13-Mar-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
TRIP BLANK02 150319	15-Mar-19	Trip Blank	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE02 140319	14-Mar-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH7 140319	14-Mar-19	Primary	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	-	0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
DUP02 140319	14-Mar-19	Duplicate	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	-	0.002	< 0.001	2.51	< 0.001	0.021	< 0.0001	0.004	< 0.01	< 0.01	0.007
Relative Percentage Difference			NC	0%	NC	NC	NC	0%	40%	NC	NC	33%	NC	5%	NC	0%	NC	NC	25%
BH7 140319	14-Mar-19	Primary	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	-	0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
TRIP02 14032019	14-Mar-19	Triplicate	< 0.001	< 0.02	< 0.001	< 0.05	< 0.0002	0.001	-	0.002	< 0.001	1.7	< 0.001	0.019	< 0.0001	< 0.001	-	< 0.005	< 0.005
Relative Percentage Difference			NC	0%	NC	NC	NC	0%	40%	NC	NC	6%	NC	5%	NC	156%	NC	NC	113%
TRIP BLANK 05 14062019	14-Jun-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE 05 14062019	14-Jun-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
SW3 14062019	14-Jun-19	Primary	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.003	< 0.001	1.68	< 0.001	0.038	< 0.0001	0.003	< 0.01	< 0.01	0.016
DUP05 14062019	14-Jun-19	Duplicate	< 0.001	0.036	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.003	< 0.001	1.63	< 0.001	0.039	< 0.0001	0.003	< 0.01	< 0.01	0.013
Relative Percentage Difference			NC	3%	NC	NC	NC	NC	NC	0%	NC	3%	NC	3%	NC	0%	NC	NC	21%
SW3 14062019	14-Jun-19	Primary	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.003	< 0.001	1.68	< 0.001	0.038	< 0.0001	0.003	< 0.01	< 0.01	0.016
TRIP05 140619	14-Jun-19	Triplicate	< 0.001	-	-	-	< 0.0002	0.001	-	-	< 0.001	1.6	< 0.001	-	< 0.0001	0.003	-	-	0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	67%	NC	NC	NC	5%	NC	NC	NC	0%	NC	NC	46%
TRIP BLANK 06 16072019	16-Jul-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE06 16072019	16-Jul-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE07	15-Aug-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
TRIP BLANK 08 16092019	16-Sep-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE 08 16092019	16-Sep-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
SW4 16092019	16-Sep-19	Primary	< 0.001	0.046	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.002	0.02	0.7	0.001	0.039	< 0.0001	0.017	< 0.01	< 0.01	0.085
DUP08 16092019	16-Sep-19	Duplicate	< 0.001	0.041	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.002	< 0.001	0.76	< 0.001	0.036	< 0.0001	0.003	< 0.01	< 0.01	0.012
Relative Percentage Difference			NC	11%	NC	NC	NC	NC	NC	0%	190%	8%	67%	8%	NC	140%	NC	NC	151%
SW4 16092019	16-Sep-19	Primary	< 0.001	0.046	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.002	0.02	0.7	0.001	0.039	< 0.0001	0.017	< 0.01	< 0.01	0.085
TRIP08 16092019	16-Sep-19	Triplicate	< 0.001	0.04	< 0.001	< 0.05	< 0.0002	< 0.001	< 0.005	0.002	< 0.001	0.69	< 0.001	0.037	< 0.0001	0.003	-	< 0.005	0.012
Relative Percentage Difference			NC	14%	NC	NC	NC	NC	NC	0%	190%	1%	67%	5%	NC	140%	NC	NC	151%
TRIP BLANK 15102019	15-Oct-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE 15102019	15-Oct-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005

Notes:
 -- Not analysed
 < - Less than laboratory limit of reporting
 NC - Not calculated
 mg/L - Milligrams per litre
 Half the laboratory limit of reporting used when calculating RPD
 RPD - Relative Percentage Difference

Notes:
 < - Less than laboratory limit of reporting
 NC - Not calculated
 µg/L - Micrograms per litre

ATTACHMENT A: LABORATORY REPORTS

CERTIFICATE OF ANALYSIS

Work Order	: ES1933705	Page	: 1 of 19
Amendment	: 1		
Client	: KLEINFELDER AUSTRALIA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Contact	: Shirley LeCornu
Address	: 95 MITCHELL ROAD CARDIFF NSW 2285	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ---	Telephone	: +6138549 9630
Project	: Williamtown Sand Syndicate	Date Samples Received	: 15-Oct-2019 15:37
Order number	: 20193820	Date Analysis Commenced	: 16-Oct-2019
C-O-C number	: 4787	Issue Date	: 23-Oct-2019 10:26
Sampler	: DANIEL KOUSBROEK		
Site	: Williamtown SS		
Quote number	: ME/114/19 ALS Compass		
No. of samples received	: 13		
No. of samples analysed	: 13		



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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW



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

Ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- EG035: Poor matrix spike recovery was obtained for Mercury on sample ES1933475 #1. Confirmed by re-analysis.
- Amendment (23/10/2019): This report has been amended and re-released to allow the reporting of additional analytical data.
- 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

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Client sample ID

				BH1	BH2	BH4	BH6	BH7
Client sampling date / time				15-Oct-2019 11:37	15-Oct-2019 11:07	15-Oct-2019 10:18	15-Oct-2019 13:31	15-Oct-2019 13:48
Compound	CAS Number	LOR	Unit	ES1933705-005	ES1933705-006	ES1933705-007	ES1933705-008	ES1933705-009
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	5.50	5.06	4.93	5.17	4.95
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	98	102	85	202	252
EA016: Calculated TDS (from Electrical Conductivity)								
Total Dissolved Solids (Calc.)	----	1	mg/L	64	66	55	131	164
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	8	13	7	21	20
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	4	<1	<1	<1	<1
Total Alkalinity as CaCO3	----	1	mg/L	4	<1	<1	<1	<1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2	5	4	13	12
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	21	20	18	41	53
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	<1	2	1	2	<1
Magnesium	7439-95-4	1	mg/L	2	2	1	4	5
Sodium	7440-23-5	1	mg/L	13	12	10	25	34
Potassium	7440-09-7	1	mg/L	<1	<1	<1	1	2
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Barium	7440-39-3	0.001	mg/L	0.005	0.004	0.010	0.026	0.009
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	0.002
Chromium	7440-47-3	0.001	mg/L	0.003	<0.001	<0.001	<0.001	0.002
Copper	7440-50-8	0.001	mg/L	0.006	0.006	0.011	<0.001	0.003
Manganese	7439-96-5	0.001	mg/L	0.007	0.011	0.136	0.009	0.018
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.002	<0.001	0.003
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Client sample ID

				BH1	BH2	BH4	BH6	BH7
Client sampling date / time				15-Oct-2019 11:37	15-Oct-2019 11:07	15-Oct-2019 10:18	15-Oct-2019 13:31	15-Oct-2019 13:48
Compound	CAS Number	LOR	Unit	ES1933705-005	ES1933705-006	ES1933705-007	ES1933705-008	ES1933705-009
				Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued								
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L	0.037	0.007	0.014	0.006	0.011
Iron	7439-89-6	0.05	mg/L	4.32	0.46	0.31	1.95	1.32
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
EN055: Ionic Balance								
∅ Total Anions	----	0.01	meq/L	0.71	0.67	0.59	1.43	1.74
∅ Total Cations	----	0.01	meq/L	0.73	0.79	0.57	1.54	1.94
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup								
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	<50	<50
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	<100	<100	<100	<100
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	<20
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	<20	<20
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L	<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Client sample ID

				BH1	BH2	BH4	BH6	BH7
Client sampling date / time				15-Oct-2019 11:37	15-Oct-2019 11:07	15-Oct-2019 10:18	15-Oct-2019 13:31	15-Oct-2019 13:48
Compound	CAS Number	LOR	Unit	ES1933705-005	ES1933705-006	ES1933705-007	ES1933705-008	ES1933705-009
				Result	Result	Result	Result	Result
EP080: BTEXN - Continued								
^ Total Xylenes	----	2	µg/L	<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L	<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L	<5	<5	<5	<5	<5
EP231A: Perfluoroalkyl Sulfonic Acids								
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
EP231B: Perfluoroalkyl Carboxylic Acids								
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
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	----	----	<0.02	<0.02	<0.02



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Client sample ID

				BH1	BH2	BH4	BH6	BH7
Client sampling date / time				15-Oct-2019 11:37	15-Oct-2019 11:07	15-Oct-2019 10:18	15-Oct-2019 13:31	15-Oct-2019 13:48
Compound	CAS Number	LOR	Unit	ES1933705-005	ES1933705-006	ES1933705-007	ES1933705-008	ES1933705-009
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
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
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
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
EP231P: PFAS Sums								
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
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	2	%	107	119	115	115	116
Toluene-D8	2037-26-5	2	%	105	98.7	101	108	97.5
4-Bromofluorobenzene	460-00-4	2	%	101	102	100	104	96.8
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	----	----	114	112	112
13C8-PFOA	----	0.02	%	----	----	118	119	116



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Client sample ID

				BH8	BH11	MW239S	----	----
Client sampling date / time				15-Oct-2019 14:02	15-Oct-2019 12:04	15-Oct-2019 13:08	----	----
Compound	CAS Number	LOR	Unit	ES1933705-010	ES1933705-013	ES1933705-014	-----	-----
				Result	Result	Result	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	5.02	4.92	4.86	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	303	194	404	----	----
EA016: Calculated TDS (from Electrical Conductivity)								
Total Dissolved Solids (Calc.)	----	1	mg/L	197	126	263	----	----
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	16	12	25	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	<1	----	----
Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	<1	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	4	3	8	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	70	44	108	----	----
ED093F: Dissolved Major Cations								
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	45	28	58	----	----
Potassium	7440-09-7	1	mg/L	<1	<1	<1	----	----
EG020F: Dissolved Metals by ICP-MS								
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	0.007	0.004	0.005	----	----
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	0.002	0.002	----	----
Copper	7440-50-8	0.001	mg/L	0.002	0.004	0.003	----	----
Manganese	7439-96-5	0.001	mg/L	0.009	0.006	0.004	----	----
Nickel	7440-02-0	0.001	mg/L	0.002	0.003	0.002	----	----
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	----	----



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Client sample ID

				BH8	BH11	MW239S	----	----
Client sampling date / time				15-Oct-2019 14:02	15-Oct-2019 12:04	15-Oct-2019 13:08	----	----
Compound	CAS Number	LOR	Unit	ES1933705-010	ES1933705-013	ES1933705-014	-----	-----
				Result	Result	Result	----	----
EG020F: Dissolved Metals by ICP-MS - Continued								
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	----	----
Zinc	7440-66-6	0.005	mg/L	0.011	0.016	0.011	----	----
Iron	7439-89-6	0.05	mg/L	2.08	0.74	0.68	----	----
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	<0.1	----	----
EN055: Ionic Balance								
∅ Total Anions	----	0.01	meq/L	2.06	1.30	3.21	----	----
∅ Total Cations	----	0.01	meq/L	2.29	1.46	3.02	----	----
∅ Ionic Balance	----	0.01	%	----	----	3.15	----	----
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup								
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	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	----	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
>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	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	----	----
EP080: BTEXN								
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	----	----

Sub-Matrix: **GROUNDWATER**
(Matrix: **WATER**)

Client sampling date / time

EP080: BTEXN - Continued

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	----	----

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	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	----	----	----	----

Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	----	----	----	----

EP231C: Perfluoroalkyl Sulfonamides

Sub-Matrix: **GROUNDWATER**
(Matrix: **WATER**)

Client sampling date / time

EP231C: Perfluoroalkyl Sulfonamides - Continued

Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	----	----	----	----

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	----	----	----	----

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	----	----	----	----

1.2-Dichloroethane-D4	17060-07-0	2	%	126	120	117	----	----
Toluene-D8	2037-26-5	2	%	107	98.4	96.5	----	----
4-Bromofluorobenzene	460-00-4	2	%	108	99.6	95.3	----	----



Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH8	BH11	MW239S	----	----
Client sampling date / time					15-Oct-2019 14:02	15-Oct-2019 12:04	15-Oct-2019 13:08	----	----
Compound	CAS Number	LOR	Unit		ES1933705-010	ES1933705-013	ES1933705-014	-----	-----
					Result	Result	Result	----	----
EP231S: PFAS Surrogate - Continued									
13C4-PFOS	----	0.02	%		111	----	----	----	----
13C8-PFOA	----	0.02	%		116	----	----	----	----



Analytical Results

Sub-Matrix: **SURFACE WATER**
 (Matrix: **WATER**)

Client sample ID

				SW1	SW3	SW4	----	----
Client sampling date / time				15-Oct-2019 10:51	15-Oct-2019 12:36	15-Oct-2019 09:41	----	----
Compound	CAS Number	LOR	Unit	ES1933705-001	ES1933705-003	ES1933705-004	-----	-----
				Result	Result	Result	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	5.32	4.75	4.48	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	1050	383	365	----	----
EA016: Calculated TDS (from Electrical Conductivity)								
Total Dissolved Solids (Calc.)	----	1	mg/L	682	249	237	----	----
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	168	41	40	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	<1	----	----
Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	<1	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	127	42	38	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	191	57	57	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	16	5	6	----	----
Magnesium	7439-95-4	1	mg/L	31	7	6	----	----
Sodium	7440-23-5	1	mg/L	124	40	44	----	----
Potassium	7440-09-7	1	mg/L	3	<1	<1	----	----
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Boron	7440-42-8	0.05	mg/L	0.07	<0.05	<0.05	----	----
Barium	7440-39-3	0.001	mg/L	0.036	0.034	0.037	----	----
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	0.005	0.005	0.002	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Copper	7440-50-8	0.001	mg/L	0.003	0.002	0.004	----	----
Manganese	7439-96-5	0.001	mg/L	0.383	0.027	0.031	----	----
Nickel	7440-02-0	0.001	mg/L	0.005	0.005	0.003	----	----
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	----	----



Analytical Results

Sub-Matrix: **SURFACE WATER**
 (Matrix: **WATER**)

Client sample ID

				SW1	SW3	SW4	----	----
Client sampling date / time				15-Oct-2019 10:51	15-Oct-2019 12:36	15-Oct-2019 09:41	----	----
Compound	CAS Number	LOR	Unit	ES1933705-001	ES1933705-003	ES1933705-004	-----	-----
				Result	Result	Result	----	----
EG020F: Dissolved Metals by ICP-MS - Continued								
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	----	----
Zinc	7440-66-6	0.005	mg/L	0.055	0.022	0.018	----	----
Iron	7439-89-6	0.05	mg/L	1.61	1.70	0.66	----	----
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	0.6	0.2	0.1	----	----
EN055: Ionic Balance								
∅ Total Anions	----	0.01	meq/L	8.03	2.48	2.40	----	----
∅ Total Cations	----	0.01	meq/L	8.82	2.56	2.71	----	----
∅ Ionic Balance	----	0.01	%	4.68	----	----	----	----
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup								
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	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	----	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
>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	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	----	----
EP080: BTEXN								
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	----	----



Analytical Results

Sub-Matrix: **SURFACE WATER**
 (Matrix: **WATER**)

Client sample ID

				SW1	SW3	SW4	----	----
Client sampling date / time				15-Oct-2019 10:51	15-Oct-2019 12:36	15-Oct-2019 09:41	----	----
Compound	CAS Number	LOR	Unit	ES1933705-001	ES1933705-003	ES1933705-004	-----	-----
				Result	Result	Result	----	----
EP080: BTEXN - Continued								
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	----	----
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	2	%	111	111	109	----	----
Toluene-D8	2037-26-5	2	%	108	97.4	101	----	----
4-Bromofluorobenzene	460-00-4	2	%	107	102	97.6	----	----



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				Rinsate09 Glove Rinsate	Trip Blank 09 Trip Blank	----	----	----
Client sampling date / time				15-Oct-2019 14:29	15-Oct-2019 14:32	----	----	----
Compound	CAS Number	LOR	Unit	ES1933705-015	ES1933705-016	-----	-----	-----
				Result	Result	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	----	----	----
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	----	----	----
Barium	7440-39-3	0.001	mg/L	<0.001	<0.001	----	----	----
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	----	----	----
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	----	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	----	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	----	----	----
Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	----	----	----
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	----	----	----
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	----	----	----
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	----	----	----
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	----	----	----
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	----	----	----
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	----	----	----
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup								
C10 - C14 Fraction	----	50	µg/L	<50	<50	----	----	----
C15 - C28 Fraction	----	100	µg/L	<100	<100	----	----	----
C29 - C36 Fraction	----	50	µg/L	<50	<50	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	----	----	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
>C10 - C16 Fraction	----	100	µg/L	<100	<100	----	----	----
>C16 - C34 Fraction	----	100	µg/L	<100	<100	----	----	----
>C34 - C40 Fraction	----	100	µg/L	<100	<100	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100	----	----	----
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	<100	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	----	----	----



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				Rinsate09 Glove Rinsate	Trip Blank 09 Trip Blank	----	----	----
Client sampling date / time				15-Oct-2019 14:29	15-Oct-2019 14:32	----	----	----
Compound	CAS Number	LOR	Unit	ES1933705-015	ES1933705-016	-----	-----	-----
				Result	Result	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued								
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	----	----	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	----	----	----
Toluene	108-88-3	2	µg/L	<2	<2	----	----	----
Ethylbenzene	100-41-4	2	µg/L	<2	<2	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	----	----	----
ortho-Xylene	95-47-6	2	µg/L	<2	<2	----	----	----
^ Total Xylenes	----	2	µg/L	<2	<2	----	----	----
^ Sum of BTEX	----	1	µg/L	<1	<1	----	----	----
Naphthalene	91-20-3	5	µg/L	<5	<5	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	----	----	----



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				Rinsate09 Glove Rinsate	Trip Blank 09 Trip Blank	----	----	----
Client sampling date / time				15-Oct-2019 14:29	15-Oct-2019 14:32	----	----	----
Compound	CAS Number	LOR	Unit	ES1933705-015	ES1933705-016	-----	-----	-----
				Result	Result	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	----	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	----	----	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-	0.01	µg/L	<0.01	<0.01	----	----	----



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Client sample ID

				Rinsate09 Glove Rinsate	Trip Blank 09 Trip Blank	----	----	----
Client sampling date / time				15-Oct-2019 14:29	15-Oct-2019 14:32	----	----	----
Compound	CAS Number	LOR	Unit	ES1933705-015	ES1933705-016	-----	-----	-----
				Result	Result	----	----	----
EP231P: PFAS Sums - Continued								
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	2	%	120	116	----	----	----
Toluene-D8	2037-26-5	2	%	95.1	95.6	----	----	----
4-Bromofluorobenzene	460-00-4	2	%	96.5	94.5	----	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	108	113	----	----	----
13C8-PFOA	----	0.02	%	117	119	----	----	----



Surrogate Control Limits

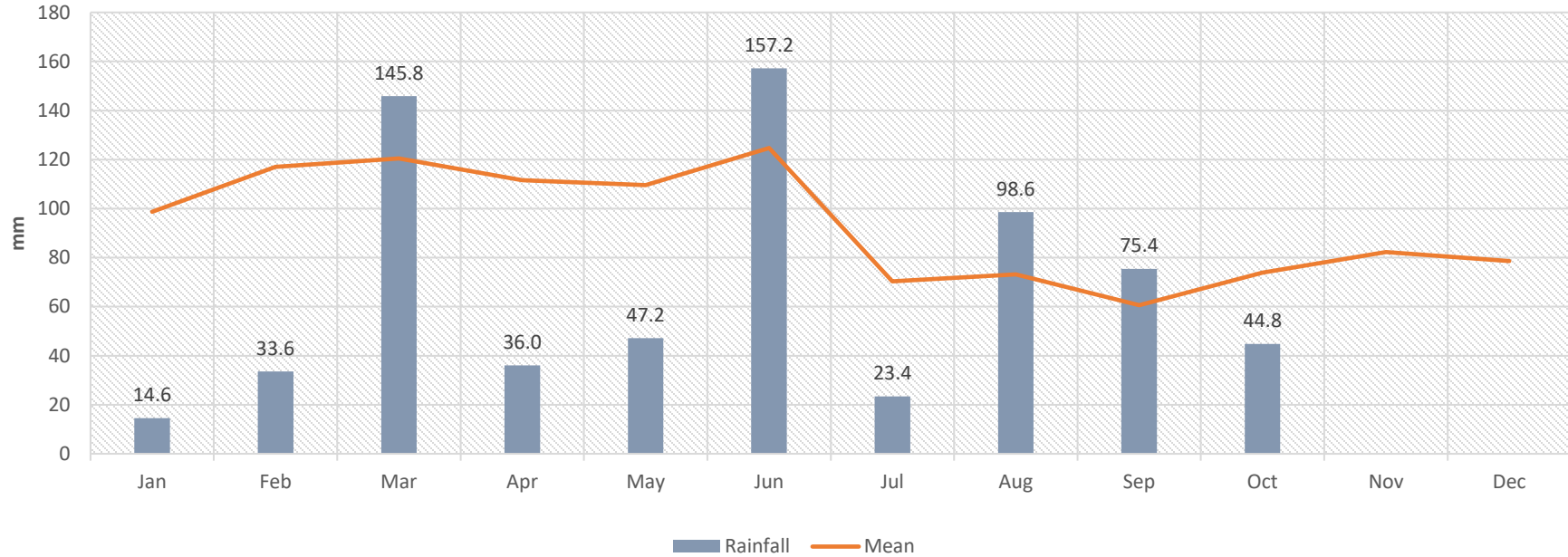
Sub-Matrix: GROUNDWATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: SURFACE WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128

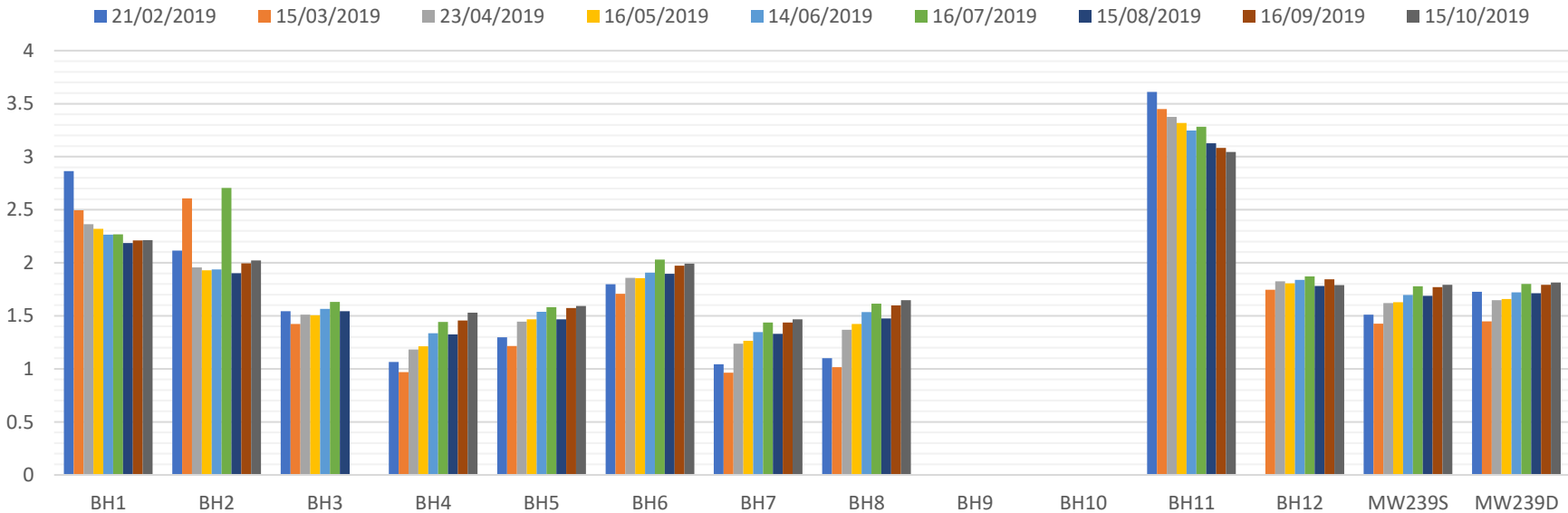
Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

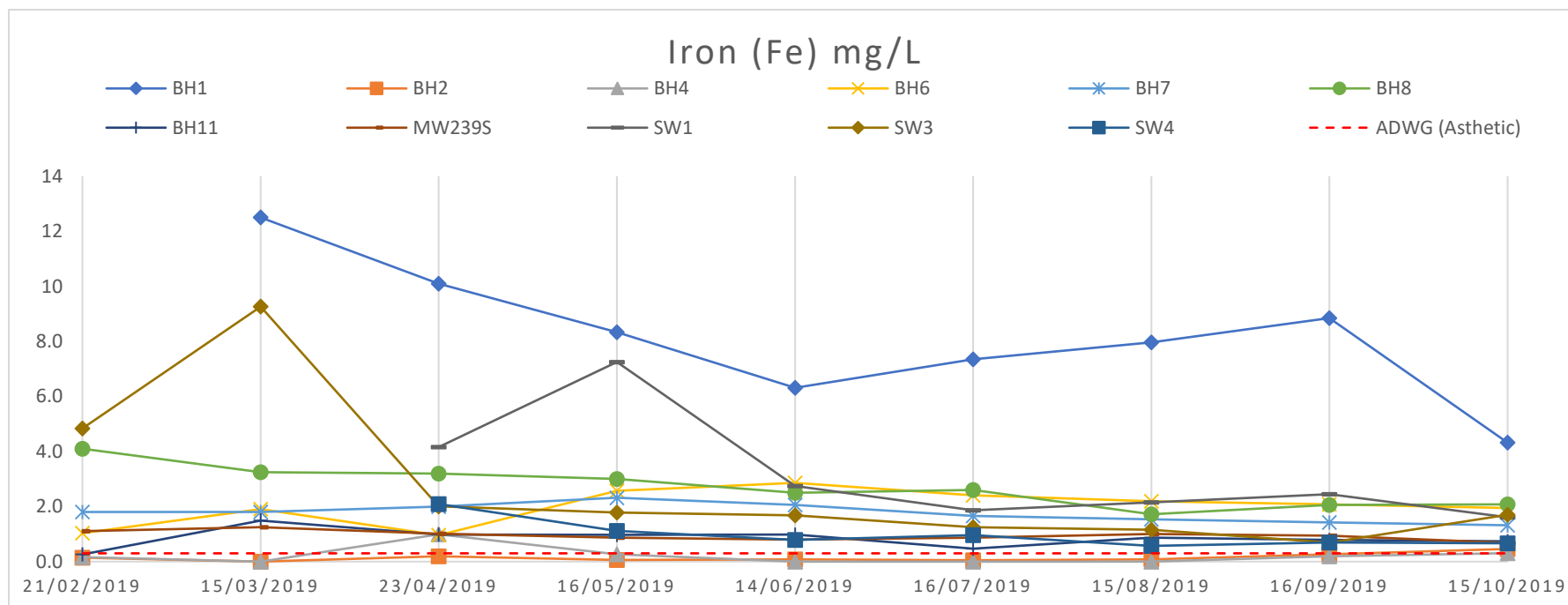
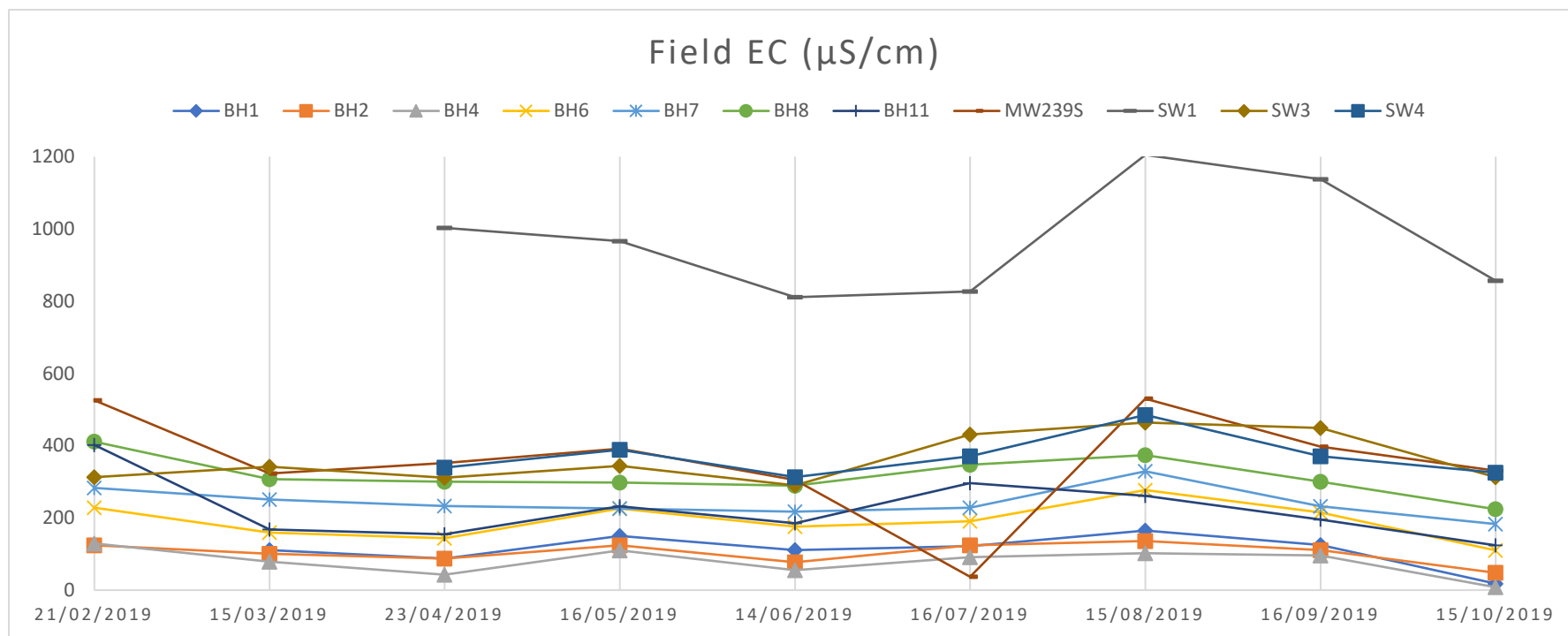
ATTACHMENT B: TREND DATA

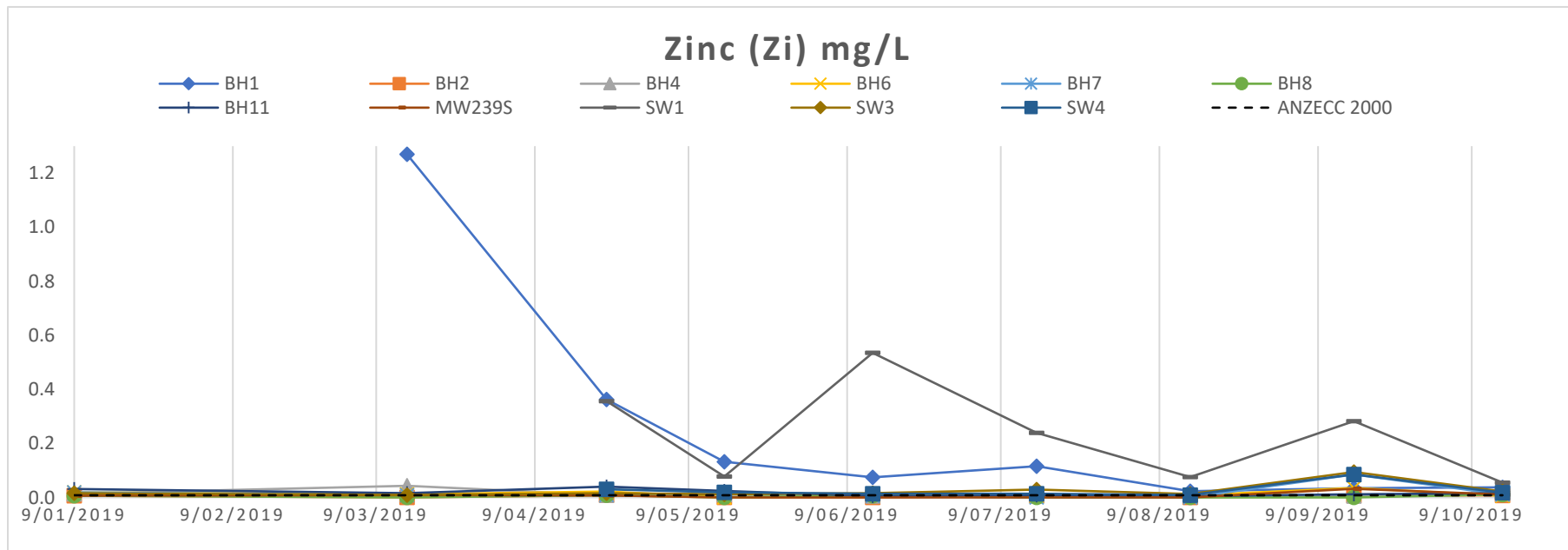
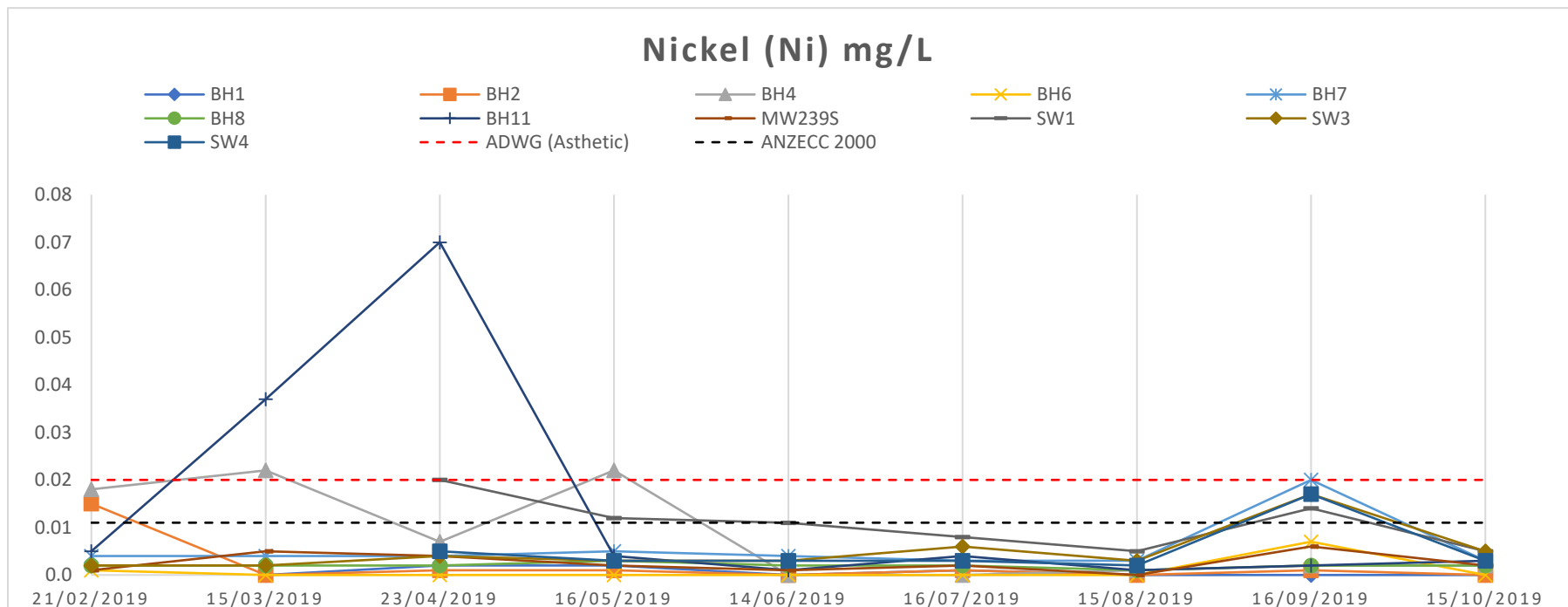
Monthly Rainfall Totals (mm)

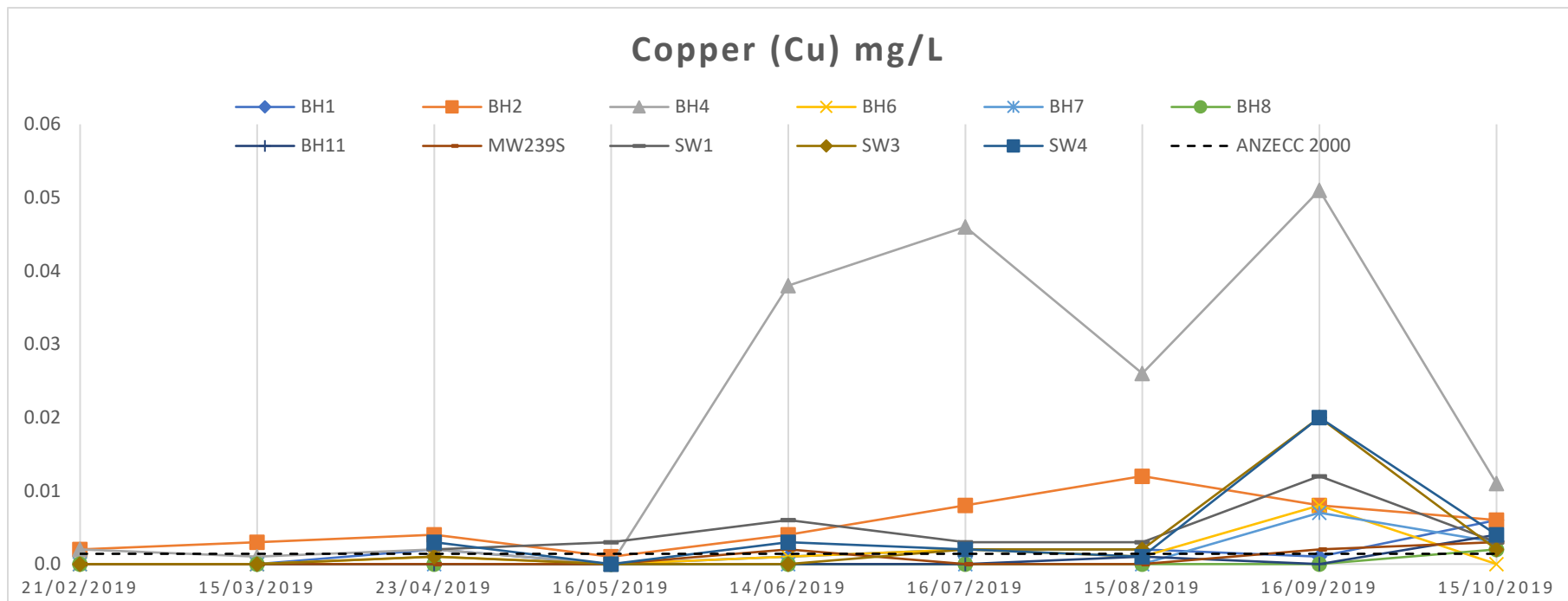
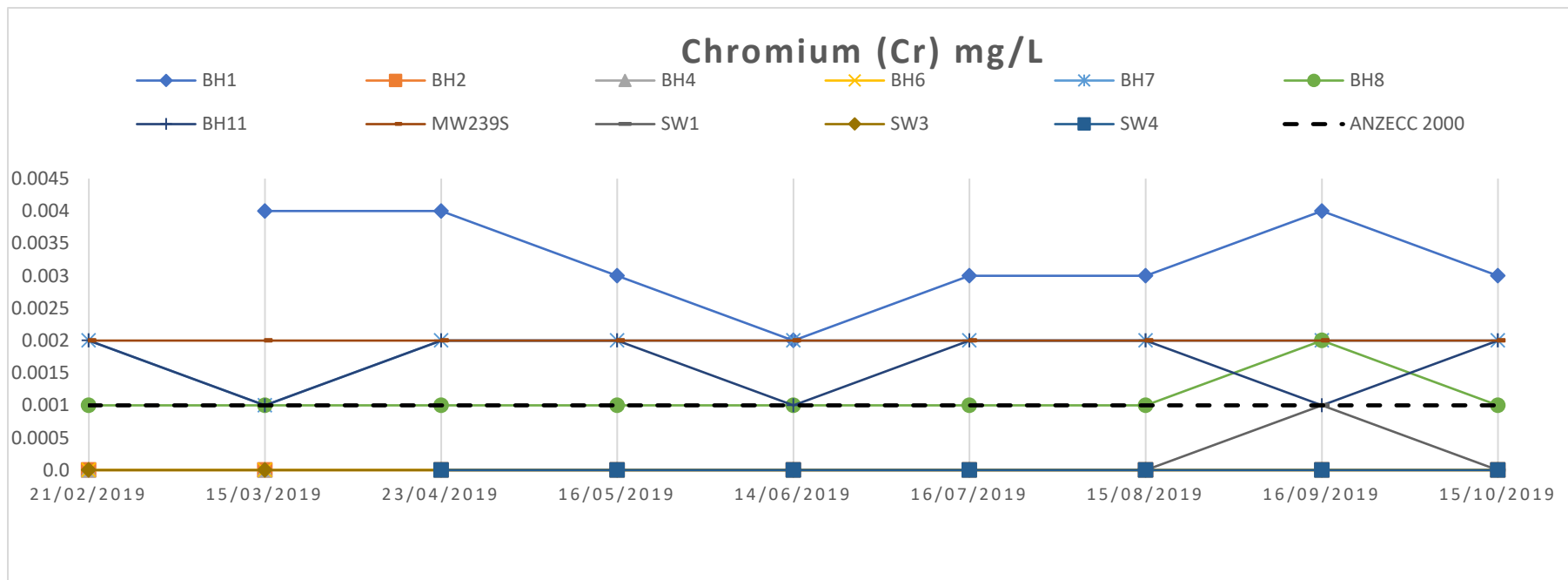


Groundwater Elevation (mAHD)

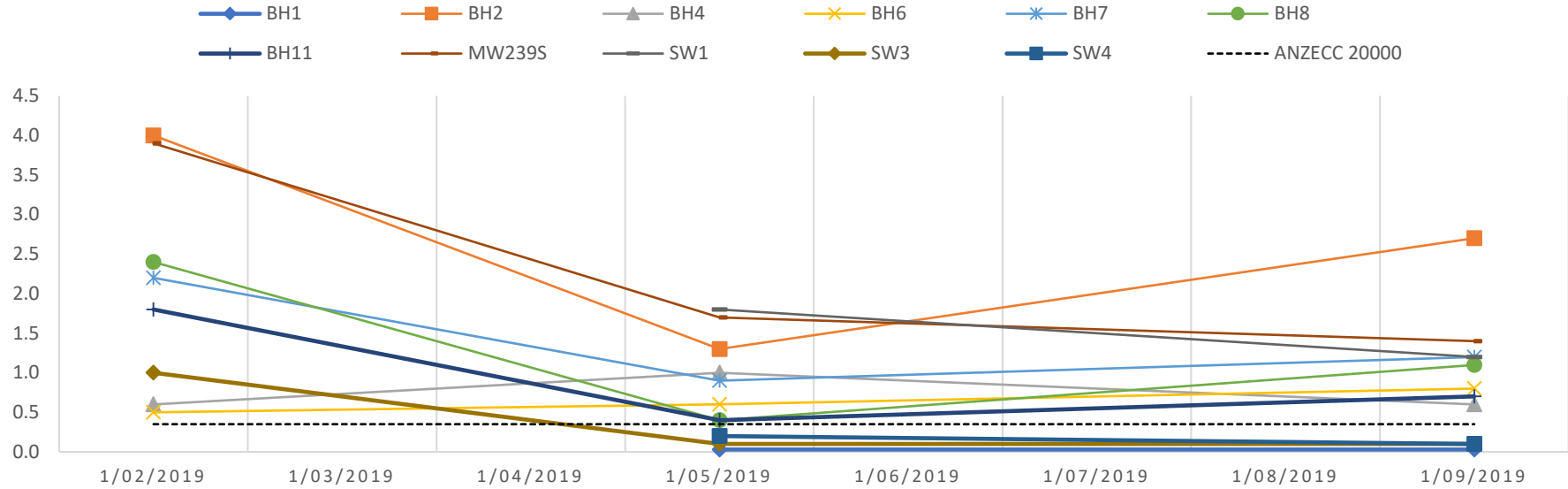




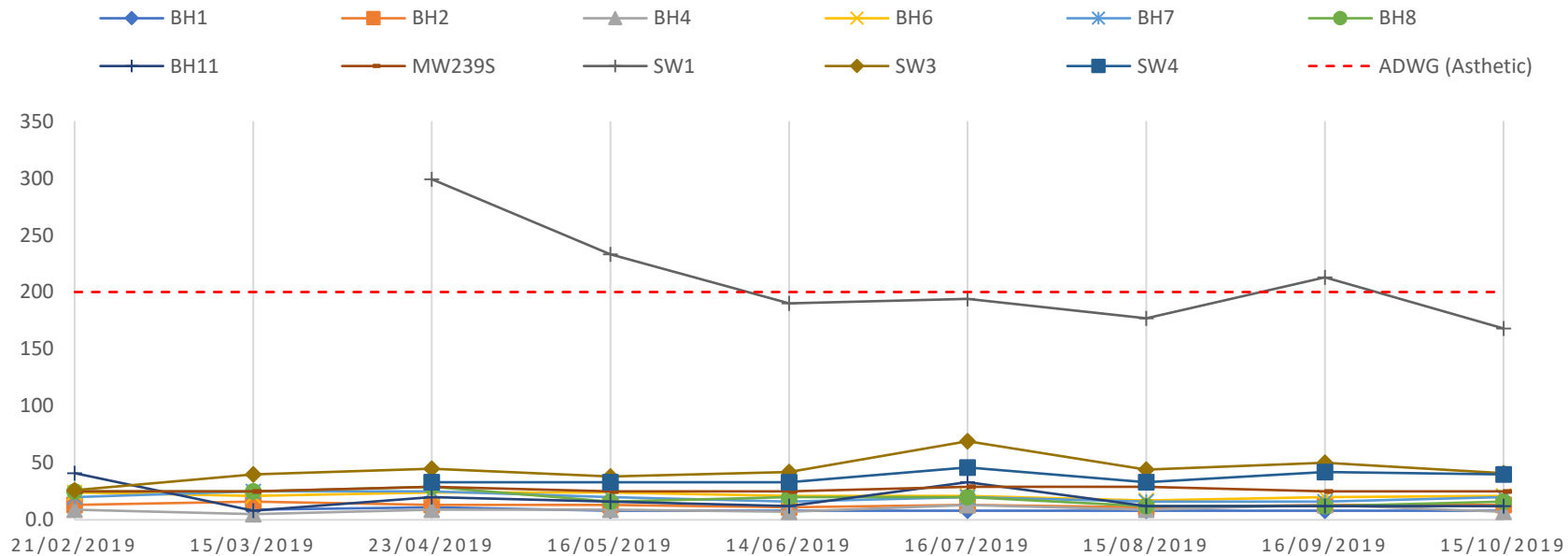




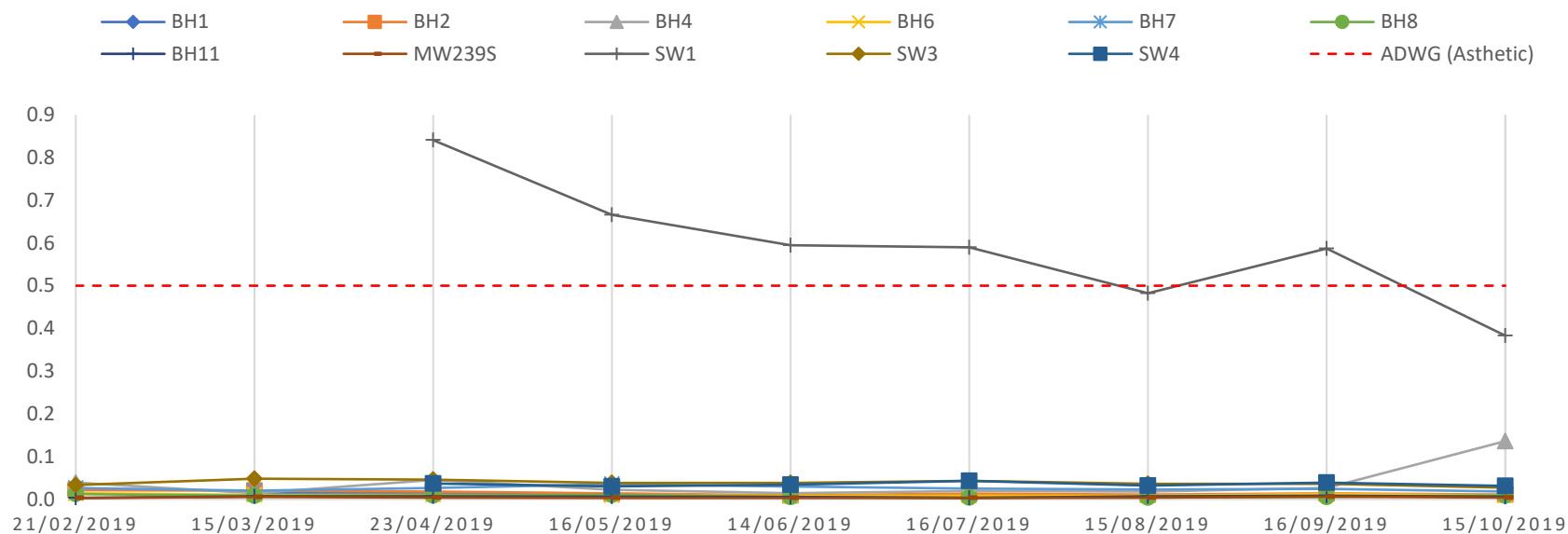
Total Nitrogen (N) mg/L



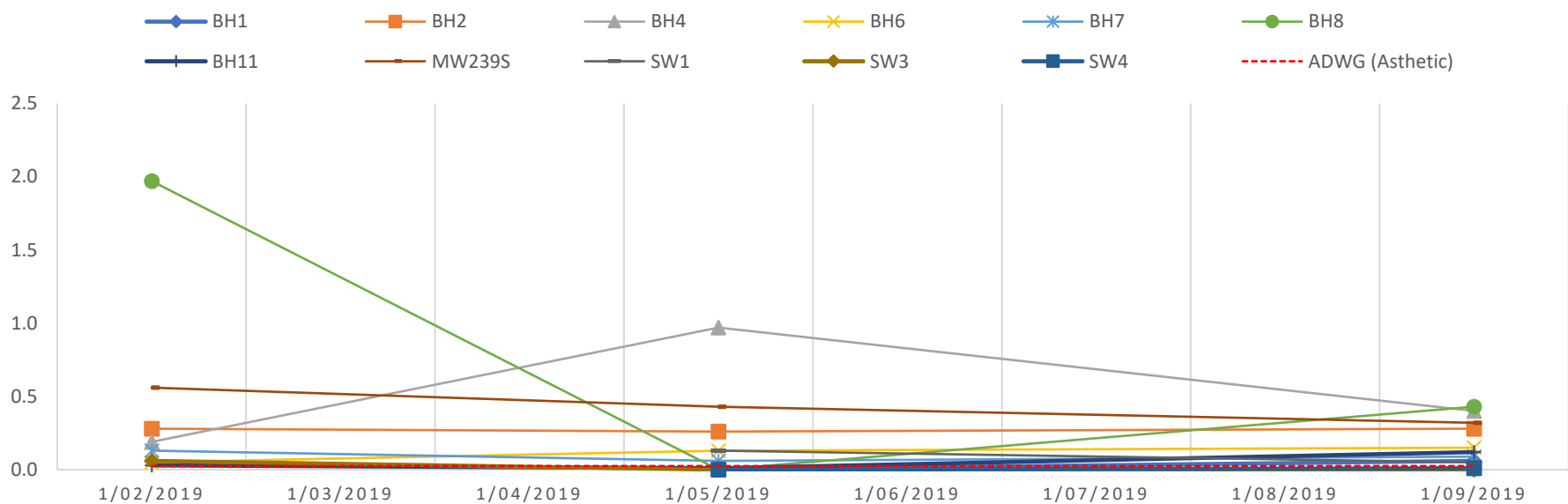
Total Hardness (CaCO₃) mg/L



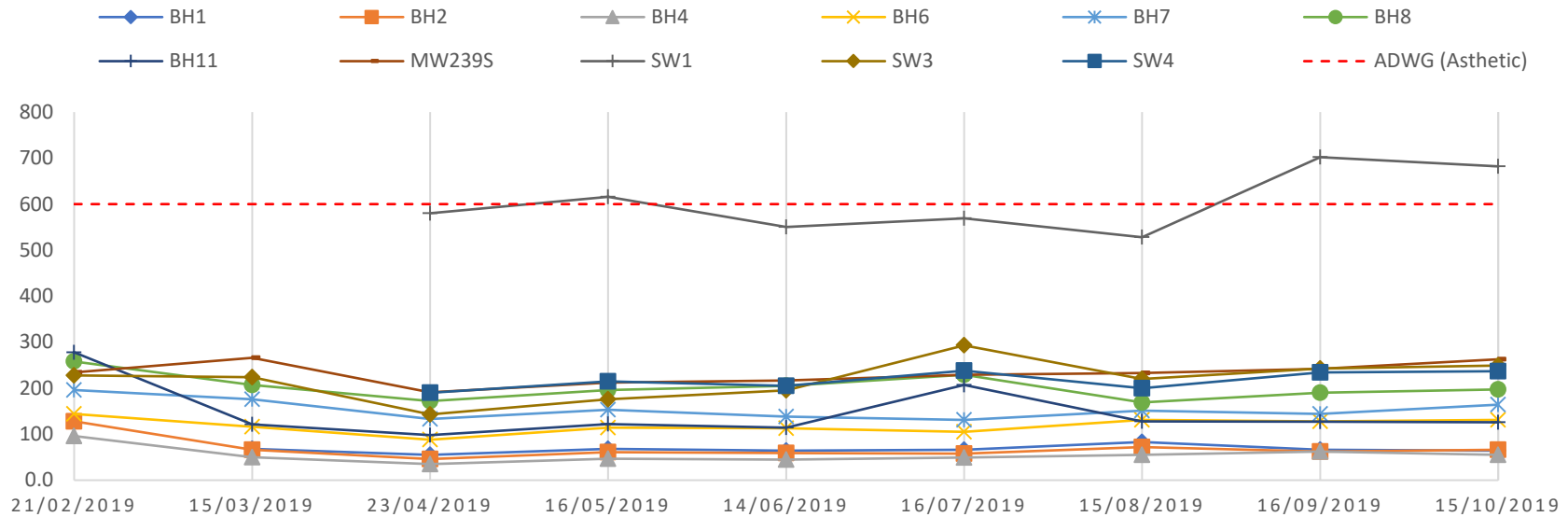
Manganese (Mn) mg/L



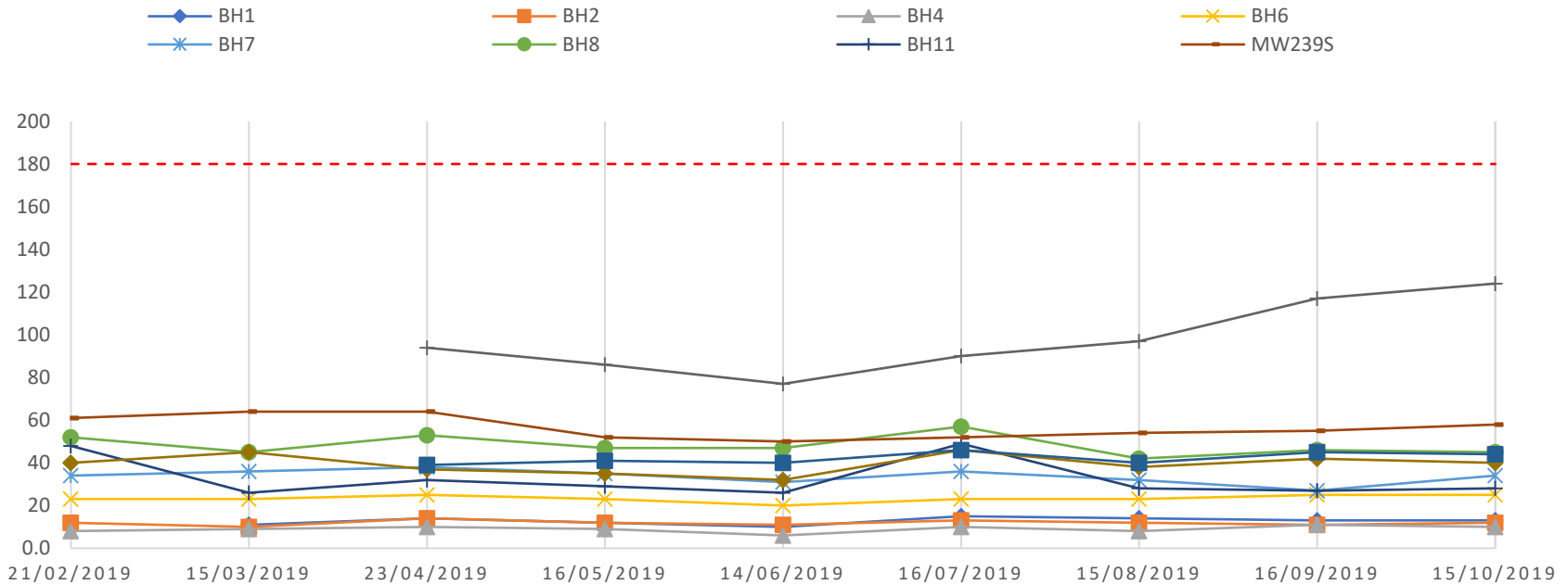
Total Phosphorus mg/L



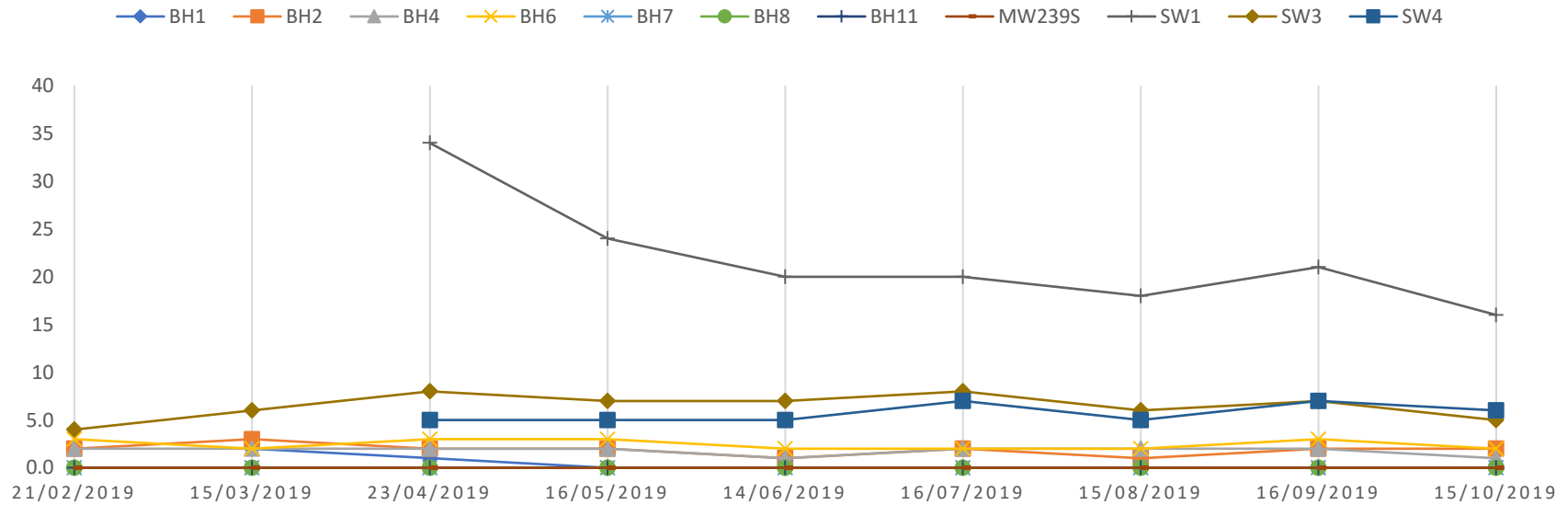
Total Dissolved Solids (TDS) mg/L



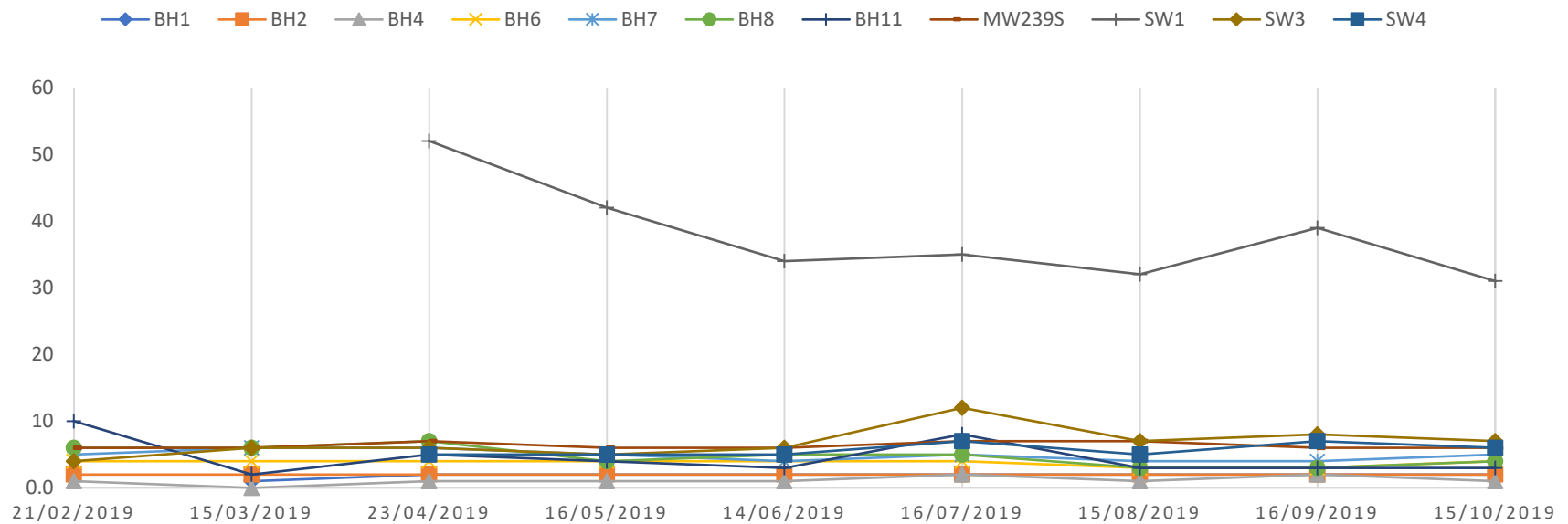
Sodium(Na) mg/L



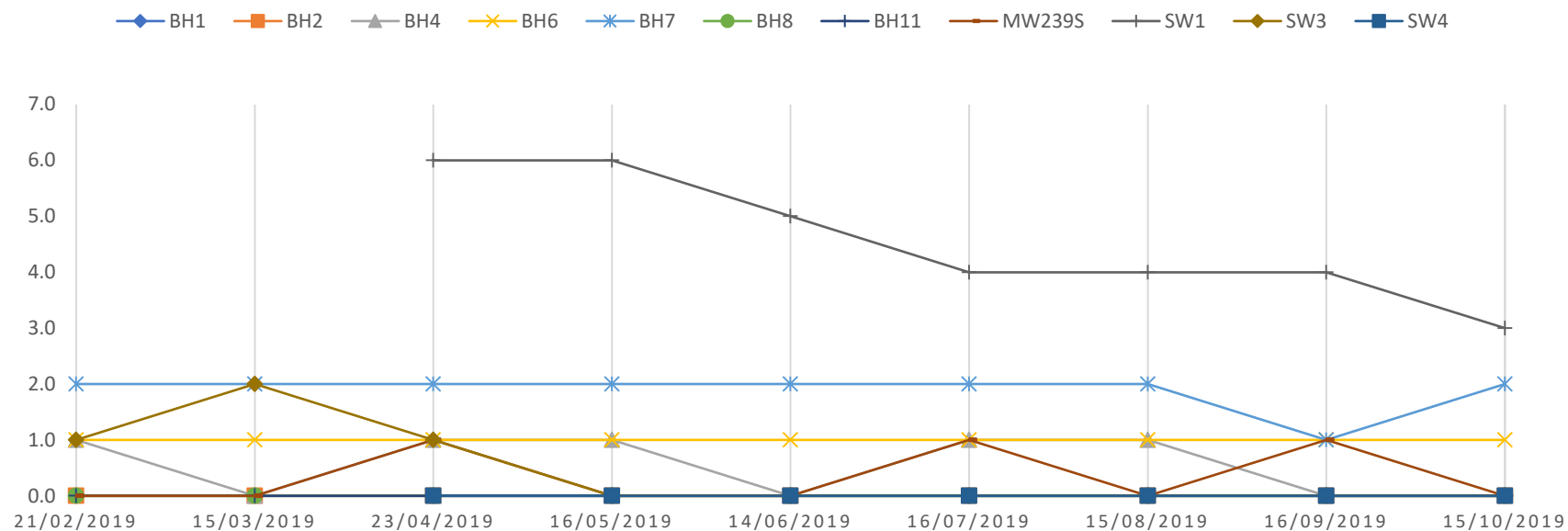
Calcium(Ca) mg/L



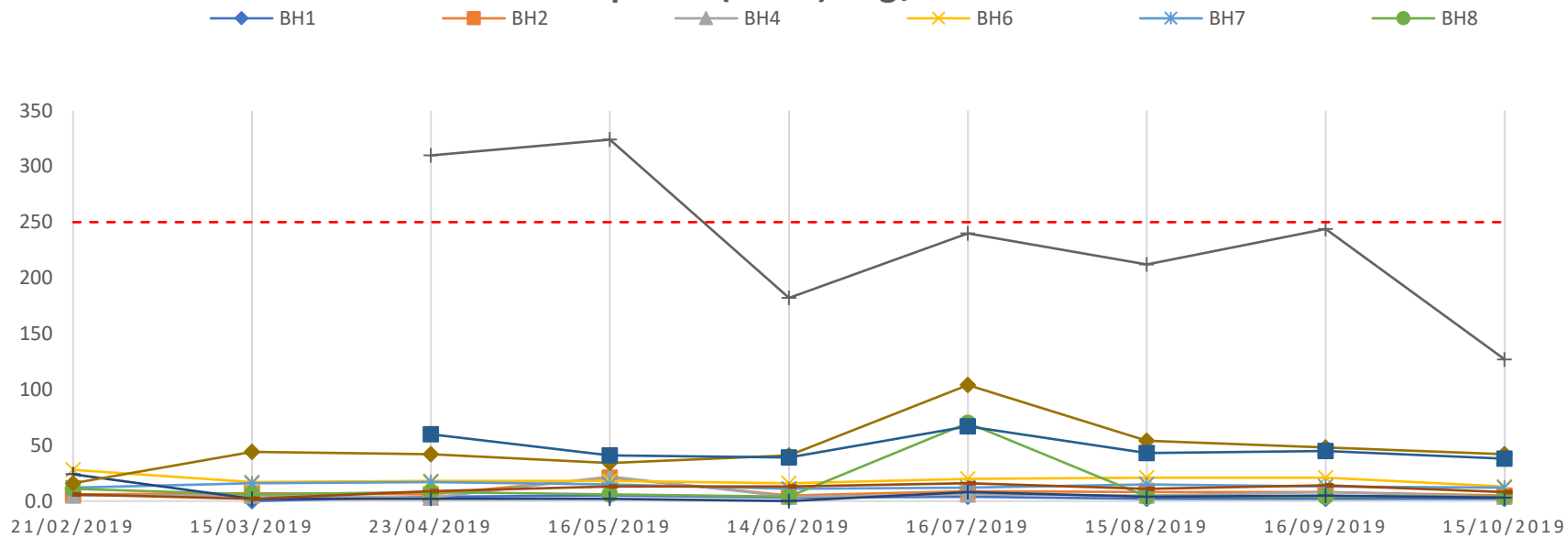
Magnesium(Mg) mg/L



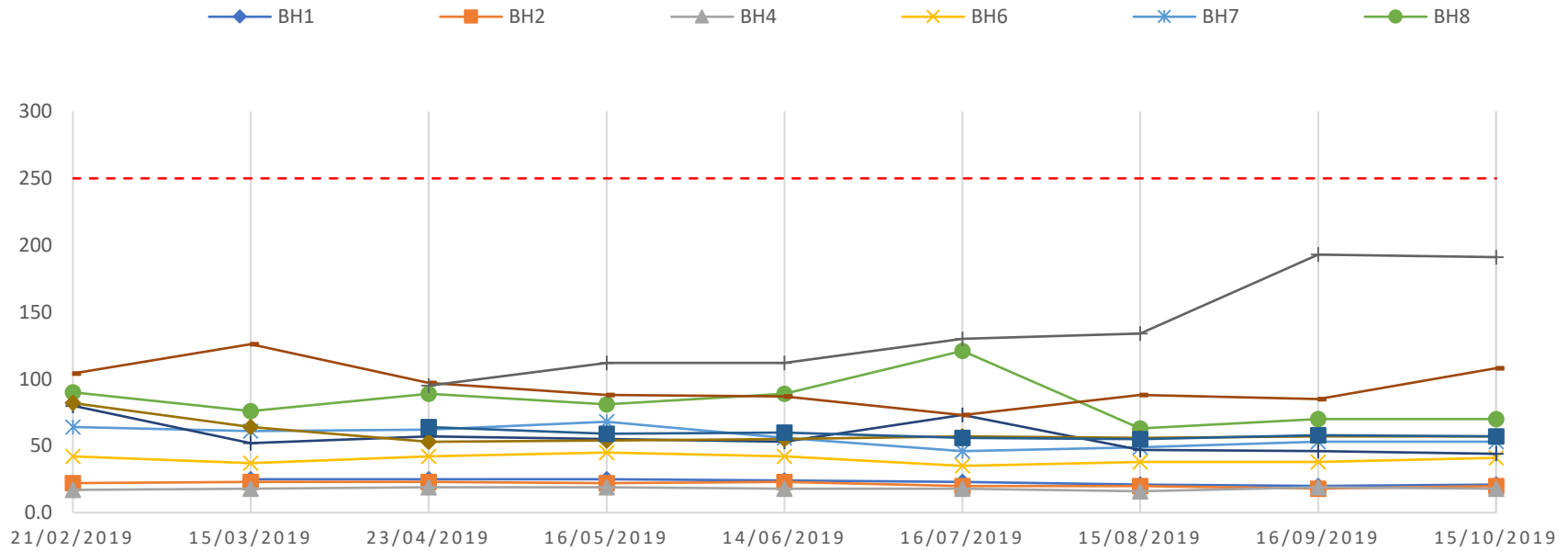
Potassium(K) mg/L



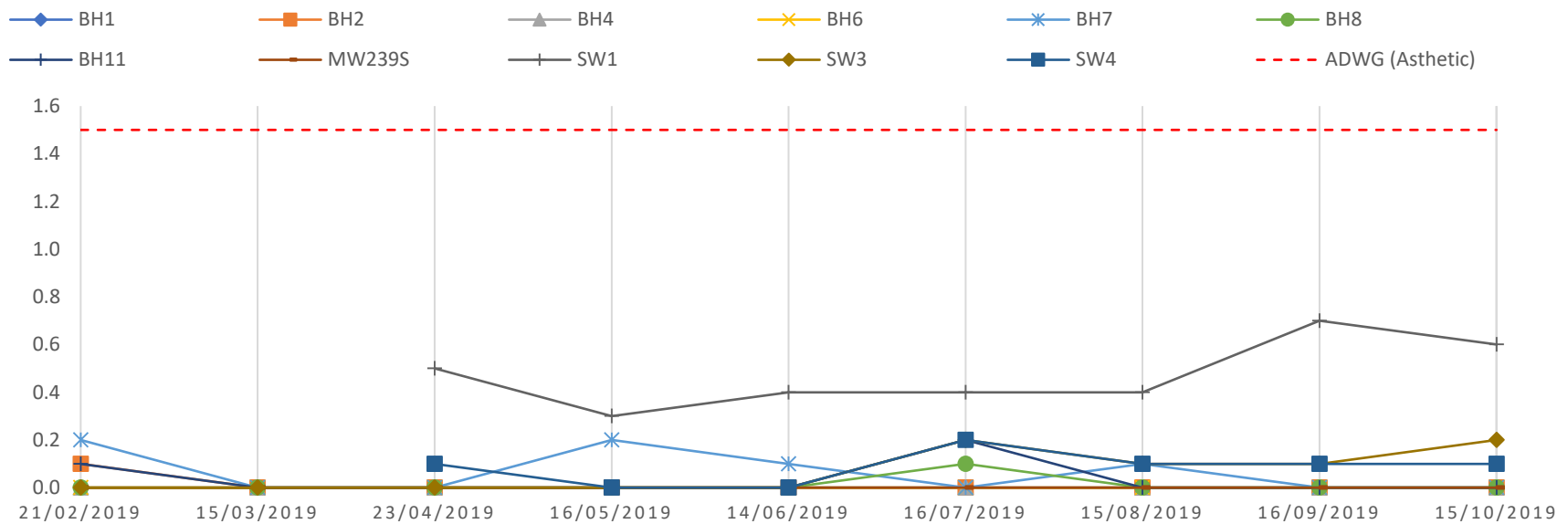
Sulphate(SO²⁻) mg/L



Chloride (Cl) mg/L



Fluoride (F⁻) mg/L



APPENDIX B10: NOVEMBER 2019

26 November 2019
Document Ref: NCA19R104403

Williamtown Sand Syndicate
PO Box 898
Newcastle, NSW 2300

Attention: Darren Williams

Delivered by email: 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, SO₄, 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 (mBTOC)	Groundwater Elevation (mAHD)	Well Total Depth (mBTOC)	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 (mBTC)	Groundwater Elevation (mAHD)	Well Total Depth (mBTC)	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 ³ Phosphorous	0.01	11	<0.1	<0.1	No	Similar
	Total Phosphorous ³	0.01	11	<0.1	2.11	7 above ANZECC 2000 Trigger range ¹ (BH11, BH2, BH4, BH6, BH8, MW239S & SW3)	Significant increase for BH11. Similar results for all other sample locations.
	Nitrite ³	0.01	11	<0.01	<0.01	No	Similar
	Nitrate ³	0.01	11	<0.01	1.01	1 above ANZECC 2000 Trigger range ¹ (BH2)	Similar
	Ammonia ³	0.01	11	<0.01	0.23	No	Similar
	Total Nitrogen ³	0.1	11	0.2	5.9	8 above ANZECC 2000 Trigger range ¹ (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 ¹ 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 ² (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 ² (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 ² (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 ² (BH1, BH2, BH6, BH7, BH8, MW239S, & SW1)	Similar
	Hg	0.0001	11	<0.0001	<0.0001	No	Similar
TRH – Silica Clean up	C ₆ -C ₁₀	0.02	11	<0.02	<0.02	No	Similar
	>C ₁₀ -C ₁₆	0.1	11	<0.1	<0.1	No	Similar
	>C ₁₆ -C ₃₄	0.1	11	<0.1	<0.1	No	Similar
	>C ₃₄ -C ₄₀	0.1	11	<0.1	<0.1	No	Similar
	Total >C ₁₀ -C ₄₀	0.1	11	<0.1	<0.1	No	Similar
	C ₆ -C ₁₀ minus BTEX (F1)	0.02	11	<0.02	<0.02	No	Similar
	>C ₁₀ -C ₁₆ 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.

¹Australian 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)

²ANZECC 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

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

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

Dkousbroek@kleinfelder.com

Mobile: 0458 197 676

Attached:

Figure 1

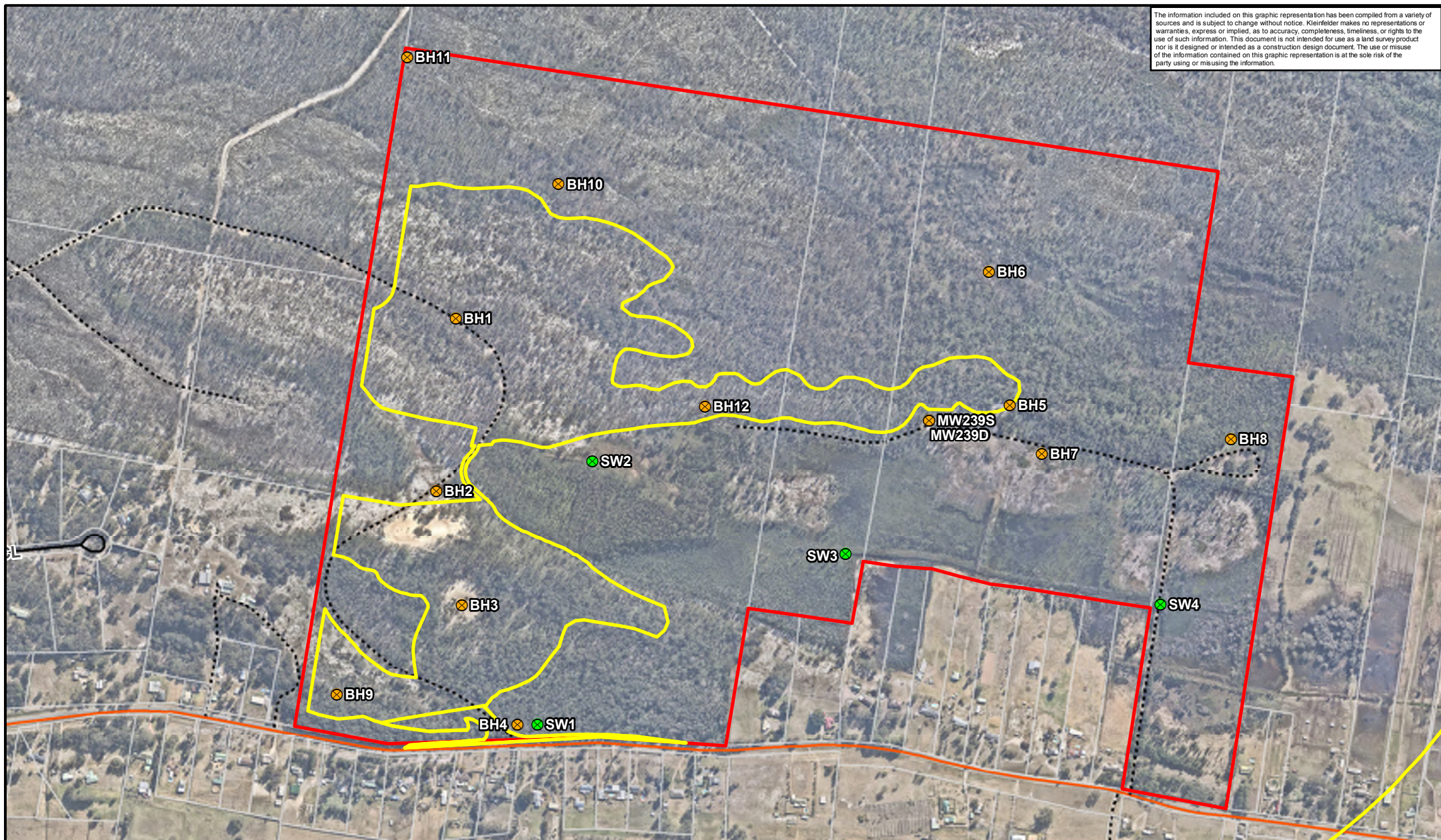
Data Tables

Attachment A – Laboratory reports

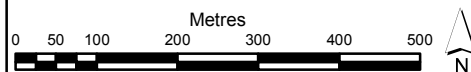
Attachment B – Data Trends

FIGURE 1

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 use of such information. This document is not intended for use as a land survey 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
- ▬ Subject Land Boundary
- ▬ Quarry Project Area
- Arterial Road
- Local Road
- - Track



PROJECT REFERENCE: 20170448
 DATE DRAWN: 13/02/2019 09:48 Version 1
 DRAWN BY: gjoyce
 DATA SOURCE:
 NSW DFSI - 2017
 Nearmap - 2018

Water monitoring locations November 2019 Monitoring

Williamtown Sand Syndicate
 Proposed Sand Quarry
 Cabbage Tree Road, Williamtown

FIGURE:

1

DATA TABLES



Analyte		BTEXN								Total Petroleum Hydrocarbons	Total Petroleum Hydrocarbons - Silica Clean up					Total Recoverable Hydrocarbons								Total Recoverable Hydrocarbons - Silica Clean up				
		Benzene**	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene**	Total Xylenes	Naphthalene**	Sum of BTEX		C ₉ - C ₉	C ₁₀ -C ₁₄ * Silica Cleanup	C ₁₅ -C ₂₈ * Silica Cleanup	C ₂₉ -C ₃₆ * Silica Cleanup	C ₃₇ -C ₄₀ Sum + Silica Cleanup	C ₉ - C ₁₀	C ₉ + C ₁₀ minus BTEX (F1)	>C ₁₀ -C ₁₄ * Silica Cleanup	F2 :Silica Cleanup	>C ₁₄ -C ₃₄ * Silica Cleanup	>C ₃₄ -C ₄₀ * Silica Cleanup	>C ₄₀ -C ₅₀ * Silica Cleanup						
LOR Units		1	2	2	2	2	2	1	20	50	100	50	50	50	20	20	100	100	100	100	100							
ANZECC 2000 Trigger Values		950	-	-	-	350	-	16																				
NHMRC ADWG 6		1	800	300	-	350	600																					
Sample Name	Sample Date																											
BH1	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	1,710	< 50	< 100	< 50	< 50	1,690	1,690	< 100	< 100	< 100	< 100	< 100							
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 100	< 50	< 100	< 50	< 50	30	30	< 100	< 100	< 100	< 100	< 100							
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100							
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100							
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100							
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100							
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100							
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100							
	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100							
	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100							
BH11	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100							
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100							
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100							
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100							
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100							
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100							
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100							
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100							
	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100							
	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100							
BH2	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100							
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100							
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100							
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100							
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100							
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100							
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100							
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100							
	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100							
	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100							
BH3	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100							
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100							
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100							
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100							
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100							
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100							
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100							
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100							
	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100							
	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100							
BH4	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100							
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100							
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100							
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100							
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100							
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100							
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100							
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100							
	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100							
	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20</													

Table 1
Groundwater Analytical Data - BTEXN
Williamstown Sand Syndicate



MW2395	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
SW1	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
SW3	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
SW4	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100

Notes:
 -- Not analysed
 < - Less than laboratory limit of reporting
 µg/L - Micrograms per litre
 BTEXN - Benzene, toluene, ethylbenzene, xylenes, naphthalene
 ** 95% Level of protection in freshwater

Table 2
Groundwater Analytical Data - Metals
Williamstown Sand Syndicate



Analyte	Metals																
	Arsenic**	Barium	Beryllium	Boron**	Cadmium**	Chromium**	Cobalt	Copper**	Iron	Lead**	Manganese**	Mercury**+2	Nickel	Selenium**	Vanadium	Zinc**	
LOR	0.001	0.001	0.001	0.05	0.0001	0.001	0.001	0.001	0.05	0.001	0.001	0.0001	0.001	0.01	0.01	0.005	
Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	
ANZECC 2000 Trigger Values	0.013	-	-	0.37	0.0002	0.001	-	0.0014	-	0.0034	1.9	0.0006	0.011	0.011	-	0.008	
NHMRC ADWQ E	0.01	-	0.06	4	0.002	0.05	-	2	0.3 ¹	0.01	0.5	0.001	0.02	0.01	-	3 ²	
Sample Name	Sample Date																
BH1	15-Mar-19	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.004	< 0.001	< 0.001	13	< 0.001	0.014	< 0.0001	< 0.001	< 0.01	< 0.01	1.27
	23-Apr-19	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.004	< 0.001	0.002	10	0.001	0.015	< 0.0001	0.002	< 0.01	< 0.01	0.363
	16-May-19	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	8.33	< 0.001	0.009	< 0.0001	0.009	< 0.0001	0.002	< 0.01	0.132
	14-Jun-19	< 0.001	0.001	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	6.31	< 0.001	0.009	< 0.0001	0.009	< 0.0001	0.001	< 0.01	0.074
	16-Jul-19	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	0.002	7.35	< 0.001	0.01	< 0.0001	0.001	< 0.01	< 0.01	0.116
	15-Aug-19	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	0.002	7.96	< 0.001	0.008	< 0.0001	< 0.001	< 0.01	< 0.01	0.023
	16-Sep-19	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.004	< 0.001	0.001	8.84	< 0.001	0.009	< 0.0001	< 0.001	< 0.01	< 0.01	0.034
	15-Oct-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	0.006	-	< 0.001	0.007	< 0.0001	0.006	< 0.001	< 0.01	0.037
	18-Nov-19	< 0.001	0.001	< 0.001	< 0.05	< 0.0001	0.004	< 0.001	0.001	11	< 0.001	0.008	< 0.0001	0.001	< 0.01	< 0.01	0.012
	21-Feb-19	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.001	0.26	< 0.001	0.003	< 0.0001	0.005	< 0.01	< 0.01	0.031
BH11	15-Mar-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	1.49	< 0.001	0.007	< 0.0001	0.037	< 0.01	< 0.01	< 0.01	0.016
	23-Apr-19	< 0.001	0.006	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.98	< 0.001	0.007	< 0.0001	0.07	< 0.01	< 0.01	< 0.01	0.04
	16-May-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.97	< 0.001	0.006	< 0.0001	0.004	< 0.01	< 0.01	< 0.01	0.024
	14-Jun-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	0.98	< 0.001	0.005	< 0.0001	0.001	< 0.01	< 0.01	< 0.01	0.005
	16-Jul-19	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.47	< 0.001	0.003	< 0.0001	0.004	< 0.01	< 0.01	< 0.01	0.007
	15-Aug-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.87	< 0.001	0.007	< 0.0001	0.001	< 0.01	< 0.01	< 0.01	0.005
	16-Sep-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	0.79	< 0.001	0.008	< 0.0001	0.002	< 0.01	< 0.01	< 0.01	0.012
	15-Oct-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.004	-	< 0.001	0.006	< 0.0001	0.003	< 0.01	< 0.01	0.016
	18-Nov-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.001	0.95	< 0.001	0.008	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
	22-Feb-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.002	0.14	< 0.001	0.021	< 0.0001	0.015	< 0.01	< 0.01	0.006
BH2	15-Mar-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.003	< 0.05	< 0.001	0.02	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
	23-Apr-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.004	0.19	< 0.001	0.018	< 0.0001	0.001	< 0.01	< 0.01	0.008
	16-May-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.001	0.06	< 0.001	0.014	< 0.0001	0.001	< 0.01	< 0.01	< 0.005
	14-Jun-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.004	0.08	< 0.001	0.009	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	16-Jul-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.008	0.05	< 0.001	0.013	< 0.0001	0.001	< 0.01	< 0.01	0.006
	15-Aug-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.012	0.08	< 0.001	0.011	< 0.0001	0.001	< 0.01	< 0.01	< 0.005
	16-Sep-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.008	0.26	< 0.001	0.014	< 0.0001	0.001	< 0.01	< 0.01	0.007
	15-Oct-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.006	-	< 0.001	0.011	< 0.0001	< 0.001	< 0.01	< 0.01	0.007
	18-Nov-19	< 0.001	0.007	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.013	0.08	< 0.001	0.011	< 0.0001	0.007	< 0.01	< 0.01	0.028
	21-Feb-19	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.001	0.06	< 0.001	0.005	< 0.0001	0.053	< 0.01	< 0.01	< 0.005
BH3	21-Feb-19	< 0.001	0.014	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.002	0.16	< 0.001	0.039	< 0.0001	0.018	< 0.01	< 0.01	0.014
	15-Mar-19	< 0.001	0.014	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.001	< 0.05	< 0.001	0.014	< 0.0001	0.022	< 0.01	< 0.01	0.043
	23-Apr-19	< 0.001	0.013	< 0.001	0.05	< 0.0001	< 0.001	< 0.001	0.002	0.99	< 0.001	0.045	< 0.0001	0.007	< 0.01	< 0.01	0.008
	16-May-19	< 0.001	0.013	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.001	0.27	< 0.001	0.022	< 0.0001	0.022	< 0.01	< 0.01	0.011
	14-Jun-19	< 0.001	0.012	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.038	< 0.05	< 0.001	0.014	< 0.0001	0.001	< 0.01	< 0.01	0.005
	16-Jul-19	< 0.001	0.013	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.046	< 0.05	< 0.001	0.019	< 0.0001	< 0.001	< 0.01	< 0.01	0.007
	15-Aug-19	< 0.001	0.013	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.026	< 0.05	< 0.001	0.018	< 0.0001	0.001	< 0.01	< 0.01	0.007
	16-Sep-19	< 0.001	0.012	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.051	0.19	< 0.001	0.026	< 0.0001	0.002	< 0.01	< 0.01	0.005
	15-Oct-19	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.011	-	< 0.001	0.136	< 0.0001	0.002	< 0.01	< 0.01	0.014
	18-Nov-19	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.005	< 0.05	< 0.001	0.013	< 0.0001	0.001	< 0.01	< 0.01	< 0.005
BH5	22-Feb-19	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	1.4	< 0.001	0.005	< 0.0001	0.003	< 0.01	< 0.01	0.008
	22-Feb-19	< 0.001	0.03	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	1.03	< 0.001	0.014	< 0.0001	0.001	< 0.01	< 0.01	0.019
	14-Mar-19	< 0.001	0.027	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	1.9	< 0.001	0.01	< 0.0001	< 0.001	< 0.01	< 0.01	0.012
	23-Apr-19	< 0.001	0.03	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.001	0.96	< 0.001	0.01	< 0.0001	< 0.001	< 0.01	< 0.01	0.022
	16-May-19	< 0.001	0.029	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	2.57	< 0.001	0.009	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	14-Jun-19	< 0.001	0.027	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.001	2.86	< 0.001	0.008	< 0.0001	< 0.001	< 0.01	< 0.01	0.008
	16-Jul-19	< 0.001	0.026	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.002	2.41	< 0.001	0.008	< 0.0001	< 0.001	< 0.01	< 0.01	0.005
	15-Aug-19	< 0.001	0.026	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.001	2.19	< 0.001	0.008	< 0.0001	< 0.001	< 0.01	< 0.01	0.007
	16-Sep-19	< 0.001	0.034	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.008	2.08	< 0.001	0.012	< 0.0001	0.007	< 0.01	< 0.01	0.035
	15-Oct-19	< 0.001	0.026	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	-	< 0.001	0.009	< 0.0001	< 0.001	< 0.01	< 0.01	0.006
BH6	18-Nov-19	< 0.001	0.03	< 0.001	< 0.05	< 0.0001	< 0.001	&lt									



Notes:
 - - Not analysed
 < - Less than laboratory limit of reporting
 µg/L - Micrograms per litre
 *** 99% Level of protection in freshwater
 † Recreation water

20193820.001A



KLEINFELDER
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Table 4
Groundwater Analytical Data - Inorganics
Wentworth Sand Synthesis



Analyte	Anions and Cations															Alkalinity										Inorganics		pH		
	Sodium	Calcium	Magnesium	Potassium	Sulphate	Chloride	Fluoride	Reactive phosphorus as P	Total Phosphorus	Nitrite as N	Nitrate as N	Nitrite + Nitrate as N	Ammonia as N	Total Nitrogen as N	Total Kjeldahl Nitrogen as N	Total Cations	Total Anions	Ionic Balance	Sodium Adsorption Ratio	Bicarbonate Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Hydroxide Alkalinity as CaCO3	Total Alkalinity as CaCO3	Total Hardness as CaCO3	Electrical Conductivity @ 25°C ¹	Total Dissolved Solids	Total Dissolved Solids			
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	%		mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L			
	1	1	1	1	1	1	0.1	0.01	0.01	0.01	0.01	0.01	0.01	0.1	0.1	0.01	0.01	%	0.01	1	1	1	1	1	1	1	0.01			
Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L		
ANDECC 2000 Trigger Values	180 ²	270 ²	270 ²	270 ²	270 ²	270 ²	1.5	0.02 ³	0.02 ³	3	50	0.3 ³	0.3 ³	0.3 ³	0.3 ³	0.3 ³	0.3 ³	0.3 ³	0.01	1	1	1	1	1	125-2200	600 ²	600 ²	6.5-8.5 ³		
NHMRC ADWS 6	180 ²	270 ²	270 ²	270 ²	270 ²	270 ²	1.5	0.02 ³	0.02 ³	3	50	0.3 ³	0.3 ³	0.3 ³	0.3 ³	0.3 ³	0.3 ³	0.3 ³	0.01	1	1	1	1	1	125-2200	600 ²	600 ²	6.5-8.5 ³		
Sample Name	Sample Date																													
BH1	15-May-19	11	2.0	1.0	<1.0	1.0	25	<0.1	-	-	-	-	-	-	-	0.66	0.88	-	-	9.0	<1.0	<1.0	<1.0	9.0	104	68	129	5.67		
	15-Jun-19	14	1.0	2.0	<1.0	4.0	25	<0.1	-	-	-	-	-	-	-	0.82	0.99	-	-	10	<1.0	<1.0	<1.0	10	84	68	97	5.83		
	16-May-19	12	<1.0	2.0	<1.0	5.0	25	<0.1	0.03	<0.01	<0.01	<0.01	0.11	0.3	0.3	0.69	1.01	-	1.7	10	<1.0	<1.0	<1.0	10	8.0	105	68	164	5.82	
	16-Jun-19	15	<1.0	2.0	<1.0	3.0	24	<0.1	-	-	-	-	-	-	-	0.6	0.94	-	-	10	<1.0	<1.0	<1.0	10	8.0	99	68	72	5.83	
	16-Jul-19	15	<1.0	2.0	<1.0	4.0	23	<0.1	-	-	-	-	-	-	-	0.8	0.95	-	-	11	<1.0	<1.0	<1.0	11	8.0	102	68	84	5.82	
	15-Aug-19	14	<1.0	2.0	<1.0	2.0	21	<0.1	-	-	-	-	-	-	-	0.77	0.92	-	-	14	<1.0	<1.0	<1.0	<1.0	14	8.0	128	83	82	6.22
	16-Sep-19	12	<1.0	2.0	<1.0	2.0	20	<0.1	0.06	<0.01	<0.01	<0.01	0.12	0.3	0.3	0.72	0.95	-	1.84	8.0	<1.0	<1.0	<1.0	8.0	102	68	82	5.84		
	15-Oct-19	13	<1.0	2.0	<1.0	2.0	21	<0.1	-	-	-	-	-	-	-	0.73	0.71	-	-	4.0	<1.0	<1.0	<1.0	4.0	8.0	126	64	64	5.6	
	18-Nov-19	16	<1.0	2.0	<1.0	2.0	23	<0.1	<0.01	<0.01	0.01	0.01	0.12	0.3	0.3	0.86	1.19	-	2.26	24	<1.0	<1.0	<1.0	<1.0	24	8.0	126	62	62	6.29
	23-Dec-19	48	<1.0	10	<1.0	24	80	0.1	<0.01	0.03	<0.01	0.04	0.04	0.06	1.8	2.31	2.75	-	2.11	41	<1.0	<1.0	<1.0	<1.0	41	346	276	407	6.47	
BH11	15-May-19	26	<1.0	2.0	<1.0	2.0	52	<0.1	-	-	-	-	-	-	-	1.3	1.51	-	-	<1.0	<1.0	<1.0	<1.0	186	121	144	4.82			
	15-Jun-19	32	<1.0	5.0	<1.0	2.0	57	<0.1	-	-	-	-	-	-	-	1.8	1.65	-	-	<1.0	<1.0	<1.0	<1.0	150	98	135	4.98			
	16-May-19	29	<1.0	4.0	<1.0	3.0	55	<0.1	<0.01	<0.01	<0.01	<0.01	0.12	0.4	0.4	1.59	1.59	-	3.0	<1.0	<1.0	<1.0	<1.0	188	122	216	4.91			
	16-Jun-19	26	<1.0	3.0	<1.0	3.0	53	<0.1	-	-	-	-	-	-	-	1.39	1.5	-	-	<1.0	<1.0	<1.0	<1.0	175	114	167	4.91			
	16-Jul-19	49	<1.0	8.0	<1.0	6.0	73	0.2	-	-	-	-	-	-	-	3.79	2.22	-	-	<1.0	<1.0	<1.0	<1.0	318	207	392	4.68			
	15-Aug-19	28	<1.0	3.0	<1.0	4.0	47	<0.1	-	-	-	-	-	-	-	1.46	1.41	-	-	<1.0	<1.0	<1.0	<1.0	12	197	128	135	4.88		
	16-Sep-19	27	<1.0	3.0	<1.0	3.0	46	<0.1	<0.01	0.12	<0.01	<0.01	<0.01	0.15	0.7	0.7	1.42	1.4	-	3.18	<1.0	<1.0	<1.0	<1.0	12	195	127	140	4.66	
	15-Oct-19	28	<1.0	3.0	<1.0	3.0	44	<0.1	-	-	-	-	-	-	-	1.46	1.3	-	-	<1.0	<1.0	<1.0	<1.0	12	194	126	-	4.92		
	18-Nov-19	28	<1.0	3.0	<1.0	3.0	51	<0.1	<0.01	0.11	<0.01	0.06	0.06	0.18	1.9	5.8	1.46	1.5	-	3.3	<1.0	<1.0	<1.0	<1.0	123	123	-	5.13		
	23-Dec-19	12	2.0	2.0	<1.0	8.0	22	0.1	<0.01	0.38	<0.01	0.76	0.76	0.08	4.0	1.2	0.79	0.74	-	1.44	<1.0	<1.0	<1.0	<1.0	13	91	128	-	4.87	
BH2	15-May-19	10	3.0	2.0	<1.0	7.0	23	<0.1	-	-	-	-	-	-	-	0.75	0.79	-	-	<1.0	<1.0	<1.0	<1.0	16	101	66	90	4.71		
	15-Jun-19	14	2.0	2.0	<1.0	6.0	23	<0.1	-	-	-	-	-	-	-	0.97	0.77	-	-	<1.0	<1.0	<1.0	<1.0	13	79	46	84	4.82		
	16-May-19	12	2.0	2.0	<1.0	21	23	<0.1	<0.01	0.26	<0.01	0.38	0.38	0.01	1.3	0.9	0.79	1.06	-	1.44	<1.0	<1.0	<1.0	<1.0	13	94	61	144	4.85	
	16-Jun-19	11	1.0	2.0	<1.0	6.0	23	<0.1	-	-	-	-	-	-	-	0.69	0.75	-	-	<1.0	<1.0	<1.0	<1.0	91	59	91	5.16			
	16-Jul-19	13	2.0	2.0	<1.0	9.0	20	<0.1	-	-	-	-	-	-	-	0.83	0.75	-	-	<1.0	<1.0	<1.0	<1.0	13	90	58	63	4.84		
	15-Aug-19	12	1.0	2.0	<1.0	8.0	20	<0.1	-	-	-	-	-	-	-	0.74	0.73	-	-	<1.0	<1.0	<1.0	<1.0	13	102	72	61	5.2		
	16-Sep-19	11	2.0	2.0	<1.0	8.0	20	<0.1	<0.01	0.28	<0.01	1.07	1.07	0.04	2.7	1.6	0.74	0.73	-	1.32	<1.0	<1.0	<1.0	<1.0	13	96	62	62	4.73	
	15-Oct-19	12	2.0	2.0	<1.0	5.0	20	<0.1	-	-	-	-	-	-	-	0.7	0.67	-	-	<1.0	<1.0	<1.0	<1.0	13	102	66	-	5.06		
	18-Nov-19	14	2.0	2.0	<1.0	7.0	19	<0.1	<0.01	0.21	<0.01	1.01	1.01	0.05	2.1	1.1	0.79	0.69	-	2.02	<1.0	<1.0	<1.0	<1.0	102	66	67	5.07		
	23-Dec-19	10	4.0	1.0	<1.0	4.0	10	<0.1	<0.01	0.76	<0.01	0.78	0.78	0.3	5.9	5.1	0.46	0.54	-	0.46	9.0	<1.0	<1.0	<1.0	14	60	438	-	5.55	
BH4	15-May-19	9.0	2.0	1.0	<1.0	3.0	18	<0.1	<0.01	0.19	<0.01	0.35	0.35	0.04	0.6	0.3	0.56	0.61	-	1.15	<1.0	<1.0	<1.0	<1.0	77	90	70	5.12		
	15-Jun-19	9.0	2.0	<1.0	<1.0	3.0	19	<0.1	-	-	-	-	-	-	-	0.64	0.6	-	-	<1.0	<1.0	<1.0	<1.0	9.0	84	35	61	5.05		
	16-May-19	9.0	2.0	1.0	<1.0	3.0	22	<1.0	<0.01	0.97	<0.01	0.29	0.29	<0.01	1.0	0.7	0.6	0.99	-	1.3	<1.0	<1.0	<1.0	<1.0	77	47	100	4.99		
	16-Jun-19	6.0	1.0	1.0	<1.0	4.0	18	<0.1	-	-	-	-	-	-	-	0.39	0.59	-	-	<1.0	<1.0	<1.0	<1.0	7.0	69	45	36	4.84		
	16-Jul-19	10	2.0	2.0	<1.0	1.0	18	<0.1	-	-	-	-	-	-	-	0.72	0.63	-	-	<1.0	<1.0	<1.0	<1.0	2.0	49	26	49	4.86		
	15-Aug-19	8.0	2.0	1.0	<1.0	3.0	16	<0.1	-	-	-	-	-	-	-	0.55	0.56	-	-	<1.0	<1.0	<1.0	<1.0	9.0	85	55	49	5.01		
	16-Sep-19	11	2.0	2.0	<1.0	8.0	19	<0.1	<0.01	0.4	<0.01	0.24	0.24	0.02	0.6	0.4	0.74	0.7	-	1.32	<1.0	<1.0	<1.0	<1.0	13	95	62	38	4.82	
	15-Oct-19	10	1.0	1.0	<1.0	1.0	18	<0.1	<0.01	0.55	<0.01	0.39	0.39	0.02	0.6	0.4	0.74	0.7	-	1.32	<1.0	<1.0	<1.0	<1.0	13	95	62	38	4.82	
	18-Nov-19	11	1.0	1.0	<1.0	6.0	18	<0.1	<0.01	0.08	<0.01	0.29	0.29	<0.01	0.3	<0.1	0.61	0.63	-	1.86	<1.0	<1.0	<1.0	<1.0	7.0	86	86	-	5.34	
	23-Dec-19	20	3.0	4.0	<1.0	1.0	19	<0.1	<0.01	0.2	<0.01	0.34	0.34	0.09	0.3	0.1	1.22	1.77	-	2.49	<1.0	<1.0	<1.0	<1.0	24	177	144	-	4.97	
BH6	15-May-19	23	2.0	4.0	<1.																									

Table 5
Quality Control Sample Analysis - BTEXN
Williamstown Sand Syndicate



Analyte			BTEXN								Total Petroleum Hydrocarbons			
			Benzene	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene	Total Xylenes	Naphthalene	Sum of BTEX	C ₆ - C ₉	C ₁₀ - C ₁₄	C ₁₅ - C ₂₈	C ₂₉ - C ₃₆
Units			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Sample Name	Sample Date	Sample Type												
TRIP BLANK_13022019	13-Feb-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
RINSATE01_21022019	21-Feb-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
BH8_21022019	21-Feb-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
DUP01_21022019	21-Feb-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
BH8_21022019	21-Feb-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
TRIP01_21022019	21-Feb-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	-	< 20	< 50	< 100	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK_130319	13-Mar-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
RINSATE02_140319	14-Mar-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
BH7_140319	14-Mar-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
DUP02_140319	14-Mar-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK_05_14062019	14-Jun-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
RINSATE_05_14062019	14-Jun-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
SW3_14062019	14-Jun-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
DUP05_14062019	14-Jun-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
SW3_14062019	14-Jun-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
TRIP05_140619	14-Jun-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	-	< 20	-	-	-
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK_06_16072019	16-Jul-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
RINSATE06_16072019	16-Jul-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
RINSATE07	15-Aug-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50
TRIP BLANK_08_16092019	16-Sep-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
RINSATE_08_16092019	16-Sep-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
SW4_16092019	16-Sep-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
DUP08_16092019	16-Sep-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
SW4_16092019	16-Sep-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
TRIP08_16092019	16-Sep-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	-	< 20	200	400	200
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK_15102019	15-Oct-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
RINSATE_15102019	15-Oct-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
TRIPBLANK09_181119	18-Nov-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
RINSATE09_181119	18-Nov-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
SW4_181119	18-Nov-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
DUP09_181119	18-Nov-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
SW4_181119	18-Nov-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
TRIP09_18112019	18-Nov-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	-	< 20	< 50	< 100	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

Notes:

- - Not analysed
< - Less than laboratory limit of reporting
NC - Not calculated
µg/L - Micrograms per litre
BTEXN - Benzene, toluene, ethylbenzene, xylenes, naphthalene

Table 5
Quality Control Sample Analysis - BTEXN
Williamstown Sand Syndicate



C ₁₀ - C ₃₆ sum	Total Petroleum Hydrocarbons - Silica Clean up				Total Recoverable Hydrocarbons						Total Recoverable Hydrocarbons -		
	C ₁₀ -C ₁₄ - Silica Cleanup	C ₁₅ -C ₂₈ - Silica Cleanup	C ₂₉ -C ₃₆ - Silica Cleanup	C ₁₀ -C ₃₆ Sum - Silica Cleanup	C ₆ - C ₁₀	C ₆ - C ₁₀ minus BTEX (F1)	>C ₁₀ - C ₁₆	>C ₁₀ - C ₁₆ minus Naphthalene (F2)	>C ₁₆ - C ₃₄	>C ₃₄ - C ₄₀	>C ₁₀ -C ₁₆ - Silica Cleanup	F2 - Silica Cleanup	>C ₁₆ -C ₃₄ - Silica Cleanup
µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
< 100	< 50	< 100	< 100	< 400	< 20	< 20	< 50	< 50	< 100	< 100	< 50	-	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
-	-	-	-	-	< 20	< 20	-	-	-	-	-	-	-
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	-	-	-	-	NC	NC	NC
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
< 100	< 50	< 100	< 100	< 100	< 20	< 20	< 50	< 50	< 100	< 100	< 50	-	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

Table 5
Quality Control Sample Analysis - BTEXN
Williamstown Sand Syndicate



Silica Clean up	
>C ₃₄ -C ₄₀ - Silica Cleanup	>C ₁₀ -C ₄₀ - 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
< 100	< 100
NC	NC
< 100	< 100
< 100	< 100
NC	NC
< 100	< 100
< 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 6
Quality Control Sample Analysis - Metals
Williamstown Sand Syndicate



Analyte			Metals																
			Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Chromium VI	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Nickel	Selenium	Vanadium	Zinc
Units			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Name	Sample Date	Sample Type																	
TRIP BLANK 13022019	13-Feb-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE01 21022019	21-Feb-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH8 21022019	21-Feb-19	Primary	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.005
DUP01 21022019	21-Feb-19	Duplicate	0.001	0.014	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.09	< 0.001	0.012	< 0.0001	0.003	< 0.01	< 0.01	0.015
Relative Percentage Difference			67%	24%	NC	NC	NC	0%	NC	NC	0%	NC	0%	NC	0%	40%	NC	NC	100%
BH8 21022019	21-Feb-19	Primary	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.005
TRIP01 21022019	21-Feb-19	Triplicate	0.001	< 0.02	< 0.001	< 0.05	< 0.0002	< 0.005	< 0.005	< 0.001	< 0.001	4.5	< 0.001	0.012	< 0.0001	0.003	-	< 0.005	0.006
Relative Percentage Difference			67%	10%	NC	NC	NC	86%	NC	NC	NC	9%	NC	0%	NC	40%	NC	NC	18%
TRIP BLANK 130319	13-Mar-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
TRIP BLANK02 150319	15-Mar-19	Trip Blank	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE02 140319	14-Mar-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH7 140319	14-Mar-19	Primary	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	-	0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
DUP02 140319	14-Mar-19	Duplicate	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	-	0.002	< 0.001	2.51	< 0.001	0.021	< 0.0001	0.004	< 0.01	< 0.01	0.007
Relative Percentage Difference			NC	0%	NC	NC	NC	0%	40%	NC	33%	NC	NC	5%	NC	0%	NC	NC	25%
BH7 140319	14-Mar-19	Primary	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	-	0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
TRIP02 14032019	14-Mar-19	Triplicate	< 0.001	< 0.02	< 0.001	< 0.05	< 0.0002	0.001	-	0.002	< 0.001	1.7	< 0.001	0.019	< 0.0001	< 0.001	-	< 0.005	< 0.005
Relative Percentage Difference			NC	0%	NC	NC	NC	0%	40%	NC	6%	NC	5%	NC	156%	NC	NC	NC	113%
TRIP BLANK 05 14062019	14-Jun-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE 05 14062019	14-Jun-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
SW3 14062019	14-Jun-19	Primary	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.003	< 0.001	1.68	< 0.001	0.038	< 0.0001	0.003	< 0.01	< 0.01	0.016
DUP05 14062019	14-Jun-19	Duplicate	< 0.001	0.036	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.003	< 0.001	1.63	< 0.001	0.039	< 0.0001	0.003	< 0.01	< 0.01	0.013
Relative Percentage Difference			NC	3%	NC	NC	NC	NC	0%	NC	3%	NC	3%	NC	0%	NC	NC	NC	21%
SW3 14062019	14-Jun-19	Primary	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.003	< 0.001	1.68	< 0.001	0.038	< 0.0001	0.003	< 0.01	< 0.01	0.016
TRIP05 140619	14-Jun-19	Triplicate	< 0.001	-	-	-	< 0.0002	0.001	-	-	< 0.001	1.6	< 0.001	-	< 0.0001	0.003	-	-	0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	67%	NC	NC	NC	5%	NC	NC	NC	0%	NC	NC	46%
TRIP BLANK 06 16072019	16-Jul-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE06 16072019	16-Jul-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE07	15-Aug-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
TRIP BLANK 08 16092019	16-Sep-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE 08 16092019	16-Sep-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
SW4 16092019	16-Sep-19	Primary	< 0.001	0.046	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.002	0.02	0.7	0.001	0.039	< 0.0001	0.017	< 0.01	< 0.01	0.085
DUP08 16092019	16-Sep-19	Duplicate	< 0.001	0.041	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.002	< 0.001	0.76	< 0.001	0.036	< 0.0001	0.003	< 0.01	< 0.01	0.012
Relative Percentage Difference			NC	11%	NC	NC	NC	NC	0%	190%	8%	67%	8%	NC	140%	NC	NC	NC	151%
SW4 16092019	16-Sep-19	Primary	< 0.001	0.046	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.002	0.02	0.7	0.001	0.039	< 0.0001	0.017	< 0.01	< 0.01	0.085
TRIP08 16092019	16-Sep-19	Triplicate	< 0.001	0.04	< 0.001	< 0.05	< 0.0002	< 0.001	< 0.005	0.002	< 0.001	0.69	< 0.001	0.037	< 0.0001	0.003	-	< 0.005	0.012
Relative Percentage Difference			NC	14%	NC	NC	NC	NC	NC	0%	190%	1%	67%	5%	NC	140%	NC	NC	151%
TRIP BLANK 15102019	15-Oct-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE 15102019	15-Oct-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
TRIPBLANK09 181119	18-Nov-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE09 181119	18-Nov-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
SW4 181119	18-Nov-19	Primary	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	6.32	< 0.001	0.032	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
DUP09 181119	18-Nov-19	Duplicate	< 0.001	0.034	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	5.9	< 0.001	0.036	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
Relative Percentage Difference			NC	3%	NC	NC	NC	NC	NC	NC	NC	7%	NC	12%	NC	0%	NC	NC	NC
SW4 181119	18-Nov-19	Primary	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	6.32	< 0.001	0.032	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
TRIP09 18112019	18-Nov-19	Triplicate	< 0.001	0.04	< 0.001	< 0.05	< 0.0002	< 0.001	< 0.005	< 0.001	0.01	-	< 0.001	0.035	< 0.0001	0.007	-	< 0.005	0.033
Relative Percentage Difference			NC	13%	NC	NC	NC	NC	NC	NC	181%	NC	NC	9%	NC	111%	NC	NC	172%

Notes:
 - - Not analysed
 < - Less than laboratory limit of reporting
 NC - Not calculated
 mg/L - Milligrams per litre
 Half the laboratory limit of reporting used when calculating RPD
 RPD - Relative Percentage Difference

Table 7
Quality Control Sample Analysis - PFAS
Williamstown Sand Syndicate



Analyte			Perfluoroalkyl Sulfonic Acids						Perfluorobutanoic acid (PFBA)		Perfluoropentanoic acid (PFPeA)
			Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonate (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)			
Units			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Sample Name	Sample Date	Sample Type									
TRIP BLANK_13022019	13-Feb-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	
RINSATE01_21022019	21-Feb-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	
BH8_21022019	21-Feb-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	
DUP01_21022019	21-Feb-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	
BH8_21022019	21-Feb-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	
TRIP01_21022019	21-Feb-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.05	< 0.01	
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	
TRIP BLANK_130319	13-Mar-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	
TRIP BLANK02_150319	15-Mar-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	
RINSATE02_140319	14-Mar-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	
BH7_140319	14-Mar-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	
DUP02_140319	14-Mar-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	
BH7_140319	14-Mar-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	
TRIP02_14032019	14-Mar-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.05	< 0.01	
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	
TRIP BLANK_05_14062019	14-Jun-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	
RINSATE_05_14062019	14-Jun-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	
TRIP BLANK_06_16072019	16-Jul-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	
RINSATE06_16072019	16-Jul-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	
RINSATE07	15-Aug-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.1	< 0.02	
TRIP BLANK_08_16092019	16-Sep-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	
RINSATE_08_16092019	16-Sep-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	
SW4_16092019	16-Sep-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	0.01	< 0.02	< 0.1	< 0.02	
DUP08_16092019	16-Sep-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	0.01	< 0.02	< 0.1	< 0.02	
Relative Percentage Difference			NC	NC	NC	NC	0%	NC	NC	NC	
SW4_16092019	16-Sep-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	0.01	< 0.02	< 0.1	< 0.02	
TRIP08_16092019	16-Sep-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	0.03	< 0.01	< 0.05	< 0.01	
Relative Percentage Difference			NC	NC	NC	NC	100%	NC	NC	NC	
TRIP BLANK_09_1931069	25-Sep-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	
RINSATE_09_1931069	25-Sep-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	
TRIPBLANK09_181119	18-Nov-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	
RINSATE09_181119	18-Nov-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	
SW4_181119	18-Nov-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	
DUP09_181119	18-Nov-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	
SW4_181119	18-Nov-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	
TRIP09_18112019	18-Nov-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.01	
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	

Notes:

< - Less than laboratory limit of reporting

NC - Not calculated

µg/L - Micrograms per litre



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[illegible]

Table 7
Quality Control Sample Analysis - PFAS
Williamtown Sand Syndicate



Perfluoroalkyl Sulfonamides					(n:2) Fluorotelomer Sulfonic Acids				Sum of PFHxS and PFOS
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	
µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.05	< 0.01	< 0.01	< 0.01
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.05	< 0.01	< 0.01	< 0.01
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.05	< 0.01	< 0.01	0.03
NC	NC	NC	NC	NC	NC	NC	NC	NC	100%
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.05	< 0.01	< 0.01	< 0.01
NC	NC	NC	NC	NC	NC	NC	NC	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
< 0.05	< 0.1
NC	NC
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
< 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
86%	133%
< 0.01	< 0.01
< 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

CERTIFICATE OF ANALYSIS

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



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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW



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

Ø = 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

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
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	6.29	5.47	5.34	5.32	4.97
EA006: Sodium Adsorption Ratio (SAR)								
^ Sodium Adsorption Ratio	----	0.01	-	2.26	2.02	1.86	2.64	2.89
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	126	102	86	204	239
EA016: Calculated TDS (from Electrical Conductivity)								
Total Dissolved Solids (Calc.)	----	1	mg/L	82	66	56	133	155
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	8	9	7	20	20
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	24	<1	<1	<1	<1
Total Alkalinity as CaCO3	----	1	mg/L	24	<1	<1	<1	<1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	3	7	6	18	15
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	23	19	18	45	56
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	<1	2	1	3	<1
Magnesium	7439-95-4	1	mg/L	2	1	1	3	5
Sodium	7440-23-5	1	mg/L	16	14	11	27	31
Potassium	7440-09-7	1	mg/L	<1	<1	<1	1	1
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Barium	7440-39-3	0.001	mg/L	0.001	0.007	0.011	0.030	0.016
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	0.002
Chromium	7440-47-3	0.001	mg/L	0.004	<0.001	<0.001	<0.001	0.002
Copper	7440-50-8	0.001	mg/L	<0.001	0.013	0.005	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L	0.008	0.011	0.013	0.009	0.015
Nickel	7440-02-0	0.001	mg/L	0.001	0.007	0.001	0.008	0.013



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
				Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued								
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L	0.012	0.028	<0.005	0.073	0.053
Iron	7439-89-6	0.05	mg/L	11.3	0.08	<0.05	1.58	1.10
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	0.1	<0.1	<0.1	<0.1	0.1
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	0.13	0.05	<0.01	0.23	0.17
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	0.01	1.01	0.29	<0.01	<0.01
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	0.01	1.01	0.29	<0.01	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.3	1.1	<0.1	0.4	0.5
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	0.3	2.1	0.3	0.4	0.5
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	<0.01	0.21	0.08	0.06	0.02
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
EN055: Ionic Balance								
∅ Total Anions	----	0.01	meq/L	1.19	0.68	0.63	1.64	1.89
∅ Total Cations	----	0.01	meq/L	0.86	0.79	0.61	1.60	1.78
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup								
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	<50	<50

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	
				Result	Result	Result	Result	Result	
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	<100	<100	
>C16 - C34 Fraction	----	100	µg/L	<100	<100	<100	<100	<100	
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	<100	
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100	<100	<100	<100	
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	<100	<100	<100	<100	
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	<20	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	<20	<20	
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	<20	<20	
EP080: BTEXN									
Benzene	71-43-2	1	µg/L	<1	<1	<1	<1	<1	
Toluene	108-88-3	2	µg/L	<2	<2	<2	<2	<2	
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	<2	
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	<2	<2	
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	<2	
^ Total Xylenes	----	2	µg/L	<2	<2	<2	<2	<2	
^ Sum of BTEX	----	1	µg/L	<1	<1	<1	<1	<1	
Naphthalene	91-20-3	5	µg/L	<5	<5	<5	<5	<5	
EP231A: Perfluoroalkyl Sulfonic Acids									
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	
EP231B: Perfluoroalkyl Carboxylic Acids									



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
				Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
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 (PFTTrDA)	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
EP231C: Perfluoroalkyl Sulfonamides								
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
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
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
				Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued								
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
EP231P: PFAS Sums								
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
EP080S: TPH(V)/BTEX Surrogates								
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
EP231S: PFAS Surrogate								
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	----	----
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	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		5.12	5.12	4.76	----	----
EA006: Sodium Adsorption Ratio (SAR)									
^ Sodium Adsorption Ratio	----	0.01	-		5.06	3.30	5.38	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		316	193	419	----	----
EA016: Calculated TDS (from Electrical Conductivity)									
Total Dissolved Solids (Calc.)	----	1	mg/L		205	125	272	----	----
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		16	12	25	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		<1	<1	<1	----	----
Total Alkalinity as CaCO3	----	1	mg/L		<1	<1	<1	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		8	<1	8	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		80	53	118	----	----
ED093F: Dissolved Major Cations									
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	----	----
EG020F: Dissolved Metals by ICP-MS									
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	----	----
EG020F: Dissolved Metals by ICP-MS - Continued								
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	----	----
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	<0.1	----	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	0.17	0.18	0.17	----	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	----	----
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	0.01	0.06	<0.01	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	0.01	0.06	<0.01	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.3	5.8	1.2	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	1.3	5.9	1.2	----	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	0.58	2.11	0.23	----	----
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	<0.01	----	----
EN055: Ionic Balance								
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	----	----
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup								
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	Result	Result	----	----
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup - Continued									
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	----	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>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	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	----	----
EP080: BTEXN									
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	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
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	----	----	----	----

Sub-Matrix: **GROUNDWATER**
(Matrix: **WATER**)

Client sampling date / time

EP231A: Perfluoroalkyl Sulfonic Acids - Continued

Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	---	---	---	---

Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	---	---	---	---

EP231C: Perfluoroalkyl Sulfonamides

Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	---	---	---	---

EP231D: (n:2) Fluorotelomer Sulfonic Acids

EP231D: (n:2) Fluorotelomer Sulfonic Acids



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	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued								
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	----	----	----	----
EP231P: PFAS Sums								
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	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
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	----	----
EP231S: PFAS Surrogate								
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	----	----
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	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		5.06	5.39	4.48	----	----
EA006: Sodium Adsorption Ratio (SAR)									
^ Sodium Adsorption Ratio	----	0.01	-		4.91	2.72	3.22	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		1090	278	348	----	----
EA016: Calculated TDS (from Electrical Conductivity)									
Total Dissolved Solids (Calc.)	----	1	mg/L		708	181	226	----	----
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		158	33	30	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		<1	<1	<1	----	----
Total Alkalinity as CaCO3	----	1	mg/L		<1	<1	<1	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		165	29	41	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		234	56	64	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		14	5	4	----	----
Magnesium	7439-95-4	1	mg/L		30	5	5	----	----
Sodium	7440-23-5	1	mg/L		142	36	41	----	----
Potassium	7440-09-7	1	mg/L		4	<1	<1	----	----
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Boron	7440-42-8	0.05	mg/L		0.11	<0.05	<0.05	----	----
Barium	7440-39-3	0.001	mg/L		0.042	0.031	0.035	----	----
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		0.003	<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		0.366	0.026	0.032	----	----
Nickel	7440-02-0	0.001	mg/L		0.003	<0.001	0.002	----	----



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	----	----
EG020F: Dissolved Metals by ICP-MS - Continued								
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	0.026	<0.005	<0.005	----	----
Iron	7439-89-6	0.05	mg/L	1.14	2.60	6.32	----	----
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	0.5	<0.1	0.2	----	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	0.03	0.03	<0.01	----	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	----	----
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	<0.01	0.01	0.02	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.01	0.02	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.1	0.6	0.2	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	1.1	0.6	0.2	----	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	0.02	0.04	<0.01	----	----
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	<0.01	----	----
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	10.0	2.18	2.66	----	----
ø Total Cations	----	0.01	meq/L	----	----	2.76	----	----
ø Total Cations	----	0.01	meq/L	9.45	2.23	----	----	----
ø Ionic Balance	----	0.01	%	3.03	----	----	----	----
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup								
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	----	----
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	----	----



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	----	----
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup - Continued									
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	----	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>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	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	----	----
EP080: BTEXN									
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	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
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	----	----

Sub-Matrix: **SURFACE WATER**
(Matrix: **WATER**)

Client sampling date / time

EP231A: Perfluoroalkyl Sulfonic Acids - Continued

Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	----	----

Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	---	---

EP231C: Perfluoroalkyl Sulfonamides

Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	----	----

EP231D: (n:2) Fluorotelomer Sulfonic Acids

EP231D: (n:2) Fluorotelomer Sulfonic Acids



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	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued								
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	----	----
EP231P: PFAS Sums								
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	----	----
EP080S: TPH(V)/BTEX Surrogates								
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	----	----
EP231S: PFAS Surrogate								
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	----	----
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	----	----
EG020F: Dissolved Metals by ICP-MS								
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	0.034	<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	0.036	<0.001	<0.001	----	----
Nickel	7440-02-0	0.001	mg/L	0.002	<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	5.90	<0.05	<0.05	----	----
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	----
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup								
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	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	----	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
>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	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
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	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	----	----
EP080: BTEXN									
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	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
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	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
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	----	----



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	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
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	----	----
EP231C: Perfluoroalkyl Sulfonamides									
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	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
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	----	----
EP231P: PFAS Sums									
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	----	----
EP231P: PFAS Sums - Continued								
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	<0.01	----	----
EP080S: TPH(V)/BTEX Surrogates								
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	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	95.5	93.2	101	----	----
13C8-PFOA	----	0.02	%	101	97.4	97.5	----	----



Surrogate Control Limits

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

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

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

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



NATA Accredited
Accreditation Number 1261
Site Number 18217

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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 WILLIAMTOWN SS
Project ID 20193820
Received Date Nov 19, 2019

Client Sample ID			TRIP09
Sample Matrix			Water
Eurofins Sample No.			S19-No25594
Date Sampled			Nov 18, 2019
Test/Reference	LOR	Unit	
Total Recoverable Hydrocarbons - 1999 NEPM Fractions			
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
BTEX			
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
Total Recoverable Hydrocarbons - 2013 NEPM Fractions			
Naphthalene ^{N02}	0.01	mg/L	< 0.01
TRH C6-C10	0.02	mg/L	< 0.02
TRH C6-C10 less BTEX (F1) ^{N04}	0.02	mg/L	< 0.02
TRH >C10-C16	0.05	mg/L	< 0.05
TRH >C10-C16 less Naphthalene (F2) ^{N01}	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
TRH - 2013 NEPM Fractions (after silica gel clean-up)			
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
TRH - 1999 NEPM Fractions (after silica gel clean-up)			
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

Client Sample ID			TRIP09
Sample Matrix			Water
Eurofins Sample No.			S19-No25594
Date Sampled			Nov 18, 2019
Test/Reference	LOR	Unit	
Heavy Metals			
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
Perfluoroalkyl carboxylic acids (PFCAs)			
Perfluorobutanoic acid (PFBA) ^{N11}	0.05	ug/L	< 0.05
Perfluoropentanoic acid (PFPeA) ^{N11}	0.01	ug/L	< 0.01
Perfluorohexanoic acid (PFHxA) ^{N11}	0.01	ug/L	< 0.01
Perfluoroheptanoic acid (PFHpA) ^{N11}	0.01	ug/L	< 0.01
Perfluorooctanoic acid (PFOA) ^{N11}	0.01	ug/L	< 0.01
Perfluorononanoic acid (PFNA) ^{N11}	0.01	ug/L	< 0.01
Perfluorodecanoic acid (PFDA) ^{N11}	0.01	ug/L	< 0.01
Perfluoroundecanoic acid (PFUnDA) ^{N11}	0.01	ug/L	< 0.01
Perfluorododecanoic acid (PFDoDA) ^{N11}	0.01	ug/L	< 0.01
Perfluorotridecanoic acid (PFTrDA) ^{N15}	0.01	ug/L	< 0.01
Perfluorotetradecanoic acid (PFTeDA) ^{N11}	0.01	ug/L	< 0.01
13C4-PFBA (surr.)	1	%	81
13C5-PFPeA (surr.)	1	%	77
13C5-PFHxA (surr.)	1	%	92
13C4-PFHpA (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
Perfluoroalkyl sulfonamido substances			
Perfluorooctane sulfonamide (FOSA) ^{N11}	0.05	ug/L	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) ^{N11}	0.05	ug/L	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) ^{N11}	0.05	ug/L	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE) ^{N11}	0.05	ug/L	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE) ^{N11}	0.05	ug/L	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) ^{N11}	0.05	ug/L	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) ^{N11}	0.05	ug/L	< 0.05
13C8-FOSA (surr.)	1	%	97
D3-N-MeFOSA (surr.)	1	%	54

Client Sample ID			TRIP09
Sample Matrix			Water
Eurofins Sample No.			S19-No25594
Date Sampled			Nov 18, 2019
Test/Reference	LOR	Unit	
Perfluoroalkyl sulfonamido substances			
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
Perfluoroalkyl sulfonic acids (PFASs)			
Perfluorobutanesulfonic acid (PFBS) ^{N11}	0.01	ug/L	< 0.01
Perfluorononanesulfonic acid (PFNS) ^{N15}	0.01	ug/L	< 0.01
Perfluoropropanesulfonic acid (PFPrS) ^{N15}	0.01	ug/L	< 0.01
Perfluoropentanesulfonic acid (PFPeS) ^{N15}	0.01	ug/L	< 0.01
Perfluorohexanesulfonic acid (PFHxS) ^{N11}	0.01	ug/L	< 0.01
Perfluoroheptanesulfonic acid (PFHpS) ^{N15}	0.01	ug/L	< 0.01
Perfluorooctanesulfonic acid (PFOS) ^{N11}	0.01	ug/L	< 0.01
Perfluorodecanesulfonic acid (PFDS) ^{N15}	0.01	ug/L	< 0.01
13C3-PFBS (surr.)	1	%	103
18O2-PFHxS (surr.)	1	%	149
13C8-PFOS (surr.)	1	%	138
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA) ^{N11}	0.01	ug/L	< 0.01
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA) ^{N11}	0.05	ug/L	< 0.05
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA) ^{N11}	0.01	ug/L	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA) ^{N15}	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
PFASs Summations			
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 (PFASs) - 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

Company Name: Kleinfelder Aust Pty Ltd (NEWCASTLE)
Address: 95 Mitchell Rd
Cardiff
NSW 2285
Project Name: WILLIAMTOWN SS
Project ID: 20193820

Order No.:
Report #: 688778
Phone: 02 4949 5200
Fax:

Received: Nov 19, 2019 1:47 PM
Due: Nov 26, 2019
Priority: 5 Day
Contact Name: Dan Kousbroek

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Metals M8 filtered	TRH (after Silica Gel cleanup)	Eurofins mgt Suite B1	NEPM 1999 Metals : Metals M15 (Filtered)	Per- and Polyfluoralkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	
Sydney Laboratory - NATA Site # 18217										
Brisbane Laboratory - NATA Site # 20794										X
Perth Laboratory - NATA Site # 23736										
External Laboratory										
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID					
1	TRIP09	Nov 18, 2019		Water	S19-No25594	X	X	X	X	X
Test Counts						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

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	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.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NC	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.
TEQ	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
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
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	
Method Blank							
BTEX							
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	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
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	
Method Blank							
TRH - 2013 NEPM Fractions (after silica gel clean-up)							
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	
Method Blank							
TRH - 1999 NEPM Fractions (after silica gel clean-up)							
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	
Method Blank							
Chromium (hexavalent)	mg/L	< 0.005			0.005	Pass	
Method Blank							
Heavy Metals							
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	
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs)							
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	
Method Blank							
Perfluoroalkyl sulfonamido substances							
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	
Method Blank							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	ug/L	< 0.01			0.01	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/L	< 0.01			0.01	Pass	
Perfluoropropanesulfonic acid (PFPrS)	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	
Perfluorooctanesulfonic acid (PFOS)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/L	< 0.01			0.01	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic 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	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	117			70-130	Pass	
TRH C10-C14	%	116			70-130	Pass	
LCS - % Recovery							
BTEX							
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	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	87			70-130	Pass	
TRH C6-C10	%	121			70-130	Pass	
TRH >C10-C16	%	109			70-130	Pass	
LCS - % Recovery							
TRH - 2013 NEPM Fractions (after silica gel clean-up)							
TRH >C10-C16 (after silica gel clean-up)	%	121			70-130	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery									
TRH - 1999 NEPM Fractions (after silica gel clean-up)									
TRH C10-C14 (after silica gel clean-up)			%	129			70-130	Pass	
LCS - % Recovery									
Chromium (hexavalent)			%	94			70-130	Pass	
LCS - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs)									
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	
Perfluorooctanoic 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 (PFDoDA)			%	100			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)			%	76			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)			%	111			50-150	Pass	
LCS - % Recovery									
Perfluoroalkyl sulfonamido substances									
Perfluorooctane 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-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)			%	77			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)			%	106			50-150	Pass	
LCS - % Recovery									
Perfluoroalkyl sulfonic acids (PFSAs)									
Perfluorobutanesulfonic acid (PFBS)			%	87			50-150	Pass	
Perfluorononanesulfonic 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	
Perfluorooctanesulfonic acid (PFOS)			%	91			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)			%	78			50-150	Pass	
LCS - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)									
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)			%	108			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic 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
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C10-C14		M19-No30667	NCP	%	96		70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
TRH >C10-C16		M19-No30667	NCP	%	92		70-130	Pass	
Spike - % Recovery									
				Result 1					
Chromium (hexavalent)		S19-No25594	CP	%	77		70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Heavy Metals				Result 1					
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	
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1					
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	
Perfluorooctanoic 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 (PFTeDA)	M19-No22937	NCP	%	53			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M19-No22937	NCP	%	108			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonamido substances				Result 1					
Perfluorooctane 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	
Spike - % Recovery									
Perfluoroalkyl sulfonic acids (PFSA's)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	M19-No22937	NCP	%	100			50-150	Pass	
Perfluorononanesulfonic 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	
Perfluorooctanesulfonic acid (PFOS)	M19-No22937	NCP	%	77			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	M19-No22937	NCP	%	60			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	M19-No22937	NCP	%	106			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic 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
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				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	
Duplicate									
BTEX				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	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				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	
Duplicate									
				Result 1	Result 2	RPD			
Chromium (hexavalent)	M19-No28046	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
Heavy Metals				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								
Heavy Metals				Result 1	Result 2	RPD		
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
Duplicate								
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD		
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
Perfluorooctanoic 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
Duplicate								
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD		
Perfluorooctane 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-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M19-No22673	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M19-No22673	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
Duplicate								
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1	Result 2	RPD		
Perfluorobutanesulfonic acid (PFBS)	M19-No22673	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorononanesulfonic 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
Perfluorooctanesulfonic 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 FTSA)				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-perfluorooctanesulfonic 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

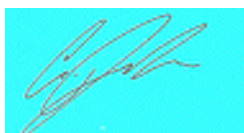
Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	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

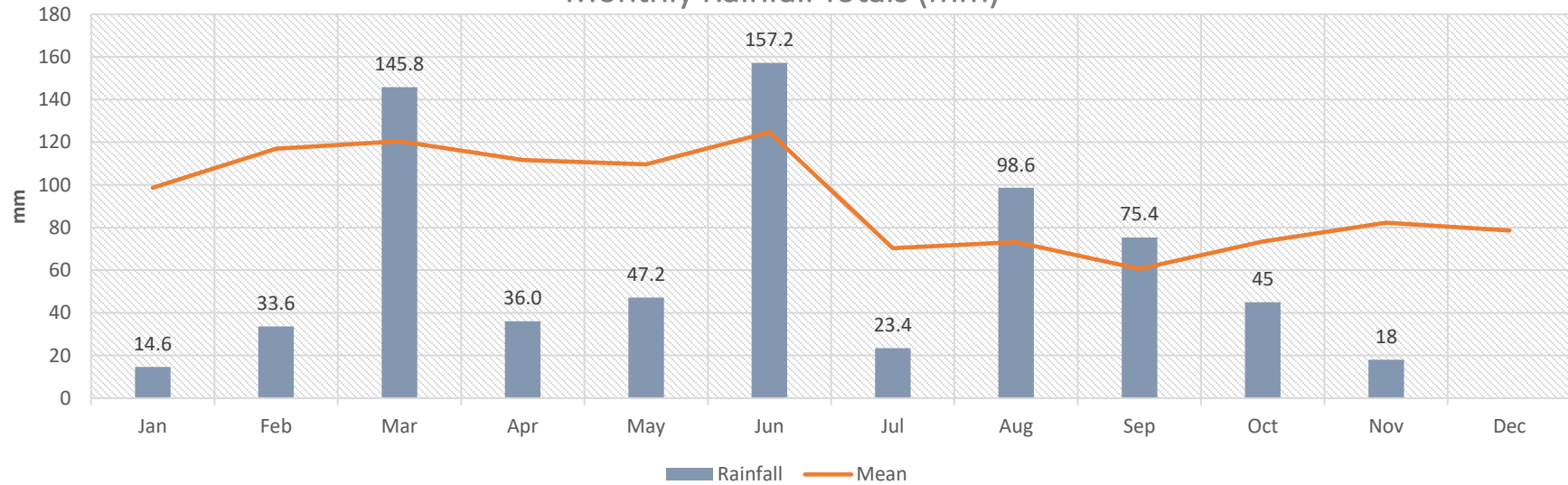
* Indicates NATA accreditation does not cover the performance of this service

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

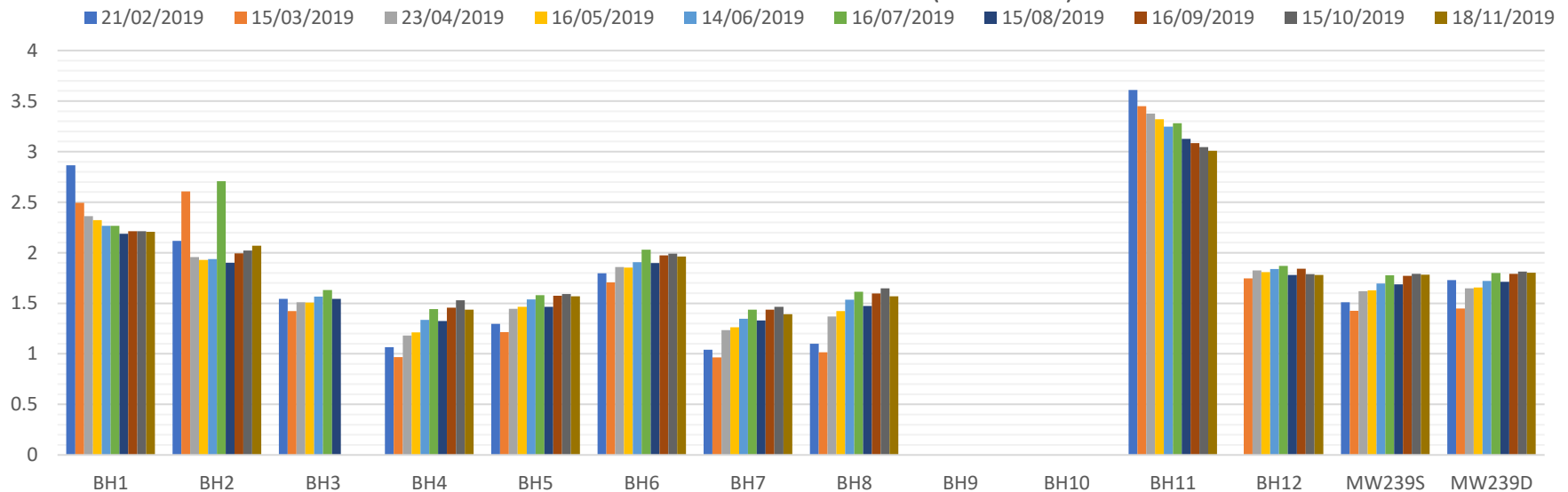
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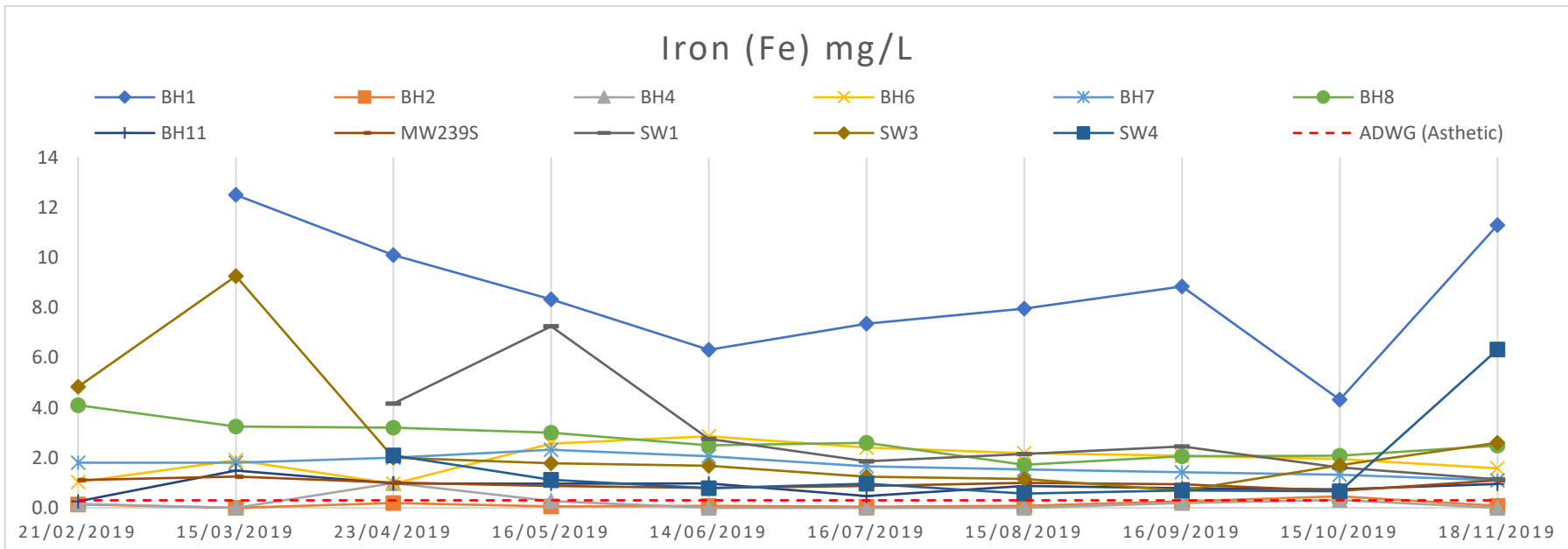
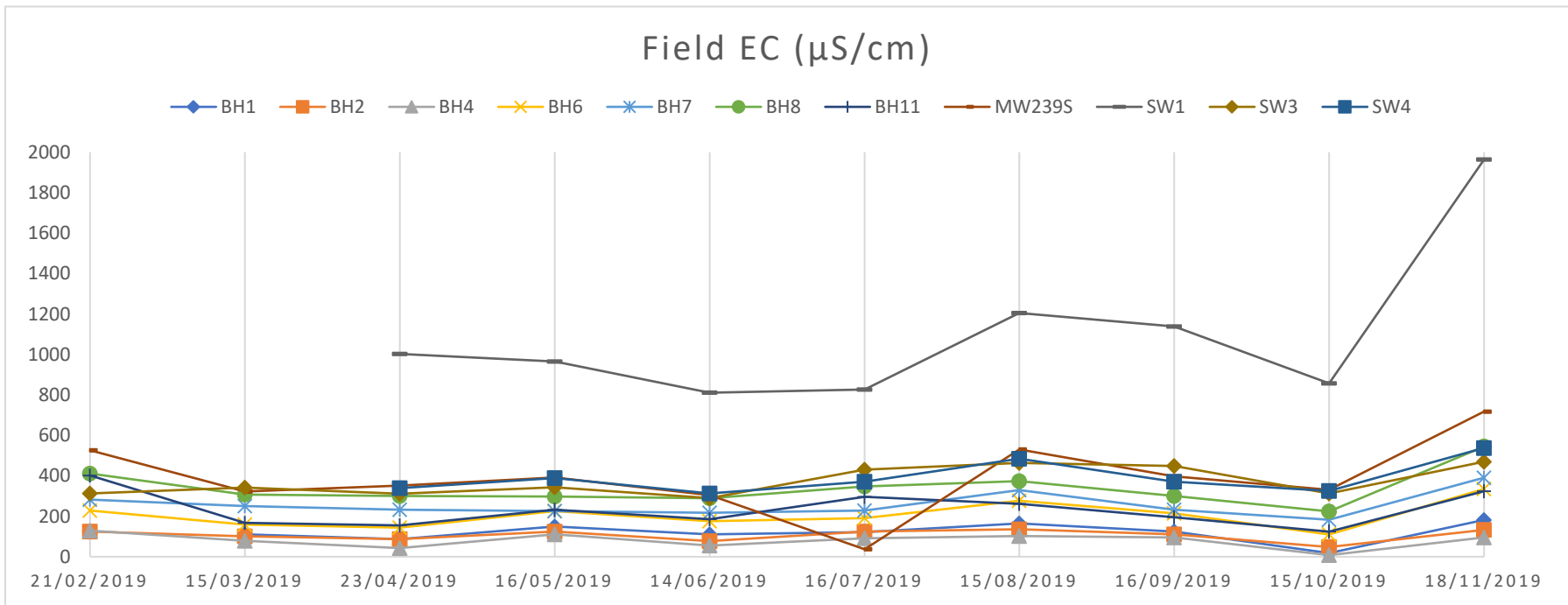
ATTACHMENT B: TREND DATA

Monthly Rainfall Totals (mm)

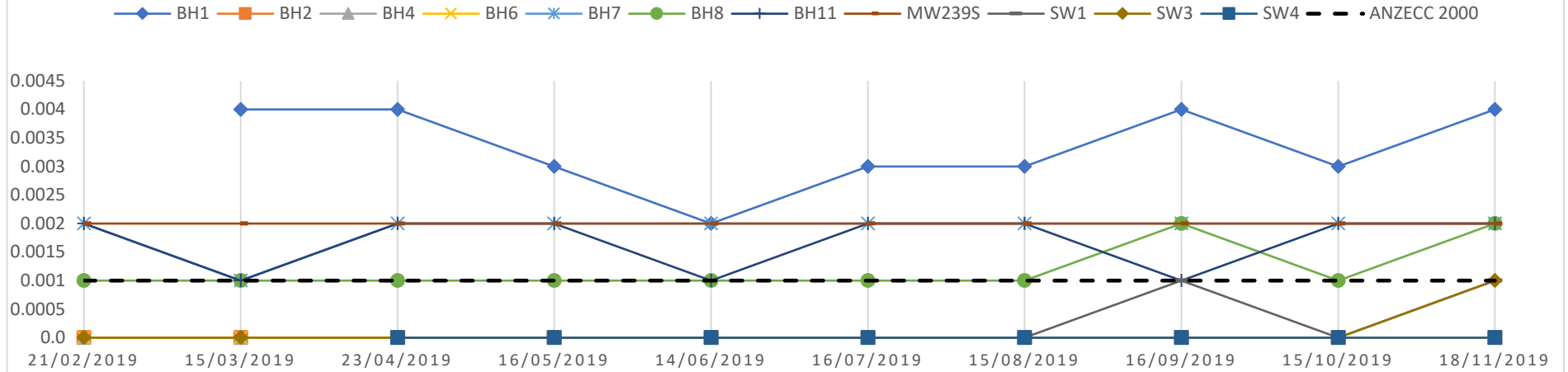


Groundwater Elevation (mAHD)

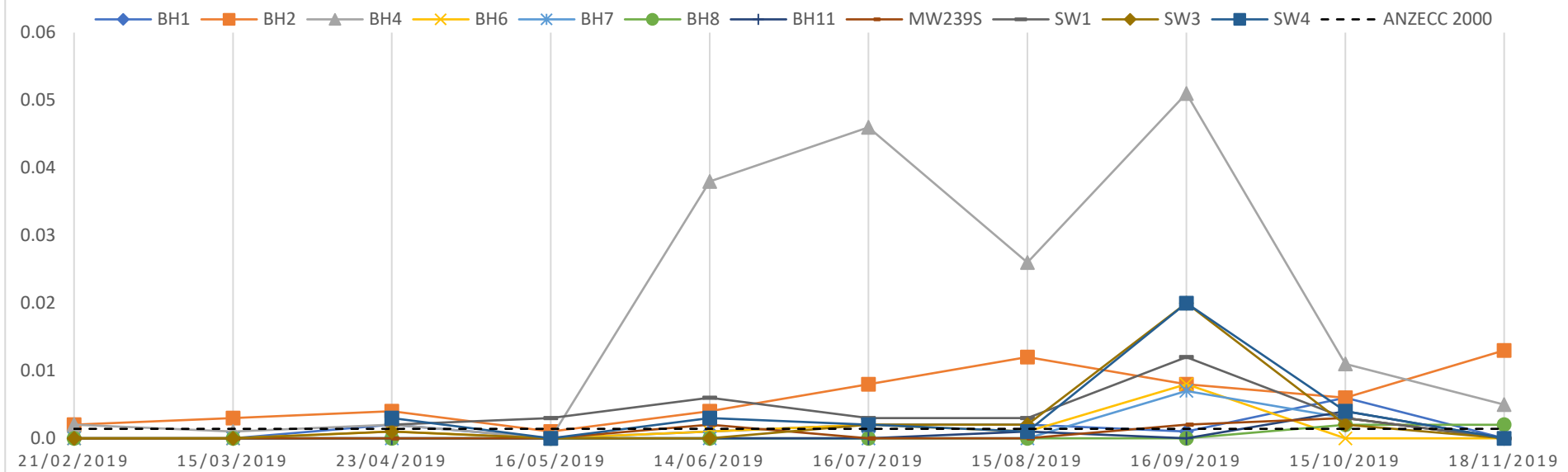




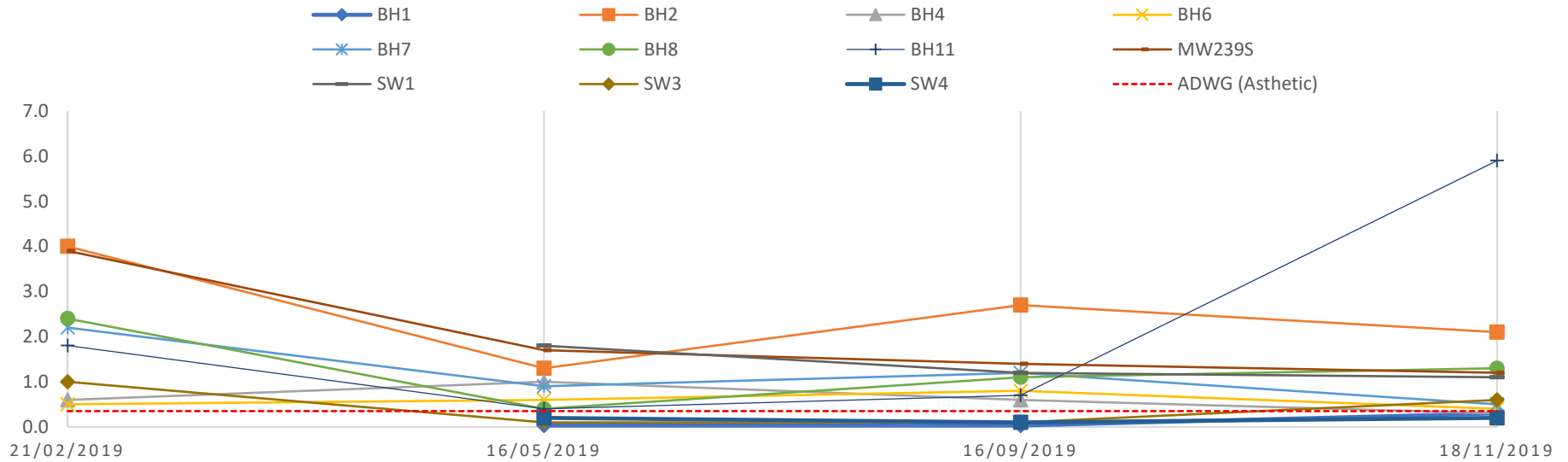
Chromium (Cr) mg/L



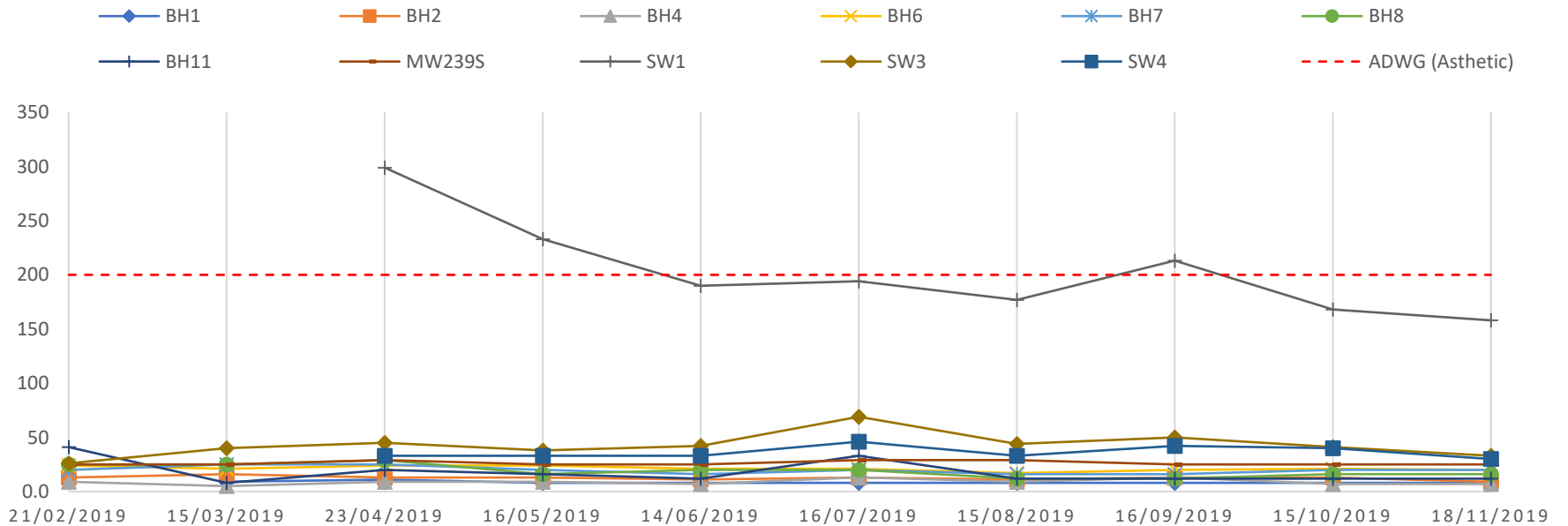
Copper (Cu) mg/L



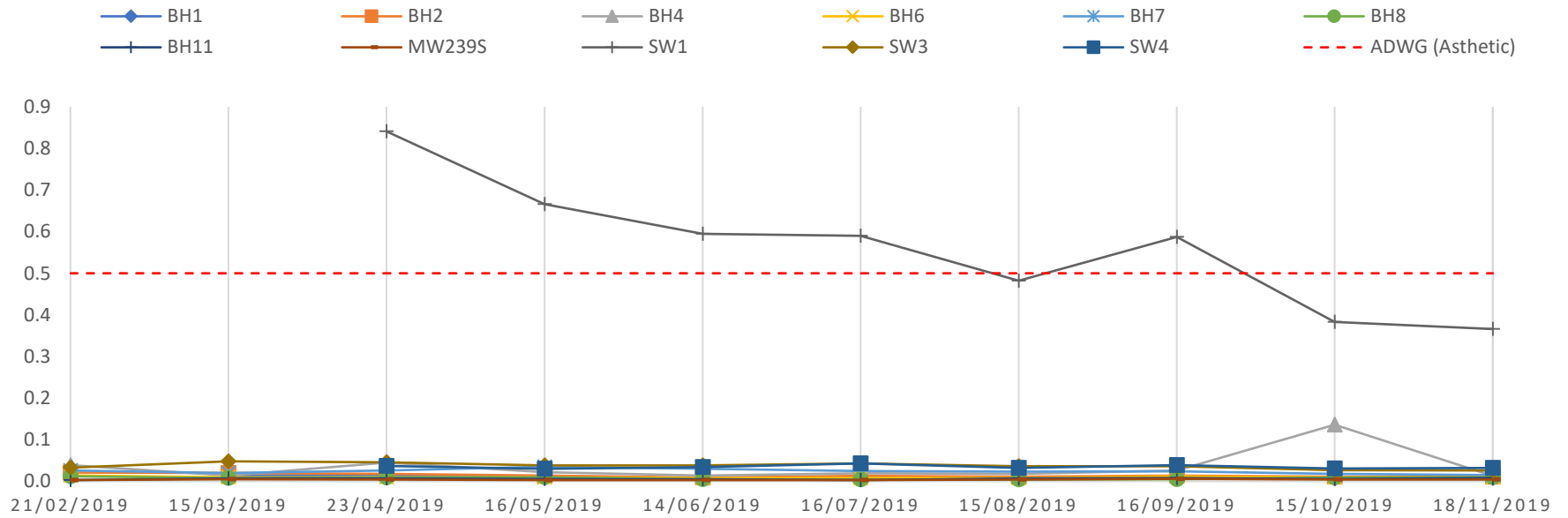
Total Nitrogen (N) mg/L



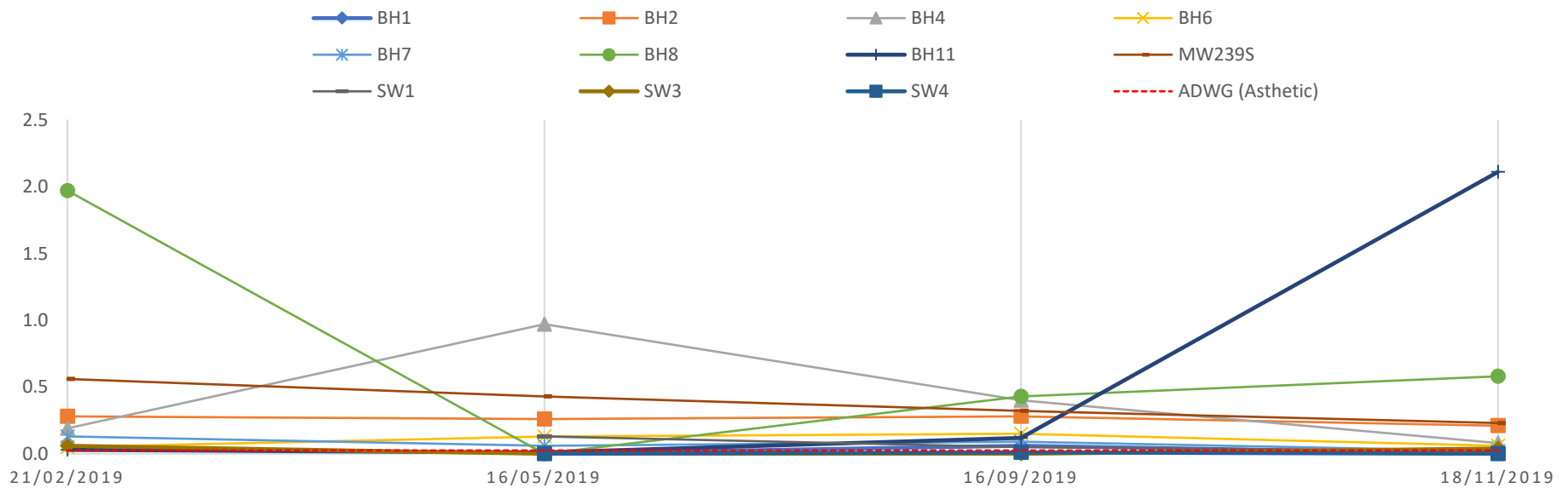
Total Hardness (CaCO₃) mg/L



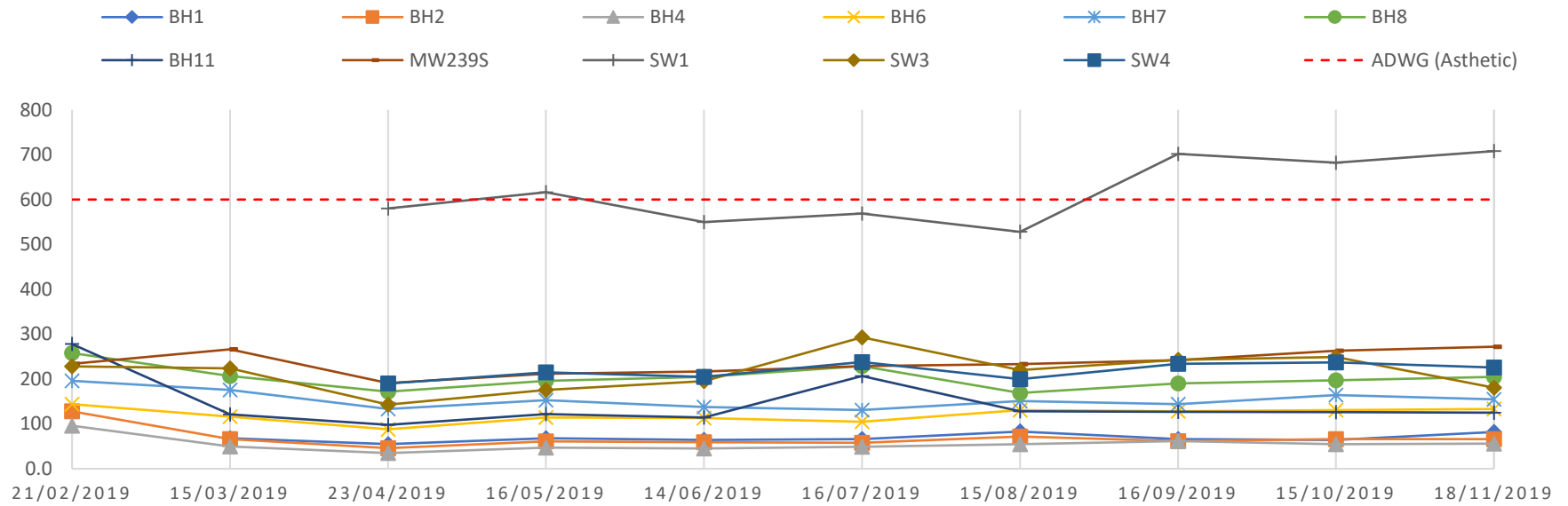
Manganese (Mn) mg/L



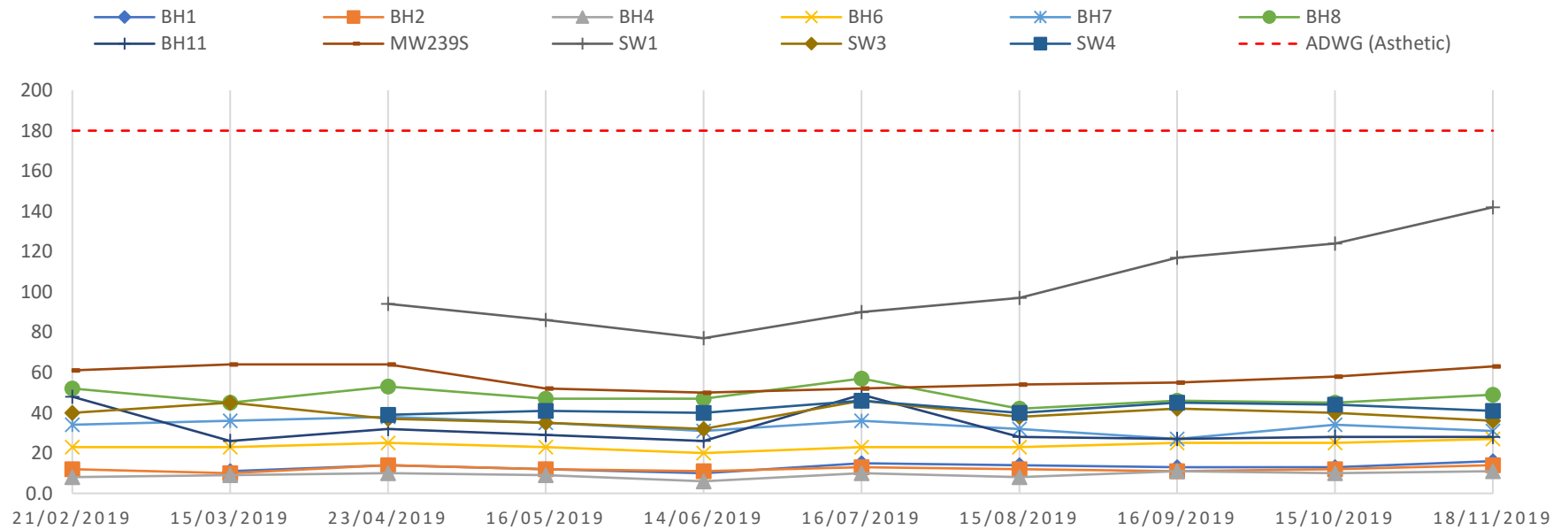
Total Phosphorus mg/L



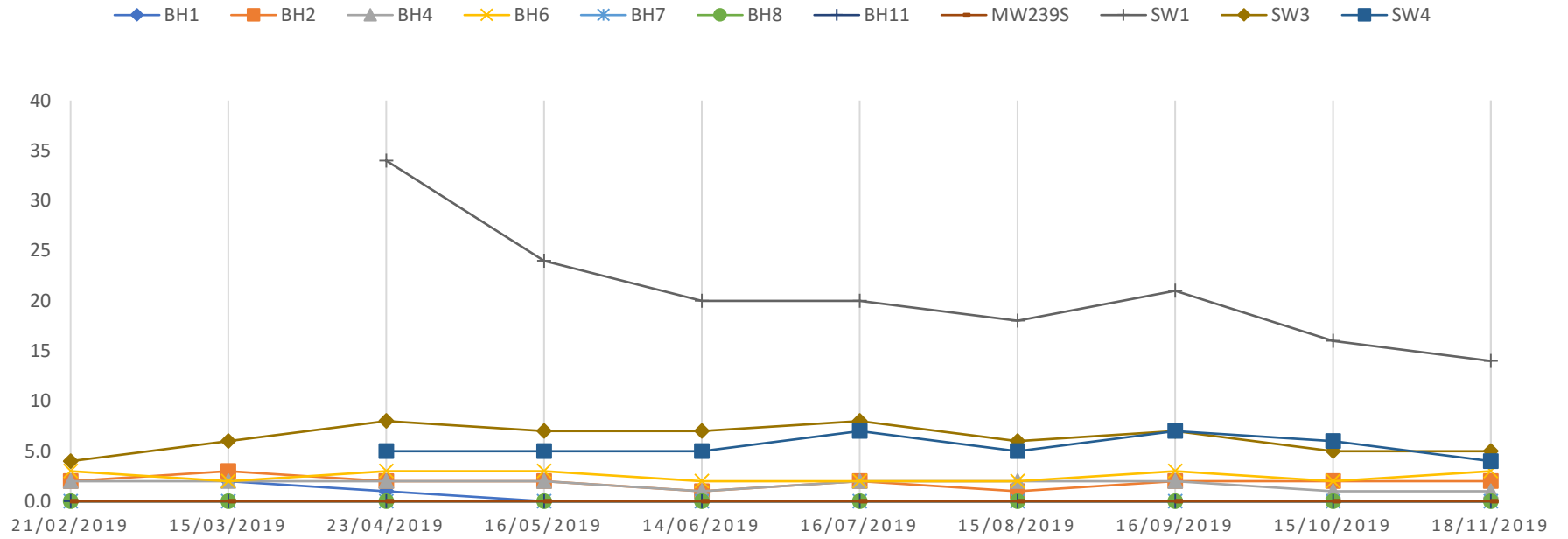
Total Dissolved Solids (TDS) mg/L



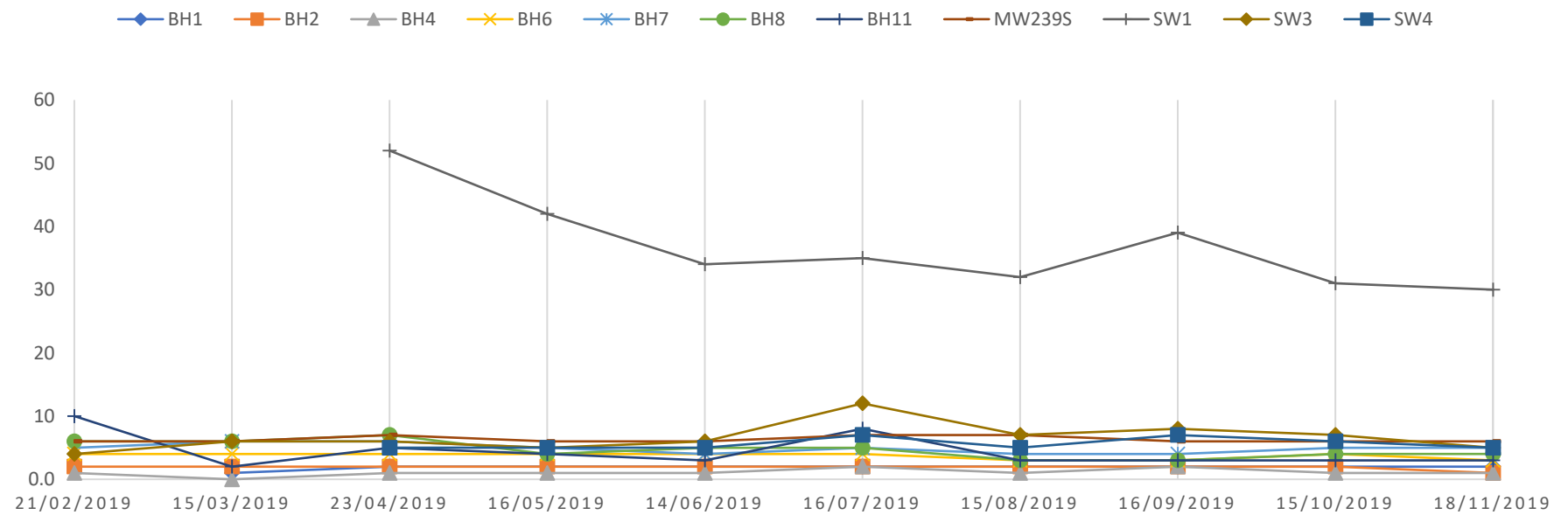
Sodium(Na) mg/L



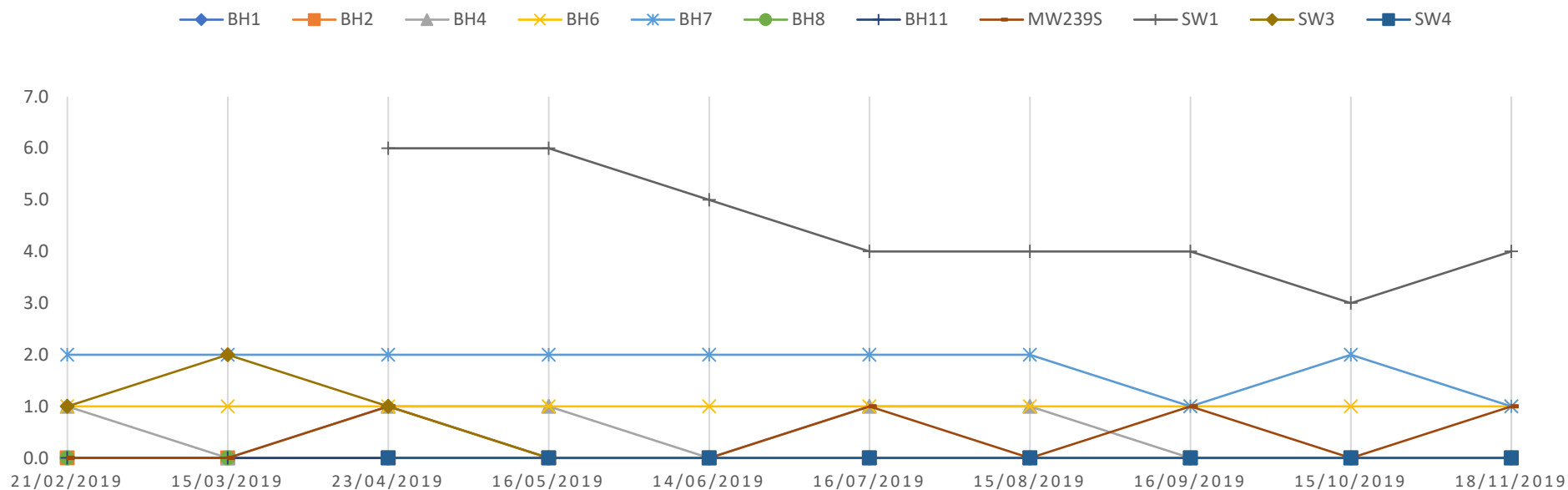
Calcium(Ca) mg/L



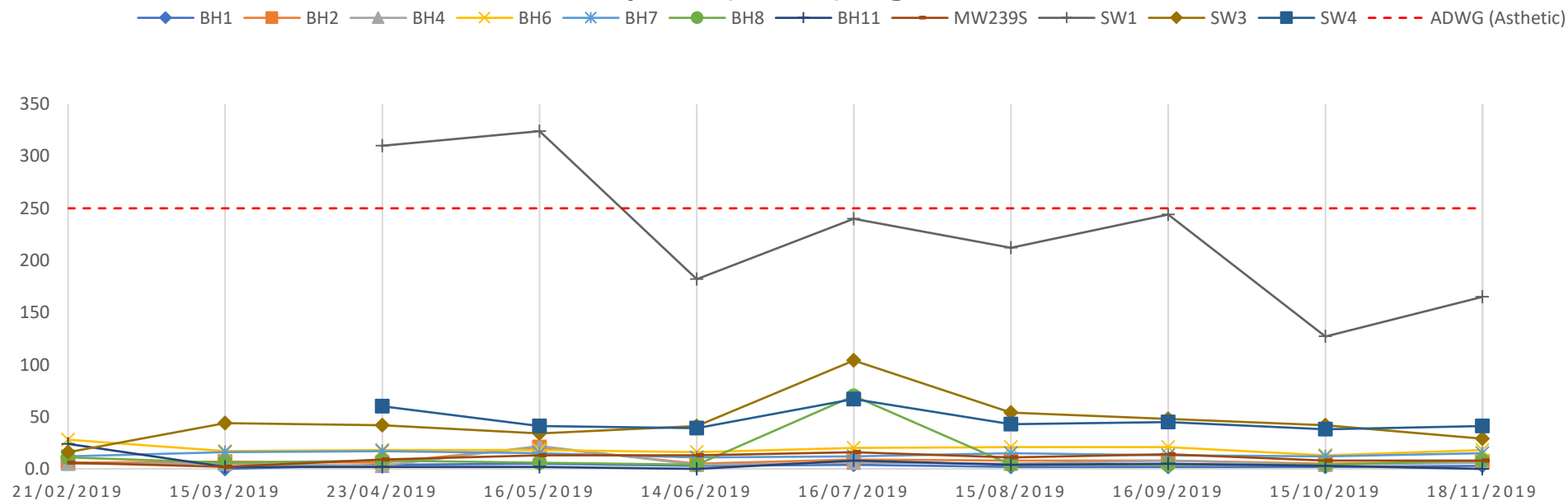
Magnesium(Mg) mg/L



Potassium(K) mg/L

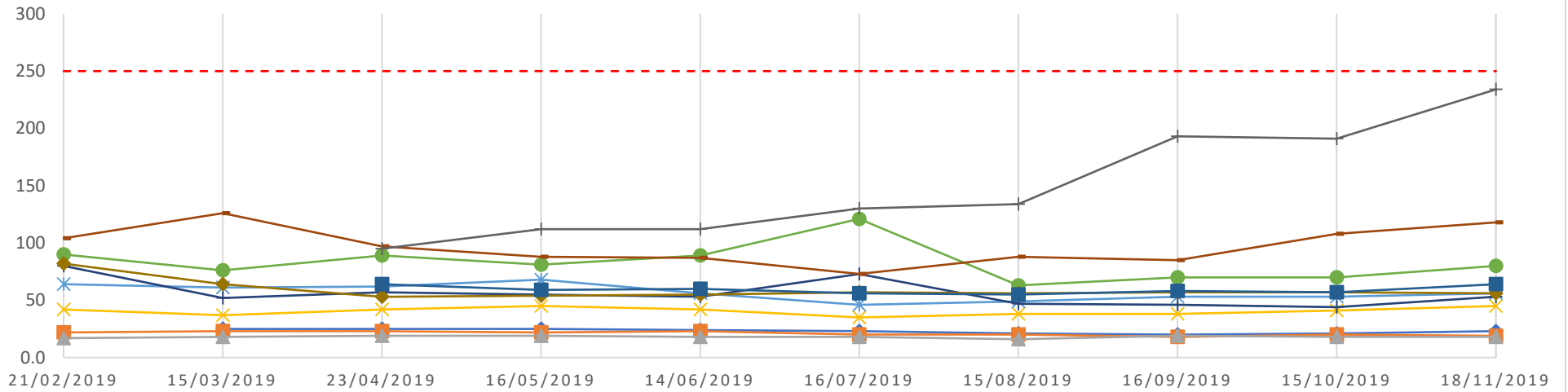


Sulphate(SO₄²⁻) mg/L



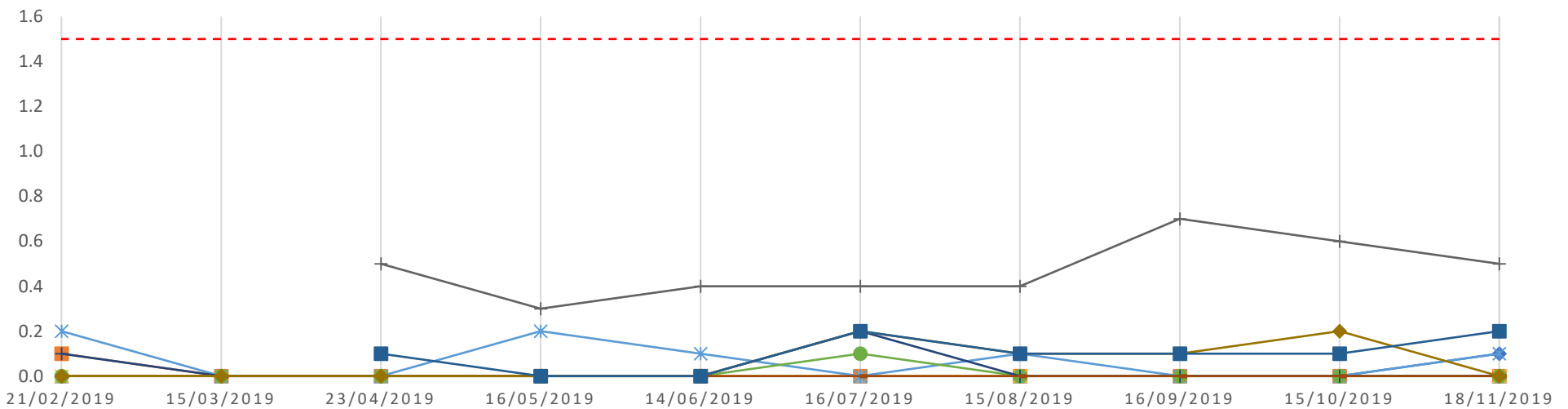
Chloride (Cl) mg/L

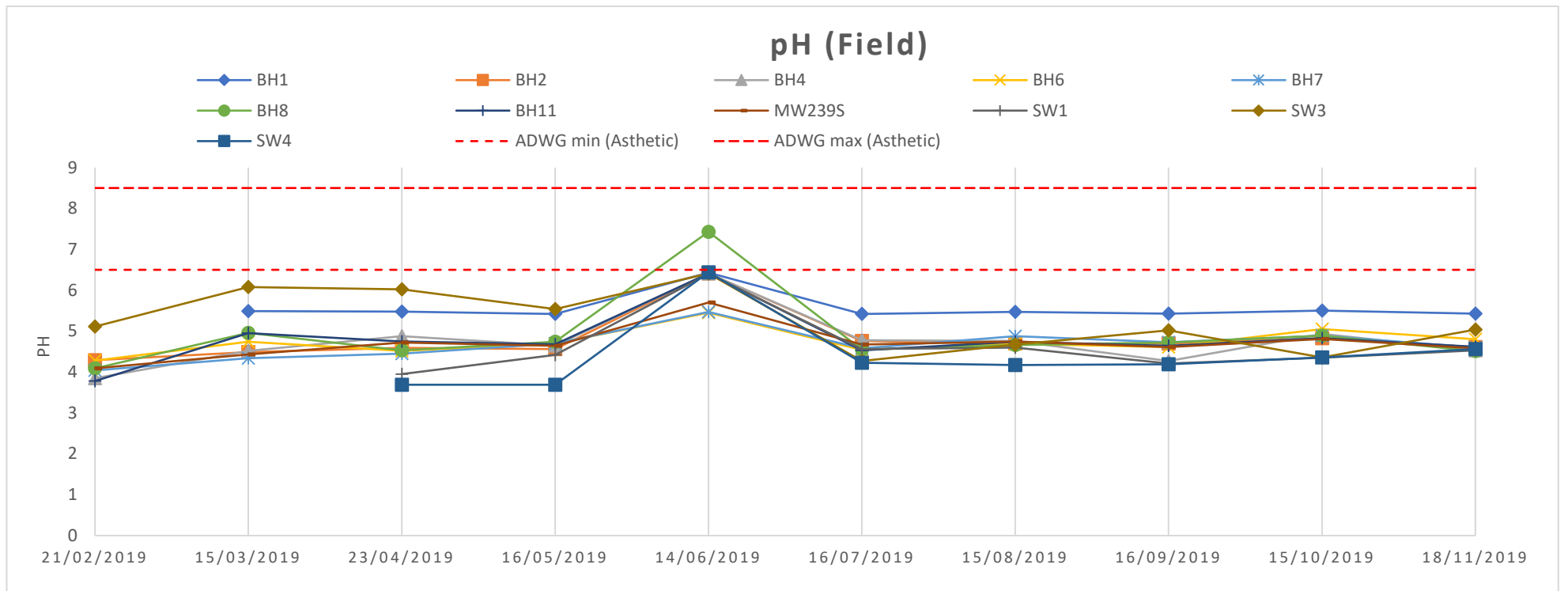
◆ BH1
 ■ BH2
 ▲ BH4
 ✕ BH6
 ✱ BH7
 ● BH8
 ✱ BH11
 — MW239S
 + SW1
 ◆ SW3
 ■ SW4
 - - - ADWG (Aesthetic)



Fluoride (F⁻) mg/L

◆ BH1
 ■ BH2
 ▲ BH4
 ✕ BH6
 ✱ BH7
 ● BH8
 ✱ BH11
 — MW239S
 + SW1
 ◆ SW3
 ■ SW4
 - - - ADWG (Aesthetic)





APPENDIX B11: DECEMBER 2019

26 January 2020
Document Ref: NCA19R104403

Williamtown Sand Syndicate
PO Box 898
Newcastle, NSW 2300

Attention: Darren Williams

Delivered by email: darren@arbus.com.au

Subject: Monthly water quality monitoring results at Cabbage Tree Road Sand Quarry – December 2019 monitoring

Please find enclosed the Monthly water quality monitoring results at Cabbage Tree Road Sand Quarry for the December 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 December monitoring round was a monthly monitoring event and included gauging of all available monitoring wells (a total of 13 wells) and sampling from 8 monitoring wells (Noting that MW239D, BH3, BH5 and BH12 were not required to be sampled and BH9 and BH10 were dry) including additional analytical parameters and sampling at one surface water location (all other surface water locations were dry).

2. SITE WORK

The monthly monitoring round was conducted on 17 December 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 December 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 1 location (SW1, SW2 and SW4 were 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 Monthly Water Quality Analysis

Analysis	Number of Samples				
	Primary	Intra-lab (Duplicate)	Inter-lab (Triplicate)	Transport Blank	Rinsate Blank
General Water Suite*	9	0	0	0	0
Hydrocarbons**	9	0	0	1	1
Metals***	9	0	0	1	1
Iron (dissolved)	9	0	0	1	1
Total Dissolved Solids (TDS)	9	0	0	0	0
Total Suspended Solids (TSS)	9	0	0	0	0
PFAS (28 analytes, standard level)	4	0	0	1	1

* General Water Suite: Ca, Mg, Na, K, pH, EC, Cl, SO₄, Alkalinity, Fluoride, Hardness & TDS (Calc')

** TRH (C6 – C40), BTEXN (Silica Gel)

*** 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), Selenium (Se), Vanadium (V), Zinc (Zn) - note sampling for Iron and no nickel

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 (mBTOC)	Groundwater Elevation (mAHD)	Well Total Depth (mBTOC)	Comment
BH1	8.64	6.558	2.028	8.28	Slight cloudy brown, no odour
BH2	7.79	5.936	1.854	9.03	Dark brown, slight sulfur odour
BH3	-	-	-	-	Well Decommissioned

Borehole	Top of Casing (mAHD)	Depth to Water (mBTC)	Groundwater Elevation (mAHD)	Well Total Depth (mBTC)	Comment
BH4	3.06	2.051	1.009	6.11	Slight cloudy brown, no odour
BH5	7.36	6.143	1.217	8.8	No odour - No sample taken.
BH6	3.62	2.009	1.611	4.62	Mostly clear, slight sulfur odour
BH7	2.98	1.989	0.991	4.61	Cloudy brown, slight sulfur odour.
BH8	3.88	2.778	1.102	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	3.859	2.771	5.39	Cloudy brown, sulfur odour
BH12	8.67	7.076	1.594	8.2	No sample taken.
MW239S	3.04	1.648	1.392	4.06	Cloudy brown, sulfur odour
MW239D	3.04	1.626	1.414	20.32	Slight Sulfur odour, no sample taken
SW01*	N/A	Dry		N/A	Location was dry
SW02*	N/A	Dry		N/A	Location was dry.
SW03*	N/A	Dry		N/A	Small amount of standing water
SW04*	N/A	Dry		N/A	Location was dry

* 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	1225	20.53	163	6.12	15.2
BH02	1200	20.13	131	5.38	178
BH04	1145	20.93	109	6.49	174
BH06	1345	21.96	256	5.52	-86.2
BH07	1400	21.87	292	5.93	-92.6
BH08	1430	22.05	995	6.16	-96.8
BH11	1300	20.55	239	5.42	-60.7
MW239S	1315	20.33	523	5.64	-104.7
SW03	1000	20.00	440	5.69	29.3

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 (µs/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	9	9	65	No	Similar
	Sulphate	1	9	5	25	No	Similar
	Chloride	1	9	16	127	No	Similar
	Fluoride	0.1	9	<0.1	<0.1	No	Similar
	Reactive ³ Phosphorous	0.01	0	-	-	-	-
	Total Phosphorous ³	0.01	0	-	-	-	-
	Nitrite ³	0.01	0	-	-	-	-
	Nitrate ³	0.01	0	-	-	-	-
	Ammonia ³	0.01	0	-	-	-	-
	Total Nitrogen ³	0.1	0	-	-	-	-
	Total Hardness	1	9	7.0	39	No	Similar
	Total Dissolved Solids	1	9	55	285	No	Similar
	pH	0.01	9	5.01	6.05	All outside ANZECC 2000 Trigger range ¹ and drinking water guidelines	Similar
Dissolved Metals	As	0.001	9	<0.001	<0.001	No	Similar
	B	0.05	9	<0.005	0.06	No	Similar
	Ba	0.001	9	0.001	0.041	No	Similar
	Be	0.001	9	<0.001	<0.001	No	Similar
	Cd	0.005-0.1	9	<0.0001	<0.0001	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)
	Cr	0.005-0.1	9	<0.001	0.003	7 above ANZECC 2000 Trigger Values ² (BH1, BH2, BH7, BH8, BH11, MW239S and SW3)	Similar
	Co	0.001	9	<0.001	0.001	No	Similar
	Cu	0.001	9	<0.001	0.008	5 above ANZECC 2000 Trigger Values ² (BH2, BH4, BH6, BH8 & BH11)	General decrease in concentrations following a spike in September 2019.
	Fe	0.05	9	<0.05	8.48	7 above NHMRC ADWG 6 aesthetics (BH1, BH6, BH7, BH8, BH11, MW239S & SW3)	Similar
	Mn	0.001	9	0.001	0.026	No	Similar
	Ni	0.001	9	<0.001	0.003	No	General decrease at groundwater locations.
	Pb	0.005-0.1	9	<0.001	<0.001	No	Similar
	Se	0.005-0.1	9	<0.01	<0.01	No	Similar
	V	0.005-0.1	9	<0.01	<0.01	No	Similar
	Zn	0.005-0.1	9	0.006	0.028	1 above ANZECC 2000 Trigger Values ² (BH1)	General decrease at most groundwater locations.
	Hg	0.0001	9	<0.0001	<0.0001	No	Similar
TRH – Silica Clean up	C ₆ -C ₁₀	0.02	9	<0.02	<0.02	No	Similar
	>C ₁₀ -C ₁₆	0.1	9	<0.1	<0.1	No	Similar
	>C ₁₆ -C ₃₄	0.1	9	<0.1	<0.1	No	Similar
	>C ₃₄ -C ₄₀	0.1	9	<0.1	<0.1	No	Similar
	Total >C ₁₀ -C ₄₀	0.1	9	<0.1	<0.1	No	Similar
	C ₆ -C ₁₀ minus BTEX (F1)	0.02	9	<0.02	<0.02	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)
	>C ₁₀ -C ₁₆ minus Naphthalene (F2)	0.1	9	<0.1	<0.1	No	Similar
BTEX	Benzene	0.001-0.005	9	<0.001	<0.001	No	Similar
	Toluene	0.001-0.005	9	<0.002	<0.002	No	Similar
	Ethylbenzene	0.001-0.005	9	<0.002	<0.002	No	Similar
	Total Xylene	0.001-0.005	9	<0.002	<0.002	No	Similar
	Naphthalene	0.001	9	<0.005	<0.005	No	Similar
PFAS	PFOS	0.00001-0.0001	4	<0.00001	<0.00001	No	Similar
	PFOA	0.00001-0.0001	4	<0.00001	<0.00001	No	Similar
	PFOS/PFHxS	0.00001-0.0001	4	<0.00001	0.00019	No	6:2 Fluorotelomer sulfonic acid reported in BH 6 for first time
	PFDS	0.00001-0.0001	4	<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.

¹Australian 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)

²ANZECC 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

³Analysis 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 November than the mean leading up to the December monitoring event. December rainfall is trending towards below average rainfall. Based on current rainfall data (mean and monthly totals) for December 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
1st	2.0	0.8	0	0	0	0	0	9.6	7.4	0	0	0
2nd	0	12.8	0	23.8	0	21.2	0	0	0.2	0	0	0
3rd	0	0.4		0.6	0	0.6	0	0.2	0	0	0	0
4th	0	0	0	0	20.8	0.4	5.2	0	0	0	17.6	0
5th	0	0	0	0	0.2	25	1.8	0.2	0	0	0.4	0
6th	0	0	0	0	23.2	2.6	1.2	0	0	6.8	0	0
7th	5.0	0	8.2	0	0.2	1	0.6	0	1	0	0	0
8th	0	0	0	0	0	0	1.6	0	0	0	0	0
9th	0	6.6	0	0	0	0	0.4	0	0	0.8	0	0
10th	0.2	0	12.0	2.2	0	0	0	0	0.6	1.4	0	0
11th	0	0	0	0	0.6	0	0	0	2.8	4	0	0
12th	3.0	0	0	0	0	0	0	0	0	23	0	0
13th	0	0	0	0	1.4	0	0	0	0	8.8	0	0
14th	0	0	0	0.2	0	0	0	0	0	0	0	0
15th	0	0	0	1.4	0	0	0	0	0	0	0	0
16th	0	0	4.8	3.6	0	0	0	0	0	0.2	0	0
17th	0	0	59.4	1.4	0	0	0	0	16.8	0	0	0
18th	0	0	2.6	0.2	0	17.8	0	0	39.4	0	0	
19th	0	0	2.2	0.2	0	0	0	0	7.2	0	0	
20th	2.4		0	2.0	0	0	0	0	0	0	0	
21st	1.0	1.4	0	0.2	0	0	0	0	0	0	0	
22nd	0	1.0	1.2	0.2	0	0.2	0	0	0	0	0	
23rd	0	1.4	0	0	0	20	0	0		0	1	
24th	0	9.2	5.4	0	0	50.6	0	0	0	0	1.6	
25th	0	0	5.2	0	0	15.2	2.0	0	0	0	0	
26th	0	0	0	0	0	1.8	0	0	0	0	31.2	
27th	0	0	0	0	0	0.8	0	0	0	0	0	
28th	1.0	0	0	0	0.8	0	0	0	0	0	0	
29th	0		0	0	0	0	0	0	0	0	0	
30th	0		38.2	0	0	0	0.6	21.2	0	0	0	
31st	0		6.6		0		10	67.4				
Total	14.6	33.6	145.8	36.0	47.2	157.2	23.4	98.6	75.4	44.8	51.8	
Mean	98.7	117.0	120.5	111.6	109.6	124.7	70.3	73.2	60.6	73.5	82.3	78.6

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

Dkousbroek@kleinfelder.com

Mobile: 0458 197 676

Attached:

Figure 1

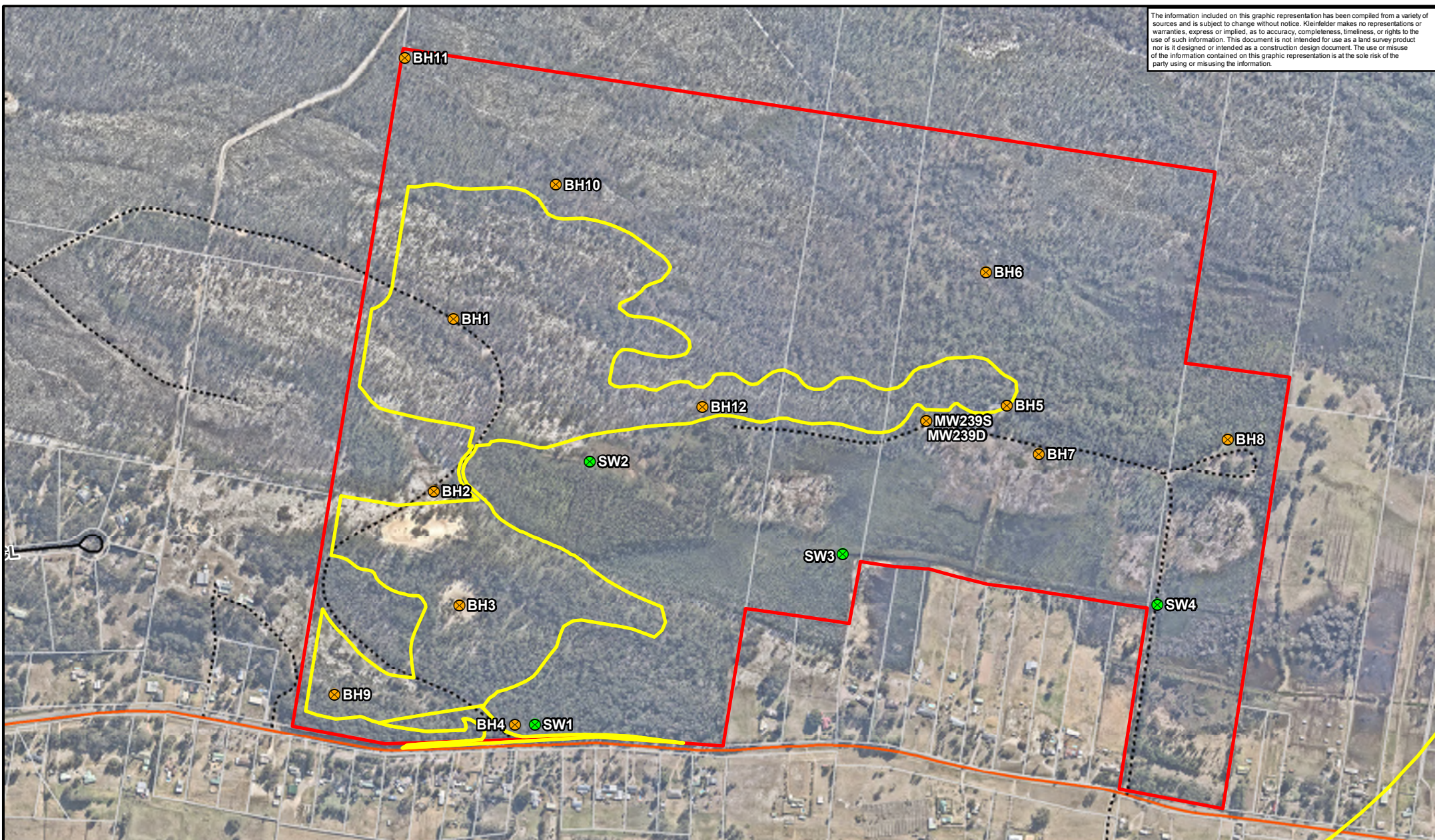
Data Tables

Attachment A – Laboratory reports

Attachment B – Data Trends

FIGURE 1

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 use of such information. This document is not intended for use as a land survey 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
- ✕ Subject Land Boundary
- ✕ Surface Water Sample Site
- ✕ Quarry Project Area
- Arterial Road
- Local Road
- - Track



www.kleinfelder.com

PROJECT REFERENCE: 20170448

DATE DRAWN: 13/02/2019 09:48 Version 1

DRAWN BY: gjoyce

DATA SOURCE:
NSW DFSI - 2017
Nearmap - 2018

Water Monitoring Plan

Williamstown Sand Syndicate
Proposed Sand Quarry
Cabbage Tree Road, Williamstown

FIGURE:

1

DATA TABLES



Analyte	BTEXN								Total Petroleum Hydrocarbons	Total Petroleum Hydrocarbons - Silica Clean up					Total Recoverable Hydrocarbons	Total Recoverable Hydrocarbons - Silica Clean up						
	Benzene**	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene**	Total Xylenes	Naphthalene**	Sum of BTEX		C ₉ - C ₉	C ₁₀ -C ₁₄ - Silica Cleanup	C ₁₅ -C ₂₈ - Silica Cleanup	C ₂₉ -C ₃₆ - Silica Cleanup	C ₁₀ -C ₃₆ Sum - Silica Cleanup		C ₉ - C ₁₀	C ₉ + C ₁₀ minus BTEX (F1)	>C ₁₀ -C ₁₄ - Silica Cleanup	F2 - Silica Cleanup	>C ₁₄ -C ₃₄ - Silica Cleanup	>C ₃₄ -C ₄₀ - Silica Cleanup	>C ₄₀ -C ₄₆ - Silica Cleanup
	1	2	2	2	2	2	5	1		20	50	100	50	50		20	20	100	100	100	100	100
Units	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L		
ANZECC 2000 Trigger Values	950	-	-	-	350	-	16	-	-	-	-	-	-	-	-	-	-	-	-	-		
NHMRC ADWG 6	1	800	300	-	350	600	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Sample Name	Sample Date																					
BH1	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	1,710	< 50	< 100	< 50	< 50	< 50	1,690	1,690	< 100	< 100	< 100	< 100		
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	40	< 50	< 100	< 50	< 50	< 50	30	30	< 100	< 100	< 100	< 100		
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	17-Dec-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
BH11	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
BH2	17-Dec-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
BH3	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	17-Dec-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
BH4	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	17-Dec-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
BH5	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100		
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50										



Notes:
 - - Not analysed
 < - Less than laboratory limit of reporting
 µg/L - Micrograms per litre
 BTEXN - Benzene, toluene, ethylbenzene, xylenes, naphthalene
 ** 95% Level of protection in freshwater

Table 2
Groundwater Analytical Data - Metals
Williamstown Sand Syndicate



		Metals															
Analyte		Arsenic**	Barium	Beryllium	Boron**	Cadmium**	Chromium**	Cobalt	Copper**	Iron	Lead**	Manganese*	Mercury**1,2	Nickel*	Selenium**	Vanadium	Zinc**
LOR		0.001	0.001	0.001	0.05	0.0001	0.001	0.001	0.001	0.05	0.001	0.001	0.0001	0.001	0.01	0.01	0.005
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ANZECC 2000 Trigger Values		0.013	-	-	0.37	0.0002	0.001	-	0.0014	0.0034	1.9	0.0006	0.011	0.011	-	-	0.008
NHMRC ADWG 6		0.01	-	0.06	4	0.002	0.05	-	2	0.3 ¹	0.01	0.5	0.001	0.02	0.01	-	3 ²
Sample Name	Sample Date																
BH1	15-Mar-19	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.004	< 0.001	< 0.001	13	< 0.001	0.014	< 0.0001	< 0.001	< 0.01	< 0.01	1.27
	23-Apr-19	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.004	< 0.001	0.002	10	0.001	0.015	< 0.0001	0.002	< 0.01	< 0.01	0.363
	16-May-19	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	< 0.001	8.33	< 0.001	0.009	< 0.0001	0.002	< 0.01	< 0.01	0.132
	14-Jun-19	< 0.001	0.001	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.001	6.31	< 0.001	0.009	< 0.0001	< 0.001	< 0.01	< 0.01	0.074
	16-Jul-19	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	0.002	7.35	< 0.001	0.01	< 0.0001	0.001	< 0.01	< 0.01	0.116
	15-Aug-19	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	0.002	7.96	< 0.001	0.008	< 0.0001	< 0.001	< 0.01	< 0.01	0.023
	16-Sep-19	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.004	< 0.001	0.001	8.84	< 0.001	0.009	< 0.0001	< 0.001	< 0.01	< 0.01	0.034
	15-Oct-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	0.006	4.32	< 0.001	0.007	< 0.0001	< 0.001	< 0.01	< 0.01	0.037
	18-Nov-19	< 0.001	0.001	< 0.001	< 0.05	< 0.0001	0.004	< 0.001	< 0.001	11	< 0.001	0.008	< 0.0001	0.001	< 0.01	< 0.01	0.012
	17-Dec-19	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	0.001	8.48	< 0.001	0.009	< 0.0001	< 0.001	< 0.01	< 0.01	0.028
BH11	21-Feb-19	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.002	0.001	< 0.001	0.26	< 0.001	0.003	< 0.001	0.005	< 0.01	< 0.01	0.031
	15-Mar-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	1.49	< 0.001	0.007	< 0.001	0.037	< 0.01	< 0.01	0.016
	23-Apr-19	< 0.001	0.006	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.98	< 0.001	0.007	< 0.001	0.007	< 0.01	< 0.01	0.04
	16-May-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.97	< 0.001	0.006	< 0.0001	0.004	< 0.01	< 0.01	0.024
	14-Jun-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	0.98	< 0.001	0.005	< 0.0001	0.001	< 0.01	< 0.01	0.005
	16-Jul-19	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.47	< 0.001	0.003	< 0.0001	0.004	< 0.01	< 0.01	0.007
	15-Aug-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.001	0.87	< 0.001	0.007	< 0.0001	0.001	< 0.01	< 0.01	0.005
	16-Sep-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	0.79	< 0.001	0.008	< 0.0001	0.002	< 0.01	< 0.01	0.012
	15-Oct-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.004	0.74	< 0.001	0.006	< 0.0001	0.003	< 0.01	< 0.01	0.016
	18-Nov-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.95	< 0.001	0.008	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
BH2	17-Dec-19	< 0.001	0.004	< 0.001	0.06	< 0.0001	0.002	< 0.001	0.002	1	< 0.001	0.008	< 0.0001	0.001	< 0.01	< 0.01	0.006
	22-Feb-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.002	0.14	< 0.001	0.021	< 0.001	0.015	< 0.01	< 0.01	0.006
	15-Mar-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.003	< 0.05	< 0.001	0.02	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	23-Apr-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.004	0.19	< 0.001	0.018	< 0.0001	0.001	< 0.01	< 0.01	0.008
	16-May-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.001	0.06	< 0.001	0.014	< 0.0001	0.001	< 0.01	< 0.01	< 0.005
	14-Jun-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.004	0.08	< 0.001	0.009	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	16-Jul-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.008	0.05	< 0.001	0.013	< 0.0001	0.001	< 0.01	< 0.01	0.006
	15-Aug-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.012	0.08	< 0.001	0.011	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	16-Sep-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.008	0.26	< 0.001	0.014	< 0.0001	0.001	< 0.01	< 0.01	0.007
	15-Oct-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.006	0.46	< 0.001	0.011	< 0.0001	< 0.001	< 0.01	< 0.01	0.007
BH3	18-Nov-19	< 0.001	0.007	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.013	0.08	< 0.001	0.013	< 0.0001	0.001	< 0.01	< 0.01	0.028
	17-Dec-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.006	0.1	< 0.001	0.012	< 0.0001	0.001	< 0.01	< 0.01	0.012
	21-Feb-19	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.06	< 0.001	0.005	< 0.0001	0.053	< 0.01	< 0.01	< 0.005
	21-Feb-19	< 0.001	0.014	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.002	0.16	< 0.001	0.039	< 0.0001	0.018	< 0.01	< 0.01	0.014
	15-Mar-19	< 0.001	0.014	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.001	< 0.05	< 0.001	0.014	< 0.0001	0.022	< 0.01	< 0.01	0.043
	23-Apr-19	< 0.001	0.013	< 0.001	0.05	< 0.0001	< 0.001	< 0.001	0.002	0.99	< 0.001	0.045	< 0.0001	0.007	< 0.01	< 0.01	0.008
	16-May-19	< 0.001	0.013	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.001	0.27	< 0.001	0.022	< 0.0001	0.022	< 0.01	< 0.01	0.011
	14-Jun-19	< 0.001	0.012	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.038	< 0.05	< 0.001	0.014	< 0.0001	< 0.001	< 0.01	< 0.01	0.005
	16-Jul-19	< 0.001	0.013	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.046	< 0.05	< 0.001	0.019	< 0.0001	< 0.001	< 0.01	< 0.01	0.007
	15-Aug-19	< 0.001	0.013	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.026	< 0.05	< 0.001	0.018	< 0.0001	< 0.001	< 0.01	< 0.01	0.007
BH4	16-Sep-19	< 0.001	0.012	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.051	0.19	< 0.001	0.026	< 0.0001	0.002	< 0.01	< 0.01	0.005
	15-Oct-19	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.011	0.31	< 0.001	0.136	< 0.0001	0.002	< 0.01	< 0.01	0.014
	18-Nov-19	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.005	< 0.05	< 0.001	0.013	< 0.0001	0.001	< 0.01	< 0.01	< 0.005
	17-Dec-19	< 0.001	0.012	< 0.001	0.06	< 0.0001	0.001	< 0.001	0.008	< 0.05	< 0.001	0.014	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	22-Feb-19	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	1.4	< 0.001	0.005	< 0.0001	0.003	< 0.01	< 0.01	0.008
	14-Mar-19	< 0.001	0.03	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	1.03	< 0.001	0.014	< 0.0001	0.001	< 0.01	< 0.01	0.019
	23-Apr-19	< 0.001	0.027	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	1.9	< 0.001	0.01	< 0.0001	< 0.001	< 0.01	< 0.01	0.012
	16-May-19	< 0.001	0.03	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.001	0.96	< 0.001	0.01	< 0.0001	< 0.001	< 0.01	< 0.01	0.022
	14-Jun-19	< 0.001	0.029	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	2.57	< 0.001	0.009	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	16-Jul-19	< 0.001	0.027	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.001	2.86	< 0.001	0.008					



Notes:
 - - Not analysed
 < - Less than laboratory limit of reporting
 µg/L - Micrograms per litre
 *** 99% Level of protection in freshwater
 † Recreation water



KLEINFELDER
Bright People. Right Solutions.

Notes:
 - - Not analysed
 < - Less than laboratory limit of reporting
 µg/L - Micrograms per litre
 *** 99% Level of protection in freshwater
⁴ Recreation water

Table 3
Groundwater Analytical Data - PFAS
Williamstown Sand Syndicate



Analyte		Sum of PFAS		
		Sum of PFHxS and PFOS	Sum of PFAS (WADER List)	Sum of PFAS
LOR		0.01	0.01	0.01
Units		µg/L	µg/L	µg/L
NHMRC ADWG 6		0.07		
HEPA NEMP 2018***				
HEPA NEMP 2018 ⁴		0.7		
Sample Name	Sample Date			
BH11	21-Feb-19	< 0.01	< 0.01	< 0.01
BH2	22-Feb-19	< 0.01	< 0.01	< 0.01
BH3	21-Feb-19	< 0.01	< 0.01	< 0.01
BH4	21-Feb-19	< 0.01	< 0.01	< 0.01
	15-Mar-19	< 0.01	< 0.01	< 0.01
	23-Apr-19	< 0.01	< 0.01	< 0.01
	16-May-19	< 0.01	< 0.01	< 0.01
	14-Jun-19	< 0.01	< 0.01	< 0.01
	16-Jul-19	< 0.01	< 0.01	< 0.01
	15-Aug-19	< 0.01	< 0.01	< 0.01
	16-Sep-19	< 0.01	< 0.01	0.02
	25-Sep-19	< 0.01	< 0.01	0.02
	15-Oct-19	< 0.01	< 0.01	< 0.01
	18-Nov-19	< 0.01	< 0.01	< 0.01
	17-Dec-19	< 0.01	< 0.01	< 0.01
BH5	22-Feb-19	< 0.01	< 0.01	< 0.01
BH6	22-Feb-19	< 0.01	< 0.01	< 0.01
	14-Mar-19	< 0.01	< 0.01	< 0.01
	23-Apr-19	< 0.01	< 0.01	< 0.01
	16-May-19	< 0.01	< 0.01	< 0.01
	14-Jun-19	< 0.01	< 0.01	< 0.01
	16-Jul-19	< 0.01	< 0.01	< 0.01
	15-Aug-19	< 0.01	< 0.01	< 0.01
	16-Sep-19	< 0.01	< 0.01	< 0.01
	15-Oct-19	< 0.01	< 0.01	< 0.01
	18-Nov-19	< 0.01	< 0.01	< 0.01
	17-Dec-19	< 0.01	< 0.01	0.19
BH7	22-Feb-19	< 0.01	< 0.01	< 0.01
	14-Mar-19	< 0.01	< 0.01	< 0.01
	23-Apr-19	< 0.01	< 0.01	< 0.01
	16-May-19	< 0.01	< 0.01	< 0.01
	14-Jun-19	< 0.01	< 0.01	< 0.01
	16-Jul-19	< 0.01	< 0.01	< 0.01
	15-Aug-19	< 0.01	< 0.01	< 0.01
	16-Sep-19	< 0.01	< 0.01	< 0.01
	15-Oct-19	< 0.01	< 0.01	< 0.01
	18-Nov-19	< 0.01	< 0.01	< 0.01
	17-Dec-19	< 0.01	< 0.01	< 0.01
BH8	21-Feb-19	< 0.01	< 0.01	< 0.01
	14-Mar-19	< 0.01	< 0.01	< 0.01
	23-Apr-19	< 0.01	< 0.01	< 0.01
	16-May-19	< 0.01	< 0.01	< 0.01
	14-Jun-19	< 0.01	< 0.01	< 0.01
	16-Jul-19	< 0.01	< 0.01	< 0.01
	15-Aug-19	< 0.01	< 0.01	< 0.01
	16-Sep-19	< 0.01	< 0.01	< 0.01
	15-Oct-19	< 0.01	< 0.01	< 0.01
	18-Nov-19	< 0.01	< 0.01	< 0.01
	17-Dec-19	< 0.01	< 0.01	< 0.01
MW239S	22-Feb-19	< 0.01	< 0.01	< 0.01
SW1	16-May-19	< 0.01	< 0.01	< 0.01
	16-Sep-19	< 0.01	< 0.01	< 0.01
	18-Nov-19	< 0.01	< 0.01	< 0.01
SW3	22-Feb-19	< 0.01	< 0.01	< 0.01
	16-May-19	< 0.01	< 0.01	< 0.01
	16-Sep-19	< 0.01	< 0.01	< 0.01
	18-Nov-19	< 0.01	< 0.01	< 0.01
SW4	16-May-19	< 0.01	< 0.01	< 0.01
	16-Sep-19	0.03 *	0.01	0.01
	25-Sep-19	0.05	0.05	0.05
	18-Nov-19	< 0.01	< 0.01	< 0.01

Notes:
 -- Not analysed
 < - Less than laboratory limit of report
 µg/L - Micrograms per litre
 *** 99% Level of protection in freshwater
⁴ Recreation water

Table 4
Groundwater Analytical Data - Inorganics
Williamstown Sand Syndicate



Analyte		Anions and Cations																
		Sodium	Calcium	Magnesium	Potassium	Sulphate	Chloride	Fluoride	Reactive phosphorus as P	Total Phosphorus	Nitrite as N	Nitrate as N	Nitrite + Nitrate as N	Ammonia as N	Total Nitrogen as N	Total Kjeldahl Nitrogen as N	Total Cations	Total Anions
LOR	Units	1	1	1	1	1	1	0.1	0.01	0.01	0.01	0.01	0.01	0.01	0.1	0.1	0.01	0.01
ANZECC 2000 Trigger Values		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	meq/L	meq/L
NHMRC ADWG 6		180 ³				250 ³	250 ³	1.5	0.02*	0.025*				0.7**	0.35*			
Sample Name	Sample Date																	
BH1	15-Mar-19	11	2.0	1.0	< 1.0	< 1.0	25	< 0.1	-	-	-	-	-	-	-	-	0.66	0.88
	23-Apr-19	14	1.0	2.0	< 1.0	4.0	25	< 0.1	-	-	-	-	-	-	-	-	0.82	0.99
	16-May-19	12	< 1.0	2.0	< 1.0	5.0	25	< 0.1	0.03	< 0.01	< 0.01	< 0.01	< 0.01	0.11	0.3	0.3	0.69	1.01
	14-Jun-19	10	< 1.0	2.0	< 1.0	3.0	24	< 0.1	-	-	-	-	-	-	-	-	0.6	0.94
	16-Jul-19	15	< 1.0	2.0	< 1.0	4.0	23	< 0.1	-	-	-	-	-	-	-	-	0.82	0.95
	15-Aug-19	14	< 1.0	2.0	< 1.0	2.0	21	< 0.1	-	-	-	-	-	-	-	-	0.77	0.91
	16-Sep-19	13	< 1.0	2.0	< 1.0	2.0	20	< 0.1	< 0.01	0.06	< 0.01	< 0.01	< 0.01	0.12	0.3	0.3	0.73	0.76
	15-Oct-19	13	< 1.0	2.0	< 1.0	2.0	21	< 0.1	-	-	-	-	-	-	-	-	0.73	0.71
	18-Nov-19	16	< 1.0	2.0	< 1.0	3.0	23	0.1	< 0.01	< 0.01	< 0.01	0.01	0.01	0.13	0.3	0.3	0.86	1.19
	17-Dec-19	14	< 1	2	< 1	5	23	< 0.1	-	-	-	-	-	-	-	-	0.77	1.05
BH11	21-Feb-19	48	< 1.0	10	< 1.0	24	80	0.1	< 0.01	0.03	< 0.01	0.04	0.04	0.06	1.8	1.8	2.91	2.76
	15-Mar-19	26	< 1.0	2.0	< 1.0	2.0	52	< 0.1	-	-	-	-	-	-	-	-	1.3	1.51
	23-Apr-19	32	< 1.0	5.0	< 1.0	2.0	57	< 0.1	-	-	-	-	-	-	-	-	1.8	1.65
	16-May-19	29	< 1.0	4.0	< 1.0	2.0	55	< 0.1	< 0.01	0.01	< 0.01	< 0.01	< 0.01	0.12	0.4	0.4	1.59	1.59
	14-Jun-19	26	< 1.0	3.0	< 1.0	< 1.0	53	< 0.1	-	-	-	-	-	-	-	-	1.38	1.5
	16-Jul-19	49	< 1.0	8.0	< 1.0	8.0	73	0.2	-	-	-	-	-	-	-	-	2.79	2.22
	15-Aug-19	28	< 1.0	3.0	< 1.0	4.0	47	< 0.1	-	-	-	-	-	-	-	-	1.46	1.41
	16-Sep-19	27	< 1.0	3.0	< 1.0	5.0	46	< 0.1	< 0.01	0.12	< 0.01	< 0.01	< 0.01	0.15	0.7	0.7	1.42	1.4
	15-Oct-19	28	< 1.0	3.0	< 1.0	3.0	44	< 0.1	-	-	-	-	-	-	-	-	1.46	1.3
	18-Nov-19	28	< 1.0	3.0	< 1.0	< 1.0	53	< 0.1	< 0.01	2.11	< 0.01	0.06	0.06	0.18	5.9	5.8	1.46	1.5
BH2	17-Dec-19	26	< 1	4	< 1	< 1	48	< 0.1	-	-	-	-	-	-	-	-	1.46	1.39
	22-Feb-19	12	2.0	2.0	< 1.0	6.0	22	0.1	< 0.01	0.28	< 0.01	2.76	2.76	0.05	4.0	1.2	0.79	0.74
	15-Mar-19	10	3.0	2.0	< 1.0	7.0	23	< 0.1	-	-	-	-	-	-	-	-	0.75	0.79
	23-Apr-19	14	2.0	2.0	< 1.0	6.0	23	< 0.1	-	-	-	-	-	-	-	-	0.87	0.77
	16-May-19	12	2.0	2.0	< 1.0	21	22	< 0.1	< 0.01	0.26	< 0.01	0.38	0.38	0.01	1.3	0.9	0.79	1.06
	14-Jun-19	11	1.0	2.0	< 1.0	5.0	23	< 0.1	-	-	-	-	-	-	-	-	0.69	0.75
	16-Jul-19	13	2.0	2.0	< 1.0	9.0	20	< 0.1	-	-	-	-	-	-	-	-	0.83	0.75
	15-Aug-19	12	1.0	2.0	< 1.0	8.0	20	< 0.1	-	-	-	-	-	-	-	-	0.74	0.73
	16-Sep-19	11	2.0	2.0	< 1.0	8.0	18	< 0.1	< 0.01	0.28	< 0.01	1.07	1.07	0.04	2.7	1.6	0.74	0.67
	15-Oct-19	12	2.0	2.0	< 1.0	5.0	20	< 0.1	-	-	-	-	-	-	-	-	0.79	0.67
BH3	18-Nov-19	14	2.0	1.0	< 1.0	7.0	19	< 0.1	< 0.01	0.21	< 0.01	1.01	1.01	0.05	2.1	1.1	0.79	0.68
	17-Dec-19	13	2	2	< 1	8	17	< 0.1	-	-	-	-	-	-	-	-	0.83	0.69
	21-Feb-19	4.0	4.0	1.0	< 1.0	4.0	10	< 0.1	< 0.01	2.76	< 0.01	0.78	0.78	0.3	5.9	5.1	0.46	0.54
	21-Feb-19	8.0	2.0	1.0	1.0	5.0	17	< 0.1	< 0.01	0.19	< 0.01	0.35	0.35	0.04	0.6	0.3	0.56	0.7
	15-Mar-19	9.0	2.0	< 1.0	< 1.0	5.0	18	< 0.1	-	-	-	-	-	-	-	-	0.49	0.61
	23-Apr-19	10	2.0	1.0	1.0	3.0	19	< 0.1	-	-	-	-	-	-	-	-	0.64	0.6
	16-May-19	9.0	2.0	1.0	1.0	22	19	< 0.1	< 0.01	0.97	< 0.01	0.29	0.29	< 0.01	1.0	0.7	0.6	0.99
	14-Jun-19	6.0	1.0	1.0	< 1.0	4.0	18	< 0.1	-	-	-	-	-	-	-	-	0.39	0.59
	16-Jul-19	10	2.0	2.0	1.0	6.0	18	< 0.1	-	-	-	-	-	-	-	-	0.72	0.63
	15-Aug-19	8.0	2.0	1.0	1.0	5.0	16	< 0.1	-	-	-	-	-	-	-	-	0.56	0.56
BH4	16-Sep-19	11	2.0	2.0	< 1.0	8.0	19	< 0.1	< 0.01	0.4	< 0.01	0.24	0.24	0.02	0.6	0.4	0.74	0.7
	15-Oct-19	10	1.0	1.0	< 1.0	4.0	18	< 0.1	-	-	-	-	-	-	-	-	0.57	0.59
	18-Nov-19	11	1.0	1.0	< 1.0	6.0	18	< 0.1	< 0.01	0.08	< 0.01	0.29	0.29	< 0.01	0.3	< 0.1	0.61	0.63
	17-Dec-19	9	1	1	1	6	16	< 0.1	-	-	-	-	-	-	-	-	0.55	0.64
	22-Feb-19	42	< 1.0	6.0	1.0	19	69	0.2	< 0.01	0.34	< 0.01	< 0.01	< 0.01	0.09	3.0	3.0	2.35	2.34
	22-Feb-19	28	3.0	4.0	1.0	28	42	< 0.1	< 0.01	0.05	< 0.01	0.09	0.09	0.14	0.5	0.4	1.72	1.77
	14-Mar-19	23	2.0	4.0	1.0	17	37	< 0.1	-	-	-	-	-	-	-	-	1.46	1.44
	23-Apr-19	25	3.0	4.0	1.0	18	42	< 0.1	-	-	-	-	-	-	-	-	1.59	1.56
	16-May-19	23	3.0	4.0	1.0	18	45	< 0.1	< 0.01	0.13	< 0.01	< 0.01	< 0.01	0.14	0.6	0.6	1.5	1.64
	14-Jun-19	20	2.0	4.0	1.0	16	42	< 0.1	-	-	-	-	-	-	-	-	1.32	1.52
BH5	16-Jul-19	23	2.0	4.0	1.0	20	35	< 0.1	-	-	-	-	-	-	-	-	1.46	1.4
	15-Aug-19	23	2.0	3.0	1.0	21	38	< 0.1	-	-	-	-	-	-	-	-	1.37	1.51
	16-Sep-19	25	3.0	3.0	1.0	21	38	< 0.1	< 0.01	0.15	< 0.01	0.07	0.07	0.19	0.8	0.7	1.51	1.55
	15-Oct-19	25	2.0	4.0	1.0	13	41	< 0.1	-	-	-	-	-	-	-	-	1.54	1.43
	18-Nov-19	27	3.0	3.0	1.0	18	45	< 0.1	< 0.01	0.06	< 0.01	< 0.01	< 0.01	0.23	0.4	0.4	1.6	1.64
	17-Dec-19	26	2	4	1	16	42	< 0.1	-	-	-	-	-	-	-	-	1.58	1.62
	22-Feb-19	34	< 1.0	5.0	2.0	12	64	0.2	< 0.01	0.13	< 0.01	0.02	0.02	0.34	2.2	2.2	1.94	2.06
	14-Mar-19	36	< 1.0	6.0	2.0	16	61	< 0.1	-	-	-	-	-	-	-	-	2.11	2.05
	23-Apr-19	38	< 1.0	6.0	2.0	17	62	< 0.1	-	-	-	-	-	-	-	-	2.2	2.1
	16-May-19	35	< 1.0	5.0	2.0	15	68	0.2	< 0.01	0.06	< 0.01	< 0.01	< 0.01	0.27	0.9	0.9	1.98	2.23
BH6	14-Jun-19	31	< 1.0	4.0	2.0	11	56	0.1	-	-	-	-	-	-	-	-	1.73	1.81
	16-Jul-19	36	< 1.0	5.0	2.0	12	46	< 0.1	-	-	-	-	-	-	-	-	2.03	1.55
	15-Aug-19	32	< 1.0	4.0	2.0	15	49	0.1	-	-	-	-	-	-	-	-	1.77	1.85
	16-Sep-19	27	< 1.0	4.0	1.0	13	53	< 0.1	< 0.01	0.09	< 0.01	0.06	0.06	0.2	1.2	1.1	1.53	1.86
	15-Oct-19	34	< 1.0	5.0	2.0	12	53	< 0.1	-	-	-	-	-	-	-	-	1.94	1.74
	18-Nov-19	31	< 1.0	5.0	1.0	15	56	0.1	< 0.01	0.02	< 0.01	< 0.01	< 0.01	0.17	0.5	0.5	1.78	1.89
	17-Dec-19	26	< 1	5	1	15	44	< 0.1	-	-	-	-	-	-	-	-	1.57	1.59
	21-Feb-19	52	< 1.0	6.0	< 1.0	11	90	< 0.1	< 0.01	1.97	< 0.01	< 0.01	< 0.01	0.5	2.4	2.4	2.76	2.77

Table 4
Groundwater Analytical Data - Inorganics
Williamstown Sand Syndicate



Ionic Balance	Sodium Adsorption Ratio	Alkalinity					Electrical Conductivity @ 25°C*	Inorganics		pH
		Bicarbonate Alkalinity as CaCO ₃	Carbonate Alkalinity as CaCO ₃	Hydroxide Alkalinity as CaCO ₃	Total Alkalinity as CaCO ₃	Total Hardness as CaCO ₃		Total Dissolved Solids	Total Dissolved Solids	
	0.01	1	1	1	1	1	1	1	10	0.01
%	-	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	pH units
						200 ³	125-2200	600 ³		6.5 - 8.0*
										6.5-8.5 ³
-	-	9.0	< 1.0	< 1.0	9.0	9.0	104	68	129	5.67
-	-	10	< 1.0	< 1.0	10	11	84	55	97	5.83
-	1.7	10	< 1.0	< 1.0	10	8.0	105	68	164	5.82
-	-	10	< 1.0	< 1.0	10	8.0	99	64	72	5.52
-	-	11	< 1.0	< 1.0	11	8.0	102	66	84	5.62
-	-	14	< 1.0	< 1.0	14	8.0	128	83	82	6.22
-	1.84	8.0	< 1.0	< 1.0	8.0	8.0	102	66	88	5.44
-	-	4.0	< 1.0	< 1.0	4.0	8.0	98	64	-	5.5
-	2.26	24	< 1.0	< 1.0	24	8.0	126	82	-	6.29
-		15	< 1	< 1	15	8	118	77	-	6.05
-	3.21	< 1.0	< 1.0	< 1.0	< 1.0	41	346	278	-	4.67
-	-	< 1.0	< 1.0	< 1.0	< 1.0	8.0	186	121	144	4.82
-	-	< 1.0	< 1.0	< 1.0	< 1.0	20	150	98	135	4.99
-	3.0	< 1.0	< 1.0	< 1.0	< 1.0	16	188	122	216	4.91
-	-	< 1.0	< 1.0	< 1.0	< 1.0	12	175	114	107	4.84
-	-	< 1.0	< 1.0	< 1.0	< 1.0	33	318	207	192	4.68
-	-	< 1.0	< 1.0	< 1.0	< 1.0	12	197	128	135	4.88
-	3.18	< 1.0	< 1.0	< 1.0	< 1.0	12	195	127	140	4.66
-	-	< 1.0	< 1.0	< 1.0	< 1.0	12	194	126	-	4.92
-	3.3	< 1.0	< 1.0	< 1.0	< 1.0	12	193	125	-	5.12
-		2	< 1	< 1	2	16	196	127	-	5.03
-	1.44	< 1.0	< 1.0	< 1.0	< 1.0	13	91	128	-	4.87
-	-	< 1.0	< 1.0	< 1.0	< 1.0	16	101	66	90	4.71
-	-	< 1.0	< 1.0	< 1.0	< 1.0	13	70	46	84	4.82
-	1.44	< 1.0	< 1.0	< 1.0	< 1.0	13	94	61	144	4.85
-	-	< 1.0	< 1.0	< 1.0	< 1.0	11	91	59	51	4.76
-	-	< 1.0	< 1.0	< 1.0	< 1.0	13	90	58	63	4.84
-	-	< 1.0	< 1.0	< 1.0	< 1.0	11	110	72	61	5.2
-	1.32	< 1.0	< 1.0	< 1.0	< 1.0	13	96	62	60	4.72
-	-	< 1.0	< 1.0	< 1.0	< 1.0	13	102	66	-	5.06
-	2.02	< 1.0	< 1.0	< 1.0	< 1.0	9.0	102	66	-	5.47
-		2	< 1	< 1	2	13	106	69	-	5.43
-	0.46	9.0	< 1.0	< 1.0	9.0	14	60	438	-	5.55
-	1.15	6.0	< 1.0	< 1.0	6.0	9.0	73	96	-	5.4
-	-	< 1.0	< 1.0	< 1.0	< 1.0	5.0	77	50	70	5.12
-	-	< 1.0	< 1.0	< 1.0	< 1.0	9.0	54	35	61	5.05
-	1.3	< 1.0	< 1.0	< 1.0	< 1.0	9.0	73	47	100	4.99
-	-	< 1.0	< 1.0	< 1.0	< 1.0	7.0	69	45	36	4.84
-	-	< 1.0	< 1.0	< 1.0	< 1.0	13	75	49	42	4.96
-	-	< 1.0	< 1.0	< 1.0	< 1.0	9.0	85	55	49	5.01
-	1.32	< 1.0	< 1.0	< 1.0	< 1.0	13	95	62	58	4.83
-	-	< 1.0	< 1.0	< 1.0	< 1.0	7.0	85	55	-	4.93
-	1.86	< 1.0	< 1.0	< 1.0	< 1.0	7.0	86	56	-	5.34
-		3	< 1	< 1	3	7	85	55	-	5.44
-	3.59	< 1.0	< 1.0	< 1.0	< 1.0	25	250	211	-	4.87
-	2.49	< 1.0	< 1.0	< 1.0	< 1.0	24	177	144	-	4.37
-	-	2.0	< 1.0	< 1.0	2.0	21	179	116	146	4.95
-	-	< 1.0	< 1.0	< 1.0	< 1.0	24	136	88	115	4.64
-	2.04	< 1.0	< 1.0	< 1.0	< 1.0	24	175	114	214	4.88
-	-	< 1.0	< 1.0	< 1.0	< 1.0	21	174	113	90	4.82
-	-	< 1.0	< 1.0	< 1.0	< 1.0	21	161	105	82	4.73
-	-	< 1.0	< 1.0	< 1.0	< 1.0	17	201	131	104	4.87
-	2.44	2.0	< 1.0	< 1.0	2.0	20	197	128	124	4.68
-	-	< 1.0	< 1.0	< 1.0	< 1.0	21	202	131	-	5.17
-	2.64	< 1.0	< 1.0	< 1.0	< 1.0	20	204	133	-	5.32
-		5	< 1	< 1	5	21	207	134	-	5.58
-	3.16	< 1.0	< 1.0	< 1.0	< 1.0	20	213	196	-	4.76
1.37	-	< 1.0	< 1.0	< 1.0	< 1.0	25	271	176	212	4.73
-	-	< 1.0	< 1.0	< 1.0	< 1.0	25	205	133	185	4.51
-	3.26	< 1.0	< 1.0	< 1.0	< 1.0	20	235	153	310	4.87
-	-	< 1.0	< 1.0	< 1.0	< 1.0	16	213	138	145	4.91
-	-	< 1.0	< 1.0	< 1.0	< 1.0	20	202	131	164	5.0
-	-	8.0	< 1.0	< 1.0	8.0	16	232	151	168	5.53
-	2.79	5.0	< 1.0	< 1.0	5.0	16	222	144	181	5.07
-	-	< 1.0	< 1.0	< 1.0	< 1.0	20	252	164	-	4.95
-	2.89	< 1.0	< 1.0	< 1.0	< 1.0	20	239	155	-	4.97
-		2	< 1	< 1	2	20	210	136	-	5.14
-	4.44	< 1.0	< 1.0	< 1.0	< 1.0	25	352	258	-	4.46

Table 4
Groundwater Analytical Data - Inorganics
Williamstown Sand Syndicate



Analyte	Anions and Cations															Total Cations	Total Anions	
	Sodium	Calcium	Magnesium	Potassium	Sulphate	Chloride	Fluoride	Reactive phosphorus as P	Total Phosphorus	Nitrite as N	Nitrate as N	Nitrite + Nitrate as N	Ammonia as N	Total Nitrogen as N	Total Kjeldahl Nitrogen as N			
LOR	1	1	1	1	1	1	0.1	0.01	0.01	0.01	0.01	0.01	0.01	0.1	0.1	0.01	0.01	
Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	
ANZECC 2000 Trigger Values																		
NHMRC ADWG 6																		
BH8	180 ³				250 ³	250 ³	1.5		0.02*	0.025*		0.7**		0.9**	0.35*			
	14-Mar-19	45	< 1.0	6.0	< 1.0	6.0	76	< 0.1	-	-	-	-	-	-	-	2.45	2.27	
	23-Apr-19	53	< 1.0	7.0	< 1.0	8.0	89	< 0.1	-	-	-	-	-	-	-	2.88	2.68	
	16-May-19	47	< 1.0	4.0	< 1.0	6.0	81	< 0.1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.12	0.4	0.4	2.37	2.43
	14-Jun-19	47	< 1.0	5.0	< 1.0	4.0	89	< 0.1	-	-	-	-	-	-	-	2.46	2.59	
	16-Jul-19	57	< 1.0	5.0	< 1.0	70	121	0.1	-	-	-	-	-	-	-	2.89	4.87	
	15-Aug-19	42	< 1.0	3.0	< 1.0	4.0	63	< 0.1	-	-	-	-	-	-	-	2.07	1.86	
	16-Sep-19	46	< 1.0	3.0	< 1.0	4.0	70	< 0.1	< 0.01	0.43	< 0.01	< 0.01	< 0.01	0.13	1.1	1.1	2.25	2.06
	15-Oct-19	45	< 1.0	4.0	< 1.0	4.0	70	< 0.1	-	-	-	-	-	-	-	2.29	2.06	
	18-Nov-19	49	< 1.0	4.0	< 1.0	8.0	80	< 0.1	< 0.01	0.58	< 0.01	0.01	0.01	0.17	1.3	1.3	2.46	2.42
17-Dec-19	50	<1	4	<1	10	75	<0.1									2.5	2.36	
MW239S	22-Feb-19	61	< 1.0	6.0	< 1.0	6.0	104	< 0.1	< 0.01	0.56	< 0.01	< 0.01	< 0.01	0.18	3.9	3.9	3.15	3.06
	14-Mar-19	64	< 1.0	6.0	< 1.0	2.0	126	< 0.1	-	-	-	-	-	-	-	3.28	3.64	
	23-Apr-19	64	< 1.0	7.0	1.0	9.0	97	< 0.1	-	-	-	-	-	-	-	3.38	2.92	
	16-May-19	52	< 1.0	6.0	< 1.0	13	88	< 0.1	< 0.01	0.43	< 0.01	< 0.01	< 0.01	0.09	1.7	1.7	2.76	2.75
	14-Jun-19	50	< 1.0	6.0	< 1.0	13	87	< 0.1	-	-	-	-	-	-	-	2.67	2.86	
	16-Jul-19	52	< 1.0	7.0	1.0	16	73	< 0.1	-	-	-	-	-	-	-	2.86	2.39	
	15-Aug-19	54	< 1.0	7.0	< 1.0	11	88	< 0.1	-	-	-	-	-	-	-	2.92	2.71	
	16-Sep-19	55	< 1.0	6.0	1.0	14	85	< 0.1	< 0.01	0.32	< 0.01	< 0.01	< 0.01	0.1	1.4	1.4	2.91	2.69
	15-Oct-19	58	< 1.0	6.0	< 1.0	8.0	108	< 0.1	-	-	-	-	-	-	-	3.02	3.21	
	18-Nov-19	63	< 1.0	6.0	1.0	8.0	118	< 0.1	< 0.01	0.23	< 0.01	< 0.01	< 0.01	0.17	1.2	1.2	3.26	3.5
17-Dec-19	65	<1	8	<1	6	127	<0.1									3.48	3.75	
SW1	23-Apr-19	94	34	52	6.0	310	95	0.5	-	-	-	-	-	-	-	-	10	9.13
	16-May-19	86	24	42	6.0	324	112	0.3	< 0.01	0.13	< 0.01	< 0.01	< 0.01	< 0.01	1.8	1.8	8.94	9.9
	14-Jun-19	77	20	34	5.0	182	112	0.4	-	-	-	-	-	-	-	7.27	6.95	
	16-Jul-19	90	20	35	4.0	240	130	0.4	-	-	-	-	-	-	-	7.9	8.66	
	15-Aug-19	97	18	32	4.0	212	134	0.4	-	-	-	-	-	-	-	7.85	8.19	
	16-Sep-19	117	21	39	4.0	244	193	0.7	< 0.01	0.05	< 0.01	0.02	0.02	< 0.01	1.2	1.2	9.45	11
	15-Oct-19	124	16	31	3.0	127	191	0.6	-	-	-	-	-	-	-	8.82	8.03	
	18-Nov-19	142	14	30	4.0	165	234	0.5	< 0.01	0.02	< 0.01	< 0.01	< 0.01	0.03	1.1	1.1	9.45	10
SW3	22-Feb-19	40	4.0	4.0	1.0	16	82	< 0.1	< 0.01	0.06	< 0.01	< 0.01	< 0.01	0.16	1.0	1.0	2.55	2.87
	14-Mar-19	45	6.0	6.0	2.0	44	64	< 0.1	-	-	-	-	-	-	-	2.8	2.8	
	23-Apr-19	37	8.0	6.0	1.0	42	53	< 0.1	-	-	-	-	-	-	-	2.53	2.37	
	16-May-19	35	7.0	5.0	< 1.0	34	54	< 0.1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.1	2.28	2.25
	14-Jun-19	32	7.0	6.0	< 1.0	41	55	< 0.1	-	-	-	-	-	-	-	2.24	2.4	
	16-Jul-19	46	8.0	12	< 1.0	104	57	0.2	-	-	-	-	-	-	-	3.39	3.77	
	15-Aug-19	38	6.0	7.0	< 1.0	54	56	0.1	-	-	-	-	-	-	-	2.53	2.7	
	16-Sep-19	42	7.0	8.0	< 1.0	48	57	0.1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	0.1	0.1	2.83	2.61
	15-Oct-19	40	5.0	7.0	< 1.0	42	57	0.2	-	-	-	-	-	-	-	2.56	2.48	
	18-Nov-19	36	5.0	5.0	< 1.0	29	56	< 0.1	< 0.01	0.04	< 0.01	0.01	0.01	0.03	0.6	0.6	2.23	2.18
17-Dec-19	40	4	7	1	25	57	<0.1									2.54	2.25	
SW4	23-Apr-19	39	5.0	5.0	< 1.0	60	64	0.1	-	-	-	-	-	-	-	-	2.36	3.05
	16-May-19	41	5.0	5.0	< 1.0	41	59	< 0.1	0.01	< 0.01	< 0.01	0.05	0.05	< 0.01	0.2	0.2	2.44	2.52
	14-Jun-19	40	5.0	5.0	< 1.0	39	60	< 0.1	-	-	-	-	-	-	-	2.4	2.5	
	16-Jul-19	46	7.0	7.0	< 1.0	67	56	0.2	-	-	-	-	-	-	-	2.93	2.97	
	15-Aug-19	40	5.0	5.0	< 1.0	43	55	0.1	-	-	-	-	-	-	-	2.4	2.45	
	16-Sep-19	45	7.0	6.0	< 1.0	45	58	0.1	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.1	2.8	2.57
	15-Oct-19	44	6.0	6.0	< 1.0	38	57	0.1	-	-	-	-	-	-	-	2.71	2.4	
	18-Nov-19	41	4.0	5.0	< 1.0	41	64	0.2	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	0.2	0.2	2.76	2.66

Notes:
 - - Not analysed
 < - Less than laboratory limit of reporting
 LOR - Laboratory limit of reporting
 mg/L - Milligrams per litre
 µS/cm - Microsiemens per centimeter
Bold indicates a detection above the laboratory limit of reporting

* 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)

** 95% Level of protection in freshwater

³ Aesthetic

Table 4
Groundwater Analytical Data - Inorganics
Williamstown Sand Syndicate



Ionic Balance	Sodium Adsorption Ratio	Alkalinity					Electrical Conductivity @ 25°C*	Inorganics		pH
		Bicarbonate Alkalinity as CaCO ₃	Carbonate Alkalinity as CaCO ₃	Hydroxide Alkalinity as CaCO ₃	Total Alkalinity as CaCO ₃	Total Hardness as CaCO ₃		Total Dissolved Solids	Total Dissolved Solids	
	0.01	1	1	1	1	1	1	1	10	0.01
%	-	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	pH units
						200 ³	125-2200	600 ³		6.5 - 8.0*
-	-	< 1.0	< 1.0	< 1.0	< 1.0	25	319	207	253	4.77
-	-	< 1.0	< 1.0	< 1.0	< 1.0	29	264	172	223	4.76
-	4.86	1.0	< 1.0	< 1.0	1.0	16	302	196	354	4.9
-	-	< 1.0	< 1.0	< 1.0	< 1.0	20	315	205	194	4.82
26	-	< 1.0	< 1.0	< 1.0	< 1.0	20	353	229	226	4.78
-	-	< 1.0	< 1.0	< 1.0	< 1.0	12	260	169	140	5.0
-	5.43	< 1.0	< 1.0	< 1.0	< 1.0	12	293	190	206	4.85
-	-	< 1.0	< 1.0	< 1.0	< 1.0	16	303	197	-	5.02
-	5.06	< 1.0	< 1.0	< 1.0	< 1.0	16	316	205	-	5.12
		2	<1	<1	2	16	328	213	-	5.02
1.43	5.21	< 1.0	< 1.0	< 1.0	< 1.0	25	329	234	-	4.89
5.18	-	2.0	< 1.0	< 1.0	2.0	25	410	266	232	5.02
7.32	-	< 1.0	< 1.0	< 1.0	< 1.0	29	294	191	208	4.92
-	4.44	< 1.0	< 1.0	< 1.0	< 1.0	25	327	212	320	4.87
-	-	7.0	< 1.0	< 1.0	7.0	25	334	217	220	5.39
-	-	< 1.0	< 1.0	< 1.0	< 1.0	29	353	229	188	4.85
-	-	< 1.0	< 1.0	< 1.0	< 1.0	29	359	233	195	4.83
-	4.7	< 1.0	< 1.0	< 1.0	< 1.0	25	373	242	224	4.66
3.15	-	< 1.0	< 1.0	< 1.0	< 1.0	25	404	263	-	4.86
3.48	5.38	< 1.0	< 1.0	< 1.0	< 1.0	25	419	272	-	4.76
3.62	-	2	<1	<1	2	33	439	285	-	5.01
5.6	-	< 1.0	< 1.0	< 1.0	< 1.0	299	893	580	707	4.01
5.13	2.45	< 1.0	< 1.0	< 1.0	< 1.0	233	947	616	715	4.6
2.28	-	< 1.0	< 1.0	< 1.0	< 1.0	190	847	550	512	4.5
4.64	-	< 1.0	< 1.0	< 1.0	< 1.0	194	876	569	568	4.42
2.12	-	< 1.0	< 1.0	< 1.0	< 1.0	177	813	528	548	4.53
5.38	3.49	< 1.0	< 1.0	< 1.0	< 1.0	213	1,080	702	689	4.32
4.68	-	< 1.0	< 1.0	< 1.0	< 1.0	168	1,050	682	-	5.32
3.03	4.91	< 1.0	< 1.0	< 1.0	< 1.0	158	1,090	708	-	5.06
-	3.38	11	< 1.0	< 1.0	11	26	262	228	-	6.21
-	-	4.0	< 1.0	< 1.0	4.0	40	344	224	279	5.42
-	-	< 1.0	< 1.0	< 1.0	< 1.0	45	220	143	190	5.2
-	2.47	1.0	< 1.0	< 1.0	1.0	38	271	176	300	5.24
-	-	< 1.0	< 1.0	< 1.0	< 1.0	42	300	195	170	4.58
5.38	-	< 1.0	< 1.0	< 1.0	< 1.0	69	451	293	246	4.47
-	-	< 1.0	< 1.0	< 1.0	< 1.0	44	338	220	192	4.47
-	2.57	< 1.0	< 1.0	< 1.0	< 1.0	50	374	243	201	4.3
-	-	< 1.0	< 1.0	< 1.0	< 1.0	41	383	249	-	4.75
-	2.72	< 1.0	< 1.0	< 1.0	< 1.0	33	278	181	-	5.39
		6	<1	<1	6	39	301	196	-	5.75
13	-	< 1.0	< 1.0	< 1.0	< 1.0	33	293	190	198	4.0
-	3.1	< 1.0	< 1.0	< 1.0	< 1.0	33	331	215	288	4.08
-	-	< 1.0	< 1.0	< 1.0	< 1.0	33	316	205	163	4.31
-	-	< 1.0	< 1.0	< 1.0	< 1.0	46	367	238	207	4.46
-	-	< 1.0	< 1.0	< 1.0	< 1.0	33	308	200	160	4.48
-	3.01	< 1.0	< 1.0	< 1.0	< 1.0	42	360	234	208	4.35
-	-	< 1.0	< 1.0	< 1.0	< 1.0	40	365	237	-	4.48
-	3.22	< 1.0	< 1.0	< 1.0	< 1.0	30	348	226	-	4.48

Table 5
Quality Control Sample Analysis - BTEXN
Williamstown Sand Syndicate



Analyte			BTEXN								Total Petroleum Hydrocarbons			
			Benzene	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene	Total Xylenes	Naphthalene	Sum of BTEX	C ₆ - C ₉	C ₁₀ - C ₁₄	C ₁₅ - C ₂₈	C ₂₉ - C ₃₆
Units			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Sample Name	Sample Date	Sample Type												
TRIP BLANK_13022019	13-Feb-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
RINSATE01_21022019	21-Feb-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
BH8_21022019	21-Feb-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
DUP01_21022019	21-Feb-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
BH8_21022019	21-Feb-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
TRIP01_21022019	21-Feb-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	-	< 20	< 50	< 100	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK_130319	13-Mar-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
RINSATE02_140319	14-Mar-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
BH7_140319	14-Mar-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
DUP02_140319	14-Mar-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK_05_14062019	14-Jun-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
RINSATE_05_14062019	14-Jun-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
SW3_14062019	14-Jun-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
DUP05_14062019	14-Jun-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
SW3_14062019	14-Jun-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
TRIP05_140619	14-Jun-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	-	< 20	-	-	-
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK_06_16072019	16-Jul-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
RINSATE06_16072019	16-Jul-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
RINSATE07	15-Aug-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50
TRIP BLANK_08_16092019	16-Sep-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
RINSATE_08_16092019	16-Sep-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
SW4_16092019	16-Sep-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
DUP08_16092019	16-Sep-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
SW4_16092019	16-Sep-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
TRIP08_16092019	16-Sep-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	-	< 20	200	400	200
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK_15102019	15-Oct-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
RINSATE_15102019	15-Oct-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
TRIPBLANK09_181119	18-Nov-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
RINSATE09_181119	18-Nov-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
SW4_181119	18-Nov-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
DUP09_181119	18-Nov-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
SW4_181119	18-Nov-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
TRIP09_18112019	18-Nov-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	-	< 20	< 50	< 100	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIPBLANK10_171219	17-Dec-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
RINSATE10_171219	17-Dec-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-

Notes:

- - Not analysed
< - Less than laboratory limit of reporting
NC - Not calculated
µg/L - Micrograms per litre
BTEXN - Benzene, toluene, ethylbenzene, xylenes, naphthalene



Total Petroleum Hydrocarbons - Silica Clean up					Total Recoverable Hydrocarbons						Total Recoverable Hydrocarbons -		
C ₁₀ - C ₃₆ sum	C ₁₀ -C ₁₄ - Silica Cleanup	C ₁₅ -C ₂₈ - Silica Cleanup	C ₂₉ -C ₃₆ - Silica Cleanup	C ₁₀ -C ₃₆ Sum - Silica Cleanup	C ₆ - C ₁₀	C ₆ - C ₁₀ minus BTEX (F1)	>C ₁₀ - C ₁₆	>C ₁₀ - C ₁₆ minus Naphthalene (F2)	>C ₁₆ - C ₃₄	>C ₃₄ - C ₄₀	>C ₁₀ -C ₁₆ - Silica Cleanup	F2 - Silica Cleanup	>C ₁₆ -C ₃₄ - Silica Cleanup
µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
< 100	< 50	< 100	< 100	< 400	< 20	< 20	< 50	< 50	< 100	< 100	< 50	-	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
-	-	-	-	-	< 20	< 20	-	-	-	-	-	-	-
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	-	-	-	-	NC	NC	NC
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
800	< 50	< 100	< 100	< 400	< 20	< 20	180	180	400	100	< 50	-	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
< 100	< 50	< 100	< 100	< 100	< 20	< 20	< 50	< 50	< 100	< 100	< 50	-	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100

Table 5
Quality Control Sample Analysis - BTEXN
Williamtown Sand Syndicate



Silica Clean up	
>C ₃₄ -C ₄₀ - Silica Cleanup	>C ₁₀ -C ₄₀ - 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
< 100	< 100
NC	NC
< 100	< 100
< 100	< 100
NC	NC
< 100	< 100
< 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
< 100	< 100
< 100	< 100

Table 6
Quality Control Sample Analysis - Metals
Williamstown Sand Syndicate



Analyte			Metals																
			Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Chromium VI	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Nickel	Selenium	Vanadium	Zinc
Units			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Name	Sample Date	Sample Type																	
TRIP BLANK 13022019	13-Feb-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE01 21022019	21-Feb-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH8 21022019	21-Feb-19	Primary	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.005
DUP01 21022019	21-Feb-19	Duplicate	0.001	0.014	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.09	< 0.001	0.012	< 0.0001	0.003	< 0.01	< 0.01	0.015
Relative Percentage Difference			67%	24%	NC	NC	NC	0%	NC	NC	NC	0%	NC	0%	NC	40%	NC	NC	100%
BH8 21022019	21-Feb-19	Primary	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.005
TRIP01 21022019	21-Feb-19	Triplicate	0.001	< 0.02	< 0.001	< 0.05	< 0.0002	< 0.005	< 0.005	< 0.001	< 0.001	4.5	< 0.001	0.012	< 0.0001	0.003	-	< 0.005	0.006
Relative Percentage Difference			67%	10%	NC	NC	NC	86%	NC	NC	NC	9%	NC	0%	NC	40%	NC	NC	18%
TRIP BLANK 130319	13-Mar-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
TRIP BLANK02 150319	15-Mar-19	Trip Blank	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE02 140319	14-Mar-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH7 140319	14-Mar-19	Primary	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	-	0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
DUP02 140319	14-Mar-19	Duplicate	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	-	0.002	< 0.001	2.51	< 0.001	0.021	< 0.0001	0.004	< 0.01	< 0.01	0.007
Relative Percentage Difference			NC	0%	NC	NC	NC	0%	40%	NC	NC	33%	NC	5%	NC	0%	NC	NC	25%
BH7 140319	14-Mar-19	Primary	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	-	0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
TRIP02 14032019	14-Mar-19	Triplicate	< 0.001	< 0.02	< 0.001	< 0.05	< 0.0002	0.001	-	0.002	< 0.001	1.7	< 0.001	0.019	< 0.0001	< 0.001	-	< 0.005	< 0.005
Relative Percentage Difference			NC	0%	NC	NC	NC	0%	40%	NC	NC	6%	NC	5%	NC	156%	NC	NC	113%
TRIP BLANK 05 14062019	14-Jun-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE 05 14062019	14-Jun-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
SW3 14062019	14-Jun-19	Primary	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.003	< 0.001	1.68	< 0.001	0.038	< 0.0001	0.003	< 0.01	< 0.01	0.016
DUP05 14062019	14-Jun-19	Duplicate	< 0.001	0.036	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.003	< 0.001	1.63	< 0.001	0.039	< 0.0001	0.003	< 0.01	< 0.01	0.013
Relative Percentage Difference			NC	3%	NC	NC	NC	NC	NC	0%	NC	3%	NC	3%	NC	0%	NC	NC	21%
SW3 14062019	14-Jun-19	Primary	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.003	< 0.001	1.68	< 0.001	0.038	< 0.0001	0.003	< 0.01	< 0.01	0.016
TRIP05 140619	14-Jun-19	Triplicate	< 0.001	-	-	-	< 0.0002	0.001	-	-	< 0.001	1.6	< 0.001	-	< 0.0001	0.003	-	-	0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	67%	NC	NC	NC	5%	NC	NC	NC	0%	NC	NC	46%
TRIP BLANK 06 16072019	16-Jul-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE06 16072019	16-Jul-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE07	15-Aug-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
TRIP BLANK 08 16092019	16-Sep-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE 08 16092019	16-Sep-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
SW4 16092019	16-Sep-19	Primary	< 0.001	0.046	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.002	0.02	0.7	0.001	0.039	< 0.0001	0.017	< 0.01	< 0.01	0.085
DUP08 16092019	16-Sep-19	Duplicate	< 0.001	0.041	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.002	< 0.001	0.76	< 0.001	0.036	< 0.0001	0.003	< 0.01	< 0.01	0.012
Relative Percentage Difference			NC	11%	NC	NC	NC	NC	NC	0%	190%	8%	67%	8%	NC	140%	NC	NC	151%
SW4 16092019	16-Sep-19	Primary	< 0.001	0.046	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.002	0.02	0.7	0.001	0.039	< 0.0001	0.017	< 0.01	< 0.01	0.085
TRIP08 16092019	16-Sep-19	Triplicate	< 0.001	0.04	< 0.001	< 0.05	< 0.0002	< 0.001	< 0.005	0.002	< 0.001	0.69	< 0.001	0.037	< 0.0001	0.003	-	< 0.005	0.012
Relative Percentage Difference			NC	14%	NC	NC	NC	NC	NC	0%	190%	1%	67%	5%	NC	140%	NC	NC	151%
TRIP BLANK 15102019	15-Oct-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE 15102019	15-Oct-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
TRIPBLANK09 181119	18-Nov-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE09 181119	18-Nov-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
SW4 181119	18-Nov-19	Primary	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	6.32	< 0.001	0.032	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
DUP09 181119	18-Nov-19	Duplicate	< 0.001	0.034	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	5.9	< 0.001	0.036	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
Relative Percentage Difference			NC	3%	NC	NC	NC	NC	NC	NC	NC	7%	NC	12%	NC	0%	NC	NC	NC
SW4 181119	18-Nov-19	Primary	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	6.32	< 0.001	0.032	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
TRIP09 18112019	18-Nov-19	Triplicate	< 0.001	0.04	< 0.001	< 0.05	< 0.0002	< 0.001	< 0.005	< 0.001	0.01	-	< 0.001	0.035	< 0.0001	0.007	-	< 0.005	0.033
Relative Percentage Difference			NC	13%	NC	NC	NC	NC	NC	NC	181%	NC	NC	9%	NC	111%	NC	NC	172%
TRIPBLANK10 171219	17-Dec-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE10 171219	17-Dec-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005

Notes:
 - - Not analysed
 < - Less than laboratory limit of reporting
 NC - Not calculated
 mg/L - Milligrams per litre
 Half the laboratory limit of reporting used when calculating RPD
 RPD - Relative Percentage Difference

Table 7
Quality Control Sample Analysis - PFAS
Williamstown Sand Syndicate



Analyte			Perfluoroalkyl Sulfonic Acids							
			Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonate (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)
Units			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Sample Name	Sample Date	Sample Type								
TRIP BLANK_13022019	13-Feb-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
RINSATE01_21022019	21-Feb-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
BH8_21022019	21-Feb-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
DUP01_21022019	21-Feb-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC
BH8_21022019	21-Feb-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
TRIP01_21022019	21-Feb-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.05	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK_130319	13-Mar-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
TRIP BLANK02_150319	15-Mar-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
RINSATE02_140319	14-Mar-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
BH7_140319	14-Mar-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
DUP02_140319	14-Mar-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC
BH7_140319	14-Mar-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
TRIP02_14032019	14-Mar-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.05	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK_05_14062019	14-Jun-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
RINSATE_05_14062019	14-Jun-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
TRIP BLANK_06_16072019	16-Jul-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
RINSATE06_16072019	16-Jul-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
RINSATE07	15-Aug-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.1	< 0.02
TRIP BLANK_08_16092019	16-Sep-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
RINSATE_08_16092019	16-Sep-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
SW4_16092019	16-Sep-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	0.01	< 0.02	< 0.1	< 0.02
DUP08_16092019	16-Sep-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	0.01	< 0.02	< 0.1	< 0.02
Relative Percentage Difference			NC	NC	NC	NC	0%	NC	NC	NC
SW4_16092019	16-Sep-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	0.01	< 0.02	< 0.1	< 0.02
TRIP08_16092019	16-Sep-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	0.03	< 0.01	< 0.05	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	100%	NC	NC	NC
TRIP BLANK_09_1931069	25-Sep-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
RINSATE_09_1931069	25-Sep-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
TRIPBLANK09_181119	18-Nov-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
RINSATE09_181119	18-Nov-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
SW4_181119	18-Nov-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
DUP09_181119	18-Nov-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC
SW4_181119	18-Nov-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
TRIP09_18112019	18-Nov-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC
TRIPBLANK10_171219	17-Dec-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
RINSATE10_171219	17-Dec-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02

Notes:

< - Less than laboratory limit of reporting
NC - Not calculated
µg/L - Micrograms per litre



KLEINFELDER
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[illegible]



KLEINFELDER
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20193820.001A

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
< 0.05	< 0.1
NC	NC
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
< 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
86%	133%
< 0.01	< 0.01
< 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
< 0.01	< 0.01
< 0.01	< 0.01

ATTACHMENT A: LABORATORY REPORTS

CERTIFICATE OF ANALYSIS

Work Order : **ES1941879**
Client : **KLEINFELDER AUSTRALIA PTY LTD**
Contact : **DANIEL KOUSBROEK**
Address : 95 Mitchell Rd
 Cardiff 2285
Telephone : ----
Project : Williamtown SS
Order number : 20193820
C-O-C number : 6900
Sampler : DANIEL KOUSBROEK
Site : Williamtown SS
Quote number : ME/114/19 ALS Compass
No. of samples received : 11
No. of samples analysed : 11

Page : 1 of 19
Laboratory : Environmental Division Sydney
Contact : Shirley LeCornu
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +6138549 9630
Date Samples Received : 17-Dec-2019 12:26
Date Analysis Commenced : 18-Dec-2019
Issue Date : 02-Jan-2020 15:46



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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW



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

Ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- EP231X: Positive result for analyte 6:2 Fluorotelomer sulfonic acid (6:2 FTS) on sample ES1941879_006 has been confirmed by re-extraction and re-analysis.
- 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.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Client sample ID

				BH-1	BH-2	BH-4	BH-6	BH-7
Client sampling date / time				17-Dec-2019 12:28	17-Dec-2019 12:09	17-Dec-2019 11:47	17-Dec-2019 13:39	17-Dec-2019 13:57
Compound	CAS Number	LOR	Unit	ES1941879-001	ES1941879-002	ES1941879-004	ES1941879-006	ES1941879-007
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	6.05	5.43	5.44	5.58	5.14
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	118	106	85	207	210
EA016: Calculated TDS (from Electrical Conductivity)								
Total Dissolved Solids (Calc.)	----	1	mg/L	77	69	55	134	136
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	8	13	7	21	20
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	15	2	3	5	2
Total Alkalinity as CaCO3	----	1	mg/L	15	2	3	5	2
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	5	8	6	16	15
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	23	17	16	42	44
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	<1	2	1	2	<1
Magnesium	7439-95-4	1	mg/L	2	2	1	4	5
Sodium	7440-23-5	1	mg/L	14	13	9	26	26
Potassium	7440-09-7	1	mg/L	<1	<1	1	1	1
EG005(ED093)F: Dissolved Metals by ICP-AES								
Iron	7439-89-6	0.05	mg/L	8.48	0.10	<0.05	1.78	0.98
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.06	0.05	0.06
Barium	7440-39-3	0.001	mg/L	0.002	0.004	0.012	0.026	0.009
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	0.001
Chromium	7440-47-3	0.001	mg/L	0.003	0.002	0.001	0.001	0.002
Copper	7440-50-8	0.001	mg/L	0.001	0.006	0.008	0.003	<0.001
Manganese	7439-96-5	0.001	mg/L	0.009	0.012	0.014	0.007	0.011
Nickel	7440-02-0	0.001	mg/L	<0.001	0.001	<0.001	0.001	0.003



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Client sample ID

				BH-1	BH-2	BH-4	BH-6	BH-7
Client sampling date / time				17-Dec-2019 12:28	17-Dec-2019 12:09	17-Dec-2019 11:47	17-Dec-2019 13:39	17-Dec-2019 13:57
Compound	CAS Number	LOR	Unit	ES1941879-001	ES1941879-002	ES1941879-004	ES1941879-006	ES1941879-007
				Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued								
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L	0.028	0.006	0.005	0.006	0.007
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
EN055: Ionic Balance								
∅ Total Anions	----	0.01	meq/L	1.05	0.69	0.64	1.62	1.59
∅ Total Cations	----	0.01	meq/L	0.77	0.83	0.55	1.58	1.57
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup								
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	<50	<50
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	<100	<100	<100	<100
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	<20
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	<20	<20
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L	<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	<2	<2

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH-1	BH-2	BH-4	BH-6	BH-7
Client sampling date / time				17-Dec-2019 12:28	17-Dec-2019 12:09	17-Dec-2019 11:47	17-Dec-2019 13:39	17-Dec-2019 13:57	
Compound	CAS Number	LOR	Unit	ES1941879-001	ES1941879-002	ES1941879-004	ES1941879-006	ES1941879-007	
				Result	Result	Result	Result	Result	
EP080: BTEXN - Continued									
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	<2	
^ Total Xylenes	----	2	µg/L	<2	<2	<2	<2	<2	
^ Sum of BTEX	----	1	µg/L	<1	<1	<1	<1	<1	
Naphthalene	91-20-3	5	µg/L	<5	<5	<5	<5	<5	
EP231A: Perfluoroalkyl Sulfonic Acids									
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	
EP231B: Perfluoroalkyl Carboxylic Acids									
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	
EP231C: Perfluoroalkyl Sulfonamides									

Sub-Matrix: **GROUNDWATER**
(Matrix: **WATER**)

Client sampling date / time

EP231S: PFAS Surrogate



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Client sample ID

				BH-1	BH-2	BH-4	BH-6	BH-7
Client sampling date / time				17-Dec-2019 12:28	17-Dec-2019 12:09	17-Dec-2019 11:47	17-Dec-2019 13:39	17-Dec-2019 13:57
Compound	CAS Number	LOR	Unit	ES1941879-001	ES1941879-002	ES1941879-004	ES1941879-006	ES1941879-007
				Result	Result	Result	Result	Result
EP231S: PFAS Surrogate - Continued								
13C4-PFOS	----	0.02	%	----	----	96.2	106	104
13C8-PFOA	----	0.02	%	----	----	99.9	116	103



Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH-8	MW239S	BH-11	----	----
Client sampling date / time					17-Dec-2019 14:15	17-Dec-2019 13:18	17-Dec-2019 12:56	----	----
Compound	CAS Number	LOR	Unit		ES1941879-008	ES1941879-010	ES1941879-011	-----	-----
					Result	Result	Result	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		5.02	5.01	5.03	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		328	439	196	----	----
EA016: Calculated TDS (from Electrical Conductivity)									
Total Dissolved Solids (Calc.)	----	1	mg/L		213	285	127	----	----
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		16	33	16	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		2	2	2	----	----
Total Alkalinity as CaCO3	----	1	mg/L		2	2	2	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		10	6	<1	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		75	127	48	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		<1	<1	<1	----	----
Magnesium	7439-95-4	1	mg/L		4	8	4	----	----
Sodium	7440-23-5	1	mg/L		50	65	26	----	----
Potassium	7440-09-7	1	mg/L		<1	<1	<1	----	----
EG005(ED093)F: Dissolved Metals by ICP-AES									
Iron	7439-89-6	0.05	mg/L		3.02	1.33	1.00	----	----
EG020F: Dissolved Metals by ICP-MS									
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	0.06	----	----
Barium	7440-39-3	0.001	mg/L		0.007	0.008	0.004	----	----
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	0.003	0.002	----	----
Copper	7440-50-8	0.001	mg/L		0.003	0.001	0.002	----	----
Manganese	7439-96-5	0.001	mg/L		0.011	0.003	0.008	----	----
Nickel	7440-02-0	0.001	mg/L		0.002	0.002	0.001	----	----



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Client sample ID

				BH-8	MW239S	BH-11	----	----
Client sampling date / time				17-Dec-2019 14:15	17-Dec-2019 13:18	17-Dec-2019 12:56	----	----
Compound	CAS Number	LOR	Unit	ES1941879-008	ES1941879-010	ES1941879-011	-----	-----
				Result	Result	Result	----	----
EG020F: Dissolved Metals by ICP-MS - Continued								
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	0.007	<0.005	0.006	----	----
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	<0.1	----	----
EN055: Ionic Balance								
∅ Total Anions	----	0.01	meq/L	2.36	3.75	1.39	----	----
∅ Total Cations	----	0.01	meq/L	2.50	3.48	1.46	----	----
∅ Ionic Balance	----	0.01	%	----	3.62	----	----	----
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup								
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	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	----	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
>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	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	----	----
EP080: BTEXN								
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	----	----

Sub-Matrix: **GROUNDWATER**
(Matrix: **WATER**)

Client sampling date / time

EP080: BTEXN - Continued

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	----	----

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	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	----	----	----	----

Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	----	----	----	----

EP231C: Perfluoroalkyl Sulfonamides

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH-8	MW239S	BH-11	----	----
Client sampling date / time				17-Dec-2019 14:15	17-Dec-2019 13:18	17-Dec-2019 12:56	----	----	
Compound	CAS Number	LOR	Unit	ES1941879-008	ES1941879-010	ES1941879-011	-----	-----	
				Result	Result	Result	----	----	
EP231C: Perfluoroalkyl Sulfonamides - Continued									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	----	----	----	----	
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	----	----	----	----	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	----	----	----	----	
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	----	----	----	----	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	----	----	----	----	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	----	----	----	----	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	----	----	----	----	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
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	----	----	----	----	
EP231P: PFAS Sums									
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	----	----	----	----	
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%	116	117	116	----	----	
Toluene-D8	2037-26-5	2	%	111	110	106	----	----	
4-Bromofluorobenzene	460-00-4	2	%	108	105	100	----	----	
EP231S: PFAS Surrogate									

Page : 12 of 19
 Work Order : ES1941879
 Client : KLEINFELDER AUSTRALIA PTY LTD
 Project : Williamtown SS



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Client sample ID

				BH-8	MW239S	BH-11	----	----
Client sampling date / time				17-Dec-2019 14:15	17-Dec-2019 13:18	17-Dec-2019 12:56	----	----
Compound	CAS Number	LOR	Unit	ES1941879-008	ES1941879-010	ES1941879-011	-----	-----
				Result	Result	Result	----	----
EP231S: PFAS Surrogate - Continued								
13C4-PFOS	----	0.02	%	94.0	----	----	----	----
13C8-PFOA	----	0.02	%	99.2	----	----	----	----



Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Client sample ID	SW3	----	----	----	----
Client sampling date / time					17-Dec-2019 10:17	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1941879-005	-----	-----	-----	-----
				Result	----	----	----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		5.75	----	----	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		301	----	----	----	----
EA016: Calculated TDS (from Electrical Conductivity)									
Total Dissolved Solids (Calc.)	----	1	mg/L		196	----	----	----	----
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		39	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		6	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		6	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		25	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		57	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		4	----	----	----	----
Magnesium	7439-95-4	1	mg/L		7	----	----	----	----
Sodium	7440-23-5	1	mg/L		40	----	----	----	----
Potassium	7440-09-7	1	mg/L		1	----	----	----	----
EG005(ED093)F: Dissolved Metals by ICP-AES									
Iron	7439-89-6	0.05	mg/L		1.42	----	----	----	----
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	----	----	----	----
Boron	7440-42-8	0.05	mg/L		<0.05	----	----	----	----
Barium	7440-39-3	0.001	mg/L		0.041	----	----	----	----
Beryllium	7440-41-7	0.001	mg/L		<0.001	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	----	----	----	----
Cobalt	7440-48-4	0.001	mg/L		<0.001	----	----	----	----
Chromium	7440-47-3	0.001	mg/L		0.002	----	----	----	----
Copper	7440-50-8	0.001	mg/L		0.003	----	----	----	----
Manganese	7439-96-5	0.001	mg/L		0.026	----	----	----	----
Nickel	7440-02-0	0.001	mg/L		0.001	----	----	----	----



Analytical Results

Sub-Matrix: **SURFACE WATER**
 (Matrix: **WATER**)

Client sample ID

				SW3	----	----	----	----
Client sampling date / time				17-Dec-2019 10:17	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1941879-005	-----	-----	-----	-----
Result				----	----	----	----	----
EG020F: Dissolved Metals by ICP-MS - Continued								
Lead	7439-92-1	0.001	mg/L	<0.001	----	----	----	----
Selenium	7782-49-2	0.01	mg/L	<0.01	----	----	----	----
Vanadium	7440-62-2	0.01	mg/L	<0.01	----	----	----	----
Zinc	7440-66-6	0.005	mg/L	<0.005	----	----	----	----
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	----	----	----	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	<0.1	----	----	----	----
EN055: Ionic Balance								
∅ Total Anions	----	0.01	meq/L	2.25	----	----	----	----
∅ Total Cations	----	0.01	meq/L	2.54	----	----	----	----



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Client sample ID

				QW10 Rinsate glove	Trip Blank 10	----	----	----
Client sampling date / time				17-Dec-2019 14:22	17-Dec-2019 14:23	----	----	----
Compound	CAS Number	LOR	Unit	ES1941879-012	ES1941879-013	-----	-----	-----
				Result	Result	----	----	----
EG005(ED093)F: Dissolved Metals by ICP-AES								
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	----	----	----
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	----	----	----
Barium	7440-39-3	0.001	mg/L	<0.001	<0.001	----	----	----
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	----	----	----
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	----	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	----	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	----	----	----
Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	----	----	----
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	----	----	----
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	----	----	----
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	----	----	----
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	----	----	----
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	----	----	----
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup								
C10 - C14 Fraction	----	50	µg/L	<50	<50	----	----	----
C15 - C28 Fraction	----	100	µg/L	<100	<100	----	----	----
C29 - C36 Fraction	----	50	µg/L	<50	<50	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	----	----	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
>C10 - C16 Fraction	----	100	µg/L	<100	<100	----	----	----
>C16 - C34 Fraction	----	100	µg/L	<100	<100	----	----	----
>C34 - C40 Fraction	----	100	µg/L	<100	<100	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100	----	----	----
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	<100	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	QW10 Rinsate glove	Trip Blank 10	----	----	----
Client sampling date / time					17-Dec-2019 14:22	17-Dec-2019 14:23	----	----	----
Compound	CAS Number	LOR	Unit		ES1941879-012	ES1941879-013	-----	-----	-----
				Result	Result		----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	----	----	----
Toluene	108-88-3	2	µg/L		<2	<2	----	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	----	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	----	----	----
^ Total Xylenes	----	2	µg/L		<2	<2	----	----	----
^ Sum of BTEX	----	1	µg/L		<1	<1	----	----	----
Naphthalene	91-20-3	5	µg/L		<5	<5	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	----	----	----



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				QW10 Rinsate glove	Trip Blank 10	----	----	----
Client sampling date / time				17-Dec-2019 14:22	17-Dec-2019 14:23	----	----	----
Compound	CAS Number	LOR	Unit	ES1941879-012	ES1941879-013	-----	-----	-----
				Result	Result	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	----	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	----	----	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-	0.01	µg/L	<0.01	<0.01	----	----	----



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Client sample ID

				QW10	Trip Blank 10			
				Rinsate glove				
Client sampling date / time				17-Dec-2019 14:22	17-Dec-2019 14:23	----	----	----
Compound	CAS Number	LOR	Unit	ES1941879-012	ES1941879-013	-----	-----	-----
				Result	Result	----	----	----
EP231P: PFAS Sums - Continued								
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	2	%	110	113	----	----	----
Toluene-D8	2037-26-5	2	%	95.2	103	----	----	----
4-Bromofluorobenzene	460-00-4	2	%	94.8	98.1	----	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	110	80.1	----	----	----
13C8-PFOA	----	0.02	%	105	85.6	----	----	----



Surrogate Control Limits

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

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

QUALITY CONTROL REPORT

Work Order	: ES1941879	Page	: 1 of 11
Client	: KLEINFELDER AUSTRALIA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Contact	: Shirley LeCornu
Address	: 95 Mitchell Rd Cardiff 2285	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +6138549 9630
Project	: Williamtown SS	Date Samples Received	: 17-Dec-2019
Order number	: 20193820	Date Analysis Commenced	: 18-Dec-2019
C-O-C number	: 6900	Issue Date	: 02-Jan-2020
Sampler	: DANIEL KOUSBROEK		
Site	: Williamtown SS		
Quote number	: ME/114/19 ALS Compass		
No. of samples received	: 11		
No. of samples analysed	: 11		



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 Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW



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

Key :
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 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
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG005(ED093)F: Dissolved Metals by ICP-AES (QC Lot: 2777503)									
ES1941879-013	Trip Blank 10	EG005F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
ES1941879-006	BH-6	EG005F: Iron	7439-89-6	0.05	mg/L	1.78	1.82	2.04	0% - 20%
EA005P: pH by PC Titrator (QC Lot: 2773602)									
ES1941631-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.66	7.67	0.130	0% - 20%
ES1941879-007	BH-7	EA005-P: pH Value	----	0.01	pH Unit	5.14	4.99	2.96	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 2773603)									
ES1941631-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	379	379	0.00	0% - 20%
ES1941879-007	BH-7	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	210	213	1.02	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 2773604)									
ES1941631-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	178	176	0.814	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	178	176	0.814	0% - 20%
ES1941879-007	BH-7	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	2	2	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	2	2	0.00	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2780396)									
ES1940975-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2450	2410	1.34	0% - 20%
ES1941806-006	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2	2	0.00	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2780398)									
ES1942356-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	13500	14000	3.58	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 2780397)									
ES1940975-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	3740	3760	0.306	0% - 20%

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ED045G: Chloride by Discrete Analyser (QC Lot: 2780397) - continued									
ES1941806-006	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	14	14	0.00	0% - 50%
ED093F: Dissolved Major Cations (QC Lot: 2777502)									
ES1941796-002	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	134	135	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	195	197	0.923	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	430	436	1.28	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	12	12	0.00	0% - 50%
ES1941879-006	BH-6	ED093F: Calcium	7440-70-2	1	mg/L	2	2	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	4	4	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	26	27	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	1	1	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2777500)									
ES1941796-002	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	0.0002	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.023	0.023	0.00	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.006	0.005	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.906	0.927	2.25	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.015	0.015	0.00	0% - 50%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.013	<0.005	89.6	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.17	0.16	0.00	No Limit
ES1941879-006	BH-6	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.026	0.026	0.00	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.007	0.007	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.006	0.006	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.05	0.06	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 2777499)									



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG035F: Dissolved Mercury by FIMS (QC Lot: 2777499) - continued									
ES1941796-002	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES1941879-006	BH-6	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 2773601)									
ES1941631-001	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.1	<0.1	0.00	No Limit
ES1941879-007	BH-7	EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2776755)									
ES1941879-001	BH-1	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
ES1941879-011	BH-11	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2776755)									
ES1941879-001	BH-1	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES1941879-011	BH-11	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 2776755)									
ES1941879-001	BH-1	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.00	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
ES1941879-011	BH-11	EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
		EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.00	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 2786563)									
EM1921659-001	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.03	0.03	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.03	0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.05	0.05	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP1913504-001	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.03	0.03	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2786563)									
EM1921659-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.10	0.09	11.8	0% - 50%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.05	0.05	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.16	0.14	16.1	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.07	0.06	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP1913504-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2786563)									
EM1921659-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP1913504-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2786563) - continued									
EP1913504-001	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2786563)									
EM1921659-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP1913504-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 2786563)									
EM1921659-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.49	0.44	10.8	0% - 20%
EP1913504-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.03	0.03	0.00	No Limit



Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result		LCS	Low	High
EG005(ED093)F: Dissolved Metals by ICP-AES (QCLot: 2777503)								
EG005F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	108	82.0	114
EA005P: pH by PC Titrator (QCLot: 2773602)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98.0	102
				----	7 pH Unit	99.7	98.0	102
EA010P: Conductivity by PC Titrator (QCLot: 2773603)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2100 µS/cm	108	95.0	113
ED037P: Alkalinity by PC Titrator (QCLot: 2773604)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	83.4	81.0	111
				----	50 mg/L	96.2	70.0	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2780396)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	98.5	82.0	122
				<1	500 mg/L	96.2	82.0	122
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2780398)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	96.5	82.0	122
				<1	500 mg/L	97.2	82.0	122
ED045G: Chloride by Discrete Analyser (QCLot: 2780397)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	102	80.9	127
				<1	1000 mg/L	96.9	80.9	127
ED093F: Dissolved Major Cations (QCLot: 2777502)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	106	80.0	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	108	90.0	116
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	101	82.0	120
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	98.2	85.0	113
EG020F: Dissolved Metals by ICP-MS (QCLot: 2777500)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	96.6	85.0	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	92.6	85.0	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	95.7	82.0	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	94.5	84.0	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	93.7	85.0	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	91.4	82.0	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	91.3	81.0	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	91.4	83.0	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	94.0	82.0	110

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EG020F: Dissolved Metals by ICP-MS (QCLot: 2777500) - continued								
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	91.5	82.0	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	87.7	85.0	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	95.1	83.0	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	87.5	81.0	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	103	85.0	115
EG035F: Dissolved Mercury by FIMS (QCLot: 2777499)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	104	83.0	105
EK040P: Fluoride by PC Titrator (QCLot: 2773601)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	105	82.0	116
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QCLot: 2772290)								
EP071SG: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	58.3	55.8	112
EP071SG: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	89.0	71.6	113
EP071SG: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	71.9	56.0	121
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 2772290)								
EP071SG: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	64.1	57.9	119
EP071SG: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	75.8	62.5	110
EP071SG: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	81.8	61.5	121
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2776755)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	94.8	75.0	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2776755)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	97.6	75.0	127
EP080: BTEXN (QCLot: 2776755)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	94.6	70.0	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	93.0	69.0	123
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	94.1	70.0	120
EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	10 µg/L	92.9	69.0	121
	106-42-3							
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	95.9	72.0	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	96.6	70.0	120
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2786563)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	80.0	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	94.2	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	88.0	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	93.4	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	81.2	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	91.2	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2786563)								



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) LowHigh	
Method: Compound	CAS Number	LOR	Unit	Result				
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2786563) - continued								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	88.7	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	97.8	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	91.0	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	100	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	81.6	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	95.0	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	93.8	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	91.6	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	84.8	72.0	134
EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	79.0	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	75.1	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2786563)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	96.2	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	90.8	70.0	130
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	87.0	70.0	130
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	97.8	70.0	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	87.9	70.0	130
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	99.6	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	88.8	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2786563)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	102	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	83.4	67.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	98.8	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	110	70.0	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	Spike Recovery (%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2780396)							
ES1940975-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	# Not Determined	70.0	130

Page : 10 of 11
 Work Order : ES1941879
 Client : KLEINFELDER AUSTRALIA PTY LTD
 Project : Williamtown SS



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2780398)							
ES1942356-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 2780397)							
ES1940975-001	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	# Not Determined	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2777500)							
ES1941796-002	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	109	70.0	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	95.2	70.0	130
		EG020A-F: Barium	7440-39-3	1 mg/L	100	70.0	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	104	70.0	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	90.3	70.0	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	94.0	70.0	130
		EG020A-F: Copper	7440-50-8	1 mg/L	91.3	70.0	130
		EG020A-F: Lead	7439-92-1	1 mg/L	83.2	70.0	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	83.2	70.0	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	100	70.0	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	93.3	70.0	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	102	70.0	130
EG035F: Dissolved Mercury by FIMS (QCLot: 2777499)							
ES1941796-001	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	78.1	70.0	130
EK040P: Fluoride by PC Titrator (QCLot: 2773601)							
ES1941481-029	Anonymous	EK040P: Fluoride	16984-48-8	5 mg/L	98.8	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2776755)							
ES1941879-001	BH-1	EP080: C6 - C9 Fraction	----	325 µg/L	92.7	70.0	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2776755)							
ES1941879-001	BH-1	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	96.2	70.0	130
EP080: BTEXN (QCLot: 2776755)							
ES1941879-001	BH-1	EP080: Benzene	71-43-2	25 µg/L	81.7	70.0	130
		EP080: Toluene	108-88-3	25 µg/L	94.8	70.0	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	103	70.0	130
		EP080: meta- & para-Xylene	108-38-3	25 µg/L	102	70.0	130
			106-42-3				
		EP080: ortho-Xylene	95-47-6	25 µg/L	105	70.0	130
		EP080: Naphthalene	91-20-3	25 µg/L	105	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2786563)							
EM1921659-002	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	79.2	50.0	130



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2786563) - continued							
EM1921659-002	Anonymous	EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	100	50.0	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	91.2	50.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	105	50.0	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	85.6	50.0	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	99.2	50.0	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2786563)							
EM1921659-002	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	98.0	50.0	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	106	50.0	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	100	50.0	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	114	50.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	86.6	50.0	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	103	50.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	108	50.0	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	105	50.0	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	91.2	50.0	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	83.4	50.0	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	86.5	50.0	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2786563)							
EM1921659-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	103	50.0	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	94.3	50.0	150
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	97.6	50.0	150
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	85.9	50.0	150
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	105	50.0	150
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	105	50.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	88.4	50.0	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2786563)							
EM1921659-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	95.2	50.0	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	96.6	50.0	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	89.2	50.0	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	109	50.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES1941879	Page	: 1 of 10
Client	: KLEINFELDER AUSTRALIA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Telephone	: +6138549 9630
Project	: Williamtown SS	Date Samples Received	: 17-Dec-2019
Site	: Williamtown SS	Issue Date	: 02-Jan-2020
Sampler	: DANIEL KOUSBROEK	No. of samples received	: 11
Order number	: 20193820	No. of samples analysed	: 11

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers exist - please see following pages for full details.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO ₄ 2- by DA	ES1940975--001	Anonymous	Sulfate as SO ₄ - Turbidimetric	14808-79-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
ED041G: Sulfate (Turbidimetric) as SO ₄ 2- by DA	ES1942356--001	Anonymous	Sulfate as SO ₄ - Turbidimetric	14808-79-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
ED045G: Chloride by Discrete Analyser	ES1940975--001	Anonymous	Chloride	16887-00-6	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method		Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
BH-1, BH-4, BH-6, BH-8, BH-11	BH-2, SW3, BH-7, MW239S,	----	----	----	18-Dec-2019	17-Dec-2019	1

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	0	10	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Dissolved Metals by ICP-AES	0	11	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	0	10	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for **VOC in soils** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P)							
BH-1, BH-4, BH-6, BH-8, BH-11	BH-2, SW3, BH-7, MW239S,	17-Dec-2019	----	----	----	18-Dec-2019	17-Dec-2019
							✗
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P)							
BH-1, BH-4, BH-6, BH-8, BH-11	BH-2, SW3, BH-7, MW239S,	17-Dec-2019	----	----	----	18-Dec-2019	14-Jan-2020
							✓
EA065: Total Hardness as CaCO3							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)							
BH-1, BH-4, BH-6, BH-8, BH-11	BH-2, SW3, BH-7, MW239S,	17-Dec-2019	----	----	----	20-Dec-2019	14-Jan-2020
							✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
BH-1, BH-4, BH-6, BH-8, BH-11	BH-2, SW3, BH-7, MW239S,	17-Dec-2019	----	----	----	18-Dec-2019	31-Dec-2019
							✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
BH-1, BH-4, BH-6, BH-8, BH-11	BH-2, SW3, BH-7, MW239S,	17-Dec-2019	----	----	----	21-Dec-2019	14-Jan-2020
							✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
BH-1, BH-4, BH-6, BH-8, BH-11	BH-2, SW3, BH-7, MW239S,	17-Dec-2019	----	----	----	21-Dec-2019	14-Jan-2020
							✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)		17-Dec-2019	----	----	----	20-Dec-2019	14-Jan-2020	✓
BH-1, BH-4, BH-6, BH-8, BH-11	BH-2, SW3, BH-7, MW239S,							
EG005(ED093)F: Dissolved Metals by ICP-AES								
Clear Plastic Bottle - Nitric Acid; Filtered (EG005F)		17-Dec-2019	----	----	----	20-Dec-2019	14-Jun-2020	✓
BH-1, BH-4, BH-6, BH-8, BH-11, Trip Blank 10	BH-2, SW3, BH-7, MW239S, QW10 - Rinsate glove,							
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)		17-Dec-2019	----	----	----	20-Dec-2019	14-Jun-2020	✓
BH-1, BH-4, BH-6, BH-8, BH-11, Trip Blank 10	BH-2, SW3, BH-7, MW239S, QW10 - Rinsate glove,							
EG035F: Dissolved Mercury by FIMS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)		17-Dec-2019	----	----	----	21-Dec-2019	14-Jan-2020	✓
BH-1, BH-4, BH-6, BH-8, BH-11, Trip Blank 10	BH-2, SW3, BH-7, MW239S, QW10 - Rinsate glove,							
EK040P: Fluoride by PC Titrator								
Clear Plastic Bottle - Natural (EK040P)		17-Dec-2019	----	----	----	18-Dec-2019	14-Jan-2020	✓
BH-1, BH-4, BH-6, BH-8, BH-11	BH-2, SW3, BH-7, MW239S,							



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup								
Amber Glass Bottle - Unpreserved (EP071SG)		17-Dec-2019	19-Dec-2019	24-Dec-2019	✓	23-Dec-2019	28-Jan-2020	✓
BH-1, BH-4, BH-7, MW239S, QW10 - Rinsate glove,	BH-2, BH-6, BH-8, BH-11, Trip Blank 10							
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
Amber Glass Bottle - Unpreserved (EP071SG)		17-Dec-2019	19-Dec-2019	24-Dec-2019	✓	23-Dec-2019	28-Jan-2020	✓
BH-1, BH-4, BH-7, MW239S, QW10 - Rinsate glove,	BH-2, BH-6, BH-8, BH-11, Trip Blank 10							
EP080/071: Total Petroleum Hydrocarbons								
Amber VOC Vial - Sulfuric Acid (EP080)		17-Dec-2019	21-Dec-2019	31-Dec-2019	✓	21-Dec-2019	31-Dec-2019	✓
BH-1, BH-4, BH-7, MW239S, QW10 - Rinsate glove,	BH-2, BH-6, BH-8, BH-11, Trip Blank 10							
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Amber VOC Vial - Sulfuric Acid (EP080)		17-Dec-2019	21-Dec-2019	31-Dec-2019	✓	21-Dec-2019	31-Dec-2019	✓
BH-1, BH-4, BH-7, MW239S, QW10 - Rinsate glove,	BH-2, BH-6, BH-8, BH-11, Trip Blank 10							
EP080: BTEXN								
Amber VOC Vial - Sulfuric Acid (EP080)		17-Dec-2019	21-Dec-2019	31-Dec-2019	✓	21-Dec-2019	31-Dec-2019	✓
BH-1, BH-4, BH-7, MW239S, QW10 - Rinsate glove,	BH-2, BH-6, BH-8, BH-11, Trip Blank 10							
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X)		17-Dec-2019	30-Dec-2019	14-Jun-2020	✓	30-Dec-2019	14-Jun-2020	✓
BH-4, BH-7, QW10 - Rinsate glove,	BH-6, BH-8, Trip Blank 10							

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X)		17-Dec-2019	30-Dec-2019	14-Jun-2020	✓	30-Dec-2019	14-Jun-2020	✓
BH-4,	BH-6,							
BH-7,	BH-8,							
QW10 - Rinsate glove,	Trip Blank 10							
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X)		17-Dec-2019	30-Dec-2019	14-Jun-2020	✓	30-Dec-2019	14-Jun-2020	✓
BH-4,	BH-6,							
BH-7,	BH-8,							
QW10 - Rinsate glove,	Trip Blank 10							
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X)		17-Dec-2019	30-Dec-2019	14-Jun-2020	✓	30-Dec-2019	14-Jun-2020	✓
BH-4,	BH-6,							
BH-7,	BH-8,							
QW10 - Rinsate glove,	Trip Blank 10							
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X)		17-Dec-2019	30-Dec-2019	14-Jun-2020	✓	30-Dec-2019	14-Jun-2020	✓
BH-4,	BH-6,							
BH-7,	BH-8,							
QW10 - Rinsate glove,	Trip Blank 10							



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)		Quality Control Specification	
Analytical Methods	Method	QC	Regular	Actual	Expected		Evaluation
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-AES	EG005F	2	11	18.18	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	3	27	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	0	10	0.00	10.00	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-AES	EG005F	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	27	14.81	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chloride by Discrete Analyser	ED045G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-AES	EG005F	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Method Blanks (MB) - Continued							
Major Cations - Dissolved	ED093F	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	27	7.41	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	1	10	10.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-AES	EG005F	0	11	0.00	5.00	✖	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	27	7.41	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	0	10	0.00	5.00	✖	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Calculated TDS (from Electrical Conductivity)	EA016	WATER	In house: Calculation from Electrical Conductivity (APHA 2510 B) using a conversion factor specified in the analytical report. This method is compliant with NEPM (2013) Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3)
Sulfate (Turbidimetric) as SO ₄ 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO ₄ . Dissolved sulfate is determined in a 0.45µm filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO ₄ suspension is measured by a photometer and the SO ₄ -2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM (2013) Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (2013) Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals by ICP-AES	EG005F	WATER	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. The ICPAES technique ionises the 0.45µm filtered samples, emitting a characteristic spectrum which is compared against matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.



Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Fluoride by PC Titrator	EK040P	WATER	In house: Referenced to APHA 4500-F C: CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (2013) Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	WATER	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C36. This method is compliant with NEPM (2013) Schedule B(3) (Method 506.1)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

CHAIN OF CUSTODY

ALS COC# 6900 ALS Laboratory ES Sydney

CLIENT: ALLENVENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: Williamtown SS

ORDER NO: 20193620

PROJECT MANAGER: Dkousbroek Dkousbroek

PRIMARY SAMPLER: Dkousbroek Dkousbroek

CONTACT PH: 0458 197 676 SAMPLER MOBILE: 0458 197 676

QUOTE NO: ME/114/19 / EM2019ALLENVENG0010

EMAIL REPORTS TO: dkousbroek@kleinfelder.com, toverton@kleinfelder.com

EMAIL INVOICES TO: dkousbroek@kleinfelder.com

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME: 17/12/19 1930

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

LABORATORY USE ONLY (Circle)

Custody Seal Intact?

Freeze / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

Yes No N/A

Yes No N/A

2.6 °C

SAMPLE DETAILS

ANALYSIS REQUIRED

SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Dissolved Iron Only from Analytes) WATER	EP231X PFAS - Full Suite (28 pH) WATER	NT-12 General Water Suite (incl W-03 NEPM 15 Metals (dissolved) WATER	Silica Gel Clean Up WATER	W-04 SG TRH/BTEXN incl	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	BH-1		17/12/2019 12:28 PM	Water	ALS: 5 Non ALS: 0	No	X		X	X	X		
002	BH-2		17/12/2019 12:09 PM	Water	ALS: 5 Non ALS: 0	No	X		X	X	X		
003	SW1	Dry		Water	ALS: 0 Non ALS: 0	No	X		X	X	X		
004	BH-4		17/12/2019 11:47 AM	Water	ALS: 6 Non ALS: 0	No	X		X	X	X		
005	SW3		17/12/2019 10:17 AM	Water	ALS: 5 Non ALS: 0	No	X		X	X	X		
006	BH-6		17/12/2019 01:39 PM	Water	ALS: 6 Non ALS: 0	No	X		X	X	X		
007	BH-7		17/12/2019 01:57 PM	Water	ALS: 6 Non ALS: 0	No	X		X	X	X		
008	BH-8		17/12/2019 02:15 PM	Water	ALS: 6 Non ALS: 0	No	X		X	X	X		
009	SW4	Dry		Water	ALS: 0 Non ALS: 0	No	X		X	X	X		

Environmental Division
Sydney
Work Order Reference
ES1941879



Telephone : + 61 2 8794 8565

RELINQUISHED BY:

RECEIVED BY:
DATE TIME: 17/12/19 1430

RELINQUISHED BY:

RECEIVED BY:
DATE TIME:

CLIENT: ALLENVENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: Williamtown SS

ORDER NO: 20193820

PROJECT MANAGER: Dkousbroek Dkousbroek

PRIMARY SAMPLER: Dkousbroek Dkousbroek

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EMAIL INVOICES TO: dkousbroek@kleinfelder.com

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

CONTACT PH: 0458 197 676 SAMPLER MOBILE: 0458 197 676

QUOTE NO: ME/114/19 / EM2019ALLENVENG0

010

LABORATORY USE ONLY (Circle)
Custody Seal intact? Yes No N/A
Free ice / frozen ice bricks present upon receipt? Yes No N/A
Random Sample Temperature on Receipt: 26.0
Other comments:

SAMPLE DETAILS

ANALYSIS REQUIRED

SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Analysis	Analysis	Analysis	Analysis	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	MMW238S		17/12/2019 01:18 PM	Water	ALS: 5 Non ALS: 0	No	X		X	X		
011	BH-11		17/12/2019 12:56 PM	Water	ALS: 5 Non ALS: 0	No	X		X	X		
012	GW10	Rinsale glove	17/12/2019 02:22 PM	Water	ALS: 4 Non ALS: 0	No	X		X	X		
013	Trip Blank 10		17/12/2019 02:23 PM	Water	ALS: 4 Non ALS: 0	No	X		X	X		

CLIENT: ALLENVENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: Williamtown SS

ORDER NO: 20193820

PROJECT MANAGER: Dkousbroek Dkousbroek

PRIMARY SAMPLER: Dkousbroek Dkousbroek

EMAIL REPORTS TO: dkousbroek@kleinfelder.com, toverton@kleinfelder.com

EMAIL INVOICES TO: dkousbroek@kleinfelder.com

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

DATE TIME:

DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custom Seal Intact?

Free ice/ frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt

Other comments:

Other comments:

2.6 °C

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	BH-1	Clear Plastic Bottle - Natural	500 mL	00070519076917	Green	No	
001	BH-1	Amber VOC Vial - Sulfuric Acid	40 mL	00160719043102	Purple	No	
001	BH-1	Amber Glass Bottle - Unpreserved	100 mL	00400719051308	Orange	No	
001	BH-1	Amber VOC Vial - Sulfuric Acid	40 mL	00160719056628	Purple	No	
001	BH-1	Clear Plastic Bottle - Nitric Acid, Filtered	60 mL	00120219051061	Red	Yes	
002	BH-2	Clear Plastic Bottle - Natural	500 mL	00070519076918	Green	No	
002	BH-2	Clear Plastic Bottle - Nitric Acid, Filtered	60 mL	00120219056672	Red	Yes	
002	BH-2	Amber Glass Bottle - Unpreserved	100 mL	00400719051256	Orange	No	
002	BH-2	Amber VOC Vial - Sulfuric Acid	40 mL	00160719056832	Purple	No	
002	BH-2	Amber VOC Vial - Sulfuric Acid	40 mL	00160719056513	Purple	No	
004	BH-4	Clear Plastic Bottle - Natural	500 mL	00070519076944	Green	No	
004	BH-4	Amber Glass Bottle - Unpreserved	100 mL	00400719028807	Orange	No	
004	BH-4	Clear Plastic Bottle - Nitric Acid, Filtered	60 mL	00120219056648	Red	Yes	
004	BH-4	HDPE (no PTFE)	60 mL	00350719008145	Gray	No	
004	BH-4	Amber VOC Vial - Sulfuric Acid	40 mL	00160719043095	Purple	No	
004	BH-4	Amber VOC Vial - Sulfuric Acid	40 mL	00160719043098	Purple	No	
005	SW3	Clear Plastic Bottle - Natural	500 mL	00070519076930	Green	No	
005	SW3	Amber VOC Vial - Sulfuric Acid	40 mL	00160719028931	Purple	No	
005	SW3	Amber VOC Vial - Sulfuric Acid	40 mL	00160719028966	Purple	No	
005	SW3	Amber Glass Bottle - Unpreserved	100 mL	00400719051245	Orange	No	
005	SW3	Clear Plastic Bottle - Nitric Acid, Filtered	60 mL	00120219056649	Red	Yes	
006	BH-6	Amber VOC Vial - Sulfuric Acid	40 mL	00160219063761	Purple	No	
006	BH-6	Amber VOC Vial - Sulfuric Acid	40 mL	00160219063728	Purple	No	
006	BH-6	HDPE (no PTFE)	60 mL	00350719008135	Gray	No	
006	BH-6	Amber Glass Bottle - Unpreserved	100 mL	00400219022939	Orange	No	
006	BH-6	Clear Plastic Bottle - Nitric Acid, Filtered	60 mL	00120219056683	Red	Yes	

**CHAIN OF CUSTODY**

COC#: 6900

ALS Laboratory: ES Sydney

CLIENT: ALLENVENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: Williamtown SS

ORDER NO: 20193820

PROJECT MANAGER: Dkousbroek Dkousbroek
PRIMARY SAMPLER: Dkousbroek DkousbroekCONTACT PH: 0458 197 676
QUOTE NO: ME/14/19
SAMPLER MOBILE: 0458 197 676
/ EM2019ALLENVENG0
010

EMAIL REPORTS TO: dkousbroek@kleinfelder.com, toverton@kleinfelder.com

EMAIL INVOICES TO: dkousbroek@kleinfelder.com

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

DATE TIME:

DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal Intact?

Free ice frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

Yes No N/A

Yes No N/A

2.5 °C

006	BH-6	Clear Plastic Bottle - Natural	500 mL	00070519076918	Green	No	
007	BH-7	Clear Plastic Bottle - Nitric Acid, Filtered	60 mL	00120219056660	Red	Yes	
007	BH-7	Amber VOC Vial - Sulfuric Acid	40 mL	00160719043163	Purple	No	
007	BH-7	Amber VOC Vial - Sulfuric Acid	40 mL	00160719043158	Purple	No	
007	BH-7	Clear Plastic Bottle - Natural	500 mL	00070519076946	Green	No	
007	BH-7	Amber Glass Bottle - Unpreserved	100 mL	00400719051289	Orange	No	
007	BH-7	HDPE (no PTFE)	60 mL	00350719008431	Grey	No	
008	BH-8	Clear Plastic Bottle - Nitric Acid, Filtered	60 mL	00120219056601	Red	Yes	
008	BH-8	Clear Plastic Bottle - Natural	500 mL	00070519076940	Green	No	
008	BH-8	HDPE (no PTFE)	60 mL	00350719008291	Grey	No	
008	BH-8	Amber VOC Vial - Sulfuric Acid	40 mL	00160719064072	Purple	No	
008	BH-8	Amber VOC Vial - Sulfuric Acid	40 mL	00160719064808	Purple	No	
008	BH-8	Amber Glass Bottle - Unpreserved	100 mL	00400719051330	Orange	No	
010	MMW238S	Amber Glass Bottle - Unpreserved	100 mL	00400219022866	Orange	No	
010	MMW238S	Amber VOC Vial - Sulfuric Acid	40 mL	00160719028804	Purple	No	
010	MMW238S	Amber VOC Vial - Sulfuric Acid	40 mL	00160719028948	Purple	No	
010	MMW238S	Clear Plastic Bottle - Natural	500 mL	00070519076942	Green	No	
010	MMW238S	Clear Plastic Bottle - Nitric Acid, Filtered	60 mL	00120219056585	Red	Yes	
011	BH-11	Clear Plastic Bottle - Natural	500 mL	00070519076927	Green	No	
011	BH-11	Amber Glass Bottle - Unpreserved	100 mL	00400219022892	Orange	No	
011	BH-11	Amber VOC Vial - Sulfuric Acid	40 mL	00160219063581	Purple	No	
011	BH-11	Clear Plastic Bottle - Nitric Acid, Filtered	60 mL	00120219056632	Red	Yes	
011	BH-11	Amber VOC Vial - Sulfuric Acid	40 mL	00160219063683	Purple	No	
012	QW10	Amber VOC Vial - Sulfuric Acid	40 mL	00160719028871	Purple	No	
012	QW10	HDPE (no PTFE)	60 mL	00350719008314	Grey	No	
012	QW10	Amber Glass Bottle - Unpreserved	100 mL	00400219023026	Orange	No	
012	QW10	Clear Plastic Bottle - Nitric Acid, Filtered	60 mL	00120219056577	Red	Yes	

CHAIN OF CUSTODY
ALS COC#: 6900 AL3 Laboratory: ES Sydney

CLIENT: ALLENVENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: Williamtown SS

ORDER NO: 20193620

PROJECT MANAGER: Dkousbroek Dkousbroek
PRIMARY SAMPLER: Dkousbroek Dkousbroek

CONTACT PH: 0458 197 676
QUOTE NO: ME/14/19

SAMPLER MOBILE: 0458 197 676
/ EM2019ALLENVENG0
010

EMAIL REPORTS TO: dkousbroek@kleinfelder.com, toverton@kleinfelder.com

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RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

DATE TIME:

DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Free ice / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

26 °C

Other comments:

013	Trip Blank 10	HOPE (no PTFE)	60 mL	00360719009097	Grey	No	
013	Trip Blank 10	Clear Plastic Bottle - Nitric Acid Filled	60 mL	00120219056562	Red	Yes	
013	Trip Blank 10	Amber VOC Vial - Sulfuric Acid	40 mL	00160719084797	Purple	No	
013	Trip Blank 10	Amber Glass Bottle - Unpreserved	100 mL	00400219022808	Orange	No	

Total Bottle Count: ALS: 57, Non ALS: 0

CLIENT: ALLENVENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: Williamtown SS

ORDER NO: 20193820

PROJECT MANAGER: Dikousbroek Dikousbroek

PRIMARY SAMPLER: Dikousbroek Dikousbroek

EMAIL REPORTS TO: dikousbroek@kleinfelder.com, toverton@kleinfelder.com

EMAIL INVOICES TO: dikousbroek@kleinfelder.com

RELINQUISHED BY:

DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

RELINQUISHED BY:

DATE TIME:

RECEIVED BY:

DATE TIME:

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Freeze / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

Yes No N/A

Yes No N/A

2.6 °C

SAMPLE DETAILS

ANALYSIS REQUIRED

SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Disolved Iron Only Iron (Dissolved) WATER	EP231X PFAS - Full Suite (28 Analytes) WATER	NT-12 General Water Suite (incl pH) WATER	W-03 NEPM 15 Metals (dissolved) WATER	W-04 SG TRH/BTEXN Incl. Silica Gel Clean Up WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	BH-1		17/12/2019 12:28 PM	Water	ALS: 5 Non ALS: 0	No	X		X	X	X		
002	BH-2		17/12/2019 12:08 PM	Water	ALS: 5 Non ALS: 0	No	X		X	X	X		
003	SW1	Dry		Water	ALS: 0 Non ALS: 0	No	X		X	X	X		
004	BH-4		17/12/2019 11:47 AM	Water	ALS: 6 Non ALS: 0	No	X	X	X	X	X		
005	SW3		17/12/2019 10:17 AM	Water	ALS: 5 Non ALS: 0	No	X		X	X			
006	BH-6		17/12/2019 01:39 PM	Water	ALS: 6 Non ALS: 0	No	X	X	X	X	X		
007	BH-7		17/12/2019 01:57 PM	Water	ALS: 6 Non ALS: 0	No	X	X	X	X	X		
008	BH-8		17/12/2019 02:15 PM	Water	ALS: 6 Non ALS: 0	No	X	X	X	X	X		
009	SW4	Dry		Water	ALS: 0 Non ALS: 0	No	X		X	X	X		

Environmental Division
Sydney
Work Order Reference
ES1941879



Telephone : + 61-2-8764 8555

CLIENT: ALLENVENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: Williamtown SS

ORDER NO: 20193820

PROJECT MANAGER: Dkousbroek Dkousbroek

PRIMARY SAMPLER: Dkousbroek Dkousbroek

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RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

DATE TIME:

DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Yes

No

N/A

Free ice / frozen ice bricks present upon receipt?

Yes

No

N/A

Random Sample Temperature on Receipt:

25 °C

Other comments:

SAMPLE DETAILS

ANALYSIS REQUIRED

SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Disolved from Only Iron (Dissolved) WATER	EP231X PFAS - Full Suite (28 Analytes) WATER	NT-12 General Water Suite (incl pH) WATER	W-03 NEPM 15 Metals (dissolved) WATER	W-04 SG TRH/TEXN Incl Silica Gel Clean Up WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	MMW239S		17/12/2019 01:18 PM	Water	ALS: 5 Non ALS: 0	No	X		X	X	X		
011	BH-11		17/12/2019 12:56 PM	Water	ALS: 5 Non ALS: 0	No	X		X	X	X		
012	QW10	Rinsate glove	17/12/2019 02:22 PM	Water	ALS: 4 Non ALS: 0	No	X	X	X	X	X		
013	Trip Blank 10		17/12/2019 02:23 PM	Water	ALS: 4 Non ALS: 0	No	X	X	X	X	X		

CLIENT: ALLENVENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: Williamtown SS

ORDER NO: 20193820

PROJECT MANAGER: Dkousbroek Dkousbroek
 PRIMARY SAMPLER: Dkousbroek Dkousbroek

CONTACT PH: 0458 197 676 SAMPLER MOBILE: 0458 197 676
 QUOTE NO: ME/114/19 / EM2019ALLENVENG0
 010

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EMAIL INVOICES TO: dkousbroek@kleinfelder.com

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	BH-1	Clear Plastic Bottle - Natural	500 mL	00070519078817	Green	No	
001	BH-1	Amber VOC Vial - Sulfuric Acid	40 mL	00160719043102	Purple	No	
001	BH-1	Amber Glass Bottle - Unpreserved	100 mL	00400719051306	Orange	No	
001	BH-1	Amber VOC Vial - Sulfuric Acid	40 mL	00160719058828	Purple	No	
001	BH-1	Clear Plastic Bottle - Nitric Acid: Filtered	60 mL	00120219051061	Red	Yes	
002	BH-2	Clear Plastic Bottle - Natural	500 mL	00070519078818	Green	No	
002	BH-2	Clear Plastic Bottle - Nitric Acid: Filtered	60 mL	00120219056672	Red	Yes	
002	BH-2	Amber Glass Bottle - Unpreserved	100 mL	00400719051296	Orange	No	
002	BH-2	Amber VOC Vial - Sulfuric Acid	40 mL	00160719058832	Purple	No	
002	BH-2	Amber VOC Vial - Sulfuric Acid	40 mL	00160719058813	Purple	No	
004	BH-4	Clear Plastic Bottle - Natural	500 mL	00070519078844	Green	No	
004	BH-4	Amber Glass Bottle - Unpreserved	100 mL	00400719028807	Orange	No	
004	BH-4	Clear Plastic Bottle - Nitric Acid: Filtered	60 mL	00120219058848	Red	Yes	
004	BH-4	HDPE (no PTFE)	60 mL	00360719008145	Gray	No	
004	BH-4	Amber VOC Vial - Sulfuric Acid	40 mL	00160719043095	Purple	No	
004	BH-4	Amber VOC Vial - Sulfuric Acid	40 mL	00160719043096	Purple	No	
005	SW3	Clear Plastic Bottle - Natural	500 mL	00070519078830	Green	No	
005	SW3	Amber VOC Vial - Sulfuric Acid	40 mL	00160719028831	Purple	No	
005	SW3	Amber VOC Vial - Sulfuric Acid	40 mL	00160719028866	Purple	No	
005	SW3	Amber Glass Bottle - Unpreserved	100 mL	00400719051245	Orange	No	
005	SW3	Clear Plastic Bottle - Nitric Acid: Filtered	60 mL	00120219058849	Red	Yes	
006	BH-6	Amber VOC Vial - Sulfuric Acid	40 mL	00160219063761	Purple	No	
006	BH-6	Amber VOC Vial - Sulfuric Acid	40 mL	00160219063728	Purple	No	
006	BH-6	HDPE (no PTFE)	60 mL	00360719008135	Gray	No	
006	BH-6	Amber Glass Bottle - Unpreserved	100 mL	00400219022839	Orange	No	
006	BH-6	Clear Plastic Bottle - Nitric Acid: Filtered	60 mL	00120219058883	Red	Yes	

RELINQUISHED BY:
 DATE TIME:

RECEIVED BY:
 DATE TIME:

RELINQUISHED BY:
 DATE TIME:

RECEIVED BY:
 DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custom Seal intact? Yes No N/A
 Ploc 100% frozen ice bricks present upon receipt? Yes No N/A
 Random Sample Temperature on Receipt: 2.6 °C
 Other comments:

CLIENT: ALLENVANG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: Williamtown SS

ORDER NO: 20193820

PROJECT MANAGER: Dkousbroek Dkousbroek

PRIMARY SAMPLER: Dkousbroek Dkousbroek

EMAIL REPORTS TO: dkousbroek@kleinfelder.com, toverton@kleinfelder.com

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CONTACT PH: 0458 197 676 SAMPLER MOBILE: 0458 197 676
 QUOTE NO: ME/14/19 / EM2019ALLENVANG010

RELINQUISHED BY:
 DATE TIME:

RECEIVED BY:
 DATE TIME:

RELINQUISHED BY:
 DATE TIME:

RECEIVED BY:
 DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A
 Free Ice/Frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: 2.5 °C
 Other comments:

006	BH-6	Clear Plastic Bottle - Natural	500 mL	00070519076919	Green	No	
007	BH-7	Clear Plastic Bottle - Nitric Acid, Filtered	60 mL	00120219056660	Red	Yes	
007	BH-7	Amber VOC Vial - Sulfuric Acid	40 mL	00160719043163	Purple	No	
007	BH-7	Amber VOC Vial - Sulfuric Acid	40 mL	00160719043158	Purple	No	
007	BH-7	Clear Plastic Bottle - Natural	500 mL	00070519076946	Green	No	
007	BH-7	Amber Glass Bottle - Unpreserved	100 mL	00400719051286	Orange	No	
007	BH-7	HDPE (no PTFE)	60 mL	00360719008431	Grey	No	
008	BH-8	Clear Plastic Bottle - Nitric Acid, Filtered	60 mL	00120219056601	Red	Yes	
008	BH-8	Clear Plastic Bottle - Natural	500 mL	00070519076940	Green	No	
008	BH-8	HDPE (no PTFE)	60 mL	00360719008291	Grey	No	
008	BH-8	Amber VOC Vial - Sulfuric Acid	40 mL	00160719064072	Purple	No	
008	BH-8	Amber VOC Vial - Sulfuric Acid	40 mL	00160719064808	Purple	No	
008	BH-8	Amber Glass Bottle - Unpreserved	100 mL	00400719051330	Orange	No	
010	MMW239S	Amber Glass Bottle - Unpreserved	100 mL	00400219022866	Orange	No	
010	MMW239S	Amber VOC Vial - Sulfuric Acid	40 mL	00160719028804	Purple	No	
010	MMW239S	Amber VOC Vial - Sulfuric Acid	40 mL	00160719028948	Purple	No	
010	MMW239S	Clear Plastic Bottle - Natural	500 mL	00070519076942	Green	No	
010	MMW239S	Clear Plastic Bottle - Nitric Acid, Filtered	60 mL	00120219056585	Red	Yes	
011	BH-11	Clear Plastic Bottle - Natural	500 mL	00070519076927	Green	No	
011	BH-11	Amber Glass Bottle - Unpreserved	100 mL	00400219022892	Orange	No	
011	BH-11	Amber VOC Vial - Sulfuric Acid	40 mL	00160219063581	Purple	No	
011	BH-11	Clear Plastic Bottle - Nitric Acid, Filtered	60 mL	00120219056632	Red	Yes	
012	QW10	Amber VOC Vial - Sulfuric Acid	40 mL	00160219063683	Purple	No	
012	QW10	Amber VOC Vial - Sulfuric Acid	40 mL	00160719028971	Purple	No	
012	QW10	HDPE (no PTFE)	60 mL	00360719008314	Grey	No	
012	QW10	Amber Glass Bottle - Unpreserved	100 mL	00400219023026	Orange	No	
012	QW10	Clear Plastic Bottle - Nitric Acid, Filtered	60 mL	00120219056577	Red	Yes	

CLIENT: ALLENVENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: Williamtown SS

ORDER NO: 20193820

PROJECT MANAGER: Dkousbroek Dkousbroek

PRIMARY SAMPLER: Dkousbroek Dkousbroek

EMAIL REPORTS TO: dkousbroek@kleinfelder.com, toverton@kleinfelder.com

EMAIL INVOICES TO: dkousbroek@kleinfelder.com

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

DATE TIME:

DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard Info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Free ice / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

Yes No

Yes No

Yes No

Yes No

Yes No

Yes No

Yes No

Yes No

Yes No

Yes No

Yes No

Total Bottle Count: ALS: 57, Non ALS: 0

013	Trip Blank 10	HDPE (no PTFE)	60 mL	00350719008097	Grey	No	
013	Trip Blank 10	Clear Plastic Bottle - Nitric Acid: Filtered	60 mL	00120219056562	Red	Yes	
013	Trip Blank 10	Amber VOC Vial - Sulfuric Acid	40 mL	00160719064797	Purple	No	
013	Trip Blank 10	Amber Glass Bottle - Unpreserved	100 mL	00400219022908	Orange	No	



Custody Document for Submissions via ALS Compass App

ALS Use Only

Project: WSS Client: Allenfelder Project Manager: Tom Overton

Phone:

ALS Compass COC Reference: 6900 # Samples: 13 Sampler: Daniel Houshroet

Phone:

(0458147676)

Turnaround Requirements: Standard ✓ Urgent

Special Instructions:

ALS Use Only	YES	NO	N/A
Custody seal intact?			
Freezer frozen ice bricks upon receipt?	☒	☐	☐
Random sample temperature on receipt?	2.1	°C	

Custody:

Relinquished by: <u>Daniel Houshroet</u>	Received by: <u>AT</u>	Relinquished by:	Received by: <u>AT</u>
Date / Time: <u>17/12/19</u> <u>1535</u>	Date / Time: <u>17-12-19</u> <u>3:37pm</u>	Date / Time:	Date / Time: <u>17-12-19</u> <u>17:12:19</u>

EMAILED
LAB OF ORIGIN:
NEWCASTLE

CHAIN OF CUSTODY
ALS CQC# 6900 ALS Laboratory: ES Sydney

CLIENT: ALLENVENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: Williamtown SS

ORDER NO: 20190820

PROJECT MANAGER: Dkousbroek Dkousbroek
PRIMARY SAMPLER: Dkousbroek Dkousbroek

CONTACT PH: 0458 197 676
QUOTE NO: ME/14/19

SAMPLER MOBILE: 0458 197 676
/ EM2019ALLENVENG0010

EMAIL REPORTS TO: dkousbroek@kleinfelder.com, toverton@kleinfelder.com
EMAIL INVOICES TO: dkousbroek@kleinfelder.com

RELINQUISHED BY:
DATE TIME:

RECEIVED BY: *[Signature]*
DATE TIME: 17/12/19 14:25

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days
Biohazard info:

LABORATORY USE ONLY (Circle)
Custody Seal intact? Yes No N/A
Free ice / frozen ice bricks present upon receipt? Yes No N/A
Random Sample Temperature on Receipt: 2.6 °C
Other comments:

SAMPLE DETAILS						ANALYSIS REQUIRED						ADDITIONAL INFORMATION
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Dissolved from Only Iron (Dissolved) WATER	EP231X PFAS - Full Suite (28 Analytes) WATER	NT-12 General Water Suite (incl pH) WATER	W-03 NEPM 15 Metals (dissolved) WATER	W-04 SG TRH/BTEXN incl Silica Gel Clean Up WATER	
001	BH-1		17/12/2019 12:28 PM	Water	ALS: 5 Non ALS: 0	No	X		X	X	X	
002	BH-2		17/12/2019 12:09 PM	Water	ALS: 5 Non ALS: 0	No	X		X	X	X	
003	SW-1	Dry		Water	ALS: 0 Non ALS: 0	No	X		X	X	X	
004	BH-4		17/12/2019 11:47 AM	Water	ALS: 6 Non ALS: 0	No	X	X	X	X	X	
005	SW-3		17/12/2019 10:17 AM	Water	ALS: 5 Non ALS: 0	No	X		X	X		
006	BH-6		17/12/2019 01:39 PM	Water	ALS: 6 Non ALS: 0	No	X	X	X	X	X	
007	BH-7		17/12/2019 01:57 PM	Water	ALS: 6 Non ALS: 0	No	X	X	X	X	X	
008	BH-8		17/12/2019 02:15 PM	Water	ALS: 6 Non ALS: 0	No	X	X	X	X	X	
009	SW-4	Dry		Water	ALS: 0 Non ALS: 0	No	X		X	X	X	



Environmental Division
Sydney
Work Order Reference
ES1941879

Telephone : + 61-2-8794 6556

CLIENT: ALLENVENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: Williamtown SS

ORDER NO: 20193820

PROJECT MANAGER: Dkousbroek Dkousbroek

PRIMARY SAMPLER: Dkousbroek Dkousbroek

EMAIL REPORTS TO: dkousbroek@kleinfelder.com, toverton@kleinfelder.com

EMAIL INVOICES TO: dkousbroek@kleinfelder.com

CONTACT PH: 0458 197 676

SAMPLER MOBILE: 0458 197 676

QUOTE NO: ME/14/19

/ EM2019ALLENVENG0010

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME: 17/12/19 1930

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? ☒ Yes ☐ No
 Free ice / frozen ice bricks present upon receipt? ☒ Yes ☐ No
 Random Sample Temperature on Receipt: 2.6 °C

Other comments:

SAMPLE DETAILS

SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	ALTERNATIVE ANALYSIS				ADDITIONAL INFORMATION	
010	MMW239S		17/12/2019 01:18 PM	Water	ALS: 5 Non ALS: 0	No	X					
011	BH-11		17/12/2019 12:56 PM	Water	ALS: 5 Non ALS: 0	No	X					
012	QW10	Rinsale glove	17/12/2019 02:22 PM	Water	ALS: 4 Non ALS: 0	No	X					
013	Trap Blank 10		17/12/2019 02:23 PM	Water	ALS: 4 Non ALS: 0	No	X					

ANALYSIS REQUIRED

NT-12 General Water Suite (incl pH) WATER
 W-03 NEPM 15 Metals (dissolved) WATER
 W-04 SG TRH/BTEXN incl Silica Gel Clean Up WATER
 EP231X PFAS - Full Suite (28 Analytes) WATER
 Dissolved Iron Only from (Dissolved) WATER

CLIENT: ALLENVING - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: Williamtown SS

ORDER NO: 20193820

PROJECT MANAGER: Dkousbroek Dkousbroek

PRIMARY SAMPLER: Dkousbroek Dkousbroek

EMAIL REPORTS TO: dkousbroek@kleinfelder.com, toverton@kleinfelder.com

EMAIL INVOICES TO: dkousbroek@kleinfelder.com

RELINQUISHED BY:
 DATE TIME:

RECEIVED BY:
 DATE TIME: 17/12/19 1930

RELINQUISHED BY:
 DATE TIME:

RECEIVED BY:
 DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No (N/A)
 Freezable frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: 2.6 °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	BH-1	Clear Plastic Bottle - Natural	500 mL	00070519076917	Green	No	
001	BH-1	Amber VOC Vial - Sulfuric Acid	40 mL	00160719043102	Purple	No	
001	BH-1	Amber Glass Bottle - Unpreserved	100 mL	00400719051306	Orange	No	
001	BH-1	Amber VOC Vial - Sulfuric Acid	40 mL	00160719058628	Purple	No	
001	BH-1	Clear Plastic Bottle - Nitric Acid, Filtered	60 mL	00120219051061	Red	Yes	
002	BH-2	Clear Plastic Bottle - Natural	500 mL	00070519076618	Green	No	
002	BH-2	Clear Plastic Bottle - Nitric Acid, Filtered	60 mL	00120219056672	Red	Yes	
002	BH-2	Amber Glass Bottle - Unpreserved	100 mL	00400719051296	Orange	No	
002	BH-2	Amber VOC Vial - Sulfuric Acid	40 mL	00160719058632	Purple	No	
002	BH-2	Amber VOC Vial - Sulfuric Acid	40 mL	00160719058613	Purple	No	
004	BH-4	Clear Plastic Bottle - Natural	500 mL	00070519076944	Green	No	
004	BH-4	Amber Glass Bottle - Unpreserved	100 mL	00400719028807	Orange	No	
004	BH-4	Clear Plastic Bottle - Nitric Acid, Filtered	60 mL	00120219056646	Red	Yes	
004	BH-4	HDPE (no PTFE)	60 mL	00350719008145	Grey	No	
004	BH-4	Amber VOC Vial - Sulfuric Acid	40 mL	00160719043095	Purple	No	
004	BH-4	Amber VOC Vial - Sulfuric Acid	40 mL	00160719043098	Purple	No	
005	SW3	Clear Plastic Bottle - Natural	500 mL	00070519076630	Green	No	
005	SW3	Amber VOC Vial - Sulfuric Acid	40 mL	00160719028931	Purple	No	
005	SW3	Amber VOC Vial - Sulfuric Acid	40 mL	00160719028966	Purple	No	
005	SW3	Amber Glass Bottle - Unpreserved	100 mL	00400719051245	Orange	No	
005	SW3	Clear Plastic Bottle - Nitric Acid, Filtered	60 mL	00120219056649	Red	Yes	
006	BH-6	Amber VOC Vial - Sulfuric Acid	40 mL	00160219063761	Purple	No	
006	BH-6	Amber VOC Vial - Sulfuric Acid	40 mL	00160219063728	Purple	No	
006	BH-6	HDPE (no PTFE)	60 mL	00350719008135	Grey	No	
006	BH-6	Amber Glass Bottle - Unpreserved	100 mL	00400219022939	Orange	No	
006	BH-6	Clear Plastic Bottle - Nitric Acid, Filtered	60 mL	00120219056683	Red	Yes	



CHAIN OF CUSTODY

COCH: 6900

ALS Laboratory: ES Sydney

CLIENT: ALLENVENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: Williamtown SS

ORDER NO: 20193820

PROJECT MANAGER: Dkousbroek Dkousbroek

PRIMARY SAMPLER: Dkousbroek Dkousbroek

CONTACT PH: 0458 197 676

SAMPLER MOBILE: 0458 197 676

QUOTE NO: ME/14/19

/ EM2019ALLENVENG0
010

EMAIL REPORTS TO: dkousbroek@kleinfelder.com, toverton@kleinfelder.com

EMAIL INVOICES TO: dkousbroek@kleinfelder.com

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

DATE TIME:

DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard Info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Free ice frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

Yes No N/A

Yes No N/A

25 C

006	BH-6	Clear Plastic Bottle - Natural	500 mL	00070519076919	Green	No	
007	BH-7	Clear Plastic Bottle - Nitric Acid, Filtered	60 mL	00120219056660	Red	Yes	
007	BH-7	Amber VOC Vial - Sulfuric Acid	40 mL	00160719043163	Purple	No	
007	BH-7	Amber VOC Vial - Sulfuric Acid	40 mL	00160719043158	Purple	No	
007	BH-7	Clear Plastic Bottle - Natural	500 mL	00070519076946	Green	No	
007	BH-7	Amber Glass Bottle - Unpreserved	100 mL	00400719051289	Orange	No	
007	BH-7	HDPE (no PTFE)	60 mL	00350719009431	Grey	No	
008	BH-8	Clear Plastic Bottle - Nitric Acid, Filtered	60 mL	00120219056601	Red	Yes	
008	BH-8	Clear Plastic Bottle - Natural	500 mL	00070519076940	Green	No	
008	BH-8	HDPE (no PTFE)	60 mL	00350719008291	Grey	No	
008	BH-8	Amber VOC Vial - Sulfuric Acid	40 mL	00160719064072	Purple	No	
008	BH-8	Amber VOC Vial - Sulfuric Acid	40 mL	00160719064808	Purple	No	
008	BH-8	Amber Glass Bottle - Unpreserved	100 mL	00400719051330	Orange	No	
010	MW239S	Amber Glass Bottle - Unpreserved	100 mL	00400219022866	Orange	No	
010	MW239S	Amber VOC Vial - Sulfuric Acid	40 mL	00160719028804	Purple	No	
010	MW239S	Amber VOC Vial - Sulfuric Acid	40 mL	00160719028948	Purple	No	
010	MW239S	Clear Plastic Bottle - Natural	500 mL	00070519076942	Green	No	
010	MW239S	Clear Plastic Bottle - Nitric Acid, Filtered	60 mL	00120219056685	Red	Yes	
011	BH-11	Clear Plastic Bottle - Natural	500 mL	00070519076927	Green	No	
011	BH-11	Amber Glass Bottle - Unpreserved	100 mL	00400219022892	Orange	No	
011	BH-11	Amber VOC Vial - Sulfuric Acid	40 mL	00160219063581	Purple	No	
011	BH-11	Clear Plastic Bottle - Nitric Acid, Filtered	60 mL	00120219056632	Red	Yes	
011	BH-11	Amber VOC Vial - Sulfuric Acid	40 mL	00160219063683	Purple	No	
012	QW10	Amber VOC Vial - Sulfuric Acid	40 mL	00160719028971	Purple	No	
012	QW10	HDPE (no PTFE)	60 mL	00350719008314	Grey	No	
012	QW10	Amber Glass Bottle - Unpreserved	100 mL	00400219023026	Orange	No	
012	QW10	Clear Plastic Bottle - Nitric Acid, Filtered	60 mL	00120219056577	Red	Yes	

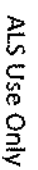
 CHAIN OF CUSTODY COC#: 6900 ALS Laboratory: ES Sydney		RELINQUISHED BY: DATE TIME:		RECEIVED BY: DATE TIME:	

CLIENT: ALLENVING - KLEINFELDER AUSTRALIA PTY LTD PROJECT: Williamtown SS SITE: Williamtown SS ORDER NO: 20193820		TURNAROUND REQUIREMENTS: 5 Days Biohazard info:		RECEIVED BY: <i>So S. H. 17/12/19 1930</i> DATE TIME:	

PROJECT MANAGER: Dikousbroek Dikousbroek PRIMARY SAMPLER: Dikousbroek Dikousbroek EMAIL REPORTS TO: dikousbroek@kleinfelder.com, toverton@kleinfelder.com EMAIL INVOICES TO: dikousbroek@kleinfelder.com		CONTACT PH: 0458 197 676 SAMPLER MOBILE: 0458 197 676 QUOTE NO: ME/114/19 / EM2019ALLENVING010		LABORATORY USE ONLY (Circle) Custody Seal intact? Yes No <u>N/A</u> Free ice / frozen ice bricks present upon receipt? Yes No N/A Random Sample Temperature on Receipt: 25 °C Other comments:	

	HDPE (no PTFE)	60 mL	00350719008097	Grey	No
013	Trip Blank 10				
013	Trip Blank 10	Clear Plastic Bottle - Nitric Acid, Filtered	60 mL	00120219056562	Red
013	Trip Blank 10	Amber VOC Vial - Sulfuric Acid	40 mL	00180719084797	Purple
013	Trip Blank 10	Amber Glass Bottle - Unpreserved	100 mL	00400219022808	Orange

Total Bottle Count: ALS: 57, Non ALS: 0



ALS Use Only

Project Manager: Tom Overton
Phone: ()

Sampler: Jane/140550e1c
Phone: (0455)57876

Urgent

ALS Use Only

YES NO N/A

☒ YES NO N/A

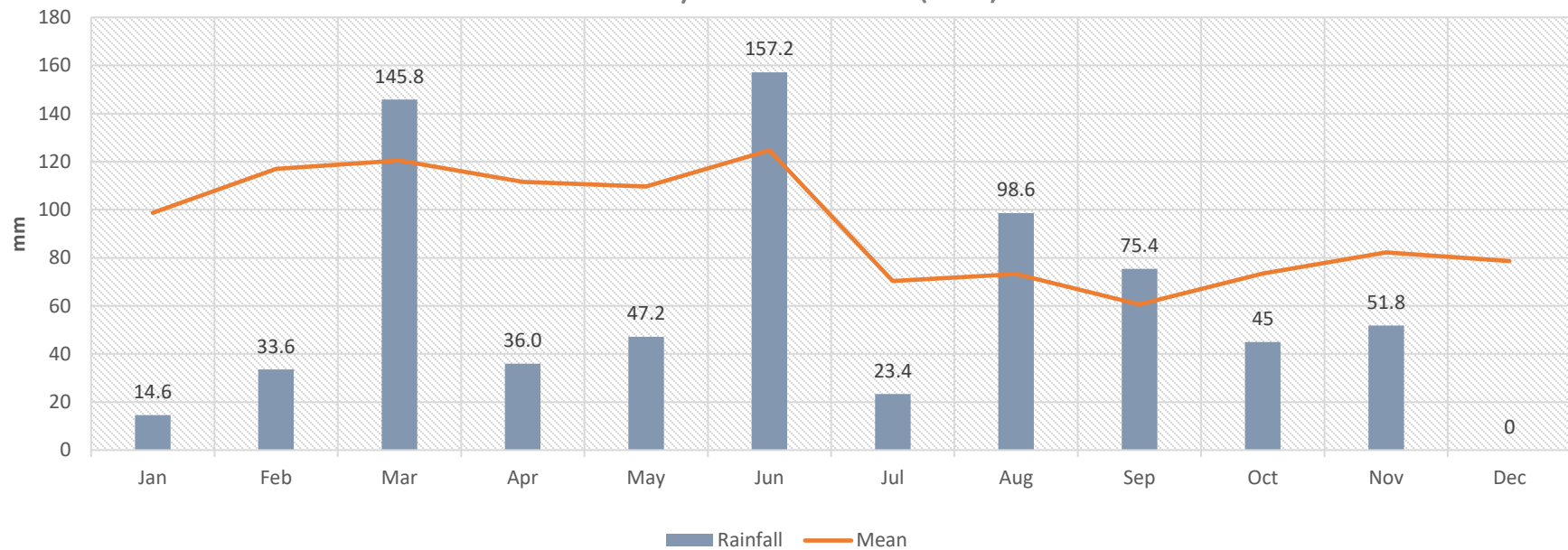
2.

2500

EMAILED
Date / Time: *Z: 25pm*
LAB OF ORIGIN:
NEWCASTLE

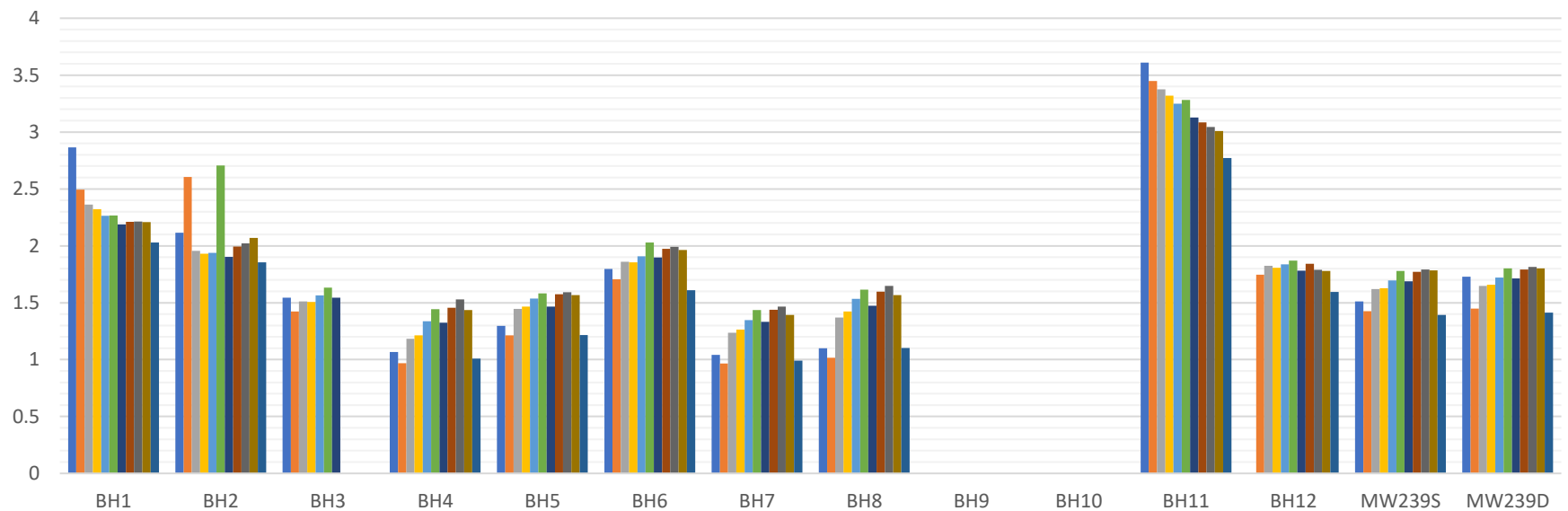
ATTACHMENT B: TREND DATA

Monthly Rainfall Totals (mm)

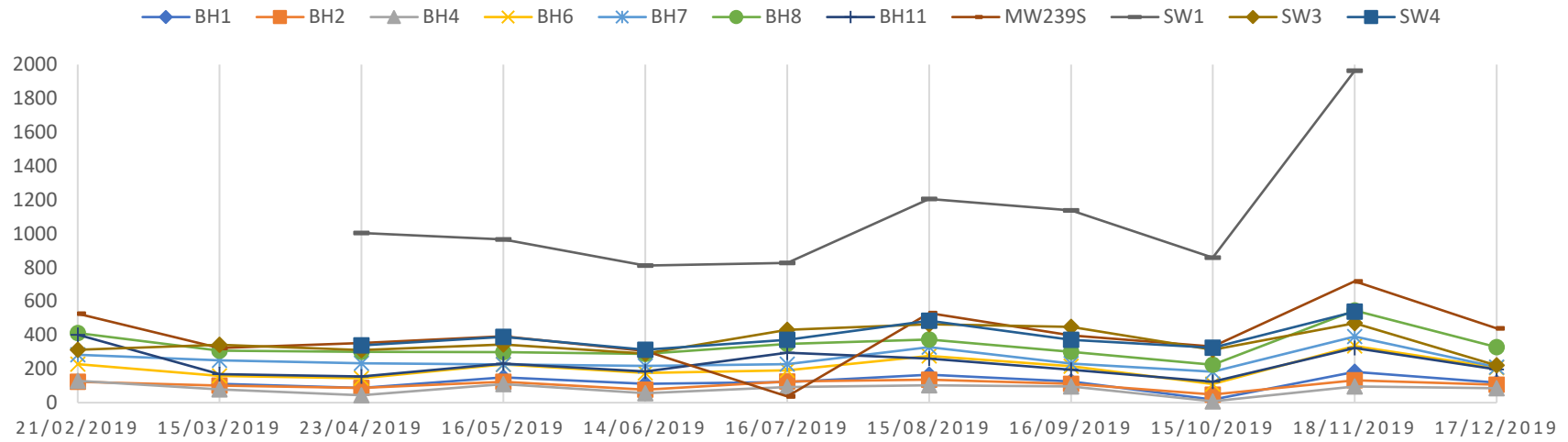


Groundwater Elevation (mAHD)

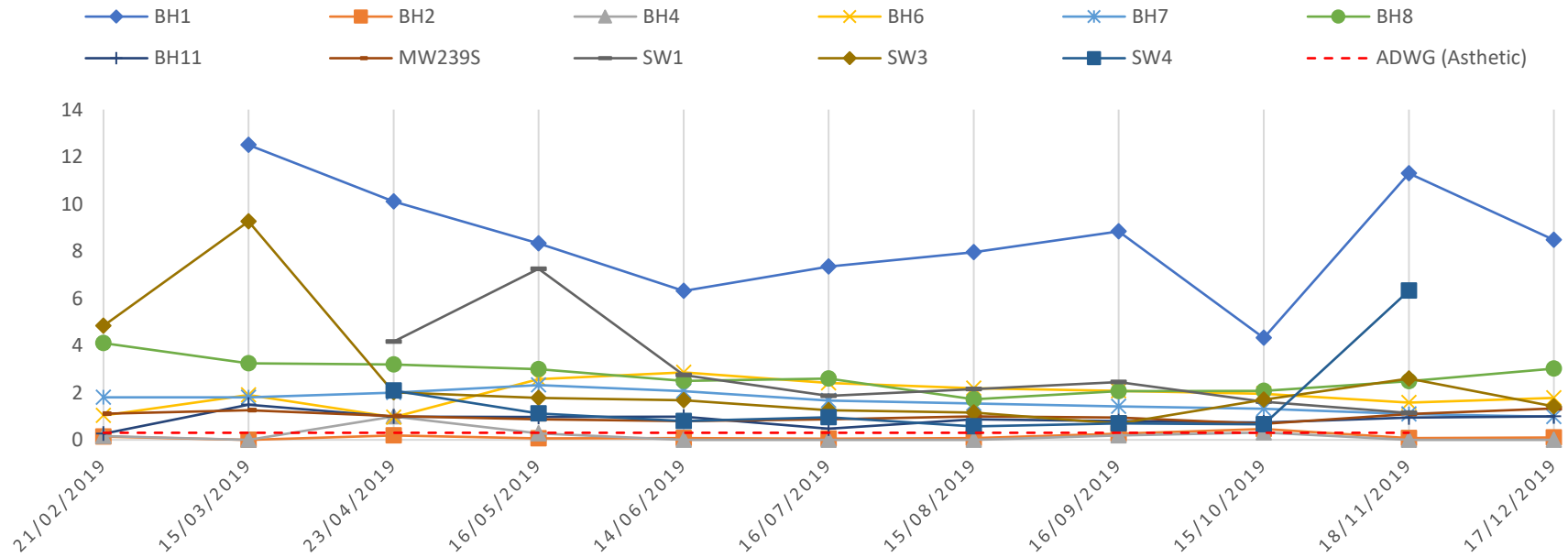
■ 21/02/2019 ■ 15/03/2019 ■ 23/04/2019 ■ 16/05/2019 ■ 14/06/2019 ■ 16/07/2019 ■ 15/08/2019 ■ 16/09/2019 ■ 15/10/2019 ■ 18/11/2019 ■ 17/12/2019

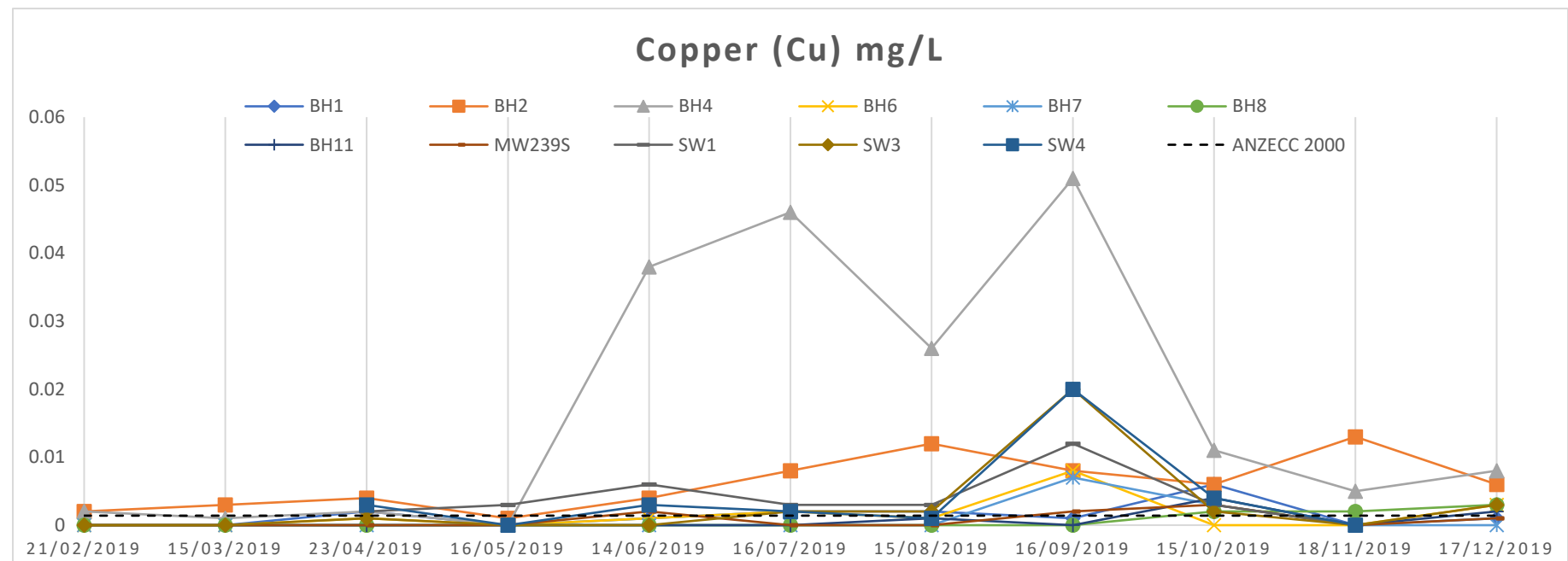
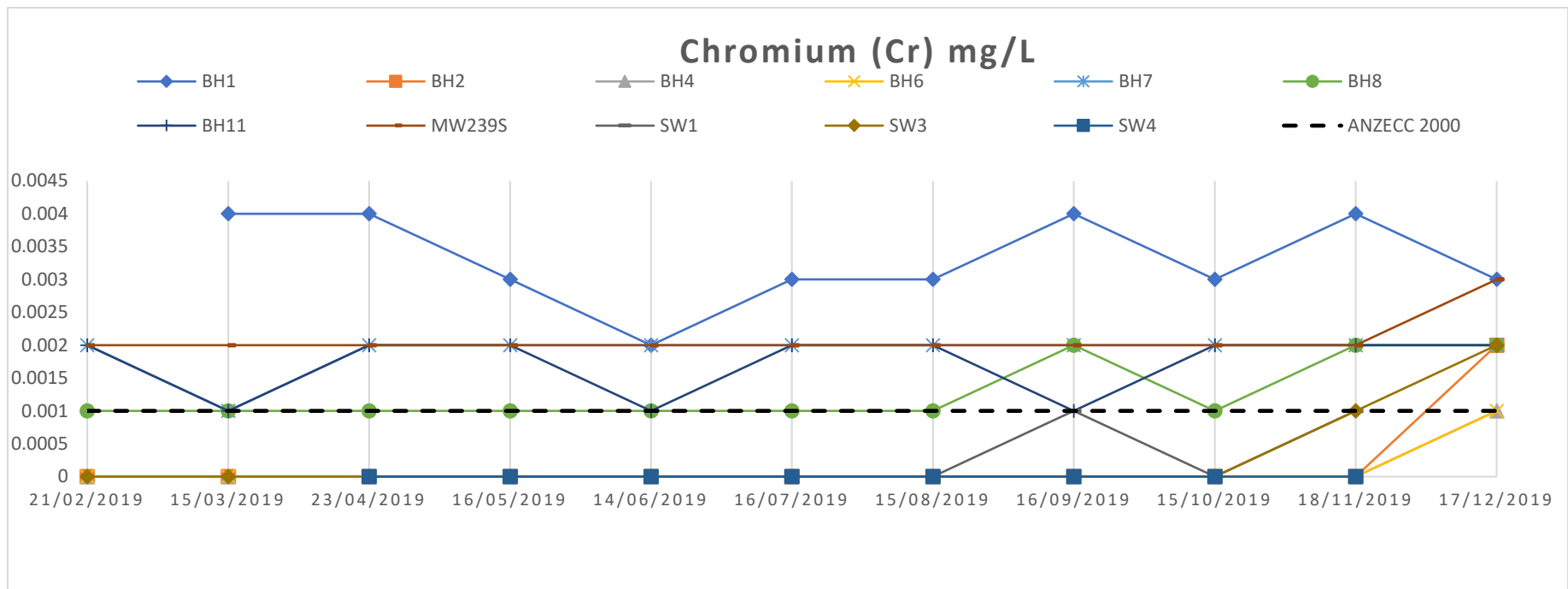


Field EC ($\mu\text{S}/\text{cm}$)

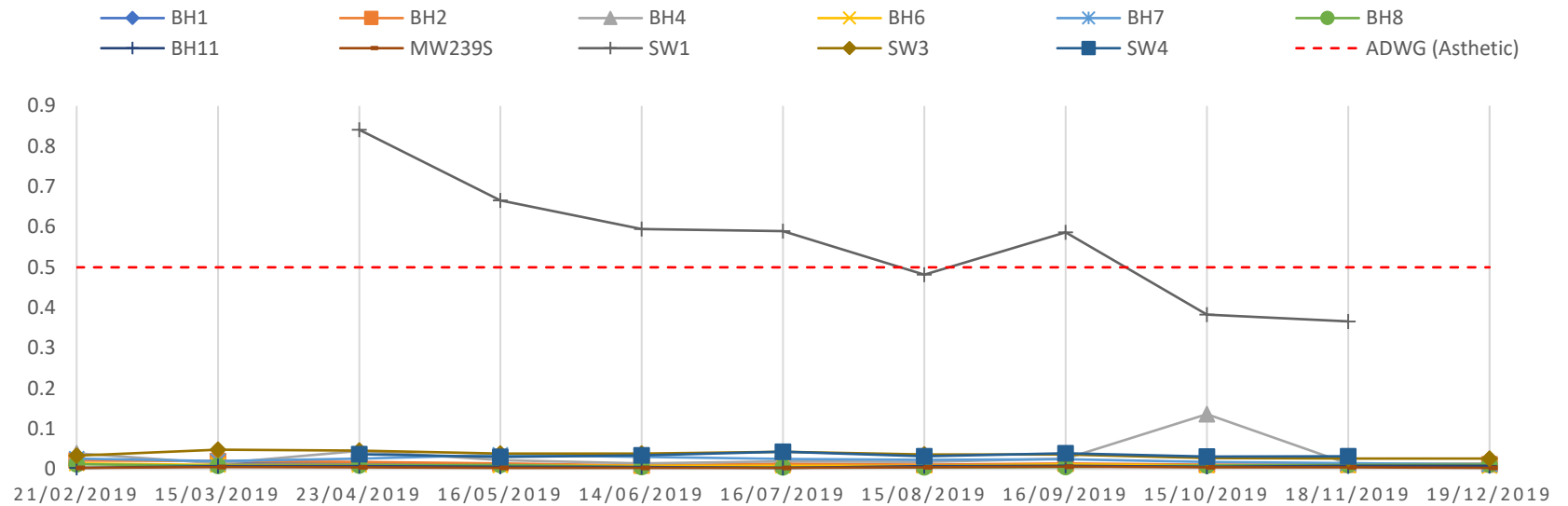


Iron (Fe) mg/L

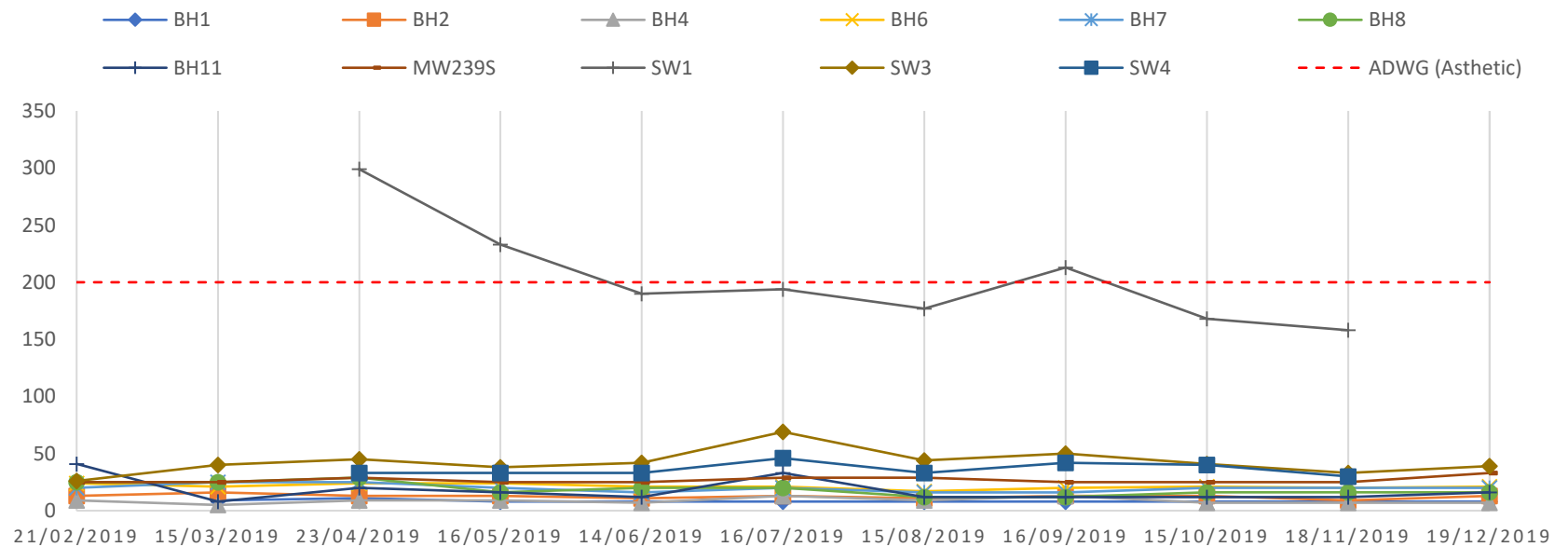




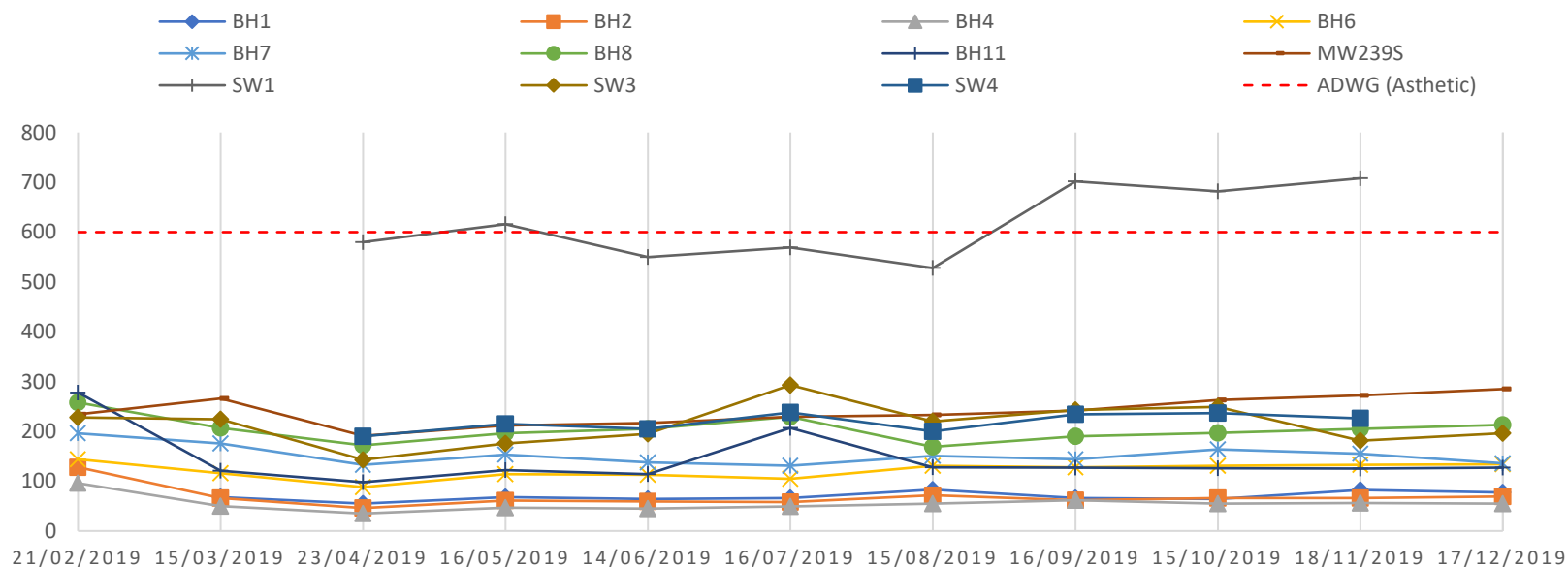
Manganese (Mn) mg/L



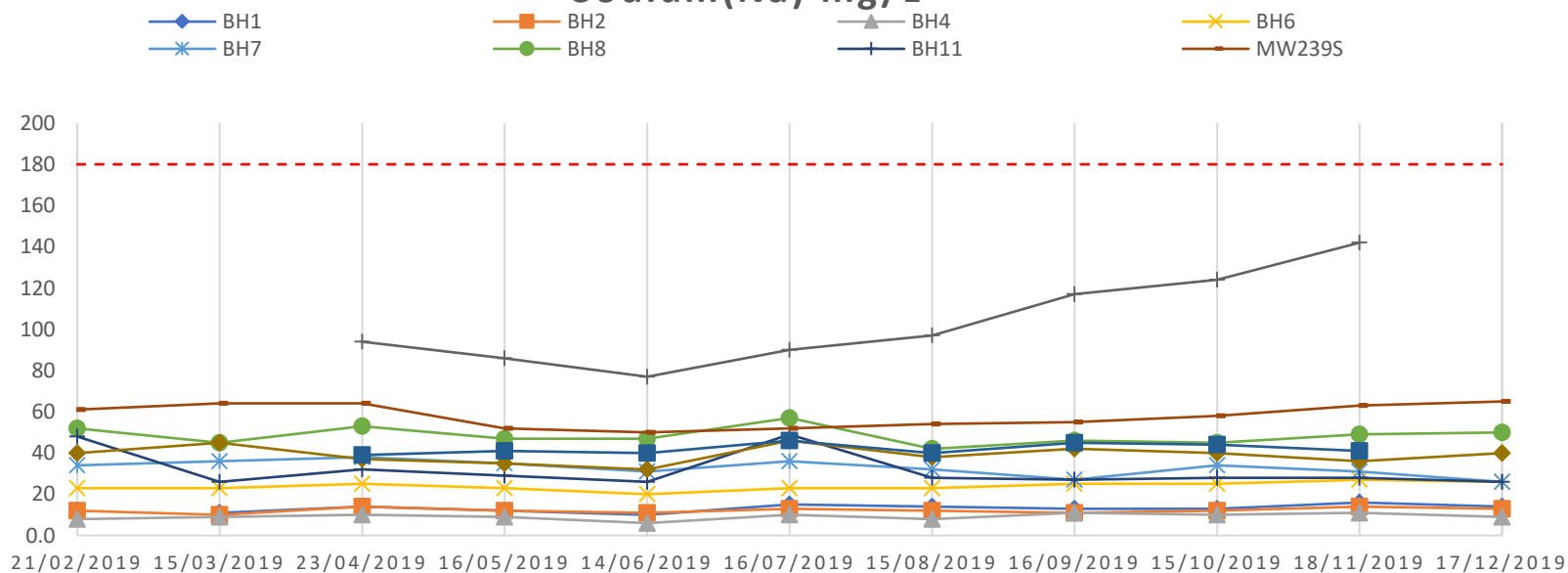
Total Hardness (CaCO₃) mg/L



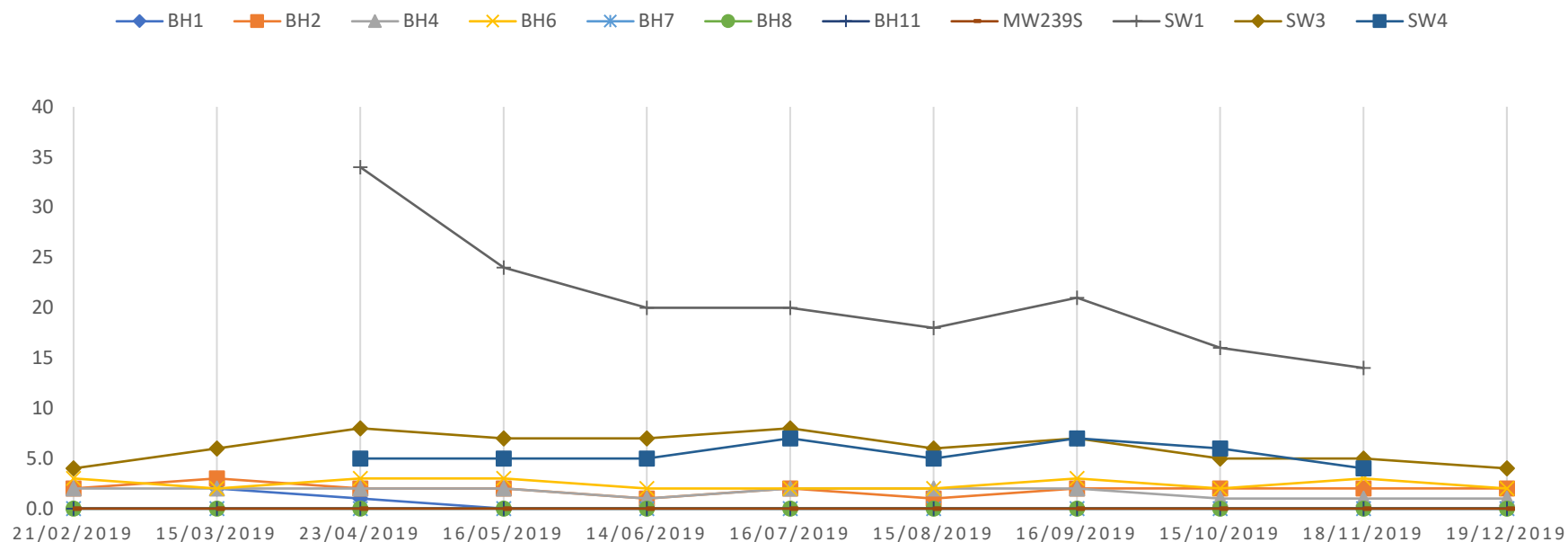
Total Dissolved Solids (TDS) mg/L



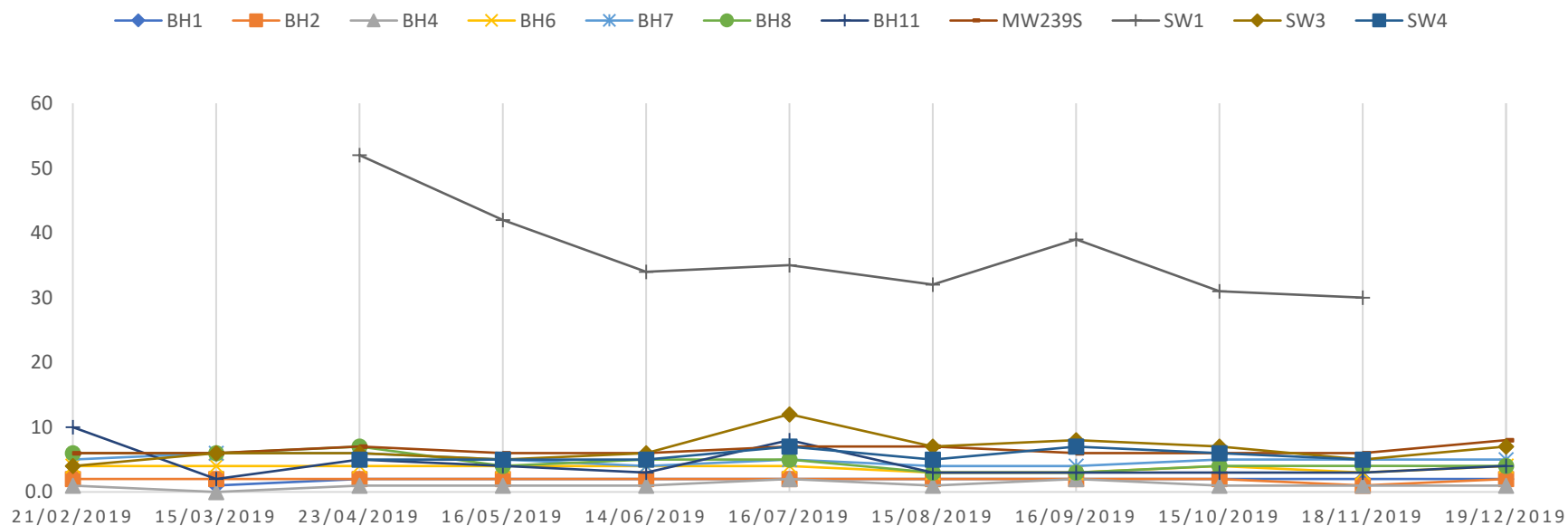
Sodium(Na) mg/L



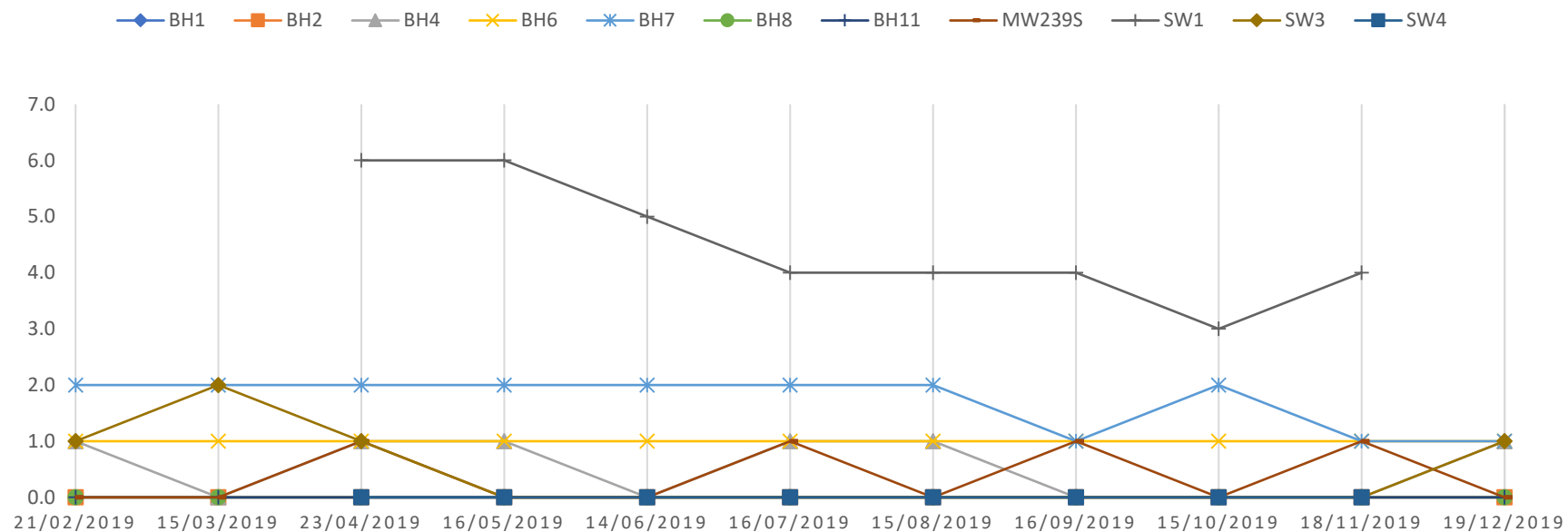
Calcium(Ca) mg/L



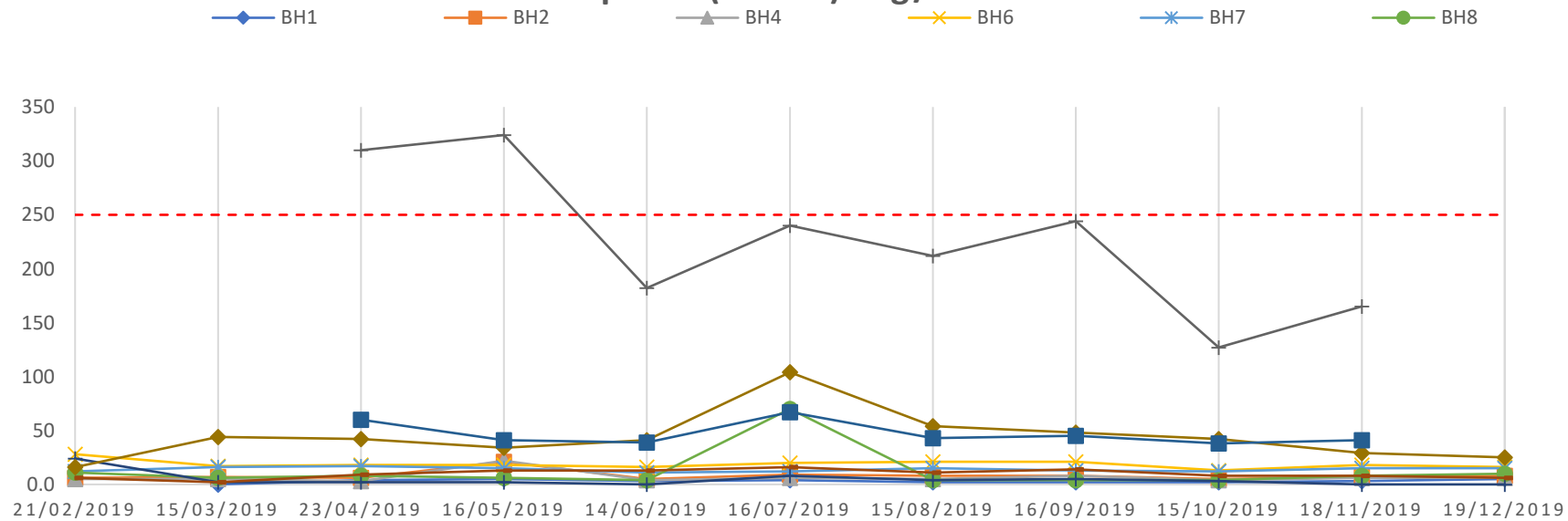
Magnesium(Mg) mg/L

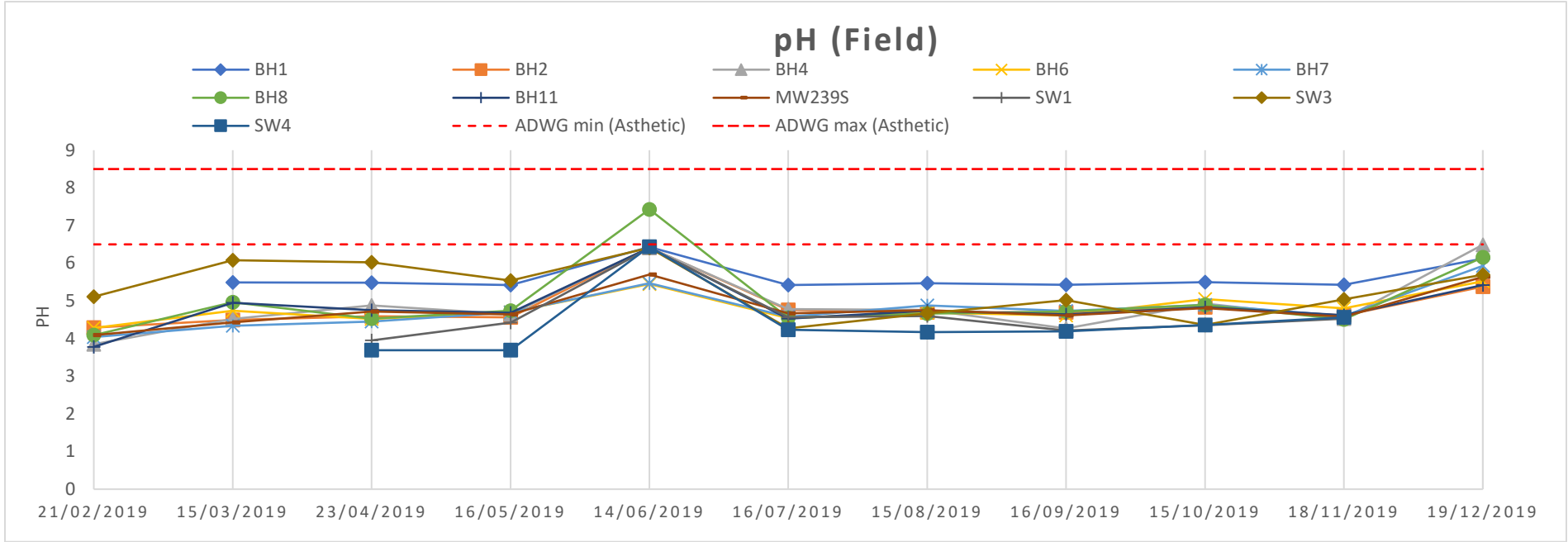


Potassium(K) mg/L



Sulphate(SO₄²⁻) mg/L





APPENDIX B12: JANUARY 2020

04 February 2020
Document Ref: NCA20R106827

Williamtown Sand Syndicate
PO Box 898
Newcastle, NSW 2300

Attention: Darren Williams

Delivered by email: darren@arbus.com.au

Subject: Monthly water quality monitoring results at Cabbage Tree Road Sand Quarry – January 2020 monitoring

Please find enclosed the Monthly water quality monitoring results at Cabbage Tree Road Sand Quarry for the January 2020 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 January monitoring round was a monthly monitoring event and included gauging of all available monitoring wells (a total of 13 wells) and sampling from 8 monitoring wells (Noting that MW239D, BH3, BH5 and BH12 were not required to be sampled and BH9 and BH10 were dry). All surface water locations at the time of the monitoring event were dry therefore no additional sampling and subsequent water quality analyses were conducted

2. SITE WORK

The monthly monitoring round was conducted on 16 January 2020. 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 data 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 January 2020 monitoring round included:

- Gauging of all available monitoring wells (a total of 13 wells), note that BH3 is now 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 (All surface water monitoring points [SW1, SW2, SW3 and SW4] were 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
General Water Suite*	8	0	0	0	0
Hydrocarbons**	8	0	0	1	1
Metals***	8	0	0	1	1
Iron (dissolved)	8	0	0	1	1
Total Dissolved Solids (TDS)	8	0	0	0	0
Total Suspended Solids (TSS)	8	0	0	0	0
PFAS (28 analytes, standard level)	4	0	0	1	1

* General Water Suite: Ca, Mg, Na, K, pH, EC, Cl, SO₄, Alkalinity, Hardness & TDS (Calc')

** 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 (mBTC)	Groundwater Elevation (mAHD)	Well Total Depth (mBTC)	Comment
BH1	8.64	6.701	1.939	8.28	Slight cloudy brown, no odour
BH2	7.79	6.153	1.637	9.03	Cloudy brown, slight sulfur odour
BH3	-	-	-	-	Well Decommissioned

Borehole	Top of Casing (mAHD)	Depth to Water (mBTC)	Groundwater Elevation (mAHD)	Well Total Depth (mBTC)	Comment
BH4	3.06	2.252	0.808	6.11	Slight cloudy brown, no odour
BH5	7.36	6.315	1.045	8.8	No odour - No sample taken.
BH6	3.62	2.169	1.451	4.62	Brown, no odour
BH7	2.98	2.169	0.811	4.61	Light brown, slight sulfur odour.
BH8	3.88	2.969	0.911	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	3.962	2.668	5.39	Cloudy brown, sulfur odour
BH12	8.67	7.252	1.418	8.2	No sample taken.
MW239S	3.04	1.823	1.217	4.06	Dark brown, sulfur odour
MW239D	3.04	1.799	1.241	20.32	Slight Sulfur odour, no sample taken
SW01*	N/A	Dry		N/A	Location was dry
SW02*	N/A	Dry		N/A	Location was dry.
SW03*	N/A	Dry		N/A	Location was dry.
SW04*	N/A	Dry		N/A	Location was dry

* 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	1145	22.52	123	5.39	27.7
BH02	1130	24.49	94	4.84	186.5
BH04	1100	23.3	85	4.63	221
BH06	1320	24.62	190	4.39	92
BH07	1410	22.39	164	4.45	23.1
BH08	1440	21.99	284	4.08	45.6
BH11	1215	22.37	129	4.61	42
MW239S	1250	24.71	396	4.59	16.1

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 (µs/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	8	13	67	No	Similar
	Sulphate	1	8	<1	15	No	Similar
	Chloride	1	8	17	120	No	Similar
	Fluoride	0.1	8	<0.1	0.2	No	Similar
	Reactive ³ Phosphorous	0.01	0	-	-	-	-
	Total Phosphorous ³	0.01	0	-	-	-	-
	Nitrite ³	0.01	0	-	-	-	-
	Nitrate ³	0.01	0	-	-	-	-
	Ammonia ³	0.01	0	-	-	-	-
	Total Nitrogen ³	0.1	0	-	-	-	-
	Total Hardness	1	8	12	33	No	Similar
	Total Dissolved Solids	1	8	55	275	No	Similar
	pH	0.01	8	5.02	6.23	All outside ANZECC 2000 Trigger range ¹ and drinking water guidelines	Similar
Dissolved Metals	As	0.001	8	<0.001	<0.001	No	Similar
	B	0.05	8	<0.005	<0.005	No	Similar
	Ba	0.001	8	0.003	0.032	No	Similar
	Be	0.001	8	<0.001	<0.001	No	Similar
	Cd	0.005-0.1	8	<0.0001	<0.0001	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)
	Cr	0.005-0.1	8	<0.001	0.002	5 above ANZECC 2000 Trigger Values ² (BH1, BH7, BH8, BH11 and MW239S)	Similar
	Co	0.001	8	<0.001	<0.001	No	Similar
	Cu	0.001	8	<0.001	0.006	3 above ANZECC 2000 Trigger Values ² (BH1, BH2 and BH4)	General decrease in concentrations following a spike in September 2019.
	Fe	0.05	8	<0.05	4.43	7 above NHMRC ADWG 6 aesthetics (BH1, BH2, BH6, BH7, BH8, BH11 and MW239S)	Similar
	Mn	0.001	8	0.004	0.014	No	Similar
	Ni	0.001	8	<0.001	0.003	No	Similar
	Pb	0.005-0.1	8	<0.001	<0.001	No	Similar
	Se	0.005-0.1	8	<0.01	<0.01	No	Similar
	V	0.005-0.1	8	<0.01	<0.01	No	Similar
	Zn	0.005-0.1	8	<0.005	0.044	4 above ANZECC 2000 Trigger Values ² (BH1, BH2, BH4 and BH8)	Slight increase in concentrations at most locations.
	Hg	0.0001	8	<0.0001	<0.0001	No	Similar
TRH – Silica Clean up	C ₆ -C ₁₀	0.02	8	<0.02	<0.02	No	Similar
	>C ₁₀ -C ₁₆	0.1	8	<0.1	<0.1	No	Similar
	>C ₁₆ -C ₃₄	0.1	8	<0.1	<0.1	No	Similar
	>C ₃₄ -C ₄₀	0.1	8	<0.1	<0.1	No	Similar
	Total >C ₁₀ -C ₄₀	0.1	8	<0.1	<0.1	No	Similar
	C ₆ -C ₁₀ minus BTEX (F1)	0.02	8	<0.02	<0.02	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)
	>C ₁₀ -C ₁₆ minus Naphthalene (F2)	0.1	8	<0.1	<0.1	No	Similar
BTEX	Benzene	0.001-0.005	8	<0.001	<0.001	No	Similar
	Toluene	0.001-0.005	8	<0.002	<0.002	No	Similar
	Ethylbenzene	0.001-0.005	8	<0.002	<0.002	No	Similar
	Total Xylene	0.001-0.005	8	<0.002	<0.002	No	Similar
	Naphthalene	0.001	8	<0.005	<0.005	No	Similar
PFAS	PFOS	0.00001-0.0001	4	<0.00001	<0.00001	No	Similar
	PFOA	0.00001-0.0001	4	<0.00001	<0.00001	No	Similar
	PFOS/PFHxS	0.00001-0.0001	4	<0.00001	<0.00001	No	No detection of PFOS/PFHxS in all samples taken
	PFDS	0.00001-0.0001	4	<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.

¹Australian 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)

²ANZECC 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

³Analysis 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 the December/January period than the mean leading up to the January 2020 monitoring event. January rainfall is trending towards below average rainfall. Based on current rainfall data (mean and monthly totals) for December 2019 it is expected that surface and groundwater levels will continue to decrease.

Table 4.5 2019/20 Rainfall data

2019	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
1st	2.0	0.8	0	0	0	0	0	9.6	7.4	0	0	0	0
2nd	0	12.8	0	23.8	0	21.2	0	0	0.2	0	0	0	0
3rd	0	0.4		0.6	0	0.6	0	0.2	0	0	0	0	0
4th	0	0	0	0	20.8	0.4	5.2	0	0	0	17.6	0	0
5th	0	0	0	0	0.2	25	1.8	0.2	0	0	0.4	0	0
6th	0	0	0	0	23.2	2.6	1.2	0	0	6.8	0	0	0
7th	5.0	0	8.2	0	0.2	1	0.6	0	1	0	0	0	0
8th	0	0	0	0	0	0	1.6	0	0	0	0	0	0.2
9th	0	6.6	0	0	0	0	0.4	0	0	0.8	0	0	0.2
10th	0.2	0	12.0	2.2	0	0	0	0	0.6	1.4	0	0	0
11th	0	0	0	0	0.6	0	0	0	2.8	4	0	0	0.2
12th	3.0	0	0	0	0	0	0	0	0	23	0	0	1.4
13th	0	0	0	0	1.4	0	0	0	0	8.8	0	0	0.4
14th	0	0	0	0.2	0	0	0	0	0	0	0	0	0
15th	0	0	0	1.4	0	0	0	0	0	0	0	0	0
16th	0	0	4.8	3.6	0	0	0	0	0	0.2	0	0	0
17th	0	0	59.4	1.4	0	0	0	0	16.8	0	0	0	
18th	0	0	2.6	0.2	0	17.8	0	0	39.4	0	0	0	
19th	0	0	2.2	0.2	0	0	0	0	7.2	0	0	0	
20th	2.4		0	2.0	0	0	0	0	0	0	0	0	
21st	1.0	1.4	0	0.2	0	0	0	0	0	0	0	0	
22nd	0	1.0	1.2	0.2	0	0.2	0	0	0	0	0	0	
23rd	0	1.4	0	0	0	20	0	0		0	1	0.2	
24th	0	9.2	5.4	0	0	50.6	0	0	0	0	1.6	0.4	
25th	0	0	5.2	0	0	15.2	2.0	0	0	0	0	0	
26th	0	0	0	0	0	1.8	0	0	0	0	31.2	0.2	
27th	0	0	0	0	0	0.8	0	0	0	0	0	0	
28th	1.0	0	0	0	0.8	0	0	0	0	0	0	0	
29th	0		0	0	0	0	0	0	0	0	0	0	
30th	0		38.2	0	0	0	0.6	21.2	0	0	0	0	
31st	0		6.6		0		10	67.4				0	
Total	14.6	33.6	145.8	36.0	47.2	157.2	23.4	98.6	75.4	44.8	51.8	0.8	1.4
Mean	98.7	117.0	120.5	111.6	109.6	124.7	70.3	73.2	60.6	73.5	82.3	77.5	98.7

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

Dkousbroek@kleinfelder.com

Mobile: 0458 197 676

Attached:

Figure 1

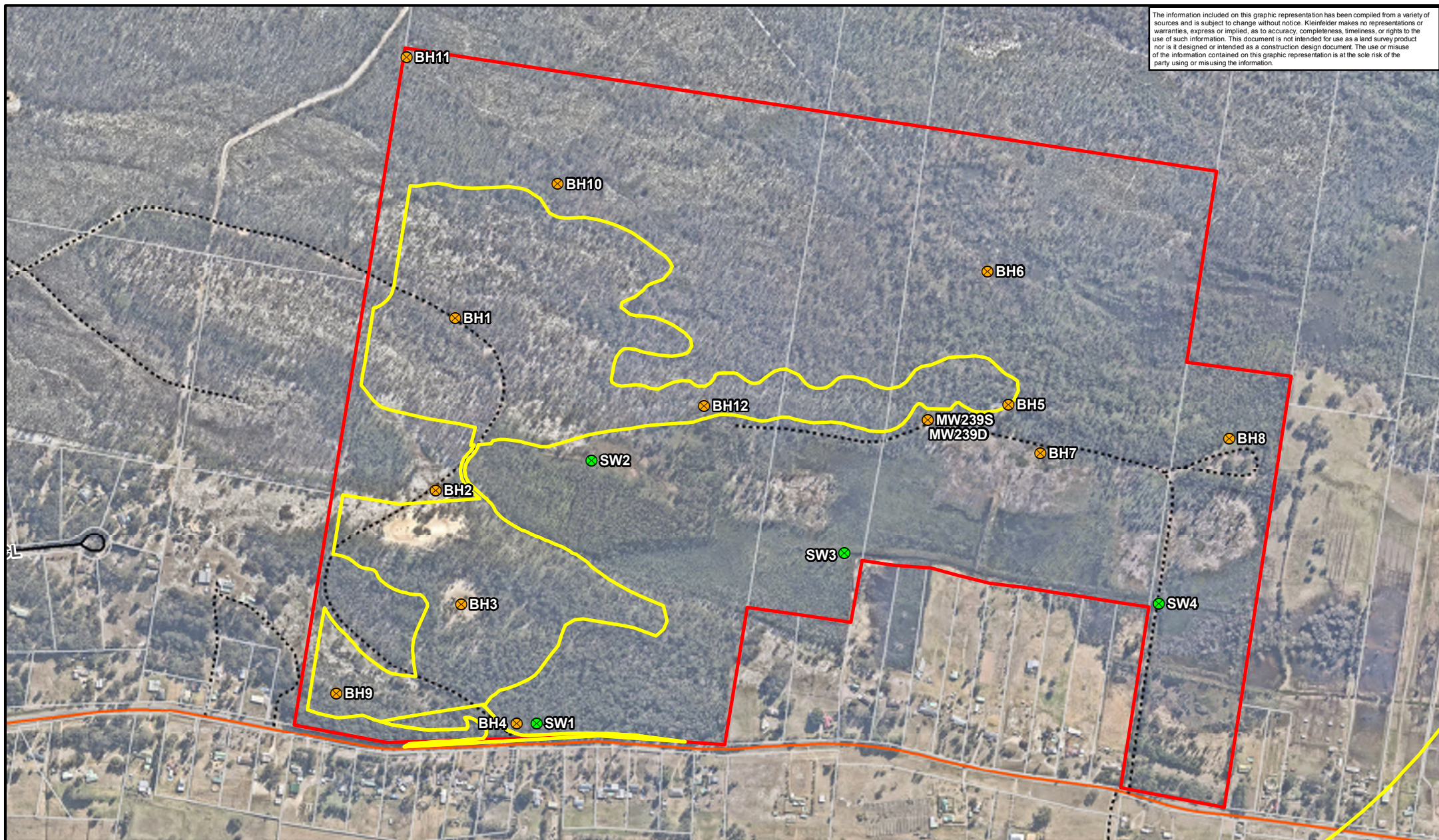
Data Tables

Attachment A – Laboratory reports

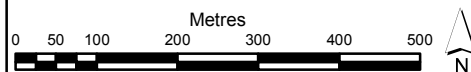
Attachment B – Data Trends

FIGURE 1

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



PROJECT REFERENCE: 20170448
 DATE DRAWN: 13/02/2019 09:48 Version 1
 DRAWN BY: gjoyce
 DATA SOURCE:
 NSW DFSI - 2017
 Nearmap - 2018

Water monitoring locations January 2020 Monitoring

Williamtown Sand Syndicate
 Proposed Sand Quarry
 Cabbage Tree Road, Williamtown

FIGURE:

1

DATA TABLES

20193820.001A



Notes:
 - - Not analysed
 < - Less than laboratory limit of reporting
 µg/L - Micrograms per litre
 BTEXN - Benzene, toluene, ethylbenzene, xylenes, naphthalene
 ** 95% Level of protection in freshwater

Table 2
Groundwater Analytical Data - Metals
Williamstown Sand Syndicate



Analyte	Metals															
	Arsenic**	Barium	Beryllium	Boron**	Cadmium**	Chromium**	Cobalt	Copper**	Iron	Lead**	Manganese**	Mercury**	Nickel**	Selenium**	Vanadium	Zinc**
	0.001 mg/L	0.001 mg/L	0.001 mg/L	0.05 mg/L	0.0001 mg/L	0.001 mg/L	0.001 mg/L	0.001 mg/L	0.05 mg/L	0.001 mg/L	0.001 mg/L	0.0001 mg/L	0.001 mg/L	0.01 mg/L	0.01 mg/L	0.005 mg/L
ANZECC 2000 Trigger Values	0.013			0.37	0.0002	0.001	-	0.0014	-	0.0034	0.1	0.0006	0.011	0.011	-	0.008
NHMRC ADWG 6	0.01		0.06	4	0.002	0.05	-	2	0.3 [†]	0.01	0.5	0.001	0.02	0.01	-	0.016
Sample Name	Sample Date															
BH1	23-Apr-19	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.004	< 0.001	< 0.001	13	< 0.001	0.014	< 0.0001	< 0.001	< 0.01	1.27
	15-May-19	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.004	< 0.001	0.002	10	0.001	0.015	< 0.0001	0.002	< 0.01	0.363
	16-May-19	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	0.001	8.33	< 0.001	0.009	< 0.0001	0.002	< 0.01	0.132
	14-Jun-19	< 0.001	0.001	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.001	6.31	< 0.001	0.009	< 0.0001	0.001	< 0.01	0.074
	16-Jul-19	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	0.002	7.35	< 0.001	0.01	< 0.001	0.001	< 0.01	0.116
	15-Aug-19	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	0.002	7.96	< 0.001	0.008	< 0.0001	0.001	< 0.01	0.123
	16-Sep-19	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.004	< 0.001	0.001	8.84	< 0.001	0.009	< 0.0001	0.001	< 0.01	0.034
	15-Oct-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	0.006	4.32	< 0.001	0.007	< 0.0001	0.001	< 0.01	0.037
	18-Nov-19	< 0.001	0.001	< 0.001	< 0.05	< 0.0001	0.004	< 0.001	< 0.001	11	< 0.001	0.008	< 0.0001	0.001	< 0.01	0.012
	17-Dec-19	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	0.003	< 0.001	0.001	8.48	< 0.001	0.009	< 0.0001	0.001	< 0.01	0.028
	16-Jan-20	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.002	4.43	< 0.001	0.011	< 0.0001	0.002	< 0.01	0.044
	21-Feb-19	< 0.001	0.008	< 0.001	< 0.05	< 0.0001	0.002	0.001	< 0.001	0.26	< 0.001	0.003	< 0.0001	0.005	< 0.01	0.031
BH11	15-Mar-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	1.49	< 0.001	0.007	< 0.0001	0.037	< 0.01	0.016
	23-Apr-19	< 0.001	0.006	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.98	< 0.001	0.007	< 0.0001	0.07	< 0.01	0.04
	15-May-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.97	< 0.001	0.006	< 0.0001	0.004	< 0.01	0.024
	16-May-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.97	< 0.001	0.006	< 0.0001	0.004	< 0.01	0.024
	14-Jun-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	0.98	< 0.001	0.005	< 0.0001	0.001	< 0.01	0.005
	16-Jul-19	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.47	< 0.001	0.003	< 0.0001	0.004	< 0.01	0.007
	15-Aug-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.001	0.87	< 0.001	0.007	< 0.0001	0.001	< 0.01	0.005
	16-Sep-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	0.79	< 0.001	0.008	< 0.0001	0.002	< 0.01	0.012
	15-Oct-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.004	0.74	< 0.001	0.006	< 0.0001	0.003	< 0.01	0.016
	18-Nov-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.95	< 0.001	0.008	< 0.0001	0.002	< 0.01	< 0.005
	17-Dec-19	< 0.001	0.004	< 0.001	0.06	< 0.0001	0.002	< 0.001	0.002	1	< 0.001	0.008	< 0.0001	0.001	< 0.01	0.006
	16-Jan-20	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	1.08	< 0.001	0.007	< 0.0001	0.003	< 0.01	0.005
22-Feb-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.002	0.14	< 0.001	0.021	< 0.001	0.015	< 0.01	0.006	
BH2	15-Mar-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.003	< 0.05	< 0.001	0.02	< 0.0001	< 0.001	< 0.01	< 0.005
	23-Apr-19	< 0.001	0.005	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.004	0.19	< 0.001	0.018	< 0.0001	0.001	< 0.01	0.008
	15-May-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.001	0.06	< 0.001	0.014	< 0.0001	0.001	< 0.01	< 0.005
	14-Jun-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.004	0.08	< 0.001	0.009	< 0.0001	0.001	< 0.01	< 0.005
	16-Jul-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.008	0.05	< 0.001	0.013	< 0.0001	0.001	< 0.01	0.006
	15-Aug-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.012	0.08	< 0.001	0.011	< 0.0001	0.001	< 0.01	< 0.005
	16-Sep-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.008	0.26	< 0.001	0.014	< 0.0001	0.001	< 0.01	0.007
	15-Oct-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.006	0.46	< 0.001	0.011	< 0.0001	0.001	< 0.01	0.007
	18-Nov-19	< 0.001	0.007	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.013	0.08	< 0.001	0.011	< 0.0001	0.007	< 0.01	0.028
	17-Dec-19	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	0.006	0.1	< 0.001	0.012	< 0.0001	0.001	< 0.01	0.006
	16-Jan-20	< 0.001	0.004	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.005	0.73	< 0.001	0.014	< 0.0001	0.001	< 0.01	0.01
	21-Feb-19	< 0.001	0.003	< 0.001	< 0.05	< 0.0001	0.002	< 0.001	< 0.001	0.06	< 0.001	0.005	< 0.0001	0.053	< 0.01	< 0.005
BH3	21-Feb-19	< 0.001	0.014	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.002	0.16	< 0.001	0.039	< 0.0001	0.018	< 0.01	0.014
	15-Mar-19	< 0.001	0.014	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.001	< 0.05	< 0.001	0.014	< 0.0001	0.022	< 0.01	0.043
	23-Apr-19	< 0.001	0.013	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.002	0.99	< 0.001	0.045	< 0.0001	0.007	< 0.01	0.008
	16-May-19	< 0.001	0.013	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	0.27	< 0.001	0.022	< 0.0001	0.022	< 0.01	0.011
	14-Jun-19	< 0.001	0.012	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.038	< 0.05	< 0.001	0.014	< 0.0001	0.001	< 0.01	0.008
	16-Jul-19	< 0.001	0.013	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.046	< 0.05	< 0.001	0.019	< 0.0001	0.001	< 0.01	0.007
	15-Aug-19	< 0.001	0.013	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.026	< 0.05	< 0.001	0.018	< 0.0001	0.001	< 0.01	0.007
	16-Sep-19	< 0.001	0.012	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.051	0.19	< 0.001	0.026	< 0.0001	0.002	< 0.01	0.005
	15-Oct-19	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.011	0.31	< 0.001	0.013	< 0.0001	0.002	< 0.01	0.014
	18-Nov-19	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.005	< 0.05	< 0.001	0.013	< 0.0001	0.001	< 0.01	0.005
	17-Dec-19	< 0.001	0.012	< 0.001	0.06	< 0.0001	0.001	< 0.001	0.008	< 0.05	< 0.001	0.014	< 0.0001	0.001	< 0.01	0.005
	16-Jan-20	< 0.001	0.014	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.006	< 0.05	< 0.001	0.014	< 0.0001	0.001	< 0.01	0.009
BH5	22-Feb-19	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	1.4	< 0.001	0.005	< 0.0001	0.003	< 0.01	0.008
	22-Feb-19	< 0.001	0.03	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	1.03	< 0.001	0.014	< 0.0001	0.001	< 0.01	0.019
	14-Mar-19	< 0.001	0.027	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	1.9	< 0.001	0.01	< 0.0001	0.001	< 0.01	0.012
	23-Apr-19	< 0.001	0.03	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.001	0.96	< 0.001	0.01	< 0.0001	0.001	< 0.01	0.022
	16-May-19	< 0.001	0.029	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	2.57	< 0.001	0.				



KLEINFELDER
Bright People. Right Solutions.

Notes:
 - - Not analysed
 < - Less than laboratory limit of reporting
 µg/L - Micrograms per litre
 *** 99% Level of protection in freshwater
⁴ Recreation water



Notes:
 - - Not analysed
 < - Less than laboratory limit of reporting
 µg/L - Micrograms per litre
 *** 99% Level of protection in freshwater
⁴ Recreation water

Table 3
Groundwater Analytical Data - PFAS
Williamstown Sand Syndicate



Analyte		Sum of PFAS
LOR		0.01
Units		µg/L
NHMRC ADWG 6		
HEPA NEMP 2018***		
HEPA NEMP 2018 [†]		
Sample Name	Sample Date	
BH11	21-Feb-19	< 0.01
BH2	22-Feb-19	< 0.01
BH3	21-Feb-19	< 0.01
BH4	21-Feb-19	< 0.01
	15-Mar-19	< 0.01
	23-Apr-19	< 0.01
	16-May-19	< 0.01
	14-Jun-19	< 0.01
	16-Jul-19	< 0.01
	15-Aug-19	< 0.01
	16-Sep-19	0.02
	25-Sep-19	0.02
	15-Oct-19	< 0.01
	18-Nov-19	< 0.01
	17-Dec-19	< 0.01
	16-Jan-20	< 0.01
BH5	22-Feb-19	< 0.01
BH6	22-Feb-19	< 0.01
	14-Mar-19	< 0.01
	23-Apr-19	< 0.01
	16-May-19	< 0.01
	14-Jun-19	< 0.01
	16-Jul-19	< 0.01
	15-Aug-19	< 0.01
	16-Sep-19	< 0.01
	15-Oct-19	< 0.01
	18-Nov-19	< 0.01
	17-Dec-19	0.19
	16-Jan-20	< 0.01
BH7	22-Feb-19	< 0.01
	14-Mar-19	< 0.01
	23-Apr-19	< 0.01
	16-May-19	< 0.01
	14-Jun-19	< 0.01
	16-Jul-19	< 0.01
	15-Aug-19	< 0.01
	16-Sep-19	< 0.01
	15-Oct-19	< 0.01
	18-Nov-19	< 0.01
	17-Dec-19	< 0.01
	16-Jan-20	< 0.01
BH8	21-Feb-19	< 0.01
	14-Mar-19	< 0.01
	23-Apr-19	< 0.01
	16-May-19	< 0.01
	14-Jun-19	< 0.01
	16-Jul-19	< 0.01
	15-Aug-19	< 0.01
	16-Sep-19	< 0.01
	15-Oct-19	< 0.01
	18-Nov-19	< 0.01
	17-Dec-19	< 0.01
	16-Jan-20	< 0.01
MW239S	22-Feb-19	< 0.01
SW1	16-May-19	< 0.01
	16-Sep-19	< 0.01
	18-Nov-19	< 0.01
SW3	22-Feb-19	< 0.01
	16-May-19	< 0.01
	16-Sep-19	< 0.01
	18-Nov-19	< 0.01
SW4	16-May-19	< 0.01
	16-Sep-19	0.01
	25-Sep-19	0.05
	18-Nov-19	< 0.01

Notes:
 - - Not analysed
 < - Less than laboratory limit of report
 µg/L - Micrograms per litre

*** 99% Level of protection in freshwa
[†] Recreation water

Table 4
Groundwater Analytical Data - Inorganics
Williamstown Sand Syndicate



Analyte		Anions and Cations															Total Cations	Total Anions	Ionic Balance
		Sodium	Calcium	Magnesium	Potassium	Sulphate	Chloride	Fluoride	Reactive phosphorus as P	Total Phosphorus	Nitrite as N	Nitrate as N	Nitrite + Nitrate as N	Ammonia as N	Total Nitrogen as N	Total Kjeldahl Nitrogen as N			
LOR Units		1 mg/L	1 mg/L	1 mg/L	1 mg/L	1 mg/L	1 mg/L	0.1 mg/L	0.01 mg/L	0.01 mg/L	0.01 mg/L	0.01 mg/L	0.01 mg/L	0.01 mg/L	0.1 mg/L	0.1 mg/L	0.01 meq/L	0.01 meq/L	%
ANZECC 2000 Trigger Values								0.02*	0.025*				0.7**		0.9**	0.35*			
NHMRC ADWIG 6		180 ³				250 ³	250 ³	1.5			3	50		0.5 ³					
Sample Name	Sample Date																		
BH1	15-Mar-19	11	2.0	1.0	< 1.0	< 1.0	25	< 0.1	-	-	-	-	-	-	-	-	0.66	0.88	-
	23-Apr-19	14	1.0	2.0	< 1.0	4.0	25	< 0.1	-	-	-	-	-	-	-	-	0.82	0.99	-
	16-May-19	12	< 1.0	2.0	< 1.0	5.0	25	< 0.1	0.03	< 0.01	< 0.01	< 0.01	< 0.01	0.11	0.3	0.3	0.69	1.01	-
	14-Jun-19	10	< 1.0	2.0	< 1.0	3.0	24	< 0.1	-	-	-	-	-	-	-	-	0.6	0.94	-
	16-Jul-19	15	< 1.0	2.0	< 1.0	4.0	23	< 0.1	-	-	-	-	-	-	-	-	0.82	0.95	-
	15-Aug-19	14	< 1.0	2.0	< 1.0	2.0	21	< 0.1	-	-	-	-	-	-	-	-	0.77	0.91	-
	16-Sep-19	13	< 1.0	2.0	< 1.0	2.0	20	< 0.1	< 0.01	0.06	< 0.01	< 0.01	< 0.01	0.12	0.3	0.3	0.73	0.76	-
	15-Oct-19	13	< 1.0	2.0	< 1.0	2.0	21	< 0.1	-	-	-	-	-	-	-	-	0.73	0.71	-
	18-Nov-19	16	< 1.0	2.0	< 1.0	3.0	23	0.1	< 0.01	< 0.01	< 0.01	0.01	0.01	0.13	0.3	0.3	0.86	1.19	-
	17-Dec-19	14	<1	2	<1	5	23	<0.1	-	-	-	-	-	-	-	-	0.77	1.05	-
	16-Jan-20	16	<1	3	<1	3	25	<0.1	-	-	-	-	-	-	-	-	0.94	1.21	-
BH11	21-Feb-19	48	< 1.0	10	< 1.0	24	80	0.1	< 0.01	0.03	< 0.01	0.04	0.04	0.06	1.8	1.8	2.91	2.76	-
	15-Mar-19	26	< 1.0	2.0	< 1.0	2.0	52	< 0.1	-	-	-	-	-	-	-	-	1.3	1.51	-
	23-Apr-19	32	< 1.0	5.0	< 1.0	2.0	57	< 0.1	-	-	-	-	-	-	-	-	1.8	1.65	-
	16-May-19	29	< 1.0	4.0	< 1.0	2.0	55	< 0.1	< 0.01	0.01	< 0.01	< 0.01	< 0.01	0.12	0.4	0.4	1.59	1.59	-
	14-Jun-19	26	< 1.0	3.0	< 1.0	< 1.0	53	< 0.1	-	-	-	-	-	-	-	-	1.38	1.5	-
	16-Jul-19	49	< 1.0	8.0	< 1.0	8.0	73	0.2	-	-	-	-	-	-	-	-	2.79	2.22	-
	15-Aug-19	28	< 1.0	3.0	< 1.0	4.0	46	< 0.1	-	-	-	-	-	-	-	-	1.46	1.41	-
	16-Sep-19	27	< 1.0	3.0	< 1.0	5.0	47	< 0.1	< 0.01	0.12	< 0.01	< 0.01	< 0.01	0.15	0.7	0.7	1.42	1.4	-
	15-Oct-19	28	< 1.0	3.0	< 1.0	3.0	44	< 0.1	-	-	-	-	-	-	-	-	1.46	1.3	-
	18-Nov-19	28	< 1.0	3.0	< 1.0	< 1.0	53	< 0.1	< 0.01	2.11	< 0.01	0.06	0.06	0.18	5.9	5.8	1.46	1.5	-
	17-Dec-19	26	<1	4	<1	<1	48	<0.1	-	-	-	-	-	-	-	-	1.46	1.39	-
16-Jan-20	25	<1	3	<1	<1	46	<0.1	-	-	-	-	-	-	-	-	1.33	1.34	-	
BH2	22-Feb-19	12	2.0	2.0	< 1.0	6.0	22	0.1	< 0.01	0.28	< 0.01	2.76	2.76	0.05	4.0	1.2	0.79	0.74	-
	15-Mar-19	10	3.0	2.0	< 1.0	7.0	23	< 0.1	-	-	-	-	-	-	-	-	0.75	0.79	-
	23-Apr-19	14	2.0	2.0	< 1.0	6.0	23	< 0.1	-	-	-	-	-	-	-	-	0.87	0.77	-
	16-May-19	12	2.0	2.0	< 1.0	21	22	< 0.1	< 0.01	0.26	< 0.01	0.38	0.38	0.01	1.3	0.9	0.79	1.06	-
	14-Jun-19	11	1.0	2.0	< 1.0	5.0	23	< 0.1	-	-	-	-	-	-	-	-	0.69	0.75	-
	16-Jul-19	13	2.0	2.0	< 1.0	9.0	20	< 0.1	-	-	-	-	-	-	-	-	0.83	0.75	-
	15-Aug-19	12	1.0	2.0	< 1.0	8.0	20	< 0.1	-	-	-	-	-	-	-	-	0.74	0.73	-
	16-Sep-19	11	2.0	2.0	< 1.0	8.0	18	< 0.1	< 0.01	0.28	< 0.01	1.07	1.07	0.04	2.7	1.6	0.74	0.67	-
	15-Oct-19	12	2.0	2.0	< 1.0	5.0	20	< 0.1	-	-	-	-	-	-	-	-	0.79	0.67	-
	18-Nov-19	14	2.0	1.0	< 1.0	7.0	19	< 0.1	< 0.01	0.21	< 0.01	1.01	1.01	0.05	2.1	1.1	0.79	0.68	-
	17-Dec-19	13	2	2	<1	8	17	<0.1	-	-	-	-	-	-	-	-	0.83	0.69	-
16-Jan-20	13	2	2	<1	6	17	<0.1	-	-	-	-	-	-	-	-	0.83	0.72	-	
BH3	21-Feb-19	4.0	4.0	1.0	< 1.0	4.0	10	< 0.1	< 0.01	2.76	< 0.01	0.78	0.78	0.3	5.9	5.1	0.46	0.54	-
	21-Feb-19	8.0	2.0	1.0	1.0	5.0	17	< 0.1	< 0.01	0.19	< 0.01	0.35	0.35	0.04	0.6	0.3	0.56	0.7	-
	15-Mar-19	9.0	2.0	< 1.0	< 1.0	5.0	18	< 0.1	-	-	-	-	-	-	-	-	0.49	0.61	-
	23-Apr-19	10	2.0	1.0	1.0	3.0	19	< 0.1	-	-	-	-	-	-	-	-	0.64	0.6	-
	16-May-19	9.0	2.0	1.0	1.0	22	19	< 0.1	< 0.01	0.97	< 0.01	0.29	0.29	< 0.01	1.0	0.7	0.6	0.99	-
	14-Jun-19	6.0	1.0	1.0	< 1.0	4.0	18	< 0.1	-	-	-	-	-	-	-	-	0.39	0.59	-
	16-Jul-19	10	2.0	2.0	1.0	6.0	18	< 0.1	-	-	-	-	-	-	-	-	0.72	0.63	-
	15-Aug-19	8.0	2.0	1.0	1.0	5.0	16	< 0.1	-	-	-	-	-	-	-	-	0.56	0.56	-
	16-Sep-19	11	2.0	2.0	< 1.0	8.0	19	< 0.1	< 0.01	0.4	< 0.01	0.24	0.24	0.02	0.6	0.4	0.74	0.7	-
	15-Oct-19	10	1.0	1.0	< 1.0	4.0	18	< 0.1	-	-	-	-	-	-	-	-	0.57	0.59	-
	18-Nov-19	11	1.0	1.0	< 1.0	6.0	18	< 0.1	< 0.01	0.08	< 0.01	0.29	0.29	< 0.01	0.3	< 0.1	0.61	0.63	-
	17-Dec-19	9	1	1	1	6	16	<0.1	-	-	-	-	-	-	-	-	0.55	0.64	-
	16-Jan-20	13	2	2	2	6	18	<0.1	-	-	-	-	-	-	-	-	0.88	0.71	-
BH5	22-Feb-19	42	< 1.0	6.0	1.0	19	69	0.2	< 0.01	0.34	< 0.01	< 0.01	< 0.01	0.09	3.0	3.0	2.35	2.34	-
	22-Feb-19	28	3.0	4.0	1.0	28	42	< 0.1	< 0.01	0.05	< 0.01	0.09	0.09	0.14	0.5	0.4	1.72	1.77	-
	14-Mar-19	23	2.0	4.0	1.0	17	37	< 0.1	-	-	-	-	-	-	-	-	1.46	1.44	-
	23-Apr-19	25	3.0	4.0	1.0	18	42	< 0.1	-	-	-	-	-	-	-	-	1.59	1.56	-
	16-May-19	23	3.0	4.0	1.0	18	45	< 0.1	< 0.01	0.13	< 0.01	< 0.01	< 0.01	0.14	0.6	0.6	1.5	1.64	-
	14-Jun-19	20	2.0	4.0	1.0	16	42	< 0.1	-	-	-	-	-	-	-	-	1.32	1.52	-
	16-Jul-19	23	2.0	4.0	1.0	20	35	< 0.1	-	-	-	-	-	-	-	-	1.46	1.4	-
	15-Aug-19	23	2.0	3.0	1.0	21	38	< 0.1	-	-	-	-	-	-	-	-	1.37	1.51	-
	16-Sep-19	25	3.0	3.0	1.0	21	38	< 0.1	< 0.01	0.15	< 0.01	0.07	0.07	0.19	0.8	0.7	1.51	1.55	-
	15-Oct-19	25	2.0	4.0	1.0	13	41	< 0.1	-	-	-	-	-	-	-	-	1.54	1.43	-
	18-Nov-19	27	3.0	3.0	1.0	18	45	< 0.1	< 0.01	0.06	< 0.01	< 0.01	< 0.01	0.23	0.4	0.4	1.6	1.64	-
	17-Dec-19	26	2	4	1	16	42	<0.1	-	-	-	-	-	-	-	-	1.58	1.62	-
	16-Jan-20	30	3	4	2	15	50	0.2	-	-	-	-	-	-	-	-	1.83	1.86	-
BH6	22-Feb-19	34	< 1.0	5.0	2.0	12	64	0.2	< 0.01	0.13	< 0.01	0.02	0.02	0.34	2.2	2.2	1.94	2.06	-
	14-Mar-19	36	< 1.0	6.0	2.0	16	61	< 0.1	-	-	-	-	-	-	-	-	2.11	2.05	1.37
	23-Apr-19	38	< 1.0	6.0	2.0	17	62	< 0.1	-	-	-	-	-	-	-	-	2.2	2.1	-
	16-May-19	35	< 1.0	5.0	2.0	15	68	0.2	< 0.01	0.06	< 0.01	< 0.01	< 0.01	0.27	0.9	0.9	1.98	2.23	-
	14-Jun-19	31	< 1.0	4.0	2.0	11	56	0.1	-	-	-	-	-	-	-	-	1.73	1.81	-
	16-Jul-19	36	&																

Table 4
Groundwater Analytical Data - Inorganics
Williamstown Sand Syndicate



Sodium Adsorption Ratio	Alkalinity					Electrical Conductivity @ 25°C*	Inorganics		pH
	Bicarbonate Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Hydroxide Alkalinity as CaCO3	Total Alkalinity as CaCO3	Total Hardness as CaCO3		Total Dissolved Solids	Total Dissolved Solids	
0.01	1	1	1	1	1	1	1	10	0.01
-	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	pH units
					200 ³	125-2200	600 ³		6.5 - 8.0*
									6.5-8.5 ³
-	9.0	<1.0	<1.0	9.0	9.0	104	68	129	5.67
-	10	<1.0	<1.0	10	11	84	55	97	5.83
1.7	10	<1.0	<1.0	10	8.0	105	68	164	5.82
-	10	<1.0	<1.0	10	8.0	99	64	72	5.52
-	11	<1.0	<1.0	11	8.0	102	66	84	5.62
-	14	<1.0	<1.0	14	8.0	128	83	82	6.22
1.84	8.0	<1.0	<1.0	8.0	8.0	102	66	88	5.44
-	4.0	<1.0	<1.0	4.0	8.0	98	64	-	5.5
2.26	24	<1.0	<1.0	24	8.0	126	82	-	6.29
-	15	<1	<1	15	8	118	77	-	6.05
-	22	<1	<1	22	12	112	73	-	6.23
3.21	<1.0	<1.0	<1.0	<1.0	41	346	278	-	4.67
-	<1.0	<1.0	<1.0	<1.0	8.0	186	121	144	4.82
-	<1.0	<1.0	<1.0	<1.0	20	150	98	135	4.99
3.0	<1.0	<1.0	<1.0	<1.0	16	188	122	216	4.91
-	<1.0	<1.0	<1.0	<1.0	12	175	114	107	4.84
-	<1.0	<1.0	<1.0	<1.0	33	318	207	192	4.68
-	<1.0	<1.0	<1.0	<1.0	12	197	128	135	4.88
3.18	<1.0	<1.0	<1.0	<1.0	12	195	127	140	4.66
-	<1.0	<1.0	<1.0	<1.0	12	194	126	-	4.92
3.3	<1.0	<1.0	<1.0	<1.0	12	193	125	-	5.12
-	2	<1	<1	2	16	196	127	-	5.03
-	2	<1	<1	2	12	168	109	-	5.09
1.44	<1.0	<1.0	<1.0	<1.0	13	91	128	-	4.87
-	<1.0	<1.0	<1.0	<1.0	16	101	66	90	4.71
-	<1.0	<1.0	<1.0	<1.0	13	70	46	84	4.82
1.44	<1.0	<1.0	<1.0	<1.0	13	94	61	144	4.85
-	<1.0	<1.0	<1.0	<1.0	11	91	59	51	4.76
-	<1.0	<1.0	<1.0	<1.0	13	90	58	63	4.84
-	<1.0	<1.0	<1.0	<1.0	11	110	72	61	5.2
1.32	<1.0	<1.0	<1.0	<1.0	13	96	62	60	4.72
-	<1.0	<1.0	<1.0	<1.0	13	102	66	-	5.06
2.02	<1.0	<1.0	<1.0	<1.0	9.0	102	66	-	5.47
-	2	<1	<1	2	13	106	69	-	5.43
-	6	<1	<1	6	13	102	66	-	5.61
0.46	9.0	<1.0	<1.0	9.0	14	60	438	-	5.55
1.15	6.0	<1.0	<1.0	6.0	9.0	73	96	-	5.4
-	<1.0	<1.0	<1.0	<1.0	5.0	77	50	70	5.12
-	<1.0	<1.0	<1.0	<1.0	9.0	54	35	61	5.05
1.3	<1.0	<1.0	<1.0	<1.0	9.0	73	47	100	4.99
-	<1.0	<1.0	<1.0	<1.0	7.0	69	45	36	4.84
-	<1.0	<1.0	<1.0	<1.0	13	75	49	42	4.96
-	<1.0	<1.0	<1.0	<1.0	9.0	85	55	49	5.01
1.32	<1.0	<1.0	<1.0	<1.0	13	95	62	58	4.83
-	<1.0	<1.0	<1.0	<1.0	7.0	85	55	-	4.93
1.86	<1.0	<1.0	<1.0	<1.0	7.0	86	56	-	5.34
-	3	<1	<1	3	7	85	55	-	5.44
-	4	<1	<1	4	13	85	55	-	5.5
3.59	<1.0	<1.0	<1.0	<1.0	25	250	211	-	4.87
2.49	<1.0	<1.0	<1.0	<1.0	24	177	144	-	4.37
-	2.0	<1.0	<1.0	2.0	21	179	116	146	4.95
-	<1.0	<1.0	<1.0	<1.0	24	136	88	115	4.64
2.04	<1.0	<1.0	<1.0	<1.0	24	175	114	214	4.88
-	<1.0	<1.0	<1.0	<1.0	21	174	113	90	4.82
-	<1.0	<1.0	<1.0	<1.0	21	161	105	82	4.73
-	<1.0	<1.0	<1.0	<1.0	17	201	131	104	4.87
2.44	2.0	<1.0	<1.0	2.0	20	197	128	124	4.68
-	<1.0	<1.0	<1.0	<1.0	11	202	131	-	5.17
2.64	<1.0	<1.0	<1.0	<1.0	5	204	133	-	5.32
-	5	<1	<1	5	21	207	134	-	5.58
-	7	<1	<1	7	24	218	142	-	5.51
3.16	<1.0	<1.0	<1.0	<1.0	20	213	196	-	4.76
-	<1.0	<1.0	<1.0	<1.0	25	271	176	212	4.73
-	<1.0	<1.0	<1.0	<1.0	25	205	133	185	4.51
3.26	<1.0	<1.0	<1.0	<1.0	20	235	153	310	4.87
-	<1.0	<1.0	<1.0	<1.0	16	213	138	145	4.91
-	<1.0	<1.0	<1.0	<1.0	20	202	131	164	5.0
-	8.0	<1.0	<1.0	8.0	16	232	151	168	5.53
2.79	5.0	<1.0	<1.0	5.0	16	222	144	181	5.07
-	<1.0	<1.0	<1.0	<1.0	20	252	164	-	4.95
2.89	<1.0	<1.0	<1.0	<1.0	20	239	155	-	4.97
-	2.0	<1	<1	2.0	20	210	136	-	5.14
-	3	<1	<1	3	16	202	131	-	5.27

Table 4
Groundwater Analytical Data - Inorganics
Williamstown Sand Syndicate



Analyte	Anions and Cations																
	Sodium	Calcium	Magnesium	Potassium	Sulphate	Chloride	Fluoride	Reactive phosphorus as P	Total Phosphorus	Nitrite as N	Nitrate as N	Nitrite + Nitrate as N	Ammonia as N	Total Nitrogen as N	Total Kjeldahl Nitrogen as N	Total Cations	Total Anions
LOR	1	1	1	1	1	1	0.1	0.01	0.01	0.01	0.01	0.01	0.01	0.1	0.1	0.01	0.01
Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	meq/L	meq/L
ANZECC 2000 Trigger Values								0.02*	0.025*		0.7**		0.9**	0.35*			
NHMRC ADWG 6	180 ³				250 ³	250 ³	1.5			3	50		0.5 ³				
BH8	21-Feb-19	52	< 1.0	6.0	< 1.0	11	90	< 0.1	< 0.01	< 0.01	< 0.01	< 0.01	0.5	2.4	2.4	2.76	2.77
	14-Mar-19	45	< 1.0	6.0	< 1.0	6.0	76	< 0.1	-	-	-	-	-	-	-	2.45	2.27
	23-Apr-19	53	< 1.0	7.0	< 1.0	8.0	89	< 0.1	-	-	-	-	-	-	-	2.88	2.68
	16-May-19	47	< 1.0	4.0	< 1.0	6.0	81	< 0.1	< 0.01	< 0.01	< 0.01	< 0.01	0.12	0.4	0.4	2.37	2.43
	14-Jun-19	47	< 1.0	5.0	< 1.0	4.0	89	< 0.1	-	-	-	-	-	-	-	2.46	2.59
	16-Jul-19	57	< 1.0	5.0	< 1.0	7.0	121	0.1	-	-	-	-	-	-	-	2.89	4.87
	15-Aug-19	42	< 1.0	3.0	< 1.0	4.0	63	< 0.1	-	-	-	-	-	-	-	2.07	1.86
	16-Sep-19	46	< 1.0	3.0	< 1.0	4.0	70	< 0.1	< 0.01	< 0.01	< 0.01	< 0.01	0.13	1.1	1.1	2.25	2.06
	15-Oct-19	45	< 1.0	4.0	< 1.0	4.0	70	< 0.1	-	-	-	-	-	-	-	2.29	2.06
	18-Nov-19	49	< 1.0	4.0	< 1.0	8.0	80	< 0.1	< 0.01	< 0.01	0.01	0.01	0.17	1.3	1.3	2.46	2.42
	17-Dec-19	50	< 1	4	< 1	10	75	< 0.1	-	-	-	-	-	-	-	2.5	2.36
	16-Jan-20	49	< 1	4	< 1	13	78	< 0.1	-	-	-	-	-	-	-	2.46	6.61
MW239S	22-Feb-19	61	< 1.0	6.0	< 1.0	6.0	104	< 0.1	< 0.01	< 0.01	< 0.01	< 0.01	0.18	3.9	3.9	3.15	3.06
	14-Mar-19	64	< 1.0	6.0	< 1.0	2.0	126	< 0.1	-	-	-	-	-	-	-	3.28	3.64
	23-Apr-19	64	< 1.0	7.0	1.0	9.0	97	< 0.1	-	-	-	-	-	-	-	3.38	2.92
	16-May-19	52	< 1.0	6.0	< 1.0	13	88	< 0.1	< 0.01	< 0.01	< 0.01	< 0.01	0.09	1.7	1.7	2.76	2.75
	14-Jun-19	50	< 1.0	6.0	< 1.0	13	87	< 0.1	-	-	-	-	-	-	-	2.67	2.86
	16-Jul-19	52	< 1.0	7.0	1.0	16	73	< 0.1	-	-	-	-	-	-	-	2.86	2.39
	15-Aug-19	54	< 1.0	7.0	< 1.0	11	88	< 0.1	-	-	-	-	-	-	-	2.92	2.71
	16-Sep-19	55	< 1.0	6.0	1.0	14	85	< 0.1	< 0.01	< 0.01	< 0.01	< 0.01	0.1	1.4	1.4	2.91	2.69
	15-Oct-19	58	< 1.0	6.0	< 1.0	8.0	108	< 0.1	-	-	-	-	-	-	-	3.02	3.21
	18-Nov-19	63	< 1.0	6.0	1.0	8.0	118	< 0.1	< 0.01	< 0.01	< 0.01	< 0.01	0.17	1.2	1.2	3.26	3.5
	17-Dec-19	65	< 1	8	< 1	6	127	< 0.1	-	-	-	-	-	-	-	3.48	3.75
	16-Jan-20	67	< 1	8	< 1	7	120	< 0.1	-	-	-	-	-	-	-	3.57	3.57
SW1	23-Apr-19	94	34	52	6.0	310	95	0.5	-	-	-	-	-	-	-	10	9.13
	16-May-19	86	24	42	6.0	324	112	0.3	< 0.01	0.13	< 0.01	< 0.01	< 0.01	1.8	1.8	8.94	9.9
	14-Jun-19	77	20	34	5.0	182	112	0.4	-	-	-	-	-	-	-	7.27	6.95
	16-Jul-19	90	20	35	4.0	240	130	0.4	-	-	-	-	-	-	-	7.9	8.66
	15-Aug-19	97	18	32	4.0	212	134	0.4	-	-	-	-	-	-	-	7.85	8.19
	16-Sep-19	117	21	39	4.0	244	193	0.7	< 0.01	0.05	< 0.01	0.02	0.02	1.2	1.2	9.45	11
	15-Oct-19	124	16	31	3.0	127	191	0.6	-	-	-	-	-	-	-	8.82	8.03
	18-Nov-19	142	14	30	4.0	165	234	0.5	< 0.01	0.02	< 0.01	< 0.01	< 0.01	0.03	1.1	9.45	10
SW3	22-Feb-19	40	4.0	4.0	1.0	16	82	< 0.1	< 0.01	0.06	< 0.01	< 0.01	< 0.01	0.16	1.0	2.55	2.87
	14-Mar-19	45	6.0	6.0	2.0	44	64	< 0.1	-	-	-	-	-	-	-	2.8	2.8
	23-Apr-19	37	8.0	6.0	1.0	42	53	< 0.1	-	-	-	-	-	-	-	2.53	2.37
	16-May-19	35	7.0	5.0	< 1.0	34	54	< 0.1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.1	2.28	2.25
	14-Jun-19	32	7.0	6.0	< 1.0	41	55	< 0.1	-	-	-	-	-	-	-	2.24	2.4
	16-Jul-19	46	8.0	12	< 1.0	104	57	0.2	-	-	-	-	-	-	-	3.39	3.77
	15-Aug-19	38	6.0	7.0	< 1.0	54	56	0.1	-	-	-	-	-	-	-	2.53	2.7
	16-Sep-19	42	7.0	8.0	< 1.0	48	57	0.1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	0.1	2.83	2.61
	15-Oct-19	40	5.0	7.0	< 1.0	42	57	0.2	-	-	-	-	-	-	-	2.56	2.48
	18-Nov-19	36	5.0	5.0	< 1.0	29	56	< 0.1	< 0.01	0.04	< 0.01	0.01	0.01	0.03	0.6	2.23	2.18
	17-Dec-19	40	4	7	1	25	57	< 0.1	-	-	-	-	-	-	-	2.54	2.25
	23-Apr-19	39	5.0	5.0	< 1.0	60	64	0.1	-	-	-	-	-	-	-	2.36	3.05
	16-May-19	41	5.0	5.0	< 1.0	41	59	< 0.1	0.01	< 0.01	< 0.01	0.05	0.05	< 0.01	0.2	2.44	2.52
SW4	14-Jun-19	40	5.0	5.0	< 1.0	39	60	< 0.1	-	-	-	-	-	-	-	2.4	2.5
	16-Jul-19	46	7.0	7.0	< 1.0	67	56	0.2	-	-	-	-	-	-	-	2.93	2.97
	15-Aug-19	40	5.0	5.0	< 1.0	43	55	0.1	-	-	-	-	-	-	-	2.4	2.45
	16-Sep-19	45	7.0	6.0	< 1.0	45	58	0.1	< 0.01	0.01	< 0.01	< 0.01	< 0.01	0.1	0.1	2.8	2.57
	15-Oct-19	44	6.0	6.0	< 1.0	38	57	0.1	-	-	-	-	-	-	-	2.71	2.4
	18-Nov-19	41	4.0	5.0	< 1.0	41	64	0.2	< 0.01	< 0.01	0.02	0.02	< 0.01	0.2	0.2	2.76	2.66

Notes:
 - - Not analysed
 < - Less than laboratory limit of reporting
 LOR - Laboratory limit of reporting
 mg/L - Milligrams per litre
 µS/cm - Microsiemens per centimeter
 Bold indicates a detection above the laboratory limit of reporting

* 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)

** 95% Level of protection in freshwater

³ Aesthetic

Table 4
Groundwater Analytical Data - Inorganics
Williamstown Sand Syndicate



Sodium Adsorption Ratio	Alkalinity					Electrical Conductivity @ 25°C*	Inorganics		pH
	Bicarbonate Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Hydroxide Alkalinity as CaCO3	Total Alkalinity as CaCO3	Total Hardness as CaCO3		Total Dissolved Solids	Total Dissolved Solids	
	1	1	1	1	1		1	10	0.01
-	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	pH units
					200 ¹	125-2200	600 ¹		6.5 - 8.5 ¹
4.44	< 1.0	< 1.0	< 1.0	< 1.0	25	352	258	-	4.46
-	< 1.0	< 1.0	< 1.0	< 1.0	25	319	207	253	4.77
-	< 1.0	< 1.0	< 1.0	< 1.0	29	264	172	223	4.76
4.86	1.0	< 1.0	< 1.0	1.0	16	302	196	354	4.9
-	< 1.0	< 1.0	< 1.0	< 1.0	20	315	205	194	4.82
-	< 1.0	< 1.0	< 1.0	< 1.0	20	353	229	226	4.78
-	< 1.0	< 1.0	< 1.0	< 1.0	12	260	169	140	5.0
5.43	< 1.0	< 1.0	< 1.0	< 1.0	12	293	190	206	4.85
-	< 1.0	< 1.0	< 1.0	< 1.0	16	303	197	-	5.02
5.06	< 1.0	< 1.0	< 1.0	< 1.0	16	316	205	-	5.12
-	2	< 1	< 1	2	16	328	213	-	5.02
-	7	< 1	< 1	7	16	318	207	-	5.55
5.21	< 1.0	< 1.0	< 1.0	< 1.0	25	329	234	-	4.89
-	2.0	< 1.0	< 1.0	2.0	25	410	266	232	5.02
-	< 1.0	< 1.0	< 1.0	< 1.0	29	294	191	208	4.92
4.44	< 1.0	< 1.0	< 1.0	< 1.0	25	327	212	320	4.87
-	7.0	< 1.0	< 1.0	7.0	25	334	217	220	5.39
-	< 1.0	< 1.0	< 1.0	< 1.0	29	353	229	188	4.85
-	< 1.0	< 1.0	< 1.0	< 1.0	29	359	233	195	4.83
4.7	< 1.0	< 1.0	< 1.0	< 1.0	25	373	242	224	4.66
-	< 1.0	< 1.0	< 1.0	< 1.0	25	404	263	-	4.86
5.38	< 1.0	< 1.0	< 1.0	< 1.0	25	419	272	-	4.76
-	2	< 1	< 1	2	33	439	285	-	5.01
-	2	< 1	< 1	2	33	423	275	-	5.02
-	< 1.0	< 1.0	< 1.0	< 1.0	299	893	580	707	4.01
2.45	< 1.0	< 1.0	< 1.0	< 1.0	233	947	616	715	4.6
-	< 1.0	< 1.0	< 1.0	< 1.0	190	847	550	512	4.5
-	< 1.0	< 1.0	< 1.0	< 1.0	194	876	569	568	4.42
-	< 1.0	< 1.0	< 1.0	< 1.0	177	813	528	548	4.53
3.49	< 1.0	< 1.0	< 1.0	< 1.0	213	1,080	702	689	4.32
-	< 1.0	< 1.0	< 1.0	< 1.0	168	1,050	682	-	5.32
4.91	< 1.0	< 1.0	< 1.0	< 1.0	158	1,090	708	-	5.06
3.38	11	< 1.0	< 1.0	11	26	262	228	-	6.21
-	4.0	< 1.0	< 1.0	4.0	40	344	224	279	5.42
-	< 1.0	< 1.0	< 1.0	< 1.0	45	220	143	190	5.2
2.47	1.0	< 1.0	< 1.0	1.0	38	271	176	300	5.24
-	< 1.0	< 1.0	< 1.0	< 1.0	42	300	195	170	4.58
-	< 1.0	< 1.0	< 1.0	< 1.0	69	451	293	246	4.47
-	< 1.0	< 1.0	< 1.0	< 1.0	44	338	220	192	4.47
2.57	< 1.0	< 1.0	< 1.0	< 1.0	50	374	243	201	4.3
-	< 1.0	< 1.0	< 1.0	< 1.0	41	383	249	-	4.75
2.72	< 1.0	< 1.0	< 1.0	< 1.0	33	278	181	-	5.39
-	6	< 1	< 1	6	39	301	196	-	5.75
-	< 1.0	< 1.0	< 1.0	< 1.0	33	293	190	198	4.0
3.1	< 1.0	< 1.0	< 1.0	< 1.0	33	331	215	288	4.08
-	< 1.0	< 1.0	< 1.0	< 1.0	33	316	205	163	4.31
-	< 1.0	< 1.0	< 1.0	< 1.0	46	367	238	207	4.46
-	< 1.0	< 1.0	< 1.0	< 1.0	33	308	200	160	4.48
3.01	< 1.0	< 1.0	< 1.0	< 1.0	42	360	234	208	4.35
-	< 1.0	< 1.0	< 1.0	< 1.0	40	365	237	-	4.48
3.22	< 1.0	< 1.0	< 1.0	< 1.0	30	348	226	-	4.48

Table 5
Quality Control Sample Analysis - BTEXN
Williamstown Sand Syndicate



Analyte			BTEXN								Total Petroleum Hydrocarbons					Total Petroleum Hydrocarbons	
			Benzene	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene	Total Xylenes	Naphthalene	Sum of BTEX	C ₆ - C ₉	C ₁₀ - C ₁₄	C ₁₅ - C ₂₈	C ₂₉ - C ₃₆	C ₁₀ - C ₃₆ sum	C ₁₀ -C ₁₄ - Silica Cleanup	C ₁₅ -C ₂₈ - Silica Cleanup
Sample Name	Sample Date	Sample Type	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
TRIP BLANK 13022019	13-Feb-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
RINSATE01 21022019	21-Feb-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
BH8 21022019	21-Feb-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
DUP01 21022019	21-Feb-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
BH8 21022019	21-Feb-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
TRIP01 21022019	21-Feb-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	< 20	< 50	< 100	< 100	< 100	< 100	< 50	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK 130319	13-Mar-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
RINSATE02 140319	14-Mar-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
BH7 140319	14-Mar-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
DUP02 140319	14-Mar-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK 03	23-Apr-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
RINSATE 03	23-Apr-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
TRIP BLANK 04	16-May-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
RINSATE 04	16-May-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
TRIP BLANK 05 14062019	14-Jun-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
RINSATE 05 14062019	14-Jun-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
SW3 14062019	14-Jun-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
DUP05 14062019	14-Jun-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
SW3 14062019	14-Jun-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
TRIP05 140619	14-Jun-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	< 20	-	< 1.0	-	-	-	< 50	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK 06 16072019	16-Jul-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
RINSATE06 16072019	16-Jul-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
RINSATE07	15-Aug-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 50	< 100
TRIP BLANK 08 16092019	16-Sep-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
RINSATE 08 16092019	16-Sep-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
SW4 16092019	16-Sep-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
DUP08 16092019	16-Sep-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
SW4 16092019	16-Sep-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
TRIP08 16092019	16-Sep-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	< 20	200	400	200	800	800	< 50	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK 15102019	15-Oct-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
RINSATE 15102019	15-Oct-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
TRIPBLANK09 181119	18-Nov-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
RINSATE09 181119	18-Nov-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
SW4 181119	18-Nov-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
DUP09 181119	18-Nov-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
SW4 181119	18-Nov-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
TRIP09 18112019	18-Nov-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	< 20	< 50	< 100	< 100	< 100	< 100	< 50	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIPBLANK10 171219	17-Dec-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
RINSATE10 171219	17-Dec-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
TRIP BLANK 13 2001333004	16-Jan-20	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
RINSATE 13 2001333009	16-Jan-20	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
BH6 2001333004	16-Jan-20	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
QW12 2001333012	16-Jan-20	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
BH6 2001333004	16-Jan-20	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
QW13 14392	16-Jan-20	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	< 20	250	300	100	650	650	< 50	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

Notes:
 - - Not analysed
 < - Less than laboratory limit of reporting
 NC - Not calculated
 µg/L - Micrograms per litre
 BTEXN - Benzene, toluene, ethylbenzene, xylenes, naphthalene

20193820.001A

Table 6
Quality Control Sample Analysis - Metals
Williamstown Sand Syndicate



Analyte			Metals															
			Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Nickel	Selenium	Vanadium	Zinc
Units			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	
Sample Name	Sample Date	Sample Type	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
TRIP BLANK 13022019	13-Feb-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE01 21022019	21-Feb-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH8 21022019	21-Feb-19	Primary	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.005
DUP01 21022019	21-Feb-19	Duplicate	0.001	0.014	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	4.09	< 0.001	0.012	< 0.0001	0.003	< 0.01	< 0.01	0.015
Relative Percentage Difference			67%	24%	NC	NC	NC	0%	NC	NC	0%	NC	0%	NC	40%	NC	NC	100%
BH8 21022019	21-Feb-19	Primary	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.005
TRIP01 21022019	21-Feb-19	Triplicate	0.001	< 0.02	< 0.001	< 0.05	< 0.0002	< 0.005	< 0.001	< 0.001	4.5	< 0.001	0.012	< 0.0001	0.003	< 0.01	< 0.005	0.006
Relative Percentage Difference			67%	10%	NC	NC	NC	86%	NC	NC	9%	NC	0%	NC	40%	NC	NC	18%
TRIP BLANK 130319	13-Mar-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
TRIP BLANK02 150319	15-Mar-19	Trip Blank	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE02 140319	14-Mar-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH7 140319	14-Mar-19	Primary	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
DUP02 140319	14-Mar-19	Duplicate	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	0.002	< 0.001	2.51	< 0.001	0.021	< 0.0001	0.004	< 0.01	< 0.01	0.007
Relative Percentage Difference			NC	0%	NC	NC	NC	0%	40%	NC	33%	NC	5%	NC	0%	NC	NC	25%
BH7 140319	14-Mar-19	Primary	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
TRIP02 14032019	14-Mar-19	Triplicate	< 0.001	< 0.02	< 0.001	< 0.05	< 0.0002	0.001	0.002	< 0.001	1.7	< 0.001	0.019	< 0.0001	< 0.001	-	< 0.005	< 0.005
Relative Percentage Difference			NC	0%	NC	NC	NC	0%	40%	NC	6%	NC	5%	NC	156%	NC	NC	113%
TRIP BLANK 03	23-Apr-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE 03	23-Apr-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
TRIP BLANK 04	16-May-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE 04	16-May-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
TRIP BLANK 05 14062019	14-Jun-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE 05 14062019	14-Jun-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
SW3 14062019	14-Jun-19	Primary	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	< 0.001	0.003	< 0.001	1.68	< 0.001	0.038	< 0.0001	0.003	< 0.01	< 0.01	0.016
DUP05 14062019	14-Jun-19	Duplicate	< 0.001	0.036	< 0.001	< 0.05	< 0.0001	< 0.001	0.003	< 0.001	1.63	< 0.001	0.039	< 0.0001	0.003	< 0.01	< 0.01	0.013
Relative Percentage Difference			NC	3%	NC	NC	NC	NC	0%	NC	3%	NC	3%	NC	0%	NC	NC	21%
SW3 14062019	14-Jun-19	Primary	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	< 0.001	0.003	< 0.001	1.68	< 0.001	0.038	< 0.0001	0.003	< 0.01	< 0.01	0.016
TRIP05 140619	14-Jun-19	Triplicate	< 0.001	-	-	< 0.05	< 0.0002	-	0.001	< 0.001	1.6	< 0.001	-	< 0.0001	0.003	-	< 0.01	-
Relative Percentage Difference			NC	NC	NC	NC	NC	67%	NC	NC	5%	NC	NC	NC	0%	NC	NC	46%
TRIP BLANK 06 16072019	16-Jul-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE06 16072019	16-Jul-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE07	15-Aug-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
TRIP BLANK 08 16092019	16-Sep-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE 08 16092019	16-Sep-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
SW4 16092019	16-Sep-19	Primary	< 0.001	0.046	< 0.001	< 0.05	< 0.0001	< 0.001	0.002	0.02	0.7	0.001	0.039	< 0.0001	0.017	< 0.01	< 0.01	0.085
DUP08 16092019	16-Sep-19	Duplicate	< 0.001	0.041	< 0.001	< 0.05	< 0.0001	< 0.001	0.002	< 0.001	0.76	< 0.001	0.036	< 0.0001	0.003	< 0.01	< 0.01	0.012
Relative Percentage Difference			NC	11%	NC	NC	NC	NC	0%	190%	8%	67%	8%	NC	140%	NC	NC	151%
SW4 16092019	16-Sep-19	Primary	< 0.001	0.046	< 0.001	< 0.05	< 0.0001	< 0.001	0.002	0.02	0.7	0.001	0.039	< 0.0001	0.017	< 0.01	< 0.01	0.085
TRIP08 16092019	16-Sep-19	Triplicate	< 0.001	0.04	< 0.001	< 0.05	< 0.0002	< 0.001	0.002	< 0.001	0.69	< 0.001	0.037	< 0.0001	0.003	-	< 0.005	0.012
Relative Percentage Difference			NC	14%	NC	NC	NC	NC	0%	190%	1%	67%	5%	NC	140%	NC	NC	151%
TRIP BLANK 15102019	15-Oct-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE 15102019	15-Oct-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
TRIPBLANK09 181119	18-Nov-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE09 181119	18-Nov-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
SW4 181119	18-Nov-19	Primary	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	6.32	< 0.001	0.032	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
DUP09 181119	18-Nov-19	Duplicate	< 0.001	0.034	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	5.9	< 0.001	0.036	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
Relative Percentage Difference			NC	3%	NC	NC	NC	NC	NC	NC	7%	NC	12%	NC	0%	NC	NC	NC
SW4 181119	18-Nov-19	Primary	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.001	6.32	< 0.001	0.032	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
TRIP09 18112019	18-Nov-19	Triplicate	< 0.001	0.04	< 0.001	< 0.05	< 0.0002	< 0.001	< 0.001	0.01	-	&						

Table 7
Quality Control Sample Analysis - PFAS
Williamtown Sand Syndicate



Analyte			Perfluoroalkyl Sulfonic Acids										Perf
			Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonate (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)
Units			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Sample Name	Sample Date	Sample Type											
TRIP BLANK_13022019	13-Feb-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
RINSATE01_21022019	21-Feb-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
BH8_21022019	21-Feb-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
DUP01_21022019	21-Feb-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
BH8_21022019	21-Feb-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
TRIP01_21022019	21-Feb-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.05	< 0.01	< 0.01	< 0.01	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK_130319	13-Mar-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
TRIP BLANK02_150319	15-Mar-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
RINSATE02_140319	14-Mar-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
BH7_140319	14-Mar-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
DUP02_140319	14-Mar-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
BH7_140319	14-Mar-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
TRIP02_14032019	14-Mar-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.05	< 0.01	< 0.01	< 0.01	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK 03	23-Apr-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
RINSATE 03	23-Apr-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
TRIP BLANK 04	16-May-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
RINSATE 04	16-May-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
TRIP BLANK 05_14062019	14-Jun-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
RINSATE 05_14062019	14-Jun-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
TRIP BLANK 06_16072019	16-Jul-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
RINSATE06_16072019	16-Jul-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
RINSATE07	15-Aug-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
TRIP BLANK 08_16092019	16-Sep-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
RINSATE 08_16092019	16-Sep-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
SW4_16092019	16-Sep-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
DUP08_16092019	16-Sep-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	0%	NC	NC	NC	NC	NC	NC
SW4_16092019	16-Sep-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
TRIP08_16092019	16-Sep-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	0.03	< 0.01	< 0.05	< 0.01	< 0.01	< 0.01	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	100%	NC	NC	NC	NC	NC	NC
TRIP BLANK 09_1931069	25-Sep-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
RINSATE 09_1931069	25-Sep-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
TRIPBLANK09_181119	18-Nov-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
RINSATE09_181119	18-Nov-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
SW4_181119	18-Nov-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
DUP09_181119	18-Nov-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
SW4_181119	18-Nov-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
TRIP09_18112019	18-Nov-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.01	< 0.01	< 0.01	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIPBLANK10_171219	17-Dec-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
RINSATE10_171219	17-Dec-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
TRIP BLANK 13_2001333008	16-Jan-20	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
RINSATE 13_2001333009	16-Jan-20	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
BH6_2001333004	16-Jan-20	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
QW12_2001333012	16-Jan-20	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
BH6_2001333004	16-Jan-20	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
QW13_14392	16-Jan-20	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.01	< 0.01	< 0.01	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

Notes:
< - Less than laboratory limit of reporting
NC - Not calculated
µg/L - Micrograms per litre

20193820.001A

20193820.001A

ATTACHMENT A: LABORATORY REPORTS

CERTIFICATE OF ANALYSIS

Work Order	: ES2001333	Page	: 1 of 17
Amendment	: 1		
Client	: KLEINFELDER AUSTRALIA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Contact	: Shirley LeCornu
Address	: 95 MITCHELL ROAD CARDIFF NSW 2285	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ---	Telephone	: +6138549 9630
Project	: Williamtown SS	Date Samples Received	: 16-Jan-2020 19:36
Order number	: 20193820	Date Analysis Commenced	: 17-Jan-2020
C-O-C number	: 7412	Issue Date	: 29-Jan-2020 15:53
Sampler	: DANIEL KOUSBROEK		
Site	: WSS		
Quote number	: ME/114/19 ALS Compass		
No. of samples received	: 11		
No. of samples analysed	: 11		



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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Gaston Allende	R&D Chemist	Sydney Organics, Smithfield, NSW
Wisam Marassa	Inorganics Coordinator	Sydney Inorganics, Smithfield, NSW



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

Ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- Amendment (29/01/2020): This report has been amended following changes to the analytical data reported. The quality system is being utilised to resolve this issue. The specific data affected include sample BH-4 and BH-11 TPH_SG results.
- 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.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.



Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH-1	BH-2	BH-4	BH-6	BH-7
Client sampling date / time					16-Jan-2020 11:49	16-Jan-2020 11:25	16-Jan-2020 11:01	16-Jan-2020 13:23	16-Jan-2020 14:11
Compound	CAS Number	LOR	Unit		ES2001333-001	ES2001333-002	ES2001333-003	ES2001333-004	ES2001333-005
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		6.23	5.61	5.50	5.51	5.27
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		112	102	85	218	202
EA016: Calculated TDS (from Electrical Conductivity)									
Total Dissolved Solids (Calc.)	----	1	mg/L		73	66	55	142	131
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		12	13	13	24	16
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		22	6	4	7	3
Total Alkalinity as CaCO3	----	1	mg/L		22	6	4	7	3
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		3	6	6	15	13
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		25	17	18	50	46
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		<1	2	2	3	<1
Magnesium	7439-95-4	1	mg/L		3	2	2	4	4
Sodium	7440-23-5	1	mg/L		16	13	13	30	27
Potassium	7440-09-7	1	mg/L		<1	<1	2	2	1
EG005(ED093)F: Dissolved Metals by ICP-AES									
Iron	7439-89-6	0.05	mg/L		4.43	0.73	<0.05	2.15	0.93
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	<0.05	<0.05	<0.05
Barium	7440-39-3	0.001	mg/L		0.003	0.004	0.014	0.032	0.010
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Chromium	7440-47-3	0.001	mg/L		0.002	<0.001	<0.001	<0.001	0.002
Copper	7440-50-8	0.001	mg/L		0.002	0.005	0.006	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L		0.011	0.014	0.014	0.010	0.006
Nickel	7440-02-0	0.001	mg/L		0.002	<0.001	<0.001	<0.001	0.003



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Client sample ID

				BH-1	BH-2	BH-4	BH-6	BH-7
Client sampling date / time				16-Jan-2020 11:49	16-Jan-2020 11:25	16-Jan-2020 11:01	16-Jan-2020 13:23	16-Jan-2020 14:11
Compound	CAS Number	LOR	Unit	ES2001333-001	ES2001333-002	ES2001333-003	ES2001333-004	ES2001333-005
				Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued								
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L	0.044	0.010	0.009	<0.005	0.007
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	<0.1	0.2	0.2
EN055: Ionic Balance								
∅ Total Anions	----	0.01	meq/L	1.21	0.72	0.71	1.86	1.63
∅ Total Cations	----	0.01	meq/L	0.94	0.83	0.88	1.83	1.53
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup								
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	<50	<50
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	<100	<100	<100	<100
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	<20
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	<20	<20
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L	<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	<2	<2

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH-1	BH-2	BH-4	BH-6	BH-7
Client sampling date / time				16-Jan-2020 11:49	16-Jan-2020 11:25	16-Jan-2020 11:01	16-Jan-2020 13:23	16-Jan-2020 14:11	
Compound	CAS Number	LOR	Unit	ES2001333-001	ES2001333-002	ES2001333-003	ES2001333-004	ES2001333-005	
				Result	Result	Result	Result	Result	
EP080: BTEXN - Continued									
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	<2	
^ Total Xylenes	----	2	µg/L	<2	<2	<2	<2	<2	
^ Sum of BTEX	----	1	µg/L	<1	<1	<1	<1	<1	
Naphthalene	91-20-3	5	µg/L	<5	<5	<5	<5	<5	
EP231A: Perfluoroalkyl Sulfonic Acids									
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	
EP231B: Perfluoroalkyl Carboxylic Acids									
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	
EP231C: Perfluoroalkyl Sulfonamides									

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH-1	BH-2	BH-4	BH-6	BH-7
Client sampling date / time				16-Jan-2020 11:49	16-Jan-2020 11:25	16-Jan-2020 11:01	16-Jan-2020 13:23	16-Jan-2020 14:11	
Compound	CAS Number	LOR	Unit	ES2001333-001	ES2001333-002	ES2001333-003	ES2001333-004	ES2001333-005	
				Result	Result	Result	Result	Result	
EP231C: Perfluoroalkyl Sulfonamides - Continued									
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	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
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	
EP231P: PFAS Sums									
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	
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%	113	103	112	110	105	
Toluene-D8	2037-26-5	2	%	123	102	111	116	106	
4-Bromofluorobenzene	460-00-4	2	%	109	99.0	104	105	101	
EP231S: PFAS Surrogate									



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Client sample ID

				BH-1	BH-2	BH-4	BH-6	BH-7
Client sampling date / time				16-Jan-2020 11:49	16-Jan-2020 11:25	16-Jan-2020 11:01	16-Jan-2020 13:23	16-Jan-2020 14:11
Compound	CAS Number	LOR	Unit	ES2001333-001	ES2001333-002	ES2001333-003	ES2001333-004	ES2001333-005
				Result	Result	Result	Result	Result
EP231S: PFAS Surrogate - Continued								
13C4-PFOS	----	0.02	%	----	----	102	97.9	96.4
13C8-PFOA	----	0.02	%	----	----	101	104	93.4



Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH-8	BH-11	MW239S	QW12	----
Client sampling date / time					16-Jan-2020 14:33	16-Jan-2020 12:16	16-Jan-2020 12:56	16-Jan-2020 13:16	----
Compound	CAS Number	LOR	Unit		ES2001333-006	ES2001333-007	ES2001333-011	ES2001333-012	-----
					Result	Result	Result	Result	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		5.55	5.09	5.02	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		318	168	423	----	----
EA016: Calculated TDS (from Electrical Conductivity)									
Total Dissolved Solids (Calc.)	----	1	mg/L		207	109	275	----	----
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		16	12	33	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		7	2	2	----	----
Total Alkalinity as CaCO3	----	1	mg/L		7	2	2	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		13	<1	7	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		78	46	120	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		<1	<1	<1	----	----
Magnesium	7439-95-4	1	mg/L		4	3	8	----	----
Sodium	7440-23-5	1	mg/L		49	25	67	----	----
Potassium	7440-09-7	1	mg/L		<1	<1	<1	----	----
EG005(ED093)F: Dissolved Metals by ICP-AES									
Iron	7439-89-6	0.05	mg/L		2.94	1.08	1.31	2.18	----
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	<0.05	<0.05	----
Barium	7440-39-3	0.001	mg/L		0.007	0.005	0.008	0.035	----
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	----
Cobalt	7440-48-4	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Chromium	7440-47-3	0.001	mg/L		0.002	0.002	0.002	<0.001	----
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Manganese	7439-96-5	0.001	mg/L		0.011	0.007	0.004	0.009	----
Nickel	7440-02-0	0.001	mg/L		0.002	0.003	0.002	0.001	----



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Client sample ID

				BH-8	BH-11	MW239S	QW12	----
Client sampling date / time				16-Jan-2020 14:33	16-Jan-2020 12:16	16-Jan-2020 12:56	16-Jan-2020 13:16	----
Compound	CAS Number	LOR	Unit	ES2001333-006	ES2001333-007	ES2001333-011	ES2001333-012	-----
				Result	Result	Result	Result	----
EG020F: Dissolved Metals by ICP-MS - Continued								
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	----
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	----
Zinc	7440-66-6	0.005	mg/L	0.011	0.005	0.007	<0.005	----
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	<0.1	----	----
EN055: Ionic Balance								
∅ Total Anions	----	0.01	meq/L	2.61	1.34	3.57	----	----
∅ Total Cations	----	0.01	meq/L	2.46	1.33	3.57	----	----
∅ Ionic Balance	----	0.01	%	----	----	0.03	----	----
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup								
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	----
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	<100	----
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	<50	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	<100	----
>C16 - C34 Fraction	----	100	µg/L	<100	<100	<100	<100	----
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100	<100	<100	----
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	<100	<100	<100	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	<20	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	<20	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	<1	<1	----
Toluene	108-88-3	2	µg/L	<2	<2	<2	<2	----
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	----

Sub-Matrix: **GROUNDWATER**
(Matrix: **WATER**)

Client sampling date / time

EP231C: Perfluoroalkyl Sulfonamides

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH-8	BH-11	MW239S	QW12	----
Client sampling date / time				16-Jan-2020 14:33	16-Jan-2020 12:16	16-Jan-2020 12:56	16-Jan-2020 13:16	----	
Compound	CAS Number	LOR	Unit	ES2001333-006	ES2001333-007	ES2001333-011	ES2001333-012	-----	
				Result	Result	Result	Result	----	
EP231C: Perfluoroalkyl Sulfonamides - Continued									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	----	----	<0.02	----	
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	----	----	<0.05	----	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	----	----	<0.05	----	
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	----	----	<0.05	----	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	----	----	<0.05	----	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	----	----	<0.02	----	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	----	----	<0.02	----	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	----	----	<0.05	----	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	----	----	<0.05	----	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	----	----	<0.05	----	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	----	----	<0.05	----	
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L	<0.01	----	----	<0.01	----	
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	----	----	<0.01	----	
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	<0.01	----	
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%	108	106	100	112	----	
Toluene-D8	2037-26-5	2	%	113	105	102	118	----	
4-Bromofluorobenzene	460-00-4	2	%	104	100	94.1	109	----	
EP231S: PFAS Surrogate									

Page : 12 of 17
 Work Order : ES2001333 Amendment 1
 Client : KLEINFELDER AUSTRALIA PTY LTD
 Project : Williamtown SS



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Client sample ID

				BH-8	BH-11	MW239S	QW12	----
Client sampling date / time				16-Jan-2020 14:33	16-Jan-2020 12:16	16-Jan-2020 12:56	16-Jan-2020 13:16	----
Compound	CAS Number	LOR	Unit	ES2001333-006	ES2001333-007	ES2001333-011	ES2001333-012	-----
				Result	Result	Result	Result	----
EP231S: PFAS Surrogate - Continued								
13C4-PFOS	----	0.02	%	100	----	----	98.9	----
13C8-PFOA	----	0.02	%	96.4	----	----	98.8	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Trip blank13	rinsate 13	----	----	----
Client sampling date / time					16-Jan-2020 14:49	16-Jan-2020 14:52	----	----	----
Compound	CAS Number	LOR	Unit		ES2001333-008	ES2001333-009	-----	-----	-----
				Result	Result		----	----	----
EG005(ED093)F: Dissolved Metals by ICP-AES									
Iron	7439-89-6	0.05	mg/L		<0.05	<0.05	----	----	----
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	----	----	----
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	----	----	----
Barium	7440-39-3	0.001	mg/L		<0.001	<0.001	----	----	----
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	----	----	----
Cobalt	7440-48-4	0.001	mg/L		<0.001	<0.001	----	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	----	----	----
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	----	----	----
Manganese	7439-96-5	0.001	mg/L		<0.001	<0.001	----	----	----
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	----	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	----	----	----
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	----	----	----
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	----	----	----
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	----	----	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	----	----	----
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L		<50	<50	----	----	----
C15 - C28 Fraction	----	100	µg/L		<100	<100	----	----	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	----	----	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L		<100	<100	----	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	----	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	----	----	----
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Trip blank13	rinsate 13	----	----	----
Client sampling date / time					16-Jan-2020 14:49	16-Jan-2020 14:52	----	----	----
Compound	CAS Number	LOR	Unit		ES2001333-008	ES2001333-009	-----	-----	-----
					Result	Result	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	----	----	----
Toluene	108-88-3	2	µg/L		<2	<2	----	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	----	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	----	----	----
^ Total Xylenes	----	2	µg/L		<2	<2	----	----	----
^ Sum of BTEX	----	1	µg/L		<1	<1	----	----	----
Naphthalene	91-20-3	5	µg/L		<5	<5	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Trip blank13	rinsate 13	----	----	----
Client sampling date / time					16-Jan-2020 14:49	16-Jan-2020 14:52	----	----	----
Compound	CAS Number	LOR	Unit		ES2001333-008	ES2001333-009	-----	-----	-----
					Result	Result	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	----	----	----



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Client sample ID

				Trip blank13	rinsate 13	----	----	----
Client sampling date / time				16-Jan-2020 14:49	16-Jan-2020 14:52	----	----	----
Compound	CAS Number	LOR	Unit	ES2001333-008	ES2001333-009	-----	-----	-----
				Result	Result	----	----	----
EP231P: PFAS Sums - Continued								
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	2	%	101	98.3	----	----	----
Toluene-D8	2037-26-5	2	%	96.5	94.0	----	----	----
4-Bromofluorobenzene	460-00-4	2	%	95.4	92.0	----	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	93.8	101	----	----	----
13C8-PFOA	----	0.02	%	94.0	98.2	----	----	----



Surrogate Control Limits

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

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

QUALITY CONTROL REPORT

Work Order : **ES2001333**

Page : 1 of 12

Amendment : **1**

Client : **KLEINFELDER AUSTRALIA PTY LTD**

Laboratory : Environmental Division Sydney

Contact : **DANIEL KOUSBROEK**

Contact : Shirley LeCornu

Address : 95 MITCHELL ROAD
CARDIFF NSW 2285

Address : 277-289 Woodpark Road Smithfield NSW Australia 2164

Telephone : ----

Telephone : +6138549 9630

Project : Williamtown SS

Date Samples Received : 16-Jan-2020

Order number : 20193820

Date Analysis Commenced : 17-Jan-2020

C-O-C number : 7412

Issue Date : 29-Jan-2020

Sampler : DANIEL KOUSBROEK

Site : WSS

Quote number : ME/114/19 ALS Compass

No. of samples received : 11

No. of samples analysed : 11



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 Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

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
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Gaston Allende	R&D Chemist	Sydney Organics, Smithfield, NSW
Wisam Marassa	Inorganics Coordinator	Sydney Inorganics, Smithfield, NSW



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

Key :
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 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
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG005(ED093)F: Dissolved Metals by ICP-AES (QC Lot: 2816943)									
ES2001333-001	BH-1	EG005F: Iron	7439-89-6	0.05	mg/L	4.43	4.47	0.743	0% - 20%
ES2001333-004	BH-6	EG005F: Iron	7439-89-6	0.05	mg/L	2.15	2.13	1.15	0% - 20%
EA005P: pH by PC Titrator (QC Lot: 2815284)									
ES2001190-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.70	7.98	3.57	0% - 20%
ES2001333-006	BH-8	EA005-P: pH Value	----	0.01	pH Unit	5.55	5.10	8.45	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 2815283)									
ES2001308-003	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	6980	6950	0.446	0% - 20%
ES2001190-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	4400	4380	0.480	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 2815286)									
ES2001333-006	BH-8	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	318	317	0.337	0% - 20%
ES2001388-006	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	3230	3240	0.326	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 2815285)									
ES2001309-006	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	226	230	1.41	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	226	230	1.41	0% - 20%
ES2001308-003	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	691	670	3.06	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	691	670	3.06	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 2815288)									
ES2001373-007	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	49	50	2.86	0% - 20%



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 2815288) - continued									
ES2001373-007	Anonymous	ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	49	50	2.86	0% - 20%
ES2001333-006	BH-8	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	7	<1	150	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	7	<1	150	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2816448)									
ES2000539-003	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	0.00	No Limit
ES2001308-005	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2320	2290	1.36	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 2816449)									
ES2000539-003	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	2	2	0.00	No Limit
ES2001308-005	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	1960	1980	1.04	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 2816940)									
ES2001309-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	133	132	0.787	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	294	295	0.340	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	1200	1210	0.831	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	29	29	0.00	0% - 20%
ES2001333-004	BH-6	ED093F: Calcium	7440-70-2	1	mg/L	3	3	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	4	4	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	30	29	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	2	2	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2816942)									
ES2001309-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.004	0.004	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.057	0.055	3.17	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.014	0.014	0.00	0% - 50%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.014	0.010	34.7	0% - 50%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.017	<0.005	111	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	3.45	3.70	7.06	0% - 20%
ES2001333-004	BH-6	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.032	0.032	0.00	0% - 20%



Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2816942) - continued									
ES2001333-004	BH-6	EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.010	0.009	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 2816941)									
ES2001309-003	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES2001333-003	BH-4	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 2815282)									
ES2001094-001	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.2	<0.1	0.00	No Limit
ES2001309-006	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	1.3	1.4	0.00	0% - 50%
EK040P: Fluoride by PC Titrator (QC Lot: 2815287)									
ES2001373-007	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit
ES2001333-006	BH-8	EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2814107)									
ES2001333-001	BH-1	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
ES2001333-007	BH-11	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2814107)									
ES2001333-001	BH-1	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES2001333-007	BH-11	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 2814107)									
ES2001333-001	BH-1	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.00	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
ES2001333-007	BH-11	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.00	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP080: BTEXN (QC Lot: 2814107) - continued									
ES2001333-007	BH-11	EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 2813818)									
EP2000293-004	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
ES2001261-001	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.07	0.07	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.09	0.09	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2813818)									
EP2000293-004	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
ES2001261-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.02	0.02	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.58	0.59	0.00	0% - 20%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.31	0.31	0.00	0% - 50%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.09	0.08	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2813818)									
EP2000293-004	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2813818) - continued									
EP2000293-004	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES2001261-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2813818)									
EP2000293-004	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES2001261-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	0.27	0.30	7.72	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2813818) - continued									
ES2001261-001	Anonymous	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 2813818)									
EP2000293-004	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.00	No Limit
ES2001261-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	1.43	1.46	2.08	0% - 20%



Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EG005(ED093)F: Dissolved Metals by ICP-AES (QCLot: 2816943)								
EG005F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	112	82.0	114
EA005P: pH by PC Titrator (QCLot: 2815284)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	101	98.0	102
				----	7 pH Unit	100	98.0	102
EA010P: Conductivity by PC Titrator (QCLot: 2815283)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2100 µS/cm	97.7	95.0	113
EA010P: Conductivity by PC Titrator (QCLot: 2815286)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2100 µS/cm	98.2	95.0	113
ED037P: Alkalinity by PC Titrator (QCLot: 2815285)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	88.1	81.0	111
				----	50 mg/L	108	70.0	130
ED037P: Alkalinity by PC Titrator (QCLot: 2815288)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	81.7	81.0	111
				----	50 mg/L	112	70.0	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2816448)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	96.2	82.0	122
				<1	500 mg/L	91.3	82.0	122
ED045G: Chloride by Discrete Analyser (QCLot: 2816449)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	98.6	80.9	127
				<1	1000 mg/L	109	80.9	127
ED093F: Dissolved Major Cations (QCLot: 2816940)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	111	80.0	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	103	90.0	116
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	101	82.0	120
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	98.5	85.0	113
EG020F: Dissolved Metals by ICP-MS (QCLot: 2816942)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	90.2	85.0	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	96.2	85.0	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	99.7	82.0	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	88.0	84.0	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	93.1	85.0	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	94.4	82.0	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	95.4	81.0	111



Sub-Matrix: **WATER**

Method: Compound				Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
						LCS	Low	High
CAS Number	LOR	Unit						
EG020F: Dissolved Metals by ICP-MS (QCLot: 2816942) - continued								
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	96.4	83.0	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	97.1	82.0	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	92.0	82.0	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	94.9	85.0	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	93.0	83.0	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	92.0	81.0	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	96.1	85.0	115
EG035F: Dissolved Mercury by FIMS (QCLot: 2816941)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	97.2	83.0	105
EK040P: Fluoride by PC Titrator (QCLot: 2815282)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	116	82.0	116
EK040P: Fluoride by PC Titrator (QCLot: 2815287)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	92.0	82.0	116
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QCLot: 2814393)								
EP071SG: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	56.6	55.8	112
EP071SG: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	102	71.6	113
EP071SG: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	105	56.0	121
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 2814393)								
EP071SG: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	82.8	57.9	119
EP071SG: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	89.9	62.5	110
EP071SG: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	70.5	61.5	121
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2814107)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	88.7	75.0	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2814107)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	87.7	75.0	127
EP080: BTEXN (QCLot: 2814107)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	101	70.0	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	99.5	69.0	123
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	100	70.0	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	96.0	69.0	121
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	96.8	72.0	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	102	70.0	120
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2813818)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	80.0	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	90.6	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	82.0	68.0	131



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2813818) - continued								
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	89.4	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	93.6	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	88.4	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2813818)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	90.9	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	99.8	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	105	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	101	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	82.6	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	96.0	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	97.0	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	104	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	91.2	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	90.4	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	93.0	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2813818)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	98.8	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	89.4	70.0	130
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	93.8	70.0	130
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	94.0	70.0	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	97.6	70.0	130
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	97.4	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	98.0	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2813818)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	94.2	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	88.0	67.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	102	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	116	70.0	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Matrix Spike (MS) Report		
Spike	Spike Recovery(%)	Recovery Limits (%)



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2816448)							
ES2000539-003	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	116	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 2816449)							
ES2000539-003	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	106	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2816942)							
ES2001309-004	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	105	70.0	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	96.1	70.0	130
		EG020A-F: Barium	7440-39-3	10 mg/L	110	70.0	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	95.8	70.0	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	95.6	70.0	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	102	70.0	130
		EG020A-F: Copper	7440-50-8	1 mg/L	100.0	70.0	130
		EG020A-F: Lead	7439-92-1	10 mg/L	100	70.0	130
		EG020A-F: Manganese	7439-96-5	10 mg/L	97.4	70.0	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	93.7	70.0	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	98.1	70.0	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	85.7	70.0	130
EG035F: Dissolved Mercury by FIMS (QCLot: 2816941)							
ES2001309-002	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	85.6	70.0	130
EK040P: Fluoride by PC Titrator (QCLot: 2815282)							
ES2001094-002	Anonymous	EK040P: Fluoride	16984-48-8	5 mg/L	97.6	70.0	130
EK040P: Fluoride by PC Titrator (QCLot: 2815287)							
ES2001333-004	BH-6	EK040P: Fluoride	16984-48-8	5 mg/L	80.8	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2814107)							
ES2001333-001	BH-1	EP080: C6 - C9 Fraction	----	325 µg/L	107	70.0	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2814107)							
ES2001333-001	BH-1	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	105	70.0	130
EP080: BTEXN (QCLot: 2814107)							
ES2001333-001	BH-1	EP080: Benzene	71-43-2	25 µg/L	101	70.0	130
		EP080: Toluene	108-88-3	25 µg/L	105	70.0	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	107	70.0	130
		EP080: meta- & para-Xylene	108-38-3	25 µg/L	105	70.0	130
			106-42-3				
		EP080: ortho-Xylene	95-47-6	25 µg/L	104	70.0	130
	EP080: Naphthalene	91-20-3	25 µg/L	97.4	70.0	130	
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2813818)							
EP2000395-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	88.4	50.0	130



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2813818) - continued							
EP2000395-001	Anonymous	EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	99.2	50.0	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	94.4	50.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	99.4	50.0	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	102	50.0	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	98.0	50.0	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2813818)							
EP2000395-001	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	101	50.0	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	108	50.0	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	111	50.0	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	107	50.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	91.0	50.0	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	111	50.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	104	50.0	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	109	50.0	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	112	50.0	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	112	50.0	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	104	50.0	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2813818)							
EP2000395-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	103	50.0	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	98.4	50.0	150
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	89.4	50.0	150
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	119	50.0	150
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	106	50.0	150
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	104	50.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	97.0	50.0	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2813818)							
EP2000395-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	99.6	50.0	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	96.8	50.0	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	106	50.0	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	110	50.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order : ES2001333

Page : 1 of 10

Amendment : 1

Client : KLEINFELDER AUSTRALIA PTY LTD

Laboratory : Environmental Division Sydney

Contact : DANIEL KOUSBROEK

Telephone : +6138549 9630

Project : Williamtown SS

Date Samples Received : 16-Jan-2020

Site : WSS

Issue Date : 29-Jan-2020

Sampler : DANIEL KOUSBROEK

No. of samples received : 11

Order number : 20193820

No. of samples analysed : 11

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- **NO** Matrix Spike outliers occur.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers exist - please see following pages for full details.



Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method		Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
BH-1,	BH-2,	----	----	----	17-Jan-2020	16-Jan-2020	1
BH-4,	BH-6,						
BH-7,	BH-8,						
BH-11,	MW239S						

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	0	11	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Dissolved Metals by ICP-AES	0	11	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	0	11	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural (EA005-P)		16-Jan-2020	----	----	----	17-Jan-2020	16-Jan-2020	✖
BH-1,	BH-2,							
BH-4,	BH-6,							
BH-7,	BH-8,							
BH-11,	MW239S							



Matrix: **WATER**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA010P: Conductivity by PC Titrator								
Clear Plastic Bottle - Natural (EA010-P)		16-Jan-2020	----	----	----	17-Jan-2020	13-Feb-2020	✓
BH-1,	BH-2,							
BH-4,	BH-6,							
BH-7,	BH-8,							
BH-11,	MW239S							
EA065: Total Hardness as CaCO3								
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)		16-Jan-2020	----	----	----	21-Jan-2020	13-Feb-2020	✓
BH-1,	BH-2,							
BH-4,	BH-6,							
BH-7,	BH-8,							
BH-11,	MW239S							
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P)		16-Jan-2020	----	----	----	17-Jan-2020	30-Jan-2020	✓
BH-1,	BH-2,							
BH-4,	BH-6,							
BH-7,	BH-8,							
BH-11,	MW239S							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G)		16-Jan-2020	----	----	----	18-Jan-2020	13-Feb-2020	✓
BH-1,	BH-2,							
BH-4,	BH-6,							
BH-7,	BH-8,							
BH-11,	MW239S							
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G)		16-Jan-2020	----	----	----	18-Jan-2020	13-Feb-2020	✓
BH-1,	BH-2,							
BH-4,	BH-6,							
BH-7,	BH-8,							
BH-11,	MW239S							
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)		16-Jan-2020	----	----	----	21-Jan-2020	13-Feb-2020	✓
BH-1,	BH-2,							
BH-4,	BH-6,							
BH-7,	BH-8,							
BH-11,	MW239S							



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EG005(ED093)F: Dissolved Metals by ICP-AES								
Clear Plastic Bottle - Nitric Acid; Filtered (EG005F) BH-1, BH-4, BH-7, BH-11, rinsate 13, QW12	BH-2, BH-6, BH-8, Trip blank13, MW239S, QW12	16-Jan-2020	----	----	----	20-Jan-2020	14-Jul-2020	✓
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) BH-1, BH-4, BH-7, BH-11, rinsate 13, QW12	BH-2, BH-6, BH-8, Trip blank13, MW239S, QW12	16-Jan-2020	----	----	----	21-Jan-2020	14-Jul-2020	✓
EG035F: Dissolved Mercury by FIMS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) BH-1, BH-4, BH-7, BH-11, rinsate 13, QW12	BH-2, BH-6, BH-8, Trip blank13, MW239S, QW12	16-Jan-2020	----	----	----	21-Jan-2020	13-Feb-2020	✓
EK040P: Fluoride by PC Titrator								
Clear Plastic Bottle - Natural (EK040P) BH-1, BH-4, BH-7, BH-11,	BH-2, BH-6, BH-8, MW239S	16-Jan-2020	----	----	----	17-Jan-2020	13-Feb-2020	✓
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup								
Amber Glass Bottle - Unpreserved (EP071SG) BH-1, BH-4, BH-7, BH-11, rinsate 13, QW12	BH-2, BH-6, BH-8, Trip blank13, MW239S,	16-Jan-2020	17-Jan-2020	23-Jan-2020	✓	22-Jan-2020	26-Feb-2020	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
Amber Glass Bottle - Unpreserved (EP071SG)		16-Jan-2020	17-Jan-2020	23-Jan-2020	✓	22-Jan-2020	26-Feb-2020	✓
BH-1, BH-4, BH-7, BH-11, rinsate 13, QW12	BH-2, BH-6, BH-8, Trip blank13, MW239S,							
EP080/071: Total Petroleum Hydrocarbons								
Amber VOC Vial - Sulfuric Acid (EP080)		16-Jan-2020	21-Jan-2020	30-Jan-2020	✓	21-Jan-2020	30-Jan-2020	✓
BH-1, BH-4, BH-7, BH-11, rinsate 13, QW12	BH-2, BH-6, BH-8, Trip blank13, MW239S,							
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Amber VOC Vial - Sulfuric Acid (EP080)		16-Jan-2020	21-Jan-2020	30-Jan-2020	✓	21-Jan-2020	30-Jan-2020	✓
BH-1, BH-4, BH-7, BH-11, rinsate 13, QW12	BH-2, BH-6, BH-8, Trip blank13, MW239S,							
EP080: BTEXN								
Amber VOC Vial - Sulfuric Acid (EP080)		16-Jan-2020	21-Jan-2020	30-Jan-2020	✓	21-Jan-2020	30-Jan-2020	✓
BH-1, BH-4, BH-7, BH-11, rinsate 13, QW12	BH-2, BH-6, BH-8, Trip blank13, MW239S,							
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X)		16-Jan-2020	17-Jan-2020	14-Jul-2020	✓	17-Jan-2020	14-Jul-2020	✓
BH-4, BH-7, Trip blank13, QW12	BH-6, BH-8, rinsate 13,							

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X) BH-4, BH-7, Trip blank13, QW12	BH-6, BH-8, rinsate 13,	16-Jan-2020	17-Jan-2020	14-Jul-2020	✓	17-Jan-2020	14-Jul-2020	✓
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X) BH-4, BH-7, Trip blank13, QW12	BH-6, BH-8, rinsate 13,	16-Jan-2020	17-Jan-2020	14-Jul-2020	✓	17-Jan-2020	14-Jul-2020	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X) BH-4, BH-7, Trip blank13, QW12	BH-6, BH-8, rinsate 13,	16-Jan-2020	17-Jan-2020	14-Jul-2020	✓	17-Jan-2020	14-Jul-2020	✓
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X) BH-4, BH-7, Trip blank13, QW12	BH-6, BH-8, rinsate 13,	16-Jan-2020	17-Jan-2020	14-Jul-2020	✓	17-Jan-2020	14-Jul-2020	✓



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)		Quality Control Specification	
Analytical Methods	Method	QC	Regular	Actual	Expected		Evaluation
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-AES	EG005F	2	11	18.18	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	13	15.38	10.00	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	0	11	0.00	10.00	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-AES	EG005F	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chloride by Discrete Analyser	ED045G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-AES	EG005F	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Matrix: **WATER** Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Method Blanks (MB) - Continued							
Major Cations - Dissolved	ED093F	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	13	7.69	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	1	11	9.09	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-AES	EG005F	0	11	0.00	5.00	✖	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	40	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	13	7.69	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	0	11	0.00	5.00	✖	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Calculated TDS (from Electrical Conductivity)	EA016	WATER	In house: Calculation from Electrical Conductivity (APHA 2510 B) using a conversion factor specified in the analytical report. This method is compliant with NEPM (2013) Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3)
Sulfate (Turbidimetric) as SO ₄ 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO ₄ . Dissolved sulfate is determined in a 0.45µm filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO ₄ suspension is measured by a photometer and the SO ₄ -2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM (2013) Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (2013) Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals by ICP-AES	EG005F	WATER	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. The ICPAES technique ionises the 0.45µm filtered samples, emitting a characteristic spectrum which is compared against matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.



Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Fluoride by PC Titrator	EK040P	WATER	In house: Referenced to APHA 4500-F C: CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (2013) Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	WATER	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C36. This method is compliant with NEPM (2013) Schedule B(3) (Method 506.1)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Preparation Methods	Method	Matrix	Method Descriptions
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.



Custody Document for Submissions via ALS Compass App

Environmental Division
Sydney
Work Order Reference
ES2001333
Telephone : + 61-2-6784 8656

Project: WSS Client: Heinfelder Project Manager: Tom Outeira

Phone:

ALS Compass COC Reference: 7412 # Samples: 12 Sampler: Daniel Houbroek

Phone:

(0458197676)

Turnaround Requirements: Standard 5 Days Urgent

Special Instructions:	Subcontract / Forward Lab / Split No.	ALS Use Only
Lab / Analysis:	<u>EUROFINS</u>	Custody seal intact?
Organised By / Date:	<u>QW13</u>	Free (ice) frozen ice bricks upon receipt?
Relinquished By / Date:		Random sample temperature on receipt?
Comnote / Courier:		

WO No:

Custody: Attached By PO / Internal Sheet:

Relinquished by:	Received by:	Relinquished by:	Received by:
<u>D. Houbroek</u>	<u>AL</u>		<u>ANDREW</u>
Date / Time:	Date / Time:	Date / Time:	Date / Time:
<u>16/1/20</u> <u>3:55</u>	<u>16/1/2020</u> <u>3:57pm</u>		<u>16/1/2020</u> <u>7:36pm</u>

CLIENT: ALLENVENG - KLEINFELDER AUSTRALIA PTY LTD
 PROJECT: Williamtown SS

SITE: WSS

ORDER NO: 20193820

PROJECT MANAGER: Dkousbroek Dkousbroek
 PRIMARY SAMPLER: Dkousbroek Dkousbroek

CONTACT PH: 0458 197 676 SAMPLER MOBILE: 0458 197 676
 QUOTE NO: ME114/19 / EM2019ALLENVENG010

EMAIL REPORTS TO: dkousbroek@kleinfelder.com, toverton@kleinfelder.com

EMAIL INVOICES TO: dkousbroek@kleinfelder.com

SAMPLE DETAILS						ANALYSIS REQUIRED							
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Disolved from Only Iron (Dissolved) WATER	EP231X PFAS - Full Suite (28 Analytes) WATER	NT-12 General Water Suite (incl pH) WATER	W-03 NEPM 15 Metals (dissolved) WATER	W-04 SC TRH/TEXX incl. Silica Gel Clean Up WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	BH-1		16/01/2020 11:49 AM	Water	ALS: 5 Non ALS: 0	No	X		X	X	X		
002	BH-2		16/01/2020 11:25 AM	Water	ALS: 5 Non ALS: 0	No	X		X	X	X		
003	BH-4		16/01/2020 11:01 AM	Water	ALS: 6 Non ALS: 0	No	X	X	X	X	X		
004	BH-6		16/01/2020 01:23 PM	Water	ALS: 6 Non ALS: 0	No	X	X	X	X	X		
005	BH-7		16/01/2020 02:11 PM	Water	ALS: 6 Non ALS: 0	No	X	X	X	X	X		
006	BH-8		16/01/2020 02:33 PM	Water	ALS: 6 Non ALS: 0	No	X	X	X	X	X		
007	BH-11		16/01/2020 12:16 PM	Water	ALS: 5 Non ALS: 0	No	X		X	X	X		
008	Top blank 13		16/01/2020 02:49 PM	Water	ALS: 5 Non ALS: 0	No	X	X		X	X		
009	rinse 13		16/01/2020 02:52 PM	Water	ALS: 5 Non ALS: 0	No	X	X		X	X		

RELINQUISHED BY:
 DATE TIME:

RECEIVED BY: *JUSTIN*
 DATE TIME: 16/1/20 7:36pm

RELINQUISHED BY:
 DATE TIME:

RECEIVED BY:
 DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days
 Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal Intact?

Free ice frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

Yes No

Yes No

N/A

6.4°C -2.6°C

CLIENT: ALLENVENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: WSS

ORDER NO: 20193820

PROJECT MANAGER: Dkousbroek Dkousbroek

PRIMARY SAMPLER: Dkousbroek Dkousbroek

EMAIL REPORTS TO: dkousbroek@kleinfelder.com, toverton@kleinfelder.com

EMAIL INVOICES TO: dkousbroek@kleinfelder.com

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
JUSIN
DATE TIME:
16/1/20

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A
 Free ice / frozen ice bricks present upon receipt? Yes No N/A
 Random Sample Temperature on Receipt: C
 Other comments:

CONTACT PH: 0458 197 676 SAMPLER MOBILE: 0458 197 676

QUOTE NO: ME114/19 / EM2019ALLENVENG010

SAMPLE DETAILS

SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Dissolved Iron Only Iron (Dissolved) WATER	EP231X PFAS - Full Suite (28 Analytes) WATER	NT-12 General Water Suite (incl pH) WATER	W-03 NEPM 15 Metals (dissolved) WATER	W-04 SG TRH/BTEXN Incl. Silica Gel Clean Up WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	QW13	Please send to Eurofins as triplicate control	16/01/2020 01:20 PM	Water	ALS: 5 Non ALS: 0	No	X	X		X	X		Send to eurofins
011	MM239S		16/01/2020 12:56 PM	Water	ALS: 5 Non ALS: 0	No	X		X	X	X		
012	QW12		16/01/2020 01:16 PM	Water	ALS: 5 Non ALS: 0	No	X	X		X	X		

ANALYSIS REQUIRED

Disolved Iron Only Iron
 EP231X PFAS - Full Suite (28 Analytes) WATER
 NT-12 General Water Suite (incl pH) WATER
 W-03 NEPM 15 Metals (dissolved) WATER
 W-04 SG TRH/BTEXN incl. Silica Gel Clean Up WATER

CLIENT: ALLENWENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: WSS

ORDER NO: 20193820

PROJECT MANAGER: Dkousbroek Dkousbroek

PRIMARY SAMPLER: Dkousbroek Dkousbroek

CONTACT PH: 0458 197 676

SAMPLER MOBILE: 0458 197 676

QUOTE NO: ME/14/19

/ EM2019ALLENWENG010

EMAIL REPORTS TO: dkousbroek@kleinfelder.com, toverton@kleinfelder.com

EMAIL INVOICES TO: dkousbroek@kleinfelder.com

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME:

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal Intact?

Free ice / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

Yes No N/A

Yes No N/A

C

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	BH-1	Amber VOC Vial - Sulfuric Acid	40 mL	00161019061199	Purple	No	
001	BH-1	Clear Plastic Bottle - Nitric Acid, Filtered	80 mL	00120198038844	Red	Yes	
001	BH-1	Amber VOC Vial - Sulfuric Acid	40 mL	00161019061212	Purple	No	
001	BH-1	Amber Glass Bottle - Unpreserved	100 mL	00400719020804	Orange	No	
001	BH-1	Clear Plastic Bottle - Natural	500 mL	00070519029791	Green	No	
002	BH-2	Clear Plastic Bottle - Natural	500 mL	00070519078921	Green	No	
002	BH-2	Amber VOC Vial - Sulfuric Acid	40 mL	00161019061202	Purple	No	
002	BH-2	Amber VOC Vial - Sulfuric Acid	40 mL	00161019061144	Purple	No	
002	BH-2	Clear Plastic Bottle - Nitric Acid, Filtered	80 mL	00120198038848	Red	Yes	
002	BH-2	Amber Glass Bottle - Unpreserved	100 mL	00400719020798	Orange	No	
003	BH-4	Clear Plastic Bottle - Natural	500 mL	00070519078939	Green	No	
003	BH-4	Clear Plastic Bottle - Nitric Acid, Filtered	80 mL	00120198038847	Red	Yes	
003	BH-4	Amber VOC Vial - Sulfuric Acid	40 mL	00161019061207	Purple	No	
003	BH-4	Amber VOC Vial - Sulfuric Acid	40 mL	00161019061222	Purple	No	
003	BH-4	HDPE (no PTFE)	80 mL	00350019045458	Grey	No	
003	BH-4	Amber Glass Bottle - Unpreserved	100 mL	00400719020213	Orange	No	
004	BH-6	Clear Plastic Bottle - Natural	500 mL	00070519028773	Green	No	
004	BH-6	Amber Glass Bottle - Unpreserved	100 mL	00400719020262	Orange	No	
004	BH-6	HDPE (no PTFE)	80 mL	00350019045554	Grey	No	
004	BH-6	Amber VOC Vial - Sulfuric Acid	40 mL	00161019061418	Purple	No	
004	BH-6	Amber VOC Vial - Sulfuric Acid	40 mL	00161019061312	Purple	No	
004	BH-6	Clear Plastic Bottle - Nitric Acid, Filtered	80 mL	00120198034289	Red	Yes	
005	BH-7	Clear Plastic Bottle - Natural	500 mL	00070519029766	Green	No	
005	BH-7	Clear Plastic Bottle - Nitric Acid, Filtered	80 mL	00120198034265	Red	Yes	
005	BH-7	Amber VOC Vial - Sulfuric Acid	40 mL	00161019063033	Purple	No	
005	BH-7	Amber VOC Vial - Sulfuric Acid	40 mL	00161019063133	Purple	No	

CLIENT: ALLENVENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: WSS

ORDER NO: 20193820

PROJECT MANAGER: Dkousbroek Dkousbroek

PRIMARY SAMPLER: Dkousbroek Dkousbroek

CONTACT PH: 0458 197 676

SAMPLER MOBILE: 0458 197 676

QUOTE NO: ME114/19

/ EM2019ALLENVENG010

EMAIL REPORTS TO: dkousbroek@kleinfelder.com, toverton@kleinfelder.com

EMAIL INVOICES TO: dkousbroek@kleinfelder.com

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DATE TIME:

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DATE TIME:

RECEIVED BY:
DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal Intact?

Free ice / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

Yes No N/A

Yes No N/A

C

005	BH-7	Amber Glass Bottle - Unpreserved	100 mL	00400719020175	Orange	No	
005	BH-7	HDPE (no PTFE)	60 mL	00350019045566	Grey	No	
006	BH-8	Clear Plastic Bottle - Natural	500 mL	00070519076941	Green	No	
006	BH-8	Amber Glass Bottle - Unpreserved	100 mL	00400719020136	Orange	No	
006	BH-8	HDPE (no PTFE)	60 mL	00350019045403	Grey	No	
006	BH-8	Amber VOC Vial - Sulfuric Acid	40 mL	00161019063008	Purple	No	
006	BH-8	Amber VOC Vial - Sulfuric Acid	40 mL	00161019063157	Purple	No	
006	BH-8	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120198034267	Red	Yes	
007	BH-11	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120198038659	Red	Yes	
007	BH-11	Clear Plastic Bottle - Natural	500 mL	00070519029603	Green	No	
007	BH-11	Amber Glass Bottle - Unpreserved	100 mL	00400719020783	Orange	No	
007	BH-11	Amber VOC Vial - Sulfuric Acid	40 mL	00161019061180	Purple	No	
007	BH-11	Amber VOC Vial - Sulfuric Acid	40 mL	00161019061302	Purple	No	
008	Tip blank13	Amber Glass Bottle - Unpreserved	100 mL	00400719020196	Orange	No	
008	Tip blank13	Amber VOC Vial - Sulfuric Acid	40 mL	00161019063056	Purple	No	
008	Tip blank13	Amber VOC Vial - Sulfuric Acid	40 mL	00161019063184	Purple	No	
008	Tip blank13	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120198034279	Red	Yes	
008	Tip blank13	HDPE (no PTFE)	60 mL	00350019045430	Grey	No	
009	rinstate 13	HDPE (no PTFE)	60 mL	00350019000564	Grey	No	
009	rinstate 13	Amber Glass Bottle - Unpreserved	100 mL	00400719020821	Orange	No	
009	rinstate 13	Amber VOC Vial - Sulfuric Acid	40 mL	00161019063165	Purple	No	
009	rinstate 13	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120198034269	Red	Yes	
010	QW13	Amber VOC Vial - Sulfuric Acid	40 mL	00161019063205	Purple	No	
010	QW13	Amber Glass Bottle - Unpreserved	100 mL	00400719020273	Orange	No	
010	QW13	Amber VOC Vial - Sulfuric Acid	40 mL	00161019061242	Purple	No	
010	QW13	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120198034150	Red	Yes	
010	QW13	Amber VOC Vial - Sulfuric Acid	40 mL	00161019061198	Purple	No	

CLIENT: ALLENVENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: WSS

ORDER NO: 20193820

PROJECT MANAGER: Dkousbroek Dkousbroek

PRIMARY SAMPLER: Dkousbroek Dkousbroek

EMAIL REPORTS TO: dkousbroek@kleinfelder.com, toverton@kleinfelder.com

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RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
JUSTIN
DATE TIME:
16/1/20 7:36pm

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Free ice / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

Yes No N/A

Yes No N/A

°C

010	QW13	HDPE (no PTFE)	60 mL	00350019045461	Grey	No	
011	MMW236S	Clear Plastic Bottle - Nitric Acid; Filtered	80 mL	00120198034271	Red	Yes	
011	MMW236S	Clear Plastic Bottle - Natural	500 mL	00070519076938	Green	No	
011	MMW236S	Amber Glass Bottle - Unpreserved	100 mL	00400719020023	Orange	No	
011	MMW236S	Amber VOC Vial - Sulfuric Acid	40 mL	00161019061233	Purple	No	
011	MMW236S	Amber VOC Vial - Sulfuric Acid	40 mL	00161019061297	Purple	No	
012	QW12	HDPE (no PTFE)	80 mL	00350019045327	Grey	No	
012	QW12	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120198034276	Red	Yes	
012	QW12	Amber VOC Vial - Sulfuric Acid	40 mL	00161019061238	Purple	No	
012	QW12	Amber VOC Vial - Sulfuric Acid	40 mL	00161019061225	Purple	No	
012	QW12	Amber Glass Bottle - Unpreserved	100 mL	00400719020245	Orange	No	

Total Bottle Count: ALS: 64, Non ALS: 0

Australia

Melbourne
6 Monterey Road
Dandenong South VIC 3175
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
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Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

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NATA # 1261 Site # 20794

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Phone : 0800 856 450
IANZ # 1290

ABN – 50 005 085 521

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e.mail : EnviroSales@eurofins.com

Company Name: Kleinfelder Aust Pty Ltd (NEWCASTLE)
Address: 95 Mitchell Rd
Cardiff
NSW 2285

Project Name: WILLIAMTOWN SS
Project ID: 20193820

Order No.:
Report #: 697336
Phone: 02 4949 5200
Fax:

Received: Jan 17, 2020 5:24 PM
Due: Jan 24, 2020
Priority: 5 Day
Contact Name: Dan Kousbroek

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Iron (filtered)	TRH (after Silica Gel cleanup)	Eurofins mgt Suite B1	NEPM 1999 Metals : Metals M15 (Filtered)	Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254 & 14271										
Sydney Laboratory - NATA Site # 18217						X	X	X	X	
Brisbane Laboratory - NATA Site # 20794										X
Perth Laboratory - NATA Site # 23736										
External Laboratory										
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID					
1	QW13	Jan 16, 2020		Water	S20-Ja14392	X	X	X	X	X
Test Counts						1	1	1	1	1

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 697336-W
Project name WILLIAMTOWN SS
Project ID 20193820
Received Date Jan 17, 2020

Client Sample ID			QW13
Sample Matrix			Water
Eurofins Sample No.			S20-Ja14392
Date Sampled			Jan 16, 2020
Test/Reference	LOR	Unit	
Total Recoverable Hydrocarbons - 1999 NEPM Fractions			
TRH C6-C9	0.02	mg/L	< 0.02
TRH C10-C14	0.05	mg/L	0.25
TRH C15-C28	0.1	mg/L	0.3
TRH C29-C36	0.1	mg/L	0.1
TRH C10-C36 (Total)	0.1	mg/L	0.65
BTEX			
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	%	89
Total Recoverable Hydrocarbons - 2013 NEPM Fractions			
Naphthalene ^{N02}	0.01	mg/L	< 0.01
TRH C6-C10	0.02	mg/L	< 0.02
TRH C6-C10 less BTEX (F1) ^{N04}	0.02	mg/L	< 0.02
TRH >C10-C16	0.05	mg/L	0.21
TRH >C10-C16 less Naphthalene (F2) ^{N01}	0.05	mg/L	0.21
TRH >C16-C34	0.1	mg/L	0.4
TRH >C34-C40	0.1	mg/L	< 0.1
TRH >C10-C40 (total)*	0.1	mg/L	0.61
TRH - 2013 NEPM Fractions (after silica gel clean-up)			
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
TRH - 1999 NEPM Fractions (after silica gel clean-up)			
TRH C10-C36 (Total) (after silica gel clean-up)	0.4	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

Client Sample ID			QW13
Sample Matrix			Water
Eurofins Sample No.			S20-Ja14392
Date Sampled			Jan 16, 2020
Test/Reference	LOR	Unit	
Heavy Metals			
Arsenic (filtered)	0.001	mg/L	< 0.001
Barium (filtered)	0.02	mg/L	0.03
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	0.004
Iron (filtered)	0.05	mg/L	1.6
Lead (filtered)	0.001	mg/L	< 0.001
Manganese (filtered)	0.005	mg/L	0.009
Mercury (filtered)	0.0001	mg/L	< 0.0001
Nickel (filtered)	0.001	mg/L	< 0.001
Vanadium (filtered)	0.005	mg/L	< 0.005
Zinc (filtered)	0.005	mg/L	0.012
Perfluoroalkyl carboxylic acids (PFCAs)			
Perfluorobutanoic acid (PFBA) ^{N11}	0.05	ug/L	< 0.05
Perfluoropentanoic acid (PFPeA) ^{N11}	0.01	ug/L	< 0.01
Perfluorohexanoic acid (PFHxA) ^{N11}	0.01	ug/L	< 0.01
Perfluoroheptanoic acid (PFHpA) ^{N11}	0.01	ug/L	< 0.01
Perfluorooctanoic acid (PFOA) ^{N11}	0.01	ug/L	< 0.01
Perfluorononanoic acid (PFNA) ^{N11}	0.01	ug/L	< 0.01
Perfluorodecanoic acid (PFDA) ^{N11}	0.01	ug/L	< 0.01
Perfluoroundecanoic acid (PFUnDA) ^{N11}	0.01	ug/L	< 0.01
Perfluorododecanoic acid (PFDoDA) ^{N11}	0.01	ug/L	< 0.01
Perfluorotridecanoic acid (PFTeDA) ^{N15}	0.01	ug/L	< 0.01
Perfluorotetradecanoic acid (PFTeDA) ^{N11}	0.01	ug/L	< 0.01
13C4-PFBA (surr.)	1	%	83
13C5-PFPeA (surr.)	1	%	97
13C5-PFHxA (surr.)	1	%	106
13C4-PFHpA (surr.)	1	%	102
13C8-PFOA (surr.)	1	%	108
13C5-PFNA (surr.)	1	%	112
13C6-PFDA (surr.)	1	%	72
13C2-PFUnDA (surr.)	1	%	45
13C2-PFDoDA (surr.)	1	%	28
13C2-PFTeDA (surr.)	1	%	73
Perfluoroalkyl sulfonamido substances			
Perfluorooctane sulfonamide (FOSA) ^{N11}	0.05	ug/L	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) ^{N11}	0.05	ug/L	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) ^{N11}	0.05	ug/L	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE) ^{N11}	0.05	ug/L	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE) ^{N11}	0.05	ug/L	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) ^{N11}	0.05	ug/L	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) ^{N11}	0.05	ug/L	< 0.05
13C8-FOSA (surr.)	1	%	53

Client Sample ID			QW13
Sample Matrix			Water
Eurofins Sample No.			S20-Ja14392
Date Sampled			Jan 16, 2020
Test/Reference	LOR	Unit	
Perfluoroalkyl sulfonamido substances			
D3-N-MeFOSA (surr.)	1	%	43
D5-N-EtFOSA (surr.)	1	%	33
D7-N-MeFOSE (surr.)	1	%	20
D9-N-EtFOSE (surr.)	1	%	19
D5-N-EtFOSAA (surr.)	1	%	INT
D3-N-MeFOSAA (surr.)	1	%	39
Perfluoroalkyl sulfonic acids (PFASs)			
Perfluorobutanesulfonic acid (PFBS) ^{N11}	0.01	ug/L	< 0.01
Perfluorononanesulfonic acid (PFNS) ^{N15}	0.01	ug/L	< 0.01
Perfluoropropanesulfonic acid (PFPrS) ^{N15}	0.01	ug/L	< 0.01
Perfluoropentanesulfonic acid (PFPeS) ^{N15}	0.01	ug/L	< 0.01
Perfluorohexanesulfonic acid (PFHxS) ^{N11}	0.01	ug/L	< 0.01
Perfluoroheptanesulfonic acid (PFHpS) ^{N15}	0.01	ug/L	< 0.01
Perfluorooctanesulfonic acid (PFOS) ^{N11}	0.01	ug/L	< 0.01
Perfluorodecanesulfonic acid (PFDS) ^{N15}	0.01	ug/L	< 0.01
13C3-PFBS (surr.)	1	%	118
18O2-PFHxS (surr.)	1	%	29
13C8-PFOS (surr.)	1	%	104
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA) ^{N11}	0.01	ug/L	< 0.01
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA) ^{N11}	0.05	ug/L	< 0.05
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA) ^{N11}	0.01	ug/L	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA) ^{N15}	0.01	ug/L	< 0.01
13C2-4:2 FTSA (surr.)	1	%	70
13C2-6:2 FTSA (surr.)	1	%	93
13C2-8:2 FTSA (surr.)	1	%	70
PFASs Summations			
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	Sydney	Jan 17, 2020	7 Days
BTEX - Method: LTM-ORG-2010 TRH C6-C40	Sydney	Jan 17, 2020	14 Days
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Sydney	Jan 17, 2020	7 Days
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Sydney	Jan 17, 2020	
TRH - 2013 NEPM Fractions (after silica gel clean-up) - Method: LTM-ORG-2010 TRH C6-C40	Sydney	Jan 17, 2020	7 Days
TRH - 1999 NEPM Fractions (after silica gel clean-up) - Method: LTM-ORG-2010 TRH C6-C40	Sydney	Jan 17, 2020	7 Days
NEPM 1999 Metals : Metals M15 (Filtered)			
Chromium (hexavalent) - Method: E057 Total Speciated Chromium	Sydney	Jan 17, 2020	28 Days
Chromium (trivalent filtered) - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Sydney	Jan 17, 2020	28 Days
Heavy Metals (filtered) - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Sydney	Jan 20, 2020	180 Days
Mobil Metals : Metals M15 - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Sydney	Jan 17, 2020	28 Days
Per- and Polyfluoroalkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs) - Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)	Brisbane	Jan 21, 2020	14 Days
Perfluoroalkyl sulfonamido substances - Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)	Brisbane	Jan 21, 2020	14 Days
Perfluoroalkyl sulfonic acids (PFSAs) - Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)	Brisbane	Jan 21, 2020	14 Days
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs) - Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)	Brisbane	Jan 21, 2020	14 Days

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NATA # 1261 Site # 18217

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NATA # 1261 Site # 20794

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NATA # 1261
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IANZ # 1290

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Company Name: Kleinfelder Aust Pty Ltd (NEWCASTLE)
Address: 95 Mitchell Rd
Cardiff
NSW 2285
Project Name: WILLIAMTOWN SS
Project ID: 20193820

Order No.:
Report #: 697336
Phone: 02 4949 5200
Fax:

Received: Jan 17, 2020 5:24 PM
Due: Jan 24, 2020
Priority: 5 Day
Contact Name: Dan Kousbroek

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Iron (filtered)	TRH (after Silica Gel cleanup)	Eurofins mgt Suite B1	NEPM 1999 Metals : Metals M15 (Filtered)	Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254 & 14271										
Sydney Laboratory - NATA Site # 18217						X	X	X	X	
Brisbane Laboratory - NATA Site # 20794										X
Perth Laboratory - NATA Site # 23736										
External Laboratory										
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID					
1	QW13	Jan 16, 2020		Water	S20-Ja14392	X	X	X	X	X
Test Counts						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

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	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.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	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.
TEQ	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
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
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	
Method Blank							
BTEX							
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	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
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	
Method Blank							
TRH - 2013 NEPM Fractions (after silica gel clean-up)							
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	
Method Blank							
TRH - 1999 NEPM Fractions (after silica gel clean-up)							
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	
Method Blank							
Heavy Metals							
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	
Iron (filtered)	mg/L	< 0.05			0.05	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	
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	ug/L	< 0.05			0.05	Pass	
Perfluoropentanoic acid (PFPeA)	ug/L	< 0.01			0.01	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
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	
Method Blank							
Perfluoroalkyl sulfonamido substances							
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	
Method Blank							
Perfluoroalkyl sulfonic acids (PFSA's)							
Perfluorobutanesulfonic acid (PFBS)	ug/L	< 0.01			0.01	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/L	< 0.01			0.01	Pass	
Perfluoropropanesulfonic acid (PFPrS)	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	
Perfluorooctanesulfonic acid (PFOS)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/L	< 0.01			0.01	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic 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	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	90			70-130	Pass	
TRH C10-C14	%	72			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	89			70-130	Pass	
Toluene	%	90			70-130	Pass	
Ethylbenzene	%	90			70-130	Pass	
m&p-Xylenes	%	87			70-130	Pass	
o-Xylene	%	89			70-130	Pass	
Xylenes - Total	%	88			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	86			70-130	Pass	
TRH C6-C10	%	93			70-130	Pass	
TRH >C10-C16	%	70			70-130	Pass	
LCS - % Recovery							
TRH - 2013 NEPM Fractions (after silica gel clean-up)							
TRH >C10-C16 (after silica gel clean-up)	%	86			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery							
TRH - 1999 NEPM Fractions (after silica gel clean-up)							
TRH C10-C14 (after silica gel clean-up)	%	88			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic (filtered)	%	95			70-130	Pass	
Barium (filtered)	%	96			70-130	Pass	
Beryllium (filtered)	%	121			70-130	Pass	
Boron (filtered)	%	80			70-130	Pass	
Cadmium (filtered)	%	91			70-130	Pass	
Chromium (filtered)	%	94			70-130	Pass	
Cobalt (filtered)	%	94			70-130	Pass	
Copper (filtered)	%	94			70-130	Pass	
Iron (filtered)	%	91			70-130	Pass	
Lead (filtered)	%	95			70-130	Pass	
Manganese (filtered)	%	91			70-130	Pass	
Mercury (filtered)	%	97			70-130	Pass	
Nickel (filtered)	%	95			70-130	Pass	
Vanadium (filtered)	%	95			70-130	Pass	
Zinc (filtered)	%	92			70-130	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	%	67			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	67			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	65			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	62			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	64			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	60			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	60			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	65			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	65			50-150	Pass	
Perfluorotridecanoic acid (PFTriDA)	%	101			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	60			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	%	61			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	51			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	57			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	%	52			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	%	57			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	%	66			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	%	57			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	%	82			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	%	56			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	%	61			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	%	63			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	%	60			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	%	107			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	%	64			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	%	56			50-150	Pass	
LCS - % Recovery							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)			%	71			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)			%	60			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)			%	67			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)			%	59			50-150	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	S20-Ja14168	NCP	%	98			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	S20-Ja14168	NCP	%	90			70-130	Pass	
Toluene	S20-Ja14168	NCP	%	95			70-130	Pass	
Ethylbenzene	S20-Ja14168	NCP	%	95			70-130	Pass	
m&p-Xylenes	S20-Ja14168	NCP	%	91			70-130	Pass	
o-Xylene	S20-Ja14168	NCP	%	95			70-130	Pass	
Xylenes - Total	S20-Ja14168	NCP	%	92			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	S20-Ja14168	NCP	%	95			70-130	Pass	
TRH C6-C10	S20-Ja14168	NCP	%	98			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic (filtered)	S20-Ja14392	CP	%	97			70-130	Pass	
Barium (filtered)	S20-Ja14392	CP	%	92			70-130	Pass	
Beryllium (filtered)	S20-Ja14392	CP	%	107			70-130	Pass	
Boron (filtered)	S20-Ja14392	CP	%	90			70-130	Pass	
Cadmium (filtered)	S20-Ja14392	CP	%	92			70-130	Pass	
Chromium (filtered)	S20-Ja14392	CP	%	90			70-130	Pass	
Cobalt (filtered)	S20-Ja14392	CP	%	91			70-130	Pass	
Copper (filtered)	S20-Ja14392	CP	%	89			70-130	Pass	
Iron (filtered)	S20-Ja14392	CP	%	25			70-130	Fail	Q08
Lead (filtered)	S20-Ja14392	CP	%	90			70-130	Pass	
Manganese (filtered)	S20-Ja14392	CP	%	90			70-130	Pass	
Mercury (filtered)	S20-Ja14392	CP	%	48			70-130	Fail	Q08
Nickel (filtered)	S20-Ja14392	CP	%	90			70-130	Pass	
Vanadium (filtered)	S20-Ja14392	CP	%	96			70-130	Pass	
Zinc (filtered)	S20-Ja14392	CP	%	93			70-130	Pass	
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1					
Perfluorobutanoic acid (PFBA)	M20-Ja14783	NCP	%	101			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	M20-Ja14783	NCP	%	97			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	M20-Ja14783	NCP	%	96			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	M20-Ja14783	NCP	%	93			50-150	Pass	
Perfluorooctanoic acid (PFOA)	M20-Ja14783	NCP	%	89			50-150	Pass	
Perfluorononanoic acid (PFNA)	M20-Ja14783	NCP	%	90			50-150	Pass	
Perfluorodecanoic acid (PFDA)	M20-Ja14783	NCP	%	90			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	M20-Ja14783	NCP	%	90			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	M20-Ja14783	NCP	%	99			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	M20-Ja14783	NCP	%	135			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M20-Ja14783	NCP	%	91			50-150	Pass	
Spike - % Recovery									

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluoroalkyl sulfonamido substances				Result 1					
Perfluorooctane sulfonamide (FOSA)	M20-Ja14783	NCP	%	99			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M20-Ja14783	NCP	%	88			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M20-Ja14783	NCP	%	94			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	M20-Ja14783	NCP	%	89			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	M20-Ja14783	NCP	%	90			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M20-Ja14783	NCP	%	93			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M20-Ja14783	NCP	%	90			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonic acids (PFSA's)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	M20-Ja14783	NCP	%	104			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	M20-Ja14783	NCP	%	84			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	M20-Ja14783	NCP	%	95			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	M20-Ja14783	NCP	%	91			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	M20-Ja14783	NCP	%	89			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	M20-Ja14783	NCP	%	129			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	M20-Ja14783	NCP	%	93			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	M20-Ja14783	NCP	%	59			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	M20-Ja14783	NCP	%	102			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	M20-Ja14783	NCP	%	87			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	M20-Ja14783	NCP	%	97			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	M20-Ja14783	NCP	%	81			50-150	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	S20-Ja14392	CP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	S20-Ja14392	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Toluene	S20-Ja14392	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Ethylbenzene	S20-Ja14392	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
m&p-Xylenes	S20-Ja14392	CP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
o-Xylene	S20-Ja14392	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Xylenes - Total	S20-Ja14392	CP	mg/L	< 0.003	< 0.003	<1	30%	Pass	

Duplicate								
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD		
Naphthalene	S20-Ja14392	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass
TRH C6-C10	S20-Ja14392	CP	mg/L	< 0.02	< 0.02	<1	30%	Pass
Duplicate								
				Result 1	Result 2	RPD		
Chromium (hexavalent)	S20-Ja10862	NCP	mg/L	0.027	0.029	8.0	30%	Pass
Duplicate								
Heavy Metals				Result 1	Result 2	RPD		
Arsenic (filtered)	S20-Ja13841	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Barium (filtered)	S20-Ja13841	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass
Beryllium (filtered)	S20-Ja13841	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Boron (filtered)	S20-Ja13841	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass
Cadmium (filtered)	S20-Ja13841	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass
Chromium (filtered)	S20-Ja13841	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Cobalt (filtered)	S20-Ja13841	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Copper (filtered)	S20-Ja13841	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Iron (filtered)	S20-Ja13841	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass
Lead (filtered)	S20-Ja13841	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Manganese (filtered)	S20-Ja13841	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Mercury (filtered)	S20-Ja13841	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass
Nickel (filtered)	S20-Ja13841	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Vanadium (filtered)	S20-Ja13841	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Zinc (filtered)	S20-Ja13841	NCP	mg/L	0.035	0.037	6.0	30%	Pass
Duplicate								
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD		
Perfluorobutanoic acid (PFBA)	M20-Ja14774	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
Perfluoropentanoic acid (PFPeA)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorohexanoic acid (PFHxA)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoroheptanoic acid (PFHpA)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorooctanoic acid (PFOA)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorononanoic acid (PFNA)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorodecanoic acid (PFDA)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoroundecanoic acid (PFUnDA)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorododecanoic acid (PFDoDA)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorotridecanoic acid (PFTrDA)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorotetradecanoic acid (PFTeDA)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Duplicate								
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD		
Perfluorooctane sulfonamide (FOSA)	M20-Ja14774	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M20-Ja14774	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M20-Ja14774	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	M20-Ja14774	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	M20-Ja14774	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M20-Ja14774	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M20-Ja14774	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass

Duplicate								
Perfluoroalkyl sulfonic acids (PFASs)				Result 1	Result 2	RPD		
Perfluorobutanesulfonic acid (PFBS)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorononanesulfonic acid (PFNS)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoropropanesulfonic acid (PFPrS)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoropentanesulfonic acid (PFPeS)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorohexanesulfonic acid (PFHxS)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoroheptanesulfonic acid (PFHpS)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorooctanesulfonic acid (PFOS)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorodecanesulfonic acid (PFDS)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Duplicate								
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)				Result 1	Result 2	RPD		
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	M20-Ja14774	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass

Comments

Sample Integrity

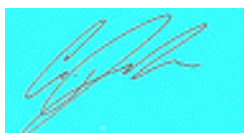
Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	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).
Q08	The matrix spike recovery is outside of the recommended acceptance criteria. An acceptable recovery was obtained for the laboratory control sample indicating a sample matrix interference.

Authorised By

Andrew Black	Analytical Services Manager
Andrew Sullivan	Senior Analyst-Organic (NSW)
Gabriele Cordero	Senior Analyst-Inorganic (NSW)
Gabriele Cordero	Senior Analyst-Metal (NSW)
Sarah McCallion	Senior Analyst-PFAS (QLD)



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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APPENDIX C: FIELD SHEETS AND CALIBRATION CERTIFICATES



Environmental monitoring
& sampling equipment
Rentals and sales.

Tel: 07 3135 9600

brisbane@ecoenvironmental.com.au
www.ecoenvironmental.com.au

Unit 2B, 6 Edmondstone Road, Bowen Hills QLD 4006

Interface Probe – Calibration Certificate

Instrument: Heron Interface Probe – 100m
Serial No: HIM100-1B

Items			
Items	Id No.	Sent	Returned
Interface Meter	HIM100-1B	X	
Manual	N/A	X	
Spare Batteries	N/A	X	
Carry Case	N/A	X	

Calibration Results		
Parameter	Standard	Result
Water	Tap Water	Pass
Oil	Kerosene	Pass
Battery	9 Volts	9.00 Volts

Date: 28.02.2019

Calibrated by:

Multi Parameter Water Meter



Air-Met Scientific Pty Ltd
1300 137 067

Instrument YSI Quatro Pro Plus
Serial No. 18L101819

Item	Test	Pass	Comments
Battery	Charge Condition	✓	
	Fuses	✓	
	Capacity	✓	
Switch/keypad	Operation	✓	
Display	Intensity	✓	
	Operation (segments)	✓	
Grill Filter	Condition	✓	
	Seal	✓	
PCB	Condition	✓	
Connectors	Condition	✓	
Sensor	1. pH	✓	
	2. mV	✓	
	3. EC	✓	
	4. D.O	✓	
	5. Temp	✓	
Alarms	Beeper		
	Settings		
Software	Version		
Data logger	Operation		
Download	Operation		
Other tests:			

Certificate of Calibration

This is to certify that the above instrument has been calibrated to the following specifications:

Sensor	Serial no	Standard Solutions	Certified	Solution Bottle Number	Instrument Reading
1. pH 10.00		pH 10.00		324189	pH 9.77
2. pH 7.00		pH 7.00		330737	pH 6.99
3. pH 4.00		pH 4.00		330734	pH 4.09
4. mV		227.4mV		338782/337308	226.6mV
5. EC		2.76mS		333787	2.74mS
6. D.O		0.00ppm		329994	0.03ppm
7. Temp		22.6°C		MultiTherm	22.5°C

Calibrated by: Sarah Lian

Calibration date: 7/02/2020

Next calibration due: 8/03/2020



Equipment Information / Calibration Certificate

Instrument: Hanna HI9829 - 2B

Serial No: B0050676

Equipment Check	Enclosed	Returned	Comment
WQM	☒	☐	
Manual	☒	☐	
Probe Cluster	☒	☐	
In situ monitoring cage	☒	☐	
Calibration cup	☒	☐	
Flow through Cell	☐	☐	Available on request
Spare Batteries	☒	☐	

Sensor Calibration Details

	Calibration Undertaken	Accuracy	Pass	Fail
Temperature	23.40	± 0.2 °C	☒	☐
Dissolved Oxygen	100%	± 0.2%	☒	☐
	0%	± 0.2%	☒	☐
pH	pH 4.00	± 0.2%	☒	☐
	pH 7.00	± 0.2%	☒	☐
	pH 10.00	± 0.2%	☒	☐
ORP	235.6 mV @ 22°C	± 30 mV	☒	☐
Turbidity	0 NTU	± 5.0 NTU	☒	☐
	20 NTU	± 5.0 NTU	☒	☐
	200 NTU	± 20.0 NTU	☒	☐
Conductivity	1.413mS/cm	±0.5%	☒	☐

This is to certify that where possible, this instrument has been calibrated in accordance with the manufacturer's calibration procedure as recommended in the instrument service manual.

ECO Standard Rental Terms & Conditions apply to all equipment calibrations.

Regards,

Joseph Feltham

Equipment Specialist
ECO Environmental Holdings

13-May-2019



Equipment Information / Calibration Certificate

Instrument: Hanna HI9829 - 4B

Serial No: B0060782

Equipment Check	Enclosed	Returned	Comment
WQM	☒	☐	
Manual	☒	☐	
Probe Cluster	☒	☐	
In situ monitoring cage	☒	☐	
Calibration cup	☒	☐	
Flow through Cell	☐	☐	
Spare Batteries	☒	☐	

Sensor Calibration Details

	Calibration Undertaken	Accuracy	Pass	Fail
Temperature	25.25°C	± 0.2 °C	☒	☐
Dissolved Oxygen	100%	± 0.2%	☒	☐
	0%	± 0.2%	☒	☐
pH	pH 4.00	± 0.2%	☒	☐
	pH 7.00	± 0.2%	☒	☐
	pH 10.00	± 0.2%	☒	☐
ORP	229 mV @ 29	± 30 mV	☒	☐
Turbidity	0 NTU	± 5.0 NTU	☒	☐
	20 NTU	± 5.0 NTU	☒	☐
	200 NTU	± 20.0 NTU	☒	☐
Conductivity	1.413mS/cm	±0.5%	☒	☐

This is to certify that where possible, this instrument has been calibrated in accordance with the manufacturer's calibration procedure as recommended in the instrument service manual.

ECO Standard Rental Terms & Conditions apply to all equipment calibrations.

Regards,

Jeremy Kil

Equipment Specialist
ECO Environmental Holdings

11-Jun-2019



Equipment Information / Calibration Certificate

Instrument: Hanna HI9829 - 4B

Serial No: B0060782

Equipment Check	Enclosed	Returned	Comment
WQM	☒	☐	
Manual	☒	☐	
Probe Cluster	☒	☐	
In situ monitoring cage	☒	☐	
Calibration cup	☒	☐	
Flow through Cell	☐	☐	
Spare Batteries	☒	☐	

Sensor Calibration Details

	Calibration Undertaken	Accuracy	Pass	Fail
Temperature	25°C	± 0.2 °C	☒	☐
Dissolved Oxygen	100%	± 0.2%	☒	☐
	0%	± 0.2%	☒	☐
pH	pH 4.00	± 0.2%	☒	☐
	pH 7.00	± 0.2%	☒	☐
	pH 10.00	± 0.2%	☒	☐
ORP	233.4 mV @ 23	± 30 mV	☒	☐
Turbidity	0 NTU	± 5.0 NTU	☒	☐
	20 NTU	± 5.0 NTU	☒	☐
	200 NTU	± 20.0 NTU	☒	☐
Conductivity	1.413mS/cm	±0.5%	☒	☐

This is to certify that where possible, this instrument has been calibrated in accordance with the manufacturer's calibration procedure as recommended in the instrument service manual.

ECO Standard Rental Terms & Conditions apply to all equipment calibrations.

Regards,

Jeremy Kil

Equipment Specialist
ECO Environmental Holdings

16-Apr-2019

Turbidity Meter

Instrument DKK TOA TURBIDITY METER
Serial No. 737757



Air-Met Scientific Pty Ltd
1300 137 067

Item	Test	Pass	Comments
Battery	Charge Condition	✓	
	Fuses	✓	
	Capacity	✓	
	Recharge OK?	✓	
Switch/keypad	Operation	✓	
Display	Intensity	✓	
	Operation (segments)	✓	
Grill Filter	Condition	✓	
	Seal	✓	
PCB	Condition	✓	
Connectors	Condition	✓	
Sensor			
	1. Turbidity	✓	
Alarms	Beeper		
	Settings		
Software	Version		
Data logger	Operation		
Download	Operation		
Other tests:			

Certificate of Calibration

This is to certify that the above instrument has been calibrated to the following specifications:

Sensor	Serial no	Standard Solutions	Certified	Solution Bottle Number	Instrument Reading
1.Turbidity		360 NTU Solution		306028	364 NTU

Calibrated by: _____ Sen Philip

Calibration date: 12/07/2019

Next calibration due: 11/08/2019



Equipment Information / Calibration Certificate

Instrument: Hanna HI9829 - 4B

Serial No: B0060782

Equipment Check	Enclosed	Returned	Comment
WQM	☒	☐	
Manual	☒	☐	
Probe Cluster	☒	☐	
In situ monitoring cage	☒	☐	
Calibration cup	☒	☐	
Flow through Cell	☐	☐	
Spare Batteries	☒	☐	

Sensor Calibration Details

	Calibration Undertaken	Accuracy	Pass	Fail
Temperature	21.6	± 0.2 °C	☒	☐
Dissolved Oxygen	100%	± 0.2%	☒	☐
	0%	± 0.2%	☒	☐
pH	pH 4.00	± 0.2%	☒	☐
	pH 7.00	± 0.2%	☒	☐
	pH 10.00	± 0.2%	☒	☐
ORP	235.6 mV @ 22	± 30 mV	☒	☐
Turbidity	0 NTU	± 5.0 NTU	☒	☐
	20 NTU	± 5.0 NTU	☒	☐
	200 NTU	± 20.0 NTU	☒	☐
Conductivity	12.90mS/cm	±0.5%	☒	☐

This is to certify that where possible, this instrument has been calibrated in accordance with the manufacturer's calibration procedure as recommended in the instrument service manual.

ECO Standard Rental Terms & Conditions apply to all equipment calibrations.

Regards,

Jeremy Kil

Equipment Specialist
ECO Environmental Holdings

13-Sep-2019



Equipment Information / Calibration Certificate

Instrument: Hanna HI9829 - 1B

Serial No: B0022987

Equipment Check

Enclosed

Returned

Comment

WQM



Manual



Probe Cluster



In situ monitoring cage



Calibration cup



Flow through Cell



Available on request

Spare Batteries



Sensor Calibration Details

		Calibration Undertaken	Accuracy	Pass	Fail
Temperature	24.15		± 0.2 °C	☒	☐
Dissolved Oxygen	100%		± 0.2%	☒	☐
	0%		± 0.2%	☒	☐
pH	pH 4.00		± 0.2%	☒	☐
	pH 7.00		± 0.2%	☒	☐
	pH 10.00		± 0.2%	☒	☐
ORP	231.2	mV @ 24	± 30 mV	☒	☐
Turbidity		0 NTU	± 5.0 NTU	☒	☐
		20 NTU	± 5.0 NTU	☒	☐
		200 NTU	± 20.0 NTU	☒	☐
Conductivity		12.90mS/cm	±0.5%	☒	☐

This is to certify that where possible, this instrument has been calibrated in accordance with the manufacturer's calibration procedure as recommended in the instrument service manual.

ECO Standard Rental Terms & Conditions apply to all equipment calibrations.

Regards,

Joseph Feltham

Equipment Specialist
ECO Environmental Holdings

12-Nov-2019



Equipment Information / Calibration Certificate

Instrument: Hanna HI9829 - 2B

Serial No: B0050676

Equipment Check	Enclosed	Returned	Comment
WQM	☒	☐	
Manual	☒	☐	
Probe Cluster	☒	☐	
In situ monitoring cage	☒	☐	
Calibration cup	☒	☐	
Flow through Cell	☐	☐	
Spare Batteries	☒	☐	

Sensor Calibration Details

	Calibration Undertaken	Accuracy	Pass	Fail
Temperature	26.20°C	± 0.2 °C	☒	☐
Dissolved Oxygen	100%	± 0.2%	☒	☐
	0%	± 0.2%	☒	☐
pH	pH 4.00	± 0.2%	☒	☐
	pH 7.00	± 0.2%	☒	☐
	pH 10.00	± 0.2%	☒	☐
ORP	226.8 mV @ 26	± 30 mV	☒	☐
Turbidity	0 NTU	± 5.0 NTU	☒	☐
	20 NTU	± 5.0 NTU	☒	☐
	200 NTU	± 20.0 NTU	☒	☐
Conductivity	12.90mS/cm	±0.5%	☒	☐

This is to certify that where possible, this instrument has been calibrated in accordance with the manufacturer's calibration procedure as recommended in the instrument service manual.

ECO Standard Rental Terms & Conditions apply to all equipment calibrations.

Regards,

Jeremy Kil

Equipment Specialist
ECO Environmental Holdings

12-Dec-2019



Equipment Information / Calibration Certificate

Instrument: Hanna HI9829 - 1B

Serial No: B0022987

Equipment Check	Enclosed	Returned	Comment
WQM	☒	☐	
Manual	☒	☐	
Probe Cluster	☒	☐	
In situ monitoring cage	☒	☐	
Calibration cup	☒	☐	
Flow through Cell	☐	☐	Available on request
Spare Batteries	☒	☐	

Sensor Calibration Details

	Calibration Undertaken	Accuracy	Pass	Fail
Temperature	25.20	± 0.2 °C	☒	☐
Dissolved Oxygen	100%	± 0.2%	☒	☐
	0%	± 0.2%	☒	☐
pH	pH 4.00	± 0.2%	☒	☐
	pH 7.00	± 0.2%	☒	☐
	pH 10.00	± 0.2%	☒	☐
ORP	229 mV @ 25	± 30 mV	☒	☐
Turbidity	0 NTU	± 5.0 NTU	☒	☐
	20 NTU	± 5.0 NTU	☒	☐
	200 NTU	± 20.0 NTU	☒	☐
Conductivity	12.90mS/cm	±0.5%	☒	☐

This is to certify that where possible, this instrument has been calibrated in accordance with the manufacturer's calibration procedure as recommended in the instrument service manual.

ECO Standard Rental Terms & Conditions apply to all equipment calibrations.

Regards,

Jeremy Kil

Equipment Specialist
ECO Environmental Holdings

14-Jan-2020

BALLER PURGING AND SAMPLING LOG



Project Number:		Site Name:		Site Address:	
Well ID:		Date:		Field Manager:	
Well Diameter (mm):		Pre Purging Depth To Water (mBTOC):		Post Purging Depth To Water (mBTOC):	
Weather Observations:					
QA/QC Samples Collected:					

TD (m) _____ DTW (m) _____) x 5 = _____ L
 Minimum volume to be purged (3.8V) = _____ L

Time	DTW (mBTOC)	Volume Purged (L)	Temp (°C)	Field Measurements					Redox (mV)	Description
				DO (mg/L)	EC (µS/cm)	TDS (mg/L)	pH			
Stabilisation Criteria:				±10%	±3%	±3%	±0.05	±10 mV		Odor, sediment, color, appearance
1330	2.76m	~~1420~~	21.8		0.411 mS/cm		4.09	121		Seller Small - Dark Brown
1420			20.4		0.129 mS/cm		3.85	135		light Purple/black
1440			22.1		0.245 mS/cm		4.54	94		light Brown
1500			22.7		157.2 mS/cm		2.82	138		Dark Brown No odor
1530			22.3		0.402 mS/cm		3.78	136		Brown No odor
1545	0.720		21.7		0.326 mS/cm		4.03	121		light Brown Slight Sulfur odor
1550	0.830		20.1		0.320 mS/cm		4.06	122		Reddish white - Brown Slight Sulfur odor
1600	0.850		23.1		0.228 mS/cm		4.28	111		Clear to Slightly Cloudy No odor
1610	0.920		23.7		0.283 mS/cm		4.04	125		Slightly Cloudy/light Brown Slight Sulfur odor
1630	1.030		22.7		124.1 mS/cm		4.25	111		At Depth
1645	1.615		26.0		0.310 mS/cm		5.11	62		Water level low Slight Sulfur odor

COMMENTS:

* Minimum volume to be purged except where noted are dry.
 * These parameters may be considered stable when three consecutive readings (obtained several minutes apart) are within these levels.
 Source: Victorian Environmental Protection Authority Groundwater Sampling Guidelines, Publication 659, April 2000.

BALLER PURGING AND SAMPLING LOG

Project Number:	Site Name:	Site Address:
	W55	
Well ID:	Date:	Field Manager:
	14/3	DL
Well Diameter (mm):	Pre Purging Depth To Water (mBTOC):	Post Purging Depth To Water (mBTOC):

() x 5 = L
TO (m) DTW (m) 1.5V Minimum volume to be purged (3x3V): L

Field Measurements											off-mv 0.28 mV NTC	
Time	DTW (mBTOC)	Volume Purged (L)	Temp (°C)	DO (mg/L)	EC (µS/cm)	TDS (mg/L)	pH	Radox (mV)	Odour, sediment load, colour, sheen	Description		
1300			21.54	4.56	0.307 mS/cm	0.19 g/L	4.96	132	176	785	Cloudy - Slight Odour	
1330			25.0	2.28	0.251 mS/cm	0.162 g/L	4.34	141	179	458	Brown - Slight Odour	
1415			23.17	3.86	0.159 mS/cm	0.163	4.74	121	178	332	Brown No Odour	
1445			23.1	3.95	0.323 mS/cm	0.215	4.49	136	179	342	Brown - Slight Odour	
1515			25.87	0.72	0.392 mS/cm	0.222	6.08	52	10	358	Very small red dots	
1545												
0745			18.87	4.72	0.168 mS/cm	0.108	4.95	109	176	565	Light Brown - Slight Odour	
0830			16.93	4.14	0.111 mS/cm	0.076	5.49	81	180	456	Light Brown - Slight Odour	
0915			19.35	4.01	0.101	0.066	4.49	132	264	489	Dark Brown No Odour	
0950			18.92	3.97	0.079	0.051	4.52	130	311	611	Light Brown - No Odour	

COMMENTS:

* Minimum volume to be purged except where wells are dry.
† These parameters may be considered stable when three consecutive readings (obtained several minutes apart) are within these levels.
Source: Victorian Environmental Protection Authority, Groundwater Sampling Guidelines, Publication 889, April 2000.

BALLER PURGING AND SAMPLING LOG

Project Number:		Site Name:		Site Address:	
		WSS			
Well ID:	Date:	Field Manager:	Weather Observations:		
		DK			
Well Diameter (mm):		Pre Purging Depth To Water (mBTC):	Post Purging Depth To Water (mBTC):		

() x 5 = L
 TD (m) DTW (m) 1 BV Minimum volume to be purged (3x BV):

Field Measurements											
Time	DTW (mBTC)	Volume Purged (L)	Temp (°C)	DO (mg/L)	EC (µS/cm)	TDS (mg/L)	pH	Redox (mV)	Description		
Stabilisation Criteria				mg/L ± 0.05	µS/cm ± 3%	mg/L ± 3% TDM	± 0.05	± 10 mV	Odour, sediment load, colour, stream		
201115.	Surface	312	17.57	1.54	163	939		163	3.65	430.5	Clear → No Apparent odour
1820	Surface.	75	23.16	2.33	27	1003		502	3.95	400.9	Small cloudy pool of water
1210		301	21.43	2.24	85.5	43.		22	4.88	269.9	Cloudy No odour
1245		>1000	22.97	2.24	85.7	87		43	4.59	308.5	Dark brown → Black, No odour
1315		533	21.41	1.92	23	87		44	5.48	51.4	Slightly Cloudy No Apparent odour
1345		533	21.64	1.87	216	155		78	4.75	78.3	Cloudy Slight salt smell
1430		86.1	19.88	0.58	6.5	311		155	6.02	-12.8	Slightly Cloudy No odour
1445.		>1000	21.43	1.82	203	852		176	4.72	45.3	Cloudy, Slight odour
1510		143	22.09	1.95	22.7	144		72	4.52	140.1	Slightly Cloudy - Slight salt smell
1530		131	22.9	2.97	38.3	783		117	4.45	94.3	" " " "
1600		>1000	20.66	2.28	35.5	300		150	4.53	17.6	" " " "
											Field Measurements
											Very Cloudy

COMMENTS:

Field Penetration
Very Cloudy

* Minimum volume to be purged occurs where wells are dry.
 ** These parameters may be considered stable when three consecutive readings (obtained several minutes apart) are within these levels.
 Source: Victorian Environmental Protection Authority, Groundwater Sampling Guidelines, Publication 889, April 2000.

BAILER PURGING AND SAMPLING LOG

Project Number:		Site Name:		Site Address:	
		W55			
Well ID:	Date:	Field Manager:	Weather Observations:		
	16/5/19	DK.			
Well Diameter (mm):		Pre Purging Depth To Water (mBTOC):	Post Purging Depth To Water (mBTOC):		

TD (m) _____ DTW (m) _____ x 5 = _____ L
 Minimum volume to be purged (3x5V): _____ L

Field Measurements									
Time	DTW (mBTOC)	Volume Purged (L)	Temp (°C)	DO (mg/L)	EC (µs/cm)	TDS (mg/L)	pH	Redox (mV)	Description
Stabilisation Criteria: "				±10%	±1%	±1%	±0.05	±10 mV	Odour, sediment load, colour, sheen
SV4 1030		0.5	12.03	1.94	389	185	3.69	211.4	Clear - No Odour
SV1 1115		24	14.9	1.89	966	483	4.42	1067	Stained Brown - Tanning
SV2 1145		378	20.14	2.09	110	55	4.65	985	Stained Brown - Tanning
SV3 1200		21006	21.13	1.44	124	62	4.56	111	Dark Brown - No Odour
SV4 1220		205	20.57	1.86	150	75	5.42	256	Very light brown - No Odour
SV5 1245		348	19.94	1.55	232	116	4.68	-71.5	light brown - No Odour
SV6 1315		24.9	14.54	2.06	344	171	5.54	71.6	light brown - No Odour
SV7 1345		782	19.49	1.17	392	196	4.64	-65.8	Dark Brown - No Odour
SV8 1415		92.7	20.62	1.59	226	113	4.70	-5.2	light brown - No Odour
SV9 1445		167	20.86	1.17	298	149	4.74	-75	light brown - No Odour
SV10 1500		379	19.48	1.39	360	180	4.75	-64	Brown - No Odour

COMMENTS:

* Minimum volume to be purged except where wells are dry.
 * These parameters may be considered stable when three consecutive readings (obtained several minutes apart) are within three levels.
 Source: Victorian Environmental Protection Authority, Groundwater Sampling Guidelines, Publication 669, April 2007.

BAILER PURGING AND SAMPLING LOG

Project Number:

Site Name:

Site Address:

Sample Bottles Collected:

Well ID:

Date:

Field Manager:

QA/QC Samples Collected:

Weather Observations:

Pre Purging Depth To Water (mETOC):

Post Purging Depth To Water (mETOC):

Well Diameter (mm):

Pre Purging Depth To Water (mETOC):

Post Purging Depth To Water (mETOC):

TD (m) - DTW (m) - 1 BV Minimum volume to be purged (3x3BV):

Turbidity (NTU)

Field Measurements

Time	DTW (mETOC)	Vol. (L)	Temp (°C)	DO (mg/L)	EC (µS/cm)	TDS (mg/L)	pH	Redox (mV)	Description
Stabilisation Criteria				± 10%	± 5%	± 5%	± 0.05	± 10 mV	Odor, sediment load, colour, sheen
SW1	10.45	1.4	13.34	2.07	313	157	6.44	332.3	Light brown, no odour
SW2	11.40	9.2	14.60	1.42	811	407	6.40	248.4	Dark brown, no odour, slight sheen
SW3	12.15	86.24	19.01	5.08	55	28	6.41	321.9	milky cloudy, no odour
SW4	12.15	>1000	20.84	2.57	77	39	6.41	255	N. cloudy, dk brown, no odour
SW5	12.50	174	19.97	1.85	111	56	6.43	33.6	clear, no odour
SW6	12.50	504	18.93	2.73	185	93	6.41	-78.5	cloudy with sulfur odour
SW7	13.00	6.8	16.56	2.12	290	144	6.41	52.4	clear, no odour
SW8	13.50	792	19.30	3.67	305	153	5.70	-107.9	cloudy, sulfur odour
SW9	14.10	91.4	19.73	1.87	176	89	5.45	-164.7	cloudy, slight sulfur odour
SW10	14.30	81.5	19.56	10.34	217	109	5.47	-227.9	slight cloud, sulfur odour
SW11	14.40	71000	18.78	1.73	289	145	7.43	-340.8	dk brown cloudy, sulfur odour

COMMENTS:

Minimum volume to be purged (3x3BV) where wells are dry. Parameters may be considered stable when three consecutive readings (obtained several minutes apart) are within these levels. See Environmental Protection Authority, Groundwater Sampling Guidelines, Publication 602, April 2000.

BALLER PURGING AND SAMPLING LOG

Project Number:		Site Name:		Site Address:	
		US			
Well ID:	Date:	Field Manager:	Weather Observations:		
	16/7	YLK			
Well Diameter (mm):	Purging Depth To Water (mBTC):	Post Purging Depth To Water (mBTC):			

TO (m) _____ DTW (m) _____ x 5 = _____ L
 Minimum volume to be purged (3x BV): _____ L

NTC									
Field Measurements									
Time	DTW (mBTC)	Volume Purged (L)	Temp (°C)	DO (mg/L)	EC (µS/cm)	TDS (mg/L)	pH	Redox (mV)	Description
0936		3.8	9.9	~~10.0~~	0.371mS	~~10.0~~	4.23	116	No Odor, light Turb
0944		155	17.6	~~10.0~~	915µS		4.78	88	cloudy No odor
1105		11.9	9.7	~~10.0~~	0.827mS		4.56	99	Drill Turb. No odor
1130		7880	18.3		124.5µS		4.76	88	Drill Cloudy No odor
1145		358	18.4		122.1µS		5.42	51	Slightly cloudy No odor
1215		7880	16.9		0.296mS		4.53	101	Cloudy No odor
1245		13.9	14.6		0.431mS		4.27	116	Clean No odor
1315		811	15.8		0.37mS		4.67	94	Cloudy Slight white swirl
1343		108	17.2		6.191mS		4.54	101	Slightly cloudy - No odor
1400		248	17.2		0.228mS		4.58	100	Slightly cloudy - Slight swirl
1420		7880	16.8		0.397mS		4.55	101	Cloudy Swirl - Slight odor

COMMENTS:

Minimum volume to be purged except where wells are dry.
 (1) These parameters may be considered stable when three consecutive readings (obtained several minutes apart) are within these levels.
 Source: Victorian Environmental Protection Authority, Groundwater Sampling Guidelines, Publication 663, April 2000.



BAILER PURGING AND SAMPLING LOG

$$\left(\frac{\text{TD (m)}}{\text{DTW (m)}} - \frac{\text{DTW (m)}}{\text{DTW (m)}} \right) \times 5 = \frac{\text{L}}{1 \text{ BV}}$$

Minimum volume to be purged (3xBV)*: _____ L

COMMENTS:

^(b) These parameters may be considered stable when three consecutive readings (obtained several minutes apart) are within those levels.

BAILER PURGING AND SAMPLING LOG

Project Number:	Site Name:	Site Address:
	W55	
Well ID:	Date:	Field Manager:
	12/19	DKL
Weather Observations:		
Well Diameter (mm):	Purging Depth To Water (mBTOC):	Post Purging Depth To Water (mBTOC):

TD (m) _____ DTW (m) _____ x 5 = _____ L
 Minimum volume to be purged (3x BV): _____ L

Time	DTW (mBTOC)	Vol. Purged (L)	Temp (°C)	Field Measurements					Redox (mV)	Description
				DO (mg/L)	EC (µS/cm)	TDS (mg/L)	pH			
SW4										
1030	1	20	14.8	3.63	371	186	4.79		360	Clear to N. odor
SW42										
1100	1	1000	21.61	5.1	111	55	4.7		263	Dark Brown S/LG
SW41										
1130	1	537	21.02	5.2	125	62	5.43		101	Slighty Brown Cloudy to N. odor
SW411										
1200		1000	20.26	5.04	195	97	4.64		31.2	Cloudy to Brown S/LG odor
SW44										
1245		346	20.53	5.18	96	48	4.77		251	Clear No odor
SW4										
1300		25.2	16.59	2.48	1138	569	4.21		923	Dark brown to brown
SW4										
1330		1600	18.64	5.26	306	156	4.72		-10	Dark Green S/LG odor
SW48										
1400		181	18.34	4.95	232	116	4.73		-22	Light Green S/LG odor
SW47										
1430		885	17.56	5.35	397	198	4.61		-11	Cloudy Green S/LG odor
SW3										
1445		114	17.05	2.88	449	224	5.02		86.7	Clear No odor
SW6										
1505		69	18.66	3.03	215	107	4.61		57	Clear Slight odor

COMMENTS:

Minimum volume to be purged (except where noted) is 3x BV.
 * These parameters may be considered stable when three consecutive readings (obtained several minutes apart) are within these levels.
 Source: Victorian Environmental Protection Authority, Groundwater Sampling Guidelines, Publication 889, April 2000.

GAUGING LOG

Project Number:

Site Name:

Site Address:

20190303.0014

ESGS, Change Inc. Rd.

Date:

Field Manager:

2/2/19

JK

Time	Monitoring Well ID	Well Diameter (mm)	PID Reading (ppm)	Depth to PSH* (mBTOC)	Depth to Water (mBTOC)	PSH Thickness (m)	Well Total Depth (mBTOC)	Detailed Description of Well Condition & Any Repairs Required	Comments: HC Sheen, PSH Appearance & Thickness, Odour, Water Appearance
07:45	M2008	50	—	—	2.780	—	6.08	good condition. 3.2m water.	
08:00	QH7	50	—	—	1.998	—	4.42	good condition. 2.7m water.	
08:15	QH5	50	—	—	6.063	—	8.63	Next Band 2.6m water	
08:25	QH4	50	—	—	1.823	—	4.43	good condition. 2.4m water	
08:35	MW335	50	—	—	1.529	—	3.85	good condition. 2.3m water	
08:36	MW330	50	—	—	1.512	—	20.21	good condition. 18.8m water	
08:50	BH12	50	—	—	0.14	—	6.166	0.9m next band	
09:10	BH1	50	—	—	5.776	—	8.89	Top Well Metred 3.1m.	Top of Gatic
09:30	BH10	50	—	—	0.14	—	3.58	0.1m	
09:45	QH11	50	—	—	3.620	—	5.21	good condition. 2.2m water.	
09:57	QH2	50	—	—	5.674	—	8.93	good condition. 3.3m water.	1 Data logger attached.
10:10	QH3	50	—	—	6.026	—	8.94	good condition. 2.91m water.	Data logger attached
10:35	QH5	50	—	—	0.14	—	15.82	good condition	2 Data loggers attached
10:45	QH4	50	—	—	7.994	—	5.42	good condition	3 Data loggers attached
10:50	QH2	50	—	—	5.674	—	8.79	good condition. 3.7m water.	1 Data logger attached

COMMENTS:

NOTES:

TOC = Top of PVC Casing

mBTOC = Metres Below Top of PVC Casing

* If PSH is gauged as present, visually confirm presence and thickness using a bailer. Record detailed description of the PSH.

GAUGING LOG

Project Number:

Site Name:

Site Address:

Date:

Field Manager:

14-3-19

Time	Monitoring Well ID	Well Diameter (mm)	PID Reading (ppm)	Depth to PSH* (mBTOC)	Depth to Water (mBTOC)	PSH Thickness (m)	Well Total Depth (mBTOC)	Detailed Description of Well Condition & Any Repairs Required	Comments: HC Sheen, PSH Appearance & Thickness, Odour, Water Appearance
0830	GH4	50	-	-	2.031	-	5.72	Good Condition	Data loggers Attached
0700	GH9	50	-	-	0.4	-	16.01	Very soft PVC	
0517	BH3	50	-	-	6.1746	-	8.75	Good Condition	Can't log properly
0925	BH2	50	-	-	5.184	-	8.93	Good Condition	Date loggers Attached
0740	BH1	50	-	-	6.145	-	8.12	Well Reinstated - Fresh concrete	Needle well cover/loop
1605	BH10	50	-	-	7.14	-	3.58	Good Condition	
1015	GH11	50	-	-	3.181	-	5.21	Good Condition	Data loggers Attached
1045	GH12	400/40	-	-	6.924	-	8.03	Good Condition	Yawning installed
1100	MW235	50	-	-	1.615	-	3.84	Good Condition	Date loggers installed
1105	MW230	50	-	-	1.531	-	20.18	Good Condition	
1120	GH5	50	-	-	6.146	-	8.63	Good Condition	
1130	GH6	50	-	-	1.913	-	4.44	Good Condition	
1145	BH7	50	-	-	2.005	-	4.42	Good Condition	
1150	BH8	50	-	-	2.864	-	6.04	Good Condition	

COMMENTS:

NOTES:

TOC = Top of PVC Casing

mBTOC = Metres Below Top of PVC Casing

* If PSH is gauged as present, visually confirm presence and thickness using a baller. Record detailed description of the PSH.



GAUGING LOG

Project Number:

Site Name:

Site Address:

Date:

Field Manager:

23/4/15

DL

Time	Monitoring Well ID	Well Diameter (mm)	PID Reading (ppm)	Depth to PSH* (mBTIC)	Depth to Water (mBTIC)	PSH Thickness (m)	Well Total Depth (mBTIC)	Detailed Description of Well Condition & Any Repairs Required	Comments: HC Sheen, PSH Appearance & Thickness, Odour, Water Appearance
0715	BH4	50	-	-	1.878		6.02	Good Condition	Date Logger Attached
0745	BH5	50	-	-	Dry		16.01	Well Dry	
0800	BH3	50	-	-	6.059		9.03	Good Condition	Date Logger Attached - Still no smell
0815	BH2	50	-	-	5.833		9.02	Good Condition	Date Logger
0830	BH1	50	-	-	6.277		8.21	Good Condition - Need End Cap	
0845	BH10	50	-	-	1.149		3.58	Good Cond.	
0910	BH11	50	-	-	3.254		5.28	Good Cond	Date Logger
0930	BH12	50/40	-	-	6.846		8.12	Good Condition	Acidic Smell - from PVC liner
0945	MV2350	50	-	-	1.342		20.20	Good Condition	
0950	MV2355	50	-	-	1.421		9.89	Good Condition	
1010	BH5	50	-	-	5.914		8.71	Good Condition	Slight sulfur smell
1020	BH6	50	-	-	1.761		4.52	" "	
1030	BH7	50	-	-	1.744		4.51	" "	Slight sulfur smell
1050	BH8	50	-	-	2.511		6.15	" "	" "

COMMENTS:

NOTES:

* BTIC = Top of PVC Casing

mBTIC = Metres Below Top of PVC Casing

* If PSH is gauged as present, visually confirm presence and thickness using a bailer. Record detailed description of the PSH.

Page

of

GAUGING LOG

Project Number:

Site Name:

Site Address:

Date: Field Manager:

16/5/19 D1C

W/S



Time	Monitoring Well ID	Well Diameter (mm)	PID Reading (ppm)	Depth to PSH* (mB TOC)	Depth to Water (mB TOC)	PSH Thickness (m)	Well Total Depth (mB TOC)	Detailed Description of Well Condition & Any Repairs Required	Comments: HC Sheen, PSH Appearance & Thickness, Odour, Water Appearance
0700	BH4			1.847				Good Condition	Det. logg. Downhole
0715	BH9			Dry.				Well Dry	
0730	BH3			6.064				Good Condition/Water Silty	Det. logg. Downhole
0745	BH2			5.868				Good Condition	Det. logg. Downhole
0800	BH1			6.319				Cap missing	
0815	BH10			Dry.				Well in Good Condition	
0830	BH11			3.311				Well in Good Cond	Det. logg. Downhole
0840	SW2			Dry					See photo
0845	BH12			5.863				Well in Good Condition	Det. logg. Downhole
0900	MW2350			1.383				" "	
0910	MW2355			1.412				" "	Det. logg. Downhole
0930	BH5			5.844				" "	
0945	BH6			1.766				" "	
0950	BH7			1.716				" "	Det. logg. Downhole
1000	BH8			2.458				" "	Det. logg. Downhole
1015	SW4			135mm				Clear water	See photo
1130	SW1			10mm				Moved To centre of water	See photo
1315	SW3			98mm					See photo

COMMENTS:

NOTES:

TOC = Top of PVC Casing

mB TOC = Metres Below Top of PVC Casing

* If PSH is gauged as present, visually confirm presence and thickness using a bailer. Record detailed description of the PSH.

GAUGING LOG

Project Number:	Site Name:	Site Address:
	W5	

Date:	Field Manager:
14/6	TKL

Time	Monitoring Well ID	Well Diameter (mm)	PID Reading (ppm)	Depth to PSH* (mBTOC)	Depth to Water (mBTOC)	PSH Thickness (m)	Well Total Depth (mBTOC)	Detailed Description of Well Condition & Any Repairs Required	Comments: HC Sheen, PSH Appearance & Thickness, Odour, Water Appearance
0800	BH4			1.723				Good Condition	
0815	SW1			>140mm				Skinned surface from Road & Trench	No odor
0836	BH9			7.7				Good Condition	Well Dry
0845	BH3			6.605				Good Condition	Sedimented
0850	BH2			5.852				1' 1'	
0910	BH1			6.375				u No exp.	
0920	BH1			3.382				Good con	
0945	BH10			1.4				Good con	
1000	BH12			6.882				Good con	
1005	SW2			7.4				Good con	
1010	MW2390			1.920				Good con	
1011	MW2355			1.344				Good con	
1015	BH5			5.823				u	No odor
1025	BH6			1.713				u	u
1036	BH7			1.634				u	u
1035	BH8			2.346				u	u
	SW4			>175mm				natural thins strong.	no odour
	SW3			>150mm				Slightly Cloudy	No odor

COMMENTS:

NOTES:

TOC = Top of PVC Casing

mBTOC = Metres Below Top of PVC Casing

* If PSH is gauged as present, visually confirm presence and thickness using a bailer. Record detailed description of the PSH.

GAUGING LOG

Project Number:

Site Name:

Site Address:

Date: 16/7

Field Manager: JLC

WSS

Time	Monitoring Well ID	Well Diameter (mm)	PID Reading (gpm)	Depth to PSH (mBTOC)	Depth to Water (mBTOC)	PSH Thickness (m)	Well Total Depth (mBTOC)	Detailed Description of Well Condition & Any Repairs Required	Comments: HC Sheen, PSH Appearance & Thickness, Odour, Water Appearance
0715	BH4.				4.617				
0730	BH5				5.588				
0740	BH3				5.588			GC - Some silty material.	
0750	BH2				5.803			GC.	
0800	BH1				6.373			GC	
0815	BH10				6.799			GC	
0830	BH11				3.348			GC - Some Rust Evident	
0845	BH12.				6.799			GC - 40mm Taper - Acrylic Seal,	
0850	MW237D				1.239			GC Silt odour	
0855	MW235S				1.202			GC. Silt odour	
0900.	BH5				5.779			GC.	
0905	BH6				1.591			GC Silt odour	
0910	BH7				1.544			GC Silt odour	
0920	BH8				2.266			GC	
0930	BH4.				< 2.65m above			Clear water	
1255	BH3				< 2.15 above			Clear / No odor	
	BH2							Dry	
	BH1							Clear / S	

COMMENTS:

NOTES:

TOC = Top of PVC Casing

mBTOC = Metres Below Top of PVC Casing

* = If PSH is gauged as present, visually confirm presence and thickness using a bailer. Record detailed description of the PSH.

GAUGING LOG

Project Number:

Site Name:

Site Address:

Date:

Field Manager:

12/18 2018

W33 Cat Tree

Time	Monitoring Well ID	Well Diameter (mm)	PID Reading (ppm)	Depth to PSH* (mBTOC)	Depth to Water (mBTOC)	PSH Thickness (m)	Well Total Depth (mBTOC)	Detailed Description of Well Condition & Any Repairs Required	Comments: HC Sheen, PSH Appearance & Thickness, Odour, Water Appearance
0740	GH4				1.736			See Photo	
0745	SV1								
0750	GH5				Dry				
0800	GH2				5.888				
0805	GH1				6.453				
0810	GH10				Dry				
0825	GH11				3.503				
0840	GH12				6.889				
0845	MW2385				1.327				
0850	MW2385				1.352			Probe Pinned to Well - Not submerged. - Monthly Date will be ok	
0859	GH5				5.894				
0906	GH6				1.723				
0915	GH7				1.649				
0920	GH8				2.406				
0921	SV2				Dry				
0945	SV4							See Photo	
1010	GH3				6.027				
1245	SV3				71.9m			See Photo	

COMMENTS:

NOTES:

TOC = Top of PVC Casing

mBTOC = Metres Below Top of PVC Casing

* If PSH is gauged as present, visually confirm presence and thickness using a bailer. Record detailed description of the PSH.

GAUGING LOG



Project Number:

Site Name:

Site Address:

Date:

Field Manager:

12/4

OK

Time	Monitoring Well ID	Well Diameter (mm)	PID Reading (ppm)	Depth to PSH* (mBTOC)	Depth to Water (mBTOC)	PSH Thickness (m)	Well Total Depth (mBTOC)	Detailed Description of Well Condition & Any Repairs Required	Comments: HC Sheen, PSH Appearance & Thickness, Odour, Water Appearance
0730	GH4	56			1.604		6.11	GC.	
0745	SL1	56						Sec Plat.	Self Odour - Tummy
0800	GH5	56			Day		5.85	GC. Day GC	
0802	GH2	56			5.796		9.08	GC.	
0820	GH1				6.408		8.28	GC - No Cap	
0840	GH11				3.546		5.39	GC	
0856	GH10				Day		3.58	GC	
0905	GH12				6.827		8.2	GC.	
0906	SL2				Day				
0917	MW231				1.269			GC	
0930	GH5				1.248			GC	
0945	GH6				5.766			GC	
0950	GH7				1.647		4.62	GC.	
1000	GH8				1.542		4.61	GC.	
1030	SL4				2.282		6.27	GC.	5/6 Odour - 5.14 Gas
1445	SL3				150			See Photo	Clear
1455	GH2								Clear

COMMENTS:

NOTES:

TOC = Top of PVC Casing

mBTOC = Metres Below Top of PVC Casing

* If PSH is gauged as present, visually confirm presence and thickness using a bailer. Record detailed description of the PSH.

Page

of

GAUGING LOG

Project Number:

Site Name:

Site Address:

WSS

Date:

Field Manager:

7/5/14 711

Time	Monitoring Well ID	Well Diameter (mm)	Pip Reading (gpm)	Depth to PSH* (mBTOC)	Depth to Water (mBTOC)	PSH Thickness (m)	Well Total Depth (mBTOC)	Detailed Description of Well Condition & Any Repairs Required	Comments: HC Sheen, PSH Appearance & Thickness, Odour, Water Appearance
0730	BH4				1.435				
0845	SL1							See Photo	
0815	SW4							See Photo	
0830	BH8				2.092			GC	
0835	BH7				1.408			GC	
0845	BH5				5.648			GC	
0850	BH6				1.499			GC	
0855	MW239D				1.139			GC	
0856	MW235S				1.159			GC	
0805	SW3				90cm			Clear	
0911	BH12				6.732			Acidic Odor	
0920	BH1				6.413				
0930	BH10				0.14				
0935	BH11				3.504			GC.	
0950	BH2				5.740			GC.	
1000	BH5				0.14				
1045	BH4								

COMMENTS:

NOTES:
 TOC = Top of PVC Casing
 mBTOC = Metres Below Top of PVC Casing
 * If PSH is gauged as present, visually confirm presence of the PSH.

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Site Address:

Site Address:	

Date:	15/12/15	Field Manager:	JK

COMMENTS:

* = If PSH is gauged as present, visually confirm presence and thickness using a bailer. Record detailed description of the PSH.

GAUGING LOG



Project Number: 20198820 Site Name: W55 Site Address: _____

Date: 17/11/19 Field Manager: _____

Time	Monitoring Well ID	Well Diameter (mm)	PID Reading (ppm)	Depth to PSH* (mBTOC)	Depth to Water (mBTOC)	PSH Thickness (m)	Well Total Depth (mBTOC)	Detailed Description of Well Condition & Any Repairs Required	Comments: HC Sheen, PSH Appearance & Thickness, Odour, Water Appearance
0745	SV1	-	-	-	0.02m Ag	-	-	Drainage in water level	
0945	SV9	-	-	-	0.02m Ag	-	-	" "	
1045	SV4	-	-	-	0.15m Ag	-	-	" "	
1010	BH4	50mm	N/A	NA	1.624				
1210	BH7	1	1	1	1.588				
1230	BH6	1	1	1	1.657				
1245	MV2345	1	1	1	1.256				
1330	BH2	1	1	1	5.721				
1430	BH1	1	1	1	6.432				
1500	BH11	1	1	1	3.621				
18050	BH8	1	1	1	2.312				
	SV2				Dry				
	BH9				Dry				
	BH10				Dry				
	BH5				5.742				
	BH12				6.890				
	NW2859	✓	✓	✓	1.238				

COMMENTS:

NOTES:

TOC = Top of PVC Casing

mBTOC = Metres Below Top of PVC Casing

* = If PSH is gauged as present, visually confirm presence and thickness using a bailer. Record detailed description of the PSH.

KLEINFELDER
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Site Address:

Date:	17/12	Field Manager:	JK

COMMENTS:

* If PSH is judged as present, visually confirm presence and thickness using a baller. Record detailed description of the PSH.

GAUGING LOG

Project Number:

Site Name:

Site Address:

Date:

Field Manager:

16/1 2011



Time	Monitoring Well ID	Well Diameter (mm)	PID Reading (ppm)	Depth to PSH* (mBTC)	Depth to Water (mBTC)	PSH Thickness (m)	Well Total Depth (mBTC)	Detailed Description of Well Condition & Any Repairs Required	Comments: HC Sheen, PSH Appearance & Thickness, Odour, Water Appearance
0805	1112	50	+	+	2.252	-		GC	
0815	1112	50	+	-	6.453	-		GC	
0850	1119	50	-	-	6.701	-		GC.	
0855	1119	50	-	-	Dry	-		Dry	
0840	1110	50	-	-	Dry	-		Dry	
0900	1114	50	-	-	5.962	-		GC.	
0920	1114	50	-	-	7.252	-		GC. - slight acidic odour	
0940	1110	50	-	-	1.749	-		GC	
0944	1110	50	-	-	1.823	-		GC	
0950	1115	50	-	-	6.315	-		GC	
0952	1117	50	-	-	Dry	-		GC	
0958	1117	50	-	-	Dry	-		-	
1010	1113	50	-	-	Dry	-		-	
1015	1115	50	-	-	2.164	-		GC.	
1020	1117	50	-	-	2.169	-		GC.	
1025	1118	50	-	-	2.969	-		GC.	

COMMENTS:

NOTES:

TOC = Top of PVC Casing

mBTC = Metres Below Top of PVC Casing

* If PSH is gauged as present, visually confirm presence and thickness using a bailer. Record detailed description of the PSH.



BALLER PIRGING AND SAMPLING LOG

Minimum volume to be purged (3x8V): _____ L

COMMENTS:

^(d) These parameters may be considered stable when three consecutive readings (obtained several minutes apart) are within those levels.

BALLER PURGING AND SAMPLING LOG

Project Number:	Site Name:	Site Address:	Sample Bottles Collected:
	W55		
Well ID:	Date:	Field Manager:	Weather Observations:
	12/16/14	DLK	Clear
Well Diameter (mm):	Pre Purging Depth To Water (mBTOC):	Post Purging Depth To Water (mBTOC):	

TD (m) _____ DTW (m) _____ x 5 = _____ L
 Minimum volume to be purged (3x5V): _____ L

Field Measurements									
Time	DTW (mBTOC)	Volume Purged (L)	Temp (°C)	DO (mg/L)	EC (µs/cm)	TDS (mg/L)	pH	Redox (mV)	Description
Standardization Check									
0945	-	40	16.45	3.64	325	163146	4.36	970	Clear No Odor
1030		180	19.18	1.48	8	4	4.93	221	Slight Sulfur Odor - Brown Cloud
1045		30.5	16.56	0.71	857	425	4.35	339	Sulfur odor - Dark Brown
1115	-	581	20.76	1.08	48	24	4.83	223	Dark Brown - Sulfur odor
1140		295	21.12	0.93	18	9	5.5	78	Slightly cloudy Brown - Slight Sulfur odor
1205		509	15.93	1.85	124	62	4.33	-117	Slightly cloudy Brown - Sulfur Odor
1230		0	18.77	0.77	3313	156	4.36	315	Clear - No odor
011920		340	20.87	1.13	331	165	4.81	-133	cloudy Brown - Sulfur
1330		109	21.65	1.64	110	55	5.05	-144	Slightly cloudy Brown - Sulfur odor
1350		119	21.79	1.25	183	92	4.89	-138	" " "
1415		861	20.44	1.19	224	112	4.85	-160	Dark Brown, Sulfur odor

COMMENTS:

* Minimum volume to be purged except where wells are dry.
 ** These parameters may be considered stable when three consecutive readings (obtained several minutes apart) are within these levels.
 Source: National Environmental Protection Agency, Groundwater Sampling Guidelines, Publication 600/4-90/007



BALLER PURGING AND SAMPLING LOG

Project Number:	20193820	Site Name:	W55	Site Address:	
Well ID:	17/11/19	Date:	OK.	Field Manager:	
Well Diameter (mm):		Pre Purging Depth To Water (mETOC):	Post Purging Depth To Water (mETOC):		

$$\left(\frac{TD (m)}{10} \times 5 \right) \times 5 = \frac{L}{1.8V} \quad \text{Minimum volume to be purged (3x8V): } L$$

Field Measurements									
Time	DTW (mETOC)	Volume Purged (L)	Temp (°C)	DO (mg/L)	EC (µS/cm)	TDS (mg/L)	pH	Radox (mV)	Description
0945			14.54	1.4	470	235	5.04	57.7	Red Algae Present
1045			18.46	0.09	538	269	4.56	218.5	Clear - No odor
1010			21.07	0.26	55	47	4.53	290	Slight Cloudy Brown + odor
1145			23.25	1.2	1964	981	4.53	230	Green / Grey / Tan, No Sulfur odor
1210			21.75	0.81	391	195	4.6	13.1	Cloudy Brown + Slight Sulfur odor
1220			23.12	0.28	335	168	4.8	6.4	"
1300			21.18	0.21	718	359	4.58	-17.6	Cloudy Brown + Sulfur odor
1330			21.76	0.29	133	67	4.61	236	Dark Brown - Slight Sulfur odor
1350			21.56	1.12	182	91	5.43	62.9	Cloudy Brown + Sulfur odor
1400			22.65	0.37	324	162	4.62	34	"
1450			22.58	0.06	545	274	4.51	-28.8	"

COMMENTS:

Minimum volume to be purged except where wells are dry.
These parameters may be considered stable when three consecutive readings (obtained several minutes apart) are within these levels.
Source: Victorian Environmental Protection Authority, Groundwater Sampling Guidelines, Publication 689, April 2009.

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Sample Bottles Collected:

10

QA/QC Samples Collected:

1001

1

COMMENTS:

Minimum volume to be purged except where wells are dry.
 (f) These parameters may be considered stable when three consecutive readings (obtained several minutes apart) are within these levels.
 Source: Victorian Environmental Protection Authority, *Groundwater Sampling Guidelines*, Publication 689, April 2000⁵.

BAILER PURGING AND SAMPLING LOG

Project Number:	Site Name:	Site Address:	Sample Bottles Collected:
Well ID:	Date:	Field Manager:	Weather Observations:
27.2.2020			
Well Diameter (mm):		Pre-Purging Depth To Water (mBTOC):	Post-Purging Depth To Water (mBTOC):

TD (m) DTW (m) x 5 = L Minimum volume to be purged (3x5V): L
 1 BV

Time	DTW (mBTOC)	Volume Purged (L)	Temp (°C)	DO (mg/L)	EC (µs/cm)	TDS (mg/L)	pH	Redox (mV)	Description
0920	—	—	20.5	1.05	403.8	—	4.85	320.0	Clear, no odor, no sludge
1010	—	—	21.3	0.98	427	—	4.68	456	Clear, slight silty odor
1035	—	—	21.3	6.04	529	—	6.09	6.2	Straw tea - No odor - silty - odor
1205	—	—	21.3	1.46	53.1	—	4.71	266.8	Mod brown
1225	—	—	20.4	2.84	114.3	—	5.22	112.7	Cloudy light brown - No odor
1245	—	—	21.0	1.90	62.4	—	4.82	274	Cloudy light brown - Slight odor - No odor
1305	—	—	23.1	0.89	235.3	—	4.67	48.3	Cloudy brown - Modish - Slight odor
1325	—	—	23.4	0.82	113.2	—	4.84	18.5	Slight brown - Slight silty odor
1345	—	—	22.5	0.90	93.4	—	4.72	5.8	Light - mod brown. No odor
1415	—	—	21.4	1.33	126	—	4.01	43.8	Mod - Dark brown - Slight silty odor
1430	—	—	20.7	1.21	117	—	4.27	25	Slightly cloudy brown - No odor

COMMENTS:

Maximum volume to be purged occurs where wells are dry.
 These parameters may be considered stable when three consecutive readings (obtained several minutes apart) are within these levels.
 Source: Victorian Environmental Protection Authority, Groundwater Sampling Guidelines, Publication 559, April 2007.