

CERTIFICATE OF ANALYSIS 172891

Client Details

Client	Larry Cook & Associates
Attention	Larry Cook
Address	PO Box 8146, TUMBI UMBI, NSW, 2261

Sample Details

Your Reference	<u>Larry Cook - Ardmore Park</u>
Number of Samples	15 Water
Date samples received	07/08/2017
Date completed instructions received	07/08/2017

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
 Samples were analysed as received from the client. Results relate specifically to the samples as received.
 Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details

Date results requested by	15/08/2017
Date of Issue	30/08/2017
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Results Approved By

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Authorised By



David Springer, General Manager

Client Reference: Larry Cook - Ardmore Park

vTRH(C6-C10)/BTEXN in Water

Our Reference		172891-1	172891-2	172891-3	172891-4	172891-5
Your Reference	UNITS	BHAP1	BHAP5 - red marker	BHAP6	BH1	BH2
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	14/08/2017	14/08/2017	14/08/2017	14/08/2017	14/08/2017
Date analysed	-	15/08/2017	15/08/2017	15/08/2017	15/08/2017	15/08/2017
TRH C ₆ - C ₉	µg/L	<10	<10	<10	<10	<10
TRH C ₆ - C ₁₀	µg/L	<10	<10	<10	<10	<10
TRH C ₆ - C ₁₀ less BTEX (F1)	µg/L	<10	<10	<10	<10	<10
Benzene	µg/L	<1	<1	<1	<1	<1
Toluene	µg/L	<1	<1	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1	<1	<1
m+p-xylene	µg/L	<2	<2	<2	<2	<2
o-xylene	µg/L	<1	<1	<1	<1	<1
Naphthalene	µg/L	<1	<1	<1	<1	<1
Surrogate Dibromofluoromethane	%	101	102	101	100	102
Surrogate toluene-d8	%	96	97	96	96	97
Surrogate 4-BFB	%	93	94	93	90	95

vTRH(C6-C10)/BTEXN in Water

Our Reference		172891-6	172891-7	172891-8	172891-9	172891-10
Your Reference	UNITS	BH3	BH4	BH6	Phils Spring	Southern Spring
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	14/08/2017	14/08/2017	14/08/2017	14/08/2017	14/08/2017
Date analysed	-	15/08/2017	15/08/2017	15/08/2017	15/08/2017	15/08/2017
TRH C ₆ - C ₉	µg/L	<10	<10	<10	<10	<10
TRH C ₆ - C ₁₀	µg/L	<10	<10	<10	<10	<10
TRH C ₆ - C ₁₀ less BTEX (F1)	µg/L	<10	<10	<10	<10	<10
Benzene	µg/L	<1	<1	<1	<1	<1
Toluene	µg/L	<1	<1	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1	<1	<1
m+p-xylene	µg/L	<2	<2	<2	<2	<2
o-xylene	µg/L	<1	<1	<1	<1	<1
Naphthalene	µg/L	<1	<1	<1	<1	<1
Surrogate Dibromofluoromethane	%	101	103	103	102	104
Surrogate toluene-d8	%	96	96	95	95	96
Surrogate 4-BFB	%	95	93	95	94	95

Client Reference: Larry Cook - Ardmore Park

vTRH(C6-C10)/BTEXN in Water						
Our Reference		172891-11	172891-12	172891-13	172891-14	172891-15
Your Reference	UNITS	Bore Dam	Damien Dam	ACD Pond	Damien Pond	BHAP5 - black marker
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	14/08/2017	14/08/2017	14/08/2017	14/08/2017	14/08/2017
Date analysed	-	15/08/2017	15/08/2017	15/08/2017	15/08/2017	15/08/2017
TRH C ₆ - C ₉	µg/L	<10	<10	<10	<10	<10
TRH C ₆ - C ₁₀	µg/L	<10	<10	<10	<10	<10
TRH C ₆ - C ₁₀ less BTEX (F1)	µg/L	<10	<10	<10	<10	<10
Benzene	µg/L	<1	<1	<1	<1	<1
Toluene	µg/L	<1	<1	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1	<1	<1
m+p-xylene	µg/L	<2	<2	<2	<2	<2
o-xylene	µg/L	<1	<1	<1	<1	<1
Naphthalene	µg/L	<1	<1	<1	<1	<1
Surrogate Dibromofluoromethane	%	103	102	102	103	103
Surrogate toluene-d8	%	96	96	96	96	96
Surrogate 4-BFB	%	94	93	94	95	94

Client Reference: Larry Cook - Ardmore Park

svTRH (C10-C40) in Water

Our Reference		172891-2	172891-3	172891-4	172891-5	172891-6
Your Reference	UNITS	BHAP5 - red marker	BHAP6	BH1	BH2	BH3
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	14/08/2017	14/08/2017	14/08/2017	14/08/2017	14/08/2017
Date analysed	-	15/08/2017	15/08/2017	15/08/2017	15/08/2017	15/08/2017
TRH C ₁₀ - C ₁₄	µg/L	<50	<50	<50	<50	<50
TRH C ₁₅ - C ₂₈	µg/L	<100	<100	<100	<100	<100
TRH C ₂₉ - C ₃₆	µg/L	<100	<100	<100	<100	<100
TRH >C ₁₀ - C ₁₆	µg/L	<50	<50	<50	<50	<50
TRH >C ₁₀ - C ₁₆ less Naphthalene (F2)	µg/L	<50	<50	<50	<50	<50
TRH >C ₁₆ - C ₃₄	µg/L	<100	<100	<100	<100	<100
TRH >C ₃₄ - C ₄₀	µg/L	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	89	77	101	88	114

svTRH (C10-C40) in Water

Our Reference		172891-7	172891-8	172891-9	172891-10	172891-11
Your Reference	UNITS	BH4	BH6	Phils Spring	Southern Spring	Bore Dam
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	14/08/2017	14/08/2017	14/08/2017	14/08/2017	14/08/2017
Date analysed	-	15/08/2017	15/08/2017	15/08/2017	15/08/2017	15/08/2017
TRH C ₁₀ - C ₁₄	µg/L	<50	<50	<50	<50	<50
TRH C ₁₅ - C ₂₈	µg/L	<100	<100	<100	<100	<100
TRH C ₂₉ - C ₃₆	µg/L	<100	<100	<100	<100	<100
TRH >C ₁₀ - C ₁₆	µg/L	<50	<50	<50	<50	<50
TRH >C ₁₀ - C ₁₆ less Naphthalene (F2)	µg/L	<50	<50	<50	<50	<50
TRH >C ₁₆ - C ₃₄	µg/L	<100	<100	<100	<100	<100
TRH >C ₃₄ - C ₄₀	µg/L	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	109	131	126	91	82

Client Reference: Larry Cook - Ardmore Park

svTRH (C10-C40) in Water					
Our Reference		172891-12	172891-13	172891-14	172891-15
Your Reference	UNITS	Damien Dam	ACD Pond	Damien Pond	BHAP5 - black marker
Type of sample		Water	Water	Water	Water
Date extracted	-	14/08/2017	14/08/2017	14/08/2017	14/08/2017
Date analysed	-	15/08/2017	15/08/2017	15/08/2017	15/08/2017
TRH C ₁₀ - C ₁₄	µg/L	<50	<50	<50	<50
TRH C ₁₅ - C ₂₈	µg/L	<100	<100	<100	<100
TRH C ₂₉ - C ₃₆	µg/L	<100	<100	<100	<100
TRH >C ₁₀ - C ₁₆	µg/L	<50	<50	<50	<50
TRH >C ₁₀ - C ₁₆ less Naphthalene (F2)	µg/L	<50	<50	<50	<50
TRH >C ₁₆ - C ₃₄	µg/L	<100	<100	<100	<100
TRH >C ₃₄ - C ₄₀	µg/L	<100	<100	<100	<100
Surrogate o-Terphenyl	%	78	74	84	87

Client Reference: Larry Cook - Ardmore Park

Ion Balance						
Our Reference		172891-1	172891-2	172891-3	172891-4	172891-5
Your Reference	UNITS	BHAP1	BHAP5 - red marker	BHAP6	BH1	BH2
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	07/08/2017	11/08/2017	07/08/2017	07/08/2017	07/08/2017
Date analysed	-	07/08/2017	11/08/2017	07/08/2017	07/08/2017	07/08/2017
Calcium - Dissolved	mg/L	20	25	98	45	8.2
Potassium - Dissolved	mg/L	1.6	0.9	2.8	1.2	0.6
Sodium - Dissolved	mg/L	110	18	160	190	86
Magnesium - Dissolved	mg/L	13	69	50	55	27
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	<5	<5	<5	<5	<5
Bicarbonate Alkalinity as CaCO ₃	mg/L	33	330	340	200	190
Carbonate Alkalinity as CaCO ₃	mg/L	<5	<5	<5	<5	<5
Total Alkalinity as CaCO ₃	mg/L	33	330	340	200	190
Sulphate, SO ₄	mg/L	6	24	15	4	7
Chloride, Cl	mg/L	160	40	250	300	50
Ionic Balance	%	15	-2.0	5.0	9.0	9.0

Ion Balance						
Our Reference		172891-6	172891-7	172891-8	172891-9	172891-10
Your Reference	UNITS	BH3	BH4	BH6	Phils Spring	Southern Spring
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	07/08/2017	07/08/2017	07/08/2017	07/08/2017	07/08/2017
Date analysed	-	07/08/2017	07/08/2017	07/08/2017	07/08/2017	07/08/2017
Calcium - Dissolved	mg/L	47	38	54	50	22
Potassium - Dissolved	mg/L	1.1	1.0	0.8	1	0.7
Sodium - Dissolved	mg/L	40	36	64	96	55
Magnesium - Dissolved	mg/L	53	55	49	80	27
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	<5	<5	<5	<5	<5
Bicarbonate Alkalinity as CaCO ₃	mg/L	280	310	340	400	230
Carbonate Alkalinity as CaCO ₃	mg/L	<5	<5	<5	<5	<5
Total Alkalinity as CaCO ₃	mg/L	280	310	340	400	230
Sulphate, SO ₄	mg/L	4	4	6	18	2
Chloride, Cl	mg/L	73	39	79	130	61
Ionic Balance	%	5.0	3.0	3.0	4.0	-5.0

Client Reference: Larry Cook - Ardmore Park

Ion Balance						
Our Reference		172891-11	172891-12	172891-13	172891-14	172891-15
Your Reference	UNITS	Bore Dam	Damien Dam	ACD Pond	Damien Pond	BHAP5 - black marker
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	07/08/2017	07/08/2017	07/08/2017	11/08/2017	11/08/2017
Date analysed	-	07/08/2017	07/08/2017	07/08/2017	11/08/2017	11/08/2017
Calcium - Dissolved	mg/L	58	28	23	75	49
Potassium - Dissolved	mg/L	2.4	5.2	4.3	2.7	1.0
Sodium - Dissolved	mg/L	77	68	60	130	34
Magnesium - Dissolved	mg/L	29	23	16	72	52
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	<5	<5	<5	<5	<5
Bicarbonate Alkalinity as CaCO ₃	mg/L	300	150	120	230	350
Carbonate Alkalinity as CaCO ₃	mg/L	<5	<5	<5	<5	<5
Total Alkalinity as CaCO ₃	mg/L	300	150	120	230	350
Sulphate, SO ₄	mg/L	9	9	10	2	3
Chloride, Cl	mg/L	68	82	66	280	40
Ionic Balance	%	4.0	7.0	7.0	11	0

Client Reference: Larry Cook - Ardmore Park

Miscellaneous Inorganics						
Our Reference		172891-1	172891-2	172891-3	172891-4	172891-5
Your Reference	UNITS	BHAP1	BHAP5 - red marker	BHAP6	BH1	BH2
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	07/08/2017	07/08/2017	07/08/2017	07/08/2017	07/08/2017
Date analysed	-	07/08/2017	07/08/2017	07/08/2017	07/08/2017	07/08/2017
pH	pH Units	6.5	7.6	7.2	6.8	6.7
Electrical Conductivity	µS/cm	700	1,400	1,500	1,400	540
Total Dissolved Solids (grav)	mg/L	430	450	620	810	370

Miscellaneous Inorganics						
Our Reference		172891-6	172891-7	172891-8	172891-9	172891-10
Your Reference	UNITS	BH3	BH4	BH6	Phils Spring	Southern Spring
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	07/08/2017	07/08/2017	07/08/2017	07/08/2017	07/08/2017
Date analysed	-	07/08/2017	07/08/2017	07/08/2017	07/08/2017	07/08/2017
pH	pH Units	7.3	7.6	7.4	6.9	7.3
Electrical Conductivity	µS/cm	770	700	850	1,200	560
Total Dissolved Solids (grav)	mg/L	420	410	500	650	290

Miscellaneous Inorganics						
Our Reference		172891-11	172891-12	172891-13	172891-14	172891-15
Your Reference	UNITS	Bore Dam	Damien Dam	ACD Pond	Damien Pond	BHAP5 - black marker
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	07/08/2017	07/08/2017	07/08/2017	07/08/2017	07/08/2017
Date analysed	-	07/08/2017	07/08/2017	07/08/2017	07/08/2017	07/08/2017
pH	pH Units	8.0	7.3	7.0	7.9	7.4
Electrical Conductivity	µS/cm	750	590	490	680	740
Total Dissolved Solids (grav)	mg/L	420	350	290	410	460
Nitrate as N in water	mg/L	0.04	<0.005	<0.005	0.007	[NA]

Client Reference: Larry Cook - Ardmore Park

HM in water - total						
Our Reference		172891-1	172891-2	172891-3	172891-4	172891-5
Your Reference	UNITS	BHAP1	BHAP5 - red marker	BHAP6	BH1	BH2
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	11/08/2017	11/08/2017	11/08/2017	11/08/2017	11/08/2017
Date analysed	-	11/08/2017	11/08/2017	11/08/2017	11/08/2017	11/08/2017
Arsenic-Total	µg/L	<1	<1	2	3	1
Cadmium-Total	µg/L	<0.1	<0.1	<0.1	0.2	<0.1
Chromium-Total	µg/L	10	1	<1	160	14
Copper-Total	µg/L	3	<1	<1	31	5
Lead-Total	µg/L	<1	<1	<1	19	2
Mercury-Total	µg/L	<0.05	<0.05	<0.05	0.10	<0.05
Nickel-Total	µg/L	12	3	<1	120	23
Zinc-Total	µg/L	10	3	7	99	31
Iron-Total	µg/L	150	12,000	16,000	22,000	3,800
Manganese-Total	µg/L	34	190	270	670	31

HM in water - total						
Our Reference		172891-6	172891-7	172891-8	172891-9	172891-10
Your Reference	UNITS	BH3	BH4	BH6	Phils Spring	Southern Spring
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	11/08/2017	11/08/2017	11/08/2017	11/08/2017	11/08/2017
Date analysed	-	11/08/2017	11/08/2017	11/08/2017	11/08/2017	11/08/2017
Arsenic-Total	µg/L	<1	<1	2	2	4
Cadmium-Total	µg/L	<0.1	<0.1	0.4	<0.1	<0.1
Chromium-Total	µg/L	7	12	71	<1	10
Copper-Total	µg/L	1	2	20	<1	8
Lead-Total	µg/L	<1	<1	18	<1	4
Mercury-Total	µg/L	<0.05	<0.05	0.09	<0.05	<0.05
Nickel-Total	µg/L	5	8	110	2	42
Zinc-Total	µg/L	7	13	100	3	23
Iron-Total	µg/L	300	490	23,000	4,500	78,000
Manganese-Total	µg/L	7	19	660	140	15,000

Client Reference: Larry Cook - Ardmore Park

HM in water - total						
Our Reference		172891-11	172891-12	172891-13	172891-14	172891-15
Your Reference	UNITS	Bore Dam	Damien Dam	ACD Pond	Damien Pond	BHAP5 - black marker
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	11/08/2017	11/08/2017	11/08/2017	11/08/2017	11/08/2017
Date analysed	-	11/08/2017	11/08/2017	11/08/2017	11/08/2017	11/08/2017
Arsenic-Total	µg/L	<1	<1	<1	<1	<1
Cadmium-Total	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium-Total	µg/L	<1	<1	4	<1	8
Copper-Total	µg/L	<1	3	5	<1	<1
Lead-Total	µg/L	<1	<1	<1	<1	<1
Mercury-Total	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Nickel-Total	µg/L	1	8	9	10	5
Zinc-Total	µg/L	3	34	8	86	13
Iron-Total	µg/L	310	720	2,000	2,000	170
Manganese-Total	µg/L	33	72	31	3,200	<5

Client Reference: Larry Cook - Ardmore Park

Metals in Waters - Total					
Our Reference		172891-11	172891-12	172891-13	172891-14
Your Reference	UNITS	Bore Dam	Damien Dam	ACD Pond	Damien Pond
Type of sample		Water	Water	Water	Water
Date prepared	-	11/08/2017	11/08/2017	11/08/2017	11/08/2017
Date analysed	-	11/08/2017	11/08/2017	11/08/2017	11/08/2017
Phosphorus - Total	mg/L	<0.05	0.1	0.09	<0.05

Client Reference: Larry Cook - Ardmore Park

Method ID	Methodology Summary
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Inorg-002	Conductivity and Salinity - measured using a conductivity cell at 25°C in accordance with APHA latest edition 2510 and Rayment & Lyons.
Inorg-006	Alkalinity - determined titrimetrically in accordance with APHA latest edition, 2320-B.
Inorg-018	Total Dissolved Solids - determined gravimetrically. The solids are dried at 180+/-5°C.
Inorg-040	The concentrations of the major ions (mg/L) are converted to milliequivalents and summed. The ionic balance should be within +/- 10% ie total anions = total cations +/-10%.
Inorg-055	Nitrate - determined colourimetrically. Soils are analysed following a water extraction.
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA latest edition, 4110-B. Alternatively determined by colourimetry/turbidity using Discrete Analyser.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Metals-022	Determination of various metals by ICP-MS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-013	Water samples are analysed directly by purge and trap GC-MS.
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.

Client Reference: Larry Cook - Ardmore Park

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Water						Duplicate		Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			14/08/2017	[NT]	[NT]	[NT]	[NT]	14/08/2017	[NT]
Date analysed	-			15/08/2017	[NT]	[NT]	[NT]	[NT]	15/08/2017	[NT]
TRH C ₆ - C ₉	µg/L	10	Org-016	<10	[NT]	[NT]	[NT]	[NT]	107	[NT]
TRH C ₆ - C ₁₀	µg/L	10	Org-016	<10	[NT]	[NT]	[NT]	[NT]	107	[NT]
Benzene	µg/L	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	108	[NT]
Toluene	µg/L	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	108	[NT]
Ethylbenzene	µg/L	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	106	[NT]
m+p-xylene	µg/L	2	Org-016	<2	[NT]	[NT]	[NT]	[NT]	106	[NT]
o-xylene	µg/L	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	107	[NT]
Naphthalene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-016	99	[NT]	[NT]	[NT]	[NT]	100	[NT]
Surrogate toluene-d8	%		Org-016	97	[NT]	[NT]	[NT]	[NT]	103	[NT]
Surrogate 4-BFB	%		Org-016	92	[NT]	[NT]	[NT]	[NT]	102	[NT]

Client Reference: Larry Cook - Ardmore Park

QUALITY CONTROL: svTRH (C10-C40) in Water					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date extracted	-			14/08/2017	[NT]	[NT]	[NT]	[NT]	14/08/2017	[NT]
Date analysed	-			15/08/2017	[NT]	[NT]	[NT]	[NT]	15/08/2017	[NT]
TRH C ₁₀ - C ₁₄	µg/L	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	108	[NT]
TRH C ₁₅ - C ₂₈	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	119	[NT]
TRH C ₂₉ - C ₃₆	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	91	[NT]
TRH >C ₁₀ - C ₁₆	µg/L	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	108	[NT]
TRH >C ₁₆ - C ₃₄	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	119	[NT]
TRH >C ₃₄ - C ₄₀	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	91	[NT]
Surrogate o-Terphenyl	%		Org-003	84	[NT]	[NT]	[NT]	[NT]	103	[NT]

Client Reference: Larry Cook - Ardmore Park

QUALITY CONTROL: Ion Balance					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	172891-12
Date prepared	-			07/08/2017	1	07/08/2017	07/08/2017		07/08/2017	07/08/2017
Date analysed	-			07/08/2017	1	07/08/2017	07/08/2017		07/08/2017	07/08/2017
Calcium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	20	20	0	104	[NT]
Potassium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	1.6	1.6	0	118	[NT]
Sodium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	110	110	0	119	[NT]
Magnesium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	13	12	8	104	[NT]
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	5	Inorg-006	<5	1	<5	<5	0	[NT]	[NT]
Bicarbonate Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	1	33	34	3	[NT]	[NT]
Carbonate Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	1	<5	<5	0	[NT]	[NT]
Total Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	1	33	34	3	95	[NT]
Sulphate, SO ₄	mg/L	1	Inorg-081	<1	1	6	6	0	98	102
Chloride, Cl	mg/L	1	Inorg-081	<1	1	160	160	0	81	116
Ionic Balance	%		Inorg-040	[NT]	1	15	13	14	[NT]	[NT]

QUALITY CONTROL: Ion Balance					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	172891-2
Date prepared	-			[NT]	11	07/08/2017	07/08/2017		[NT]	07/08/2017
Date analysed	-			[NT]	11	07/08/2017	07/08/2017		[NT]	07/08/2017
Calcium - Dissolved	mg/L	0.5	Metals-020	[NT]	11	58	[NT]		[NT]	80
Potassium - Dissolved	mg/L	0.5	Metals-020	[NT]	11	2.4	[NT]		[NT]	111
Sodium - Dissolved	mg/L	0.5	Metals-020	[NT]	11	77	[NT]		[NT]	100
Magnesium - Dissolved	mg/L	0.5	Metals-020	[NT]	11	29	[NT]		[NT]	#
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	5	Inorg-006	[NT]	11	<5	[NT]		[NT]	[NT]
Bicarbonate Alkalinity as CaCO ₃	mg/L	5	Inorg-006	[NT]	11	300	[NT]		[NT]	[NT]
Carbonate Alkalinity as CaCO ₃	mg/L	5	Inorg-006	[NT]	11	<5	[NT]		[NT]	[NT]
Total Alkalinity as CaCO ₃	mg/L	5	Inorg-006	[NT]	11	300	[NT]		[NT]	[NT]
Sulphate, SO ₄	mg/L	1	Inorg-081	[NT]	11	9	10	11	[NT]	[NT]
Chloride, Cl	mg/L	1	Inorg-081	[NT]	11	68	68	0	[NT]	[NT]
Ionic Balance	%		Inorg-040	[NT]	11	4.0	[NT]		[NT]	[NT]

Client Reference: Larry Cook - Ardmore Park

QUALITY CONTROL: Ion Balance						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	12	07/08/2017	07/08/2017		[NT]	[NT]
Date analysed	-			[NT]	12	07/08/2017	07/08/2017		[NT]	[NT]
Calcium - Dissolved	mg/L	0.5	Metals-020	[NT]	12	28	28	0	[NT]	[NT]
Potassium - Dissolved	mg/L	0.5	Metals-020	[NT]	12	5.2	5.1	2	[NT]	[NT]
Sodium - Dissolved	mg/L	0.5	Metals-020	[NT]	12	68	68	0	[NT]	[NT]
Magnesium - Dissolved	mg/L	0.5	Metals-020	[NT]	12	23	23	0	[NT]	[NT]
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	5	Inorg-006	[NT]	12	<5	[NT]		[NT]	[NT]
Bicarbonate Alkalinity as CaCO ₃	mg/L	5	Inorg-006	[NT]	12	150	[NT]		[NT]	[NT]
Carbonate Alkalinity as CaCO ₃	mg/L	5	Inorg-006	[NT]	12	<5	[NT]		[NT]	[NT]
Total Alkalinity as CaCO ₃	mg/L	5	Inorg-006	[NT]	12	150	[NT]		[NT]	[NT]
Sulphate, SO4	mg/L	1	Inorg-081	[NT]	12	9	[NT]		[NT]	[NT]
Chloride, Cl	mg/L	1	Inorg-081	[NT]	12	82	[NT]		[NT]	[NT]
Ionic Balance	%		Inorg-040	[NT]	12	7.0	[NT]		[NT]	[NT]

Client Reference: Larry Cook - Ardmore Park

QUALITY CONTROL: Miscellaneous Inorganics					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			07/08/2017	1	07/08/2017	07/08/2017		07/08/2017	[NT]
Date analysed	-			07/08/2017	1	07/08/2017	07/08/2017		07/08/2017	[NT]
pH	pH Units		Inorg-001	[NT]	1	6.5	6.5	0	102	[NT]
Electrical Conductivity	µS/cm	1	Inorg-002	<1	1	700	690	1	103	[NT]
Total Dissolved Solids (grav)	mg/L	5	Inorg-018	<5	1	430	430	0	92	[NT]
Nitrate as N in water	mg/L	0.005	Inorg-055	<0.005	11	0.04	0.04	0	108	[NT]

QUALITY CONTROL: Miscellaneous Inorganics					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	11	07/08/2017	07/08/2017		[NT]	[NT]
Date analysed	-			[NT]	11	07/08/2017	07/08/2017		[NT]	[NT]
pH	pH Units		Inorg-001	[NT]	11	8.0	7.9	1	[NT]	[NT]
Electrical Conductivity	µS/cm	1	Inorg-002	[NT]	11	750	760	1	[NT]	[NT]
Total Dissolved Solids (grav)	mg/L	5	Inorg-018	[NT]	11	420	[NT]		[NT]	[NT]

Client Reference: Larry Cook - Ardmore Park

QUALITY CONTROL: HM in water - total					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	172891-2
Date prepared	-			11/08/2017	1	11/08/2017	11/08/2017		11/08/2017	11/08/2017
Date analysed	-			11/08/2017	1	11/08/2017	11/08/2017		11/08/2017	11/08/2017
Arsenic-Total	µg/L	1	Metals-022	<1	1	<1	<1	0	106	101
Cadmium-Total	µg/L	0.1	Metals-022	<0.1	1	<0.1	<0.1	0	109	104
Chromium-Total	µg/L	1	Metals-022	<1	1	10	11	10	103	97
Copper-Total	µg/L	1	Metals-022	<1	1	3	3	0	101	90
Lead-Total	µg/L	1	Metals-022	<1	1	<1	<1	0	108	104
Mercury-Total	µg/L	0.05	Metals-021	<0.05	1	<0.05	[NT]		93	[NT]
Nickel-Total	µg/L	1	Metals-022	<1	1	12	12	0	103	94
Zinc-Total	µg/L	1	Metals-022	<1	1	10	11	10	105	96
Iron-Total	µg/L	10	Metals-022	<10	1	150	150	0	103	#
Manganese-Total	µg/L	5	Metals-022	<5	1	34	35	3	105	94

QUALITY CONTROL: HM in water - total					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	172891-9
Date prepared	-			[NT]	11	11/08/2017	11/08/2017		[NT]	11/08/2017
Date analysed	-			[NT]	11	11/08/2017	11/08/2017		[NT]	11/08/2017
Arsenic-Total	µg/L	1	Metals-022	[NT]	11	<1	1	0	[NT]	[NT]
Cadmium-Total	µg/L	0.1	Metals-022	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Chromium-Total	µg/L	1	Metals-022	[NT]	11	<1	<1	0	[NT]	[NT]
Copper-Total	µg/L	1	Metals-022	[NT]	11	<1	<1	0	[NT]	[NT]
Lead-Total	µg/L	1	Metals-022	[NT]	11	<1	<1	0	[NT]	[NT]
Mercury-Total	µg/L	0.05	Metals-021	[NT]	11	<0.05	[NT]		[NT]	86
Nickel-Total	µg/L	1	Metals-022	[NT]	11	1	<1	0	[NT]	[NT]
Zinc-Total	µg/L	1	Metals-022	[NT]	11	3	3	0	[NT]	[NT]
Iron-Total	µg/L	10	Metals-022	[NT]	11	310	350	12	[NT]	[NT]
Manganese-Total	µg/L	5	Metals-022	[NT]	11	33	35	6	[NT]	[NT]

QUALITY CONTROL: HM in water - total					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	7	11/08/2017	11/08/2017		[NT]	[NT]
Date analysed	-			[NT]	7	11/08/2017	11/08/2017		[NT]	[NT]
Arsenic-Total	µg/L	1	Metals-022	[NT]	7	<1	[NT]		[NT]	[NT]
Cadmium-Total	µg/L	0.1	Metals-022	[NT]	7	<0.1	[NT]		[NT]	[NT]
Chromium-Total	µg/L	1	Metals-022	[NT]	7	12	[NT]		[NT]	[NT]
Copper-Total	µg/L	1	Metals-022	[NT]	7	2	[NT]		[NT]	[NT]
Lead-Total	µg/L	1	Metals-022	[NT]	7	<1	[NT]		[NT]	[NT]
Mercury-Total	µg/L	0.05	Metals-021	[NT]	7	<0.05	<0.05	0	[NT]	[NT]
Nickel-Total	µg/L	1	Metals-022	[NT]	7	8	[NT]		[NT]	[NT]
Zinc-Total	µg/L	1	Metals-022	[NT]	7	13	[NT]		[NT]	[NT]
Iron-Total	µg/L	10	Metals-022	[NT]	7	490	[NT]		[NT]	[NT]
Manganese-Total	µg/L	5	Metals-022	[NT]	7	19	[NT]		[NT]	[NT]

Client Reference: Larry Cook - Ardmore Park

QUALITY CONTROL: HM in water - total						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	14	11/08/2017	11/08/2017		[NT]	[NT]
Date analysed	-			[NT]	14	11/08/2017	11/08/2017		[NT]	[NT]
Arsenic-Total	µg/L	1	Metals-022	[NT]	14	<1	[NT]		[NT]	[NT]
Cadmium-Total	µg/L	0.1	Metals-022	[NT]	14	<0.1	[NT]		[NT]	[NT]
Chromium-Total	µg/L	1	Metals-022	[NT]	14	<1	[NT]		[NT]	[NT]
Copper-Total	µg/L	1	Metals-022	[NT]	14	<1	[NT]		[NT]	[NT]
Lead-Total	µg/L	1	Metals-022	[NT]	14	<1	[NT]		[NT]	[NT]
Mercury-Total	µg/L	0.05	Metals-021	[NT]	14	<0.05	<0.05	0	[NT]	[NT]
Nickel-Total	µg/L	1	Metals-022	[NT]	14	10	[NT]		[NT]	[NT]
Zinc-Total	µg/L	1	Metals-022	[NT]	14	86	[NT]		[NT]	[NT]
Iron-Total	µg/L	10	Metals-022	[NT]	14	2000	[NT]		[NT]	[NT]
Manganese-Total	µg/L	5	Metals-022	[NT]	14	3200	[NT]		[NT]	[NT]

Client Reference: Larry Cook - Ardmore Park

QUALITY CONTROL: Metals in Waters - Total						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	172891-12
Date prepared	-			11/08/2017	11	11/08/2017	11/08/2017		11/08/2017	11/08/2017
Date analysed	-			11/08/2017	11	11/08/2017	11/08/2017		11/08/2017	11/08/2017
Phosphorus - Total	mg/L	0.05	Metals-020	<0.05	11	<0.05	<0.05	0	110	99

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.
Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.	

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Report Comments

8 HM in Water - Total Metals:

No preserved sample was received, therefore analysis was conducted from the unpreserved sample bottle.

Note: there is a possibility some elements may be underestimated.

Percent recovery is not possible to report due to the high concentration of the element/s in the sample/s. However an acceptable recovery was obtained for the LCS.

Ion Balance:

Percent recovery is not possible to report due to the high concentration of the element/s in the sample/s. However an acceptable recovery was obtained for the LCS.

vTRH, BTEX in water:

Subsampled from plastic bottles.

TRH in water:

Sampled from plastic bottles.

Sample 1 was not analysed for TRHs in water as there was insufficient sample for analysis.