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CERTIFICATE OF ANALYSIS 134924

Client:
Larry Cook & Associates
PO Box 8146
TUMBI UMBI
NSW 2261

Attention: Larry Cook

Sample log in details:

Your Reference:	**Larry Cook - Ardmore Park**
No. of samples:	10 Waters
Date samples received / completed instructions received	24/09/2015 / 24/09/2015

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: / Issue Date:	1/10/15 / 30/09/15
Date of Preliminary Report:	Not issued

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Accredited for compliance with ISO/IEC 17025. **Tests not covered by NATA are denoted with *.**

Results Approved By:

Jacinta Hurst
Laboratory Manager

Ion Balance Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	134924-1 BHAP 1 23/09/2015 Water	134924-2 BHAP 5 23/09/2015 Water	134924-3 BHAP 6 23/09/2015 Water	134924-4 BHAP 10 23/09/2015 Water	134924-5 PHILLS SPRING 23/09/2015 Water
Date prepared	-	24/09/2015	24/09/2015	24/09/2015	24/09/2015	24/09/2015
Date analysed	-	24/09/2015	24/09/2015	24/09/2015	24/09/2015	24/09/2015
Calcium - Dissolved	mg/L	15	24	160	68	47
Potassium - Dissolved	mg/L	1.4	1	4.2	8.3	0.5
Sodium - Dissolved	mg/L	94	16	260	390	88
Magnesium - Dissolved	mg/L	9.0	75	78	94	81
Hydroxide Alkalinity (OH^-) as $CaCO_3$	mg/L	<5	<5	<5	<5	<5
Bicarbonate Alkalinity as $CaCO_3$	mg/L	27	230	390	340	420
Carbonate Alkalinity as $CaCO_3$	mg/L	<5	<5	<5	<5	<5
Total Alkalinity as $CaCO_3$	mg/L	27	230	390	340	420
Sulphate, SO4	mg/L	6	20	28	59	15
Chloride, Cl	mg/L	170	53	630	670	150
Ionic Balance	%	0.58	11	-0.92	2.4	-0.080

Ion Balance Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	134924-6 SOUTHERN SPRING 23/09/2015 Water	134924-7 BH 2 23/09/2015 Water	134924-8 BH 4 23/09/2015 Water	134924-9 BH 5 23/09/2015 Water	134924-10 BH 6 23/09/2015 Water
Date prepared	-	24/09/2015	24/09/2015	24/09/2015	24/09/2015	24/09/2015
Date analysed	-	24/09/2015	24/09/2015	24/09/2015	24/09/2015	24/09/2015
Calcium - Dissolved	mg/L	26	9.3	39	48	38
Potassium - Dissolved	mg/L	<0.5	0.6	0.8	0.9	0.9
Sodium - Dissolved	mg/L	55	82	35	31	62
Magnesium - Dissolved	mg/L	33	30	55	54	40
Hydroxide Alkalinity (OH^-) as $CaCO_3$	mg/L	<5	<5	<5	<5	<5
Bicarbonate Alkalinity as $CaCO_3$	mg/L	210	180	300	330	280
Carbonate Alkalinity as $CaCO_3$	mg/L	<5	<5	<5	<5	<5
Total Alkalinity as $CaCO_3$	mg/L	210	180	300	330	280
Sulphate, SO4	mg/L	1	8	4	3	6
Chloride, Cl	mg/L	81	80	48	51	81
Ionic Balance	%	-0.29	4.1	3.5	0.40	0.21

Metals in Waters - Acid extractable						
Our Reference:	UNITS	134924-1	134924-2	134924-3	134924-4	134924-5
Your Reference	----------	BHAP 1	BHAP 5	BHAP 6	BHAP 10	PHILS SPRING
Date Sampled	----------	23/09/2015	23/09/2015	23/09/2015	23/09/2015	23/09/2015
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	25/09/2015	25/09/2015	25/09/2015	25/09/2015	25/09/2015
Date analysed	-	25/09/2015	25/09/2015	25/09/2015	25/09/2015	25/09/2015
Phosphorus - Total	mg/L	0.1	0.1	0.07	0.4	0.09

Metals in Waters - Acid extractable						
Our Reference:	UNITS	134924-6	134924-7	134924-8	134924-9	134924-10
Your Reference	----------	SOUTHERN SPRING	BH 2	BH 4	BH 5	BH 6
Date Sampled	----------	23/09/2015	23/09/2015	23/09/2015	23/09/2015	23/09/2015
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	25/09/2015	25/09/2015	25/09/2015	25/09/2015	25/09/2015
Date analysed	-	25/09/2015	25/09/2015	25/09/2015	25/09/2015	25/09/2015
Phosphorus - Total	mg/L	0.07	1.5	0.3	0.3	0.9

Miscellaneous Inorganics						
Our Reference:	UNITS	134924-1	134924-2	134924-3	134924-4	134924-5
Your Reference	----------	BHAP 1	BHAP 5	BHAP 6	BHAP 10	PHILS SPRING
Date Sampled	----------	23/09/2015	23/09/2015	23/09/2015	23/09/2015	23/09/2015
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	24/09/2015	24/09/2015	24/09/2015	24/09/2015	24/09/2015
Date analysed	-	24/09/2015	24/09/2015	24/09/2015	24/09/2015	24/09/2015
pH	pH Units	6.5	8.1	7.2	7.0	7.5
Electrical Conductivity	µS/cm	640	810	2,600	2,700	1,200

Miscellaneous Inorganics						
Our Reference:	UNITS	134924-6	134924-7	134924-8	134924-9	134924-10
Your Reference	----------	SOUTHERN SPRING	BH 2	BH 4	BH 5	BH 6
Date Sampled	----------	23/09/2015	23/09/2015	23/09/2015	23/09/2015	23/09/2015
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	24/09/2015	24/09/2015	24/09/2015	24/09/2015	24/09/2015
Date analysed	-	24/09/2015	24/09/2015	24/09/2015	24/09/2015	24/09/2015
pH	pH Units	7.5	6.8	7.6	7.6	7.7
Electrical Conductivity	µS/cm	630	630	740	760	760

Method ID	Methodology Summary
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Inorg-006	Alkalinity - determined titrimetrically in accordance with APHA latest edition, 2320-B.
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA latest edition, 4110-B.
Inorg-041	Gravimetric determination of the total solids content of water based on APHA latest edition 2540B.
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 25oC in accordance with APHA latest edition 2510 and Rayment & Lyons.

QUALITY CONTROL Ion Balance	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			24/09/2015	134924-1	24/09/2015 || 24/09/2015	LCS-W1	24/09/2015
Date analysed	-			24/09/2015	134924-1	24/09/2015 || 24/09/2015	LCS-W1	24/09/2015
Calcium - Dissolved	mg/L	0.5	Metals-020 ICP-AES	<0.5	134924-1	15 || 15 || RPD: 0	LCS-W1	101%
Potassium - Dissolved	mg/L	0.5	Metals-020 ICP-AES	<0.5	134924-1	1.4 || 1.3 || RPD: 7	LCS-W1	124%
Sodium - Dissolved	mg/L	0.5	Metals-020 ICP-AES	<0.5	134924-1	94 || 92 || RPD: 2	LCS-W1	106%
Magnesium - Dissolved	mg/L	0.5	Metals-020 ICP-AES	<0.5	134924-1	9.0 || 9.0 || RPD: 0	LCS-W1	99%
Hydroxide Alkalinity (OH^-) as $CaCO_3$	mg/L	5	Inorg-006	<5	134924-1	<5 || <5	[NR]	[NR]
Bicarbonate Alkalinity as $CaCO_3$	mg/L	5	Inorg-006	<5	134924-1	27 || 25 || RPD: 8	[NR]	[NR]
Carbonate Alkalinity as $CaCO_3$	mg/L	5	Inorg-006	<5	134924-1	<5 || <5	[NR]	[NR]
Total Alkalinity as $CaCO_3$	mg/L	5	Inorg-006	<5	134924-1	27 || 25 || RPD: 8	LCS-W1	105%
Sulphate, SO4	mg/L	1	Inorg-081	<1	134924-1	6 || 6 || RPD: 0	LCS-W1	108%
Chloride, Cl	mg/L	1	Inorg-081	<1	134924-1	170 || 170 || RPD: 0	LCS-W1	103%
Ionic Balance	%		Inorg-041	[NT]	134924-1	0.58 || 2.0 || RPD: 110	[NR]	[NR]

QUALITY CONTROL Metals in Waters - Acid extractable	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			25/09/2015	134924-1	25/09/2015 || 25/09/2015	LCS-W1	25/09/2015
Date analysed	-			25/09/2015	134924-1	25/09/2015 || 25/09/2015	LCS-W1	25/09/2015
Phosphorus - Total	mg/L	0.05	Metals-020 ICP-AES	<0.05	134924-1	0.1 || 0.1 || RPD: 0	LCS-W1	92%

QUALITY CONTROL Miscellaneous Inorganics	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			24/09/2015	134924-1	24/09/2015 || 24/09/2015	LCS-W1	24/09/2015
Date analysed	-			24/09/2015	134924-1	24/09/2015 || 24/09/2015	LCS-W1	24/09/2015
pH	pH Units		Inorg-001	[NT]	134924-1	6.5 || 6.5 || RPD: 0	LCS-W1	101%
Electrical Conductivity	µS/cm	1	Inorg-002	<1	134924-1	640 || 630 || RPD: 2	LCS-W1	107%

QUALITY CONTROL Ion Balance	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date prepared	-	[NT]	[NT]	134924-2	24/09/2015
Date analysed	-	[NT]	[NT]	134924-2	24/09/2015
Calcium - Dissolved	mg/L	[NT]	[NT]	134924-2	82%
Potassium - Dissolved	mg/L	[NT]	[NT]	134924-2	113%
Sodium - Dissolved	mg/L	[NT]	[NT]	134924-2	104%

QUALITY CONTROL Ion Balance	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Magnesium - Dissolved	mg/L	[NT]	[NT]	134924-2	#
Hydroxide Alkalinity (OH^-) as $CaCO_3$	mg/L	[NT]	[NT]	[NR]	[NR]
Bicarbonate Alkalinity as $CaCO_3$	mg/L	[NT]	[NT]	[NR]	[NR]
Carbonate Alkalinity as $CaCO_3$	mg/L	[NT]	[NT]	[NR]	[NR]
Total Alkalinity as $CaCO_3$	mg/L	[NT]	[NT]	[NR]	[NR]
Sulphate, SO4	mg/L	[NT]	[NT]	134924-2	112%
Chloride, Cl	mg/L	[NT]	[NT]	134924-2	93%
Ionic Balance	%	[NT]	[NT]	[NR]	[NR]

Report Comments:

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.

Asbestos ID was analysed by Approved Identifier:	Not applicable for this job
Asbestos ID was authorised by Approved Signatory:	Not applicable for this job

INS: Insufficient sample for this test	PQL: Practical Quantitation Limit	NT: Not tested
NA: Test not required	RPD: Relative Percent Difference	NA: Test not required
<: Less than	>: Greater than	LCS: Laboratory Control Sample

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.

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.