

CERTIFICATE OF ANALYSIS

Work Order : **EW1603016**
Client : **WOLLONGONG CITY COUNCIL**
Contact : MR WAYDE PETERSON
Address : 41 BURELLI STREET
 WOLLONGONG NSW, AUSTRALIA 2500

Telephone : +61 02 4227 7111
Project : Helensburgh Groundwater Quarterly
Order number : 3058354
C-O-C number : ----
Sampler : Craig Wilson, Robert DaLio
Site : ----
Quote number : ----
No. of samples received : 9
No. of samples analysed : 9

Page : 1 of 4
Laboratory : Environmental Division NSW South Coast
Contact : Glenn Davies
Address : 1/19 Ralph Black Dr, North Wollongong 2500
 4/13 Geary Pl, North Nowra 2541
 Australia
Telephone : 02 42253125
Date Samples Received : 10-Aug-2016 14:00
Date Analysis Commenced : 10-Aug-2016
Issue Date : 18-Aug-2016 10:28



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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
Glenn Davies	Environmental Services Representative	Laboratory - Wollongong



General Comments

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

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

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

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

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

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

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

LOR = Limit of reporting

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

∅ = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- TDS by method EA-015 may bias high for sample 5 due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- Sampling and sample data supplied by ALS Wollongong.
- Sampling completed as per FWI-EN001 Groundwater Sampling.
- Field tests completed on day of sampling/receipt.



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID				
Client sampling date / time				BH1	BH2	BH4	BH5 GWMB5	BH6 GWMB6
Client sampling date / time				10-Aug-2016 12:40	10-Aug-2016 11:20	10-Aug-2016 12:00	10-Aug-2016 13:00	10-Aug-2016 11:50
Compound	CAS Number	LOR	Unit	EW1603016-001	EW1603016-002	EW1603016-003	EW1603016-004	EW1603016-005
				Result	Result	Result	Result	Result
EA005FD: Field pH								
pH	----	0.1	pH Unit	4.4	6.0	4.2	4.3	6.5
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	1	mg/L	349	518	364	129	293
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	174	<1	<1	137
Total Alkalinity as CaCO3	----	1	mg/L	<1	174	<1	<1	137
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	85	52	121	24	10
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	82	135	122	37	20
ED093T: Total Major Cations								
Calcium	7440-70-2	1	mg/L	26	10	<1	4	35
Magnesium	7439-95-4	1	mg/L	20	6	5	4	18
Sodium	7440-23-5	1	mg/L	41	156	110	23	15
Potassium	7440-09-7	1	mg/L	<1	21	<1	<1	3
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	<0.01	11.2	0.01	<0.01	0.05
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	3	21	3	<1	7
FWI-EN/001: Groundwater Sampling - Depth								
Depth	----	0.01	m	1.43	1.55	1.57	2.50	1.59



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	LGMB1	LGMB2	LGMB3	LGMB4	----
Client sampling date / time				10-Aug-2016 12:50	10-Aug-2016 12:30	10-Aug-2016 12:20	10-Aug-2016 11:10	----	
Compound	CAS Number	LOR	Unit	EW1603016-006	EW1603016-007	EW1603016-008	EW1603016-009	-----	
				Result	Result	Result	Result	----	
EA005FD: Field pH									
pH	----	0.1	pH Unit	6.6	5.5	5.0	4.5	----	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	1	mg/L	331	217	98	175	----	
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	196	30	18	6	----	
Total Alkalinity as CaCO3	----	1	mg/L	196	30	18	6	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	39	25	16	47	----	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	17	46	10	16	----	
ED093T: Total Major Cations									
Calcium	7440-70-2	1	mg/L	66	25	9	10	----	
Magnesium	7439-95-4	1	mg/L	21	9	4	5	----	
Sodium	7440-23-5	1	mg/L	18	21	8	10	----	
Potassium	7440-09-7	1	mg/L	2	4	2	27	----	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	<0.01	0.24	<0.01	<0.01	----	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	5	3	2	3	----	
FWI-EN/001: Groundwater Sampling - Depth									
Depth	----	0.01	m	1.68	1.92	1.68	1.60	----	