

CERTIFICATE OF ANALYSIS

Work Order : **EP1912952**
Client : **GASCOYNE WATER COOPERATIVE LTD**
Contact : Alan Tyler
Address : 50 BOUNDARY ROAD PO BOX 5
 CARNARVON WESTERN AUSTRALIA, AUSTRALIA 6701
Telephone : ----
Project : GWC ANNUAL SAMPLING
Order number : ----
C-O-C number : ----
Sampler : Desmond Williamson
Site : ----
Quote number : EP/1012/19
No. of samples received : 12
No. of samples analysed : 12

Page : 1 of 8
Laboratory : Environmental Division Perth
Contact : Marnie Thomsett
Address : 26 Rigali Way Wangara WA Australia 6065
Telephone : 08 9406 1311
Date Samples Received : 06-Dec-2019 10:55
Date Analysis Commenced : 06-Dec-2019
Issue Date : 16-Dec-2019 08:28



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

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

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>
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Vinitha Kesavan	Analyst	Perth Microbiology, Wangara, WA



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.

- MF = membrane filtration
- CFU = colony forming unit
- EG020: It is recognised that total arsenic concentration is less than dissolved for samples EP1912952-002, 004, as well as aluminium for sample 010. However, the difference is within experimental variation of the methods.
- Microbiological Comment: In accordance with ALS work instruction QWI-MIC/04, membrane filtration result is reported an approximate (~) when the count of colonies on the filtered membrane is outside the range of 10 - 100cfu.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- MW006 is ALS's internal code and is equivalent to AS4276.7.
- 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	B 1/10	B 2/10	B 3/10	B 18/10	B 19/10
Client sampling date / time				05-Dec-2019 00:00	05-Dec-2019 00:00	05-Dec-2019 00:00	05-Dec-2019 00:00	05-Dec-2019 00:00	
Compound	CAS Number	LOR	Unit	EP1912952-001	EP1912952-002	EP1912952-003	EP1912952-004	EP1912952-005	
				Result	Result	Result	Result	Result	
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit	7.90	8.01	7.65	8.18	7.68	
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm	1340	1170	1040	645	880	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	830	732	734	416	645	
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	191	84	100	107	100	
Total Alkalinity as CaCO3	----	1	mg/L	191	84	100	107	100	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	97	49	49	41	76	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	325	312	271	117	187	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	39	30	51	21	56	
Magnesium	7439-95-4	1	mg/L	21	22	27	11	24	
Sodium	7440-23-5	1	mg/L	210	172	120	96	89	
Potassium	7440-09-7	1	mg/L	14	17	12	13	10	
ED093F: SAR and Hardness Calculations									
Total Hardness as CaCO3	----	1	mg/L	184	166	238	98	239	
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Arsenic	7440-38-2	0.001	mg/L	0.001	0.003	<0.001	0.006	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Copper	7440-50-8	0.001	mg/L	0.001	<0.001	0.002	<0.001	0.002	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Molybdenum	7439-98-7	0.001	mg/L	0.009	0.003	0.001	0.003	0.001	
Selenium	7782-49-2	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	<0.005	0.009	
Boron	7440-42-8	0.05	mg/L	1.38	0.59	0.37	0.52	0.24	
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
EG020T: Total Metals by ICP-MS									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	B 1/10	B 2/10	B 3/10	B 18/10	B 19/10
Client sampling date / time				05-Dec-2019 00:00	05-Dec-2019 00:00	05-Dec-2019 00:00	05-Dec-2019 00:00	05-Dec-2019 00:00	
Compound	CAS Number	LOR	Unit	EP1912952-001	EP1912952-002	EP1912952-003	EP1912952-004	EP1912952-005	
				Result	Result	Result	Result	Result	
EG020T: Total Metals by ICP-MS - Continued									
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Arsenic	7440-38-2	0.001	mg/L	0.001	0.002	<0.001	0.005	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Copper	7440-50-8	0.001	mg/L	0.001	<0.001	0.002	<0.001	0.002	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Molybdenum	7439-98-7	0.001	mg/L	0.012	0.004	0.002	0.004	0.002	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	0.009	0.010	0.010	0.006	0.017	
Boron	7440-42-8	0.05	mg/L	1.58	0.67	0.41	0.57	0.25	
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
EG052G: Silica by Discrete Analyser									
Reactive Silica	----	0.05	mg/L	42.4	61.6	62.2	52.6	60.1	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	1.2	0.6	0.4	0.5	0.3	
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	0.66	0.83	1.38	1.04	0.90	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	0.66	0.83	1.38	1.04	0.90	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	15.0	11.5	10.7	6.29	8.86	
∅ Total Cations	----	0.01	meq/L	13.2	11.2	10.3	6.46	8.90	
∅ Ionic Balance	----	0.01	%	6.52	1.21	1.76	1.33	0.23	
MW006: Faecal Coliforms & E.coli by MF									
<i>Escherichia coli</i>	----	1	CFU/100mL	<1	<1	<1	<1	<1	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	B 20/10	B 21/10	B 11/13	B 2/14	B 3/14
Client sampling date / time				05-Dec-2019 00:00	05-Dec-2019 00:00	05-Dec-2019 00:00	05-Dec-2019 00:00	05-Dec-2019 00:00	
Compound	CAS Number	LOR	Unit	EP1912952-006	EP1912952-007	EP1912952-008	EP1912952-009	EP1912952-010	
				Result	Result	Result	Result	Result	
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit	8.20	7.98	8.03	7.84	7.64	
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm	855	805	944	554	847	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	538	524	566	384	568	
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	108	84	112	113	98	
Total Alkalinity as CaCO3	----	1	mg/L	108	84	112	113	98	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	68	74	86	38	78	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	168	169	196	82	182	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	14	32	19	44	44	
Magnesium	7439-95-4	1	mg/L	9	16	12	15	20	
Sodium	7440-23-5	1	mg/L	145	106	162	48	98	
Potassium	7440-09-7	1	mg/L	10	10	13	7	8	
ED093F: SAR and Hardness Calculations									
Total Hardness as CaCO3	----	1	mg/L	72	146	97	172	192	
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	0.03	
Arsenic	7440-38-2	0.001	mg/L	0.008	0.004	0.003	<0.001	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Copper	7440-50-8	0.001	mg/L	<0.001	0.001	0.002	<0.001	0.002	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Molybdenum	7439-98-7	0.001	mg/L	0.006	0.003	0.008	<0.001	<0.001	
Selenium	7782-49-2	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	<0.005	<0.005	
Boron	7440-42-8	0.05	mg/L	0.67	0.41	1.12	0.21	0.25	
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
EG020T: Total Metals by ICP-MS									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	B 20/10	B 21/10	B 11/13	B 2/14	B 3/14
Client sampling date / time				05-Dec-2019 00:00	05-Dec-2019 00:00	05-Dec-2019 00:00	05-Dec-2019 00:00	05-Dec-2019 00:00	
Compound	CAS Number	LOR	Unit	EP1912952-006	EP1912952-007	EP1912952-008	EP1912952-009	EP1912952-010	
				Result	Result	Result	Result	Result	
EG020T: Total Metals by ICP-MS - Continued									
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Arsenic	7440-38-2	0.001	mg/L	0.008	0.004	0.003	<0.001	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Copper	7440-50-8	0.001	mg/L	<0.001	0.003	0.002	<0.001	0.003	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Molybdenum	7439-98-7	0.001	mg/L	0.007	0.004	0.011	<0.001	0.001	
Selenium	7782-49-2	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	0.007	0.009	0.006	
Boron	7440-42-8	0.05	mg/L	0.72	0.44	1.19	0.23	0.26	
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
EG052G: Silica by Discrete Analyser									
Reactive Silica	----	0.05	mg/L	58.0	54.4	43.1	30.6	49.0	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	1.3	0.8	1.3	0.2	0.2	
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	1.12	1.08	0.71	3.25	0.63	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	1.12	1.08	0.71	3.25	0.63	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	8.31	7.99	9.56	5.36	8.72	
∅ Total Cations	----	0.01	meq/L	8.00	7.78	9.31	5.70	8.31	
∅ Ionic Balance	----	0.01	%	1.90	1.31	1.28	3.03	2.39	
MW006: Faecal Coliforms & E.coli by MF									
<i>Escherichia coli</i>	----	1	CFU/100mL	<1	<1	<1	<1	<1	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID		B 22/14	B 1/15	----	----	----
Client sampling date / time		05-Dec-2019 00:00		05-Dec-2019 00:00		----	----	----
Compound	CAS Number	LOR	Unit	EP1912952-011	EP1912952-012	-----	-----	-----
				Result	Result	----	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.58	7.72	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	999	944	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	676	660	----	----	----
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	91	81	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	91	81	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	75	80	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	241	224	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	46	47	----	----	----
Magnesium	7439-95-4	1	mg/L	26	20	----	----	----
Sodium	7440-23-5	1	mg/L	115	116	----	----	----
Potassium	7440-09-7	1	mg/L	11	9	----	----	----
ED093F: SAR and Hardness Calculations								
Total Hardness as CaCO3	----	1	mg/L	222	200	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	----	----	----
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	----	----	----
Copper	7440-50-8	0.001	mg/L	0.002	0.004	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	0.002	----	----	----
Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	----	----	----
Molybdenum	7439-98-7	0.001	mg/L	0.002	0.002	----	----	----
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	----	----	----
Zinc	7440-66-6	0.005	mg/L	<0.005	0.006	----	----	----
Boron	7440-42-8	0.05	mg/L	0.26	0.26	----	----	----
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	----	----	----
EG020T: Total Metals by ICP-MS								



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	B 22/14	B 1/15	----	----	----
Client sampling date / time				05-Dec-2019 00:00	05-Dec-2019 00:00	----	----	----	
Compound	CAS Number	LOR	Unit	EP1912952-011	EP1912952-012	-----	-----	-----	
				Result	Result	----	----	----	
EG020T: Total Metals by ICP-MS - Continued									
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	----	----	----	
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	----	----	----	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	----	----	----	
Copper	7440-50-8	0.001	mg/L	0.002	0.004	----	----	----	
Lead	7439-92-1	0.001	mg/L	<0.001	0.002	----	----	----	
Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	----	----	----	
Molybdenum	7439-98-7	0.001	mg/L	0.002	0.002	----	----	----	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	----	----	----	
Zinc	7440-66-6	0.005	mg/L	0.008	0.011	----	----	----	
Boron	7440-42-8	0.05	mg/L	0.28	0.29	----	----	----	
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	----	----	----	
EG052G: Silica by Discrete Analyser									
Reactive Silica	----	0.05	mg/L	36.4	31.8	----	----	----	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	0.3	0.3	----	----	----	
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	1.06	0.58	----	----	----	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	1.06	0.58	----	----	----	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	10.2	9.60	----	----	----	
∅ Total Cations	----	0.01	meq/L	9.72	9.27	----	----	----	
∅ Ionic Balance	----	0.01	%	2.31	1.78	----	----	----	
MW006: Faecal Coliforms & E.coli by MF									
<i>Escherichia coli</i>	----	1	CFU/100mL	<1	<1	----	----	----	