

CERTIFICATE OF ANALYSIS

Work Order : **EP1713696**
Client : **GASCOYNE WATER COOPERATIVE LTD**
Contact : MISS LISA HODSON
Address : 50 BOUNDARY ROAD PO BOX 5
 CARNARVON WESTERN AUSTRALIA, AUSTRALIA 6701
Telephone : +61 08 9941 4488
Project : Water Samples NBF
Order number : 90
C-O-C number : ----
Sampler : Northwest Solutions P/L - Ashley Abreu
Site : ----
Quote number : ----
No. of samples received : 13
No. of samples analysed : 13

Page : 1 of 8
Laboratory : Environmental Division Perth
Contact : Adrienne Sanders
Address : 10 Hod Way Malaga WA Australia 6090
Telephone : 08 9209 7632
Date Samples Received : 05-Dec-2017 12:15
Date Analysis Commenced : 05-Dec-2017
Issue Date : 11-Dec-2017 18:08



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	Metals Instrument Chemist	Perth Inorganics, Malaga, WA
Efua Wilson	Metals Chemist	Perth Inorganics, Malaga, WA
Jeremy Truong	Laboratory Manager	Perth Inorganics, Malaga, WA
Tyrone Cole	Inorganics Preparation Supervisor	Perth Inorganics, Malaga, WA
Vinitha Kesavan	Analyst	Perth Microbiology, Malaga, 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 concentration is less than dissolved for some metal analytes. 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.
- MW006: estimate (~) is reported where there are many non-target colonies; the typical colonies may be masked by overgrowth of non-target organisms. It may be informative to record this fact.
- MW006 is ALS's internal code and is equivalent to AS4276.7.
- EA016: Calculated TDS is determined from Electrical conductivity using a conversion factor of 0.65.



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Bore 1/10	Bore 2/10	Bore 3/10	Bore 18/10	Bore 19/10
Client sampling date / time				04-Dec-2017 00:00	04-Dec-2017 00:00	04-Dec-2017 00:00	04-Dec-2017 00:00	04-Dec-2017 00:00	
Compound	CAS Number	LOR	Unit	EP1713696-001	EP1713696-002	EP1713696-003	EP1713696-004	EP1713696-005	
				Result	Result	Result	Result	Result	
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit	7.98	7.99	7.88	8.17	7.73	
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm	1110	1280	1170	702	1030	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	663	795	764	440	726	
EA016: Calculated TDS (from Electrical Conductivity)									
Total Dissolved Solids (Calc.)	----	1	mg/L	722	832	760	456	670	
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	112	84	111	97	105	
Total Alkalinity as CaCO3	----	1	mg/L	112	84	111	97	105	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	61	46	58	40	53	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	242	323	271	120	204	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	43	32	54	25	56	
Magnesium	7439-95-4	1	mg/L	23	25	32	13	29	
Sodium	7440-23-5	1	mg/L	110	154	109	87	88	
Potassium	7440-09-7	1	mg/L	13	19	13	14	11	
ED093F: SAR and Hardness Calculations									
Total Hardness as CaCO3	----	1	mg/L	202	183	267	116	259	
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	0.002	<0.001	0.004	<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	<0.001	<0.001	<0.001	
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	0.002	<0.001	<0.001	<0.001	<0.001	
Molybdenum	7439-98-7	0.001	mg/L	0.002	0.002	0.001	0.002	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	0.007	<0.005	<0.005	<0.005	<0.005	
Boron	7440-42-8	0.05	mg/L	0.30	0.55	0.28	0.41	0.23	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Bore 1/10	Bore 2/10	Bore 3/10	Bore 18/10	Bore 19/10
Client sampling date / time				04-Dec-2017 00:00	04-Dec-2017 00:00	04-Dec-2017 00:00	04-Dec-2017 00:00	04-Dec-2017 00:00	
Compound	CAS Number	LOR	Unit	EP1713696-001	EP1713696-002	EP1713696-003	EP1713696-004	EP1713696-005	
				Result	Result	Result	Result	Result	
EG020F: Dissolved Metals by ICP-MS - Continued									
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
EG020T: Total 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	0.002	<0.001	0.004	<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	<0.001	<0.001	<0.001	
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	0.002	<0.001	<0.001	<0.001	<0.001	
Molybdenum	7439-98-7	0.001	mg/L	0.002	0.003	0.001	0.002	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	0.009	0.005	<0.005	<0.005	<0.005	
Boron	7440-42-8	0.05	mg/L	0.28	0.53	0.28	0.38	0.22	
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	40.8	64.8	63.2	54.5	64.0	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	0.9	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	0.53	0.83	1.59	0.99	0.81	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	0.53	0.83	1.59	0.99	0.81	
EN055: Ionic Balance									
Total Anions	----	0.01	meq/L	10.3	11.7	11.1	6.16	8.96	
Total Cations	----	0.01	meq/L	9.16	10.8	10.4	6.46	9.29	
Ionic Balance	----	0.01	%	6.05	4.02	3.11	2.41	1.83	
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	Bore 20/10	Bore 21/10	Bore 2/14	Bore 11/13	Bore 3/14
Client sampling date / time					04-Dec-2017 00:00	04-Dec-2017 00:00	04-Dec-2017 00:00	04-Dec-2017 00:00	04-Dec-2017 00:00
Compound	CAS Number	LOR	Unit		EP1713696-006	EP1713696-007	EP1713696-008	EP1713696-009	EP1713696-010
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		8.11	7.96	8.03	7.95	7.83
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		992	881	588	926	918
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		596	558	368	562	620
EA016: Calculated TDS (from Electrical Conductivity)									
Total Dissolved Solids (Calc.)	----	1	mg/L		645	573	382	602	597
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		111	80	115	135	95
Total Alkalinity as CaCO3	----	1	mg/L		111	80	115	135	95
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		82	73	34	71	57
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		197	172	78	182	196
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		29	35	49	38	46
Magnesium	7439-95-4	1	mg/L		17	21	17	21	30
Sodium	7440-23-5	1	mg/L		124	98	52	108	89
Potassium	7440-09-7	1	mg/L		14	13	9	13	12
ED093F: SAR and Hardness Calculations									
Total Hardness as CaCO3	----	1	mg/L		142	174	192	181	238
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		0.004	0.003	<0.001	<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	<0.001	<0.001	<0.001
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		0.003	<0.001	0.008	<0.001	<0.001
Molybdenum	7439-98-7	0.001	mg/L		0.003	0.002	<0.001	0.001	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		<0.005	<0.005	<0.005	<0.005	<0.005
Boron	7440-42-8	0.05	mg/L		0.44	0.30	0.18	0.30	0.23



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Bore 20/10	Bore 21/10	Bore 2/14	Bore 11/13	Bore 3/14
Client sampling date / time				04-Dec-2017 00:00	04-Dec-2017 00:00	04-Dec-2017 00:00	04-Dec-2017 00:00	04-Dec-2017 00:00	
Compound	CAS Number	LOR	Unit	EP1713696-006	EP1713696-007	EP1713696-008	EP1713696-009	EP1713696-010	
				Result	Result	Result	Result	Result	
EG020F: Dissolved Metals by ICP-MS - Continued									
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
EG020T: Total 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	0.004	0.004	<0.001	<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	<0.001	<0.001	<0.001	
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	0.002	<0.001	0.005	<0.001	<0.001	
Molybdenum	7439-98-7	0.001	mg/L	0.004	0.003	<0.001	0.002	0.003	
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	0.46	0.33	0.18	0.28	0.23	
Iron	7439-89-6	0.05	mg/L	0.16	<0.05	0.16	<0.05	<0.05	
EG052G: Silica by Discrete Analyser									
Reactive Silica	----	0.05	mg/L	59.9	59.2	31.5	40.7	61.9	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	0.9	0.8	0.2	0.4	0.5	
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	0.97	1.00	4.86	0.74	1.09	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	0.97	1.00	4.86	0.74	1.09	
EN055: Ionic Balance									
Total Anions	----	0.01	meq/L	9.48	7.97	5.20	9.31	8.61	
Total Cations	----	0.01	meq/L	8.60	8.07	6.34	8.65	8.94	
Ionic Balance	----	0.01	%	4.89	0.62	9.79	3.64	1.87	
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	Bore 22/14	Bore 1/15	Bore 5/16	----	----
Client sampling date / time				04-Dec-2017 00:00	04-Dec-2017 00:00	04-Dec-2017 00:00	----	----	
Compound	CAS Number	LOR	Unit	EP1713696-011	EP1713696-012	EP1713696-013	-----	-----	
				Result	Result	Result	----	----	
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit	7.87	7.94	7.76	----	----	
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm	881	890	707	----	----	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	560	522	430	----	----	
EA016: Calculated TDS (from Electrical Conductivity)									
Total Dissolved Solids (Calc.)	----	1	mg/L	573	578	460	----	----	
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	91	82	66	----	----	
Total Alkalinity as CaCO3	----	1	mg/L	91	82	66	----	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	46	78	56	----	----	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	194	174	129	----	----	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	40	39	42	----	----	
Magnesium	7439-95-4	1	mg/L	24	16	18	----	----	
Sodium	7440-23-5	1	mg/L	95	108	70	----	----	
Potassium	7440-09-7	1	mg/L	12	8	8	----	----	
ED093F: SAR and Hardness Calculations									
Total Hardness as CaCO3	----	1	mg/L	199	163	179	----	----	
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	<0.01	----	----	
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	----	----	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	----	
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	----	----	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	----	----	
Manganese	7439-96-5	0.001	mg/L	0.003	<0.001	<0.001	----	----	
Molybdenum	7439-98-7	0.001	mg/L	0.002	0.001	0.003	----	----	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	----	----	
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	<0.005	----	----	
Boron	7440-42-8	0.05	mg/L	0.25	0.25	0.16	----	----	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Bore 22/14	Bore 1/15	Bore 5/16	----	----
Client sampling date / time				04-Dec-2017 00:00	04-Dec-2017 00:00	04-Dec-2017 00:00	----	----	
Compound	CAS Number	LOR	Unit	EP1713696-011	EP1713696-012	EP1713696-013	-----	-----	
				Result	Result	Result	----	----	
EG020F: Dissolved Metals by ICP-MS - Continued									
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	<0.05	----	----	
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	<0.01	----	----	
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	----	----	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	----	
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	----	----	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	----	----	
Manganese	7439-96-5	0.001	mg/L	0.002	<0.001	<0.001	----	----	
Molybdenum	7439-98-7	0.001	mg/L	0.002	0.001	0.004	----	----	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	----	----	
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	<0.005	----	----	
Boron	7440-42-8	0.05	mg/L	0.24	0.24	0.16	----	----	
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	<0.05	----	----	
EG052G: Silica by Discrete Analyser									
Reactive Silica	----	0.05	mg/L	42.4	25.7	29.1	----	----	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	0.4	0.2	0.4	----	----	
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	1.14	0.57	1.19	----	----	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	1.14	0.57	1.19	----	----	
EN055: Ionic Balance									
Total Anions	----	0.01	meq/L	8.25	8.17	6.12	----	----	
Total Cations	----	0.01	meq/L	8.41	8.16	6.83	----	----	
Ionic Balance	----	0.01	%	0.97	0.03	5.43	----	----	
MW006: Faecal Coliforms & E.coli by MF									
<i>Escherichia coli</i>	----	1	CFU/100mL	<1	<1	<1	----	----	