

CERTIFICATE OF ANALYSIS

Work Order : **EM2015594**
Client : **Dept for Environment & Water**
Contact : Mr FRANK MANGERUCA
Address : GPO BOX 2834
ADELAIDE SA, AUSTRALIA 5001
Telephone : ----
Project : HCHB
Order number : ----
C-O-C number : ----
Sampler : JOSHUA CASTLE
Site : ----
Quote number : AD/052/20 V2
No. of samples received : 19
No. of samples analysed : 19

Page : 1 of 10
Laboratory : Environmental Division Melbourne
Contact : Kieren Burns
Address : 4 Westall Rd Springvale VIC Australia 3171
Telephone : +61881625130
Date Samples Received : 10-Sep-2020 10:40
Date Analysis Commenced : 10-Sep-2020
Issue Date : 16-Sep-2020 13:27



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>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Samantha Smith	Laboratory Coordinator	WRG Subcontracting, Springvale, VIC



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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.

- EP002, EP005: EM2015594 :It is recognised that total organic carbon is less than dissolved organic carbon for sample #3. However, the difference is within experimental variation of the methods.
- ED037: EM2015583 #2 Poor duplicate precision for Alkalinity. Confirmed by re-extraction and re-analysis.
- EG052G: EM2015594 #4 & 6-12. Samples required dilution prior to analysis due to sample matrix. LOR has been raised accordingly.
- EP008, Chlorophyll-a standard does not contained Pheophytin-a standard.
- EP008, LOR raised for Pheophytin-a for sample 9 due to sample matrix.
- EA015H: EM2015594 #13: TDS by method EA-015 may bias high due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- ED045G: The presence of thiocyanate can positively contribute to the chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.
- NR - Reported in separate COA
- Algal Count (BM010) has been performed by ALS Water Resources Group, NATA Accreditation no. 992, Site no. 989.

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Murray Mouth	US Tauwitschere	DS Tauwitschere	Mark Point	Long Point
Client sampling date / time				09-Sep-2020 14:30	08-Sep-2020 10:05	08-Sep-2020 10:05	08-Sep-2020 13:30	08-Sep-2020 11:00	
Compound	CAS Number	LOR	Unit	EM2015594-001	EM2015594-002	EM2015594-003	EM2015594-004	EM2015594-005	
				Result	Result	Result	Result	Result	
BM010: Algal Count									
Algal Count	----	-	-	NR	NR	NR	NR	NR	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	8160	478	688	12600	18700	
EA045: Turbidity									
Turbidity	----	0.1	NTU	17.0	37.5	46.2	7.8	5.8	
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	106	97	99	114	119	
Total Alkalinity as CaCO3	----	1	mg/L	106	97	99	114	119	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	4840	226	320	7470	10900	
EG052G: Silica by Discrete Analyser									
Reactive Silica	----	0.05	mg/L	0.44	0.37	0.40	<0.10	<0.05	
EK055G-SW: Ammonia as N by Discrete Analyser in Sea Water									
Ammonia as N	7664-41-7	0.02	mg/L	0.15	0.04	0.10	0.05	0.05	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	0.03	<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	0.03	0.02	0.03	<0.01	0.03	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	0.06	0.02	0.04	<0.01	0.03	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.4	1.6	1.8	1.1	1.0	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	1.5	1.6	1.8	1.1	1.0	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.07	0.10	0.10	0.04	0.03	
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
EP002: Dissolved Organic Carbon (DOC)									
Dissolved Organic Carbon	----	1	mg/L	8	8	8	7	7	
EP005: Total Organic Carbon (TOC)									



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Client sample ID

				Murray Mouth	US Tauwitchere	DS Tauwitchere	Mark Point	Long Point
Client sampling date / time				09-Sep-2020 14:30	08-Sep-2020 10:05	08-Sep-2020 10:05	08-Sep-2020 13:30	08-Sep-2020 11:00
Compound	CAS Number	LOR	Unit	EM2015594-001	EM2015594-002	EM2015594-003	EM2015594-004	EM2015594-005
				Result	Result	Result	Result	Result
EP005: Total Organic Carbon (TOC) - Continued								
Total Organic Carbon	----	1	mg/L	9	8	7	8	8
EP008: Chlorophyll								
Chlorophyll a	----	1	mg/m³	8	28	23	24	5
Chlorophyll b	----	1	mg/m³	<1	<1	<1	<1	<1
Pheophytin a	----	1	mg/m³	2	6	9	5	1

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Noonameena	Bonneys	McGrath Flat North	Parnka Point	Villa de Yumpa
Client sampling date / time				08-Sep-2020 11:30	08-Sep-2020 11:52	08-Sep-2020 15:00	09-Sep-2020 10:30	09-Sep-2020 11:00	
Compound	CAS Number	LOR	Unit	EM2015594-006	EM2015594-007	EM2015594-008	EM2015594-009	EM2015594-010	
				Result	Result	Result	Result	Result	
BM010: Algal Count									
Algal Count	----	-	-	NR	NR	NR	NR	NR	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	44200	45200	50600	68500	74200	
EA045: Turbidity									
Turbidity	----	0.1	NTU	9.9	3.6	5.7	24.1	10.0	
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	161	173	165	189	199	
Total Alkalinity as CaCO3	----	1	mg/L	161	173	165	189	199	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	20000	26100	26700	36900	39000	
EG052G: Silica by Discrete Analyser									
Reactive Silica	----	0.05	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	
EK055G-SW: Ammonia as N by Discrete Analyser in Sea Water									
Ammonia as N	7664-41-7	0.02	mg/L	0.04	0.02	0.04	<0.02	<0.02	
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	<0.01	0.04	<0.01	<0.01	<0.01	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.04	<0.01	<0.01	<0.01	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.9	1.8	2.2	3.6	3.0	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	1.9	1.8	2.2	3.6	3.0	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.09	0.09	0.17	0.51	0.88	
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
EP002: Dissolved Organic Carbon (DOC)									
Dissolved Organic Carbon	----	1	mg/L	14	15	17	25	26	
EP005: Total Organic Carbon (TOC)									



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Client sample ID

				Noonameena	Bonneys	McGrath Flat North	Parnka Point	Villa de Yumpa
Client sampling date / time				08-Sep-2020 11:30	08-Sep-2020 11:52	08-Sep-2020 15:00	09-Sep-2020 10:30	09-Sep-2020 11:00
Compound	CAS Number	LOR	Unit	EM2015594-006	EM2015594-007	EM2015594-008	EM2015594-009	EM2015594-010
				Result	Result	Result	Result	Result
EP005: Total Organic Carbon (TOC) - Continued								
Total Organic Carbon	----	1	mg/L	14	16	19	28	30
EP008: Chlorophyll								
Chlorophyll a	----	1	mg/m ³	13	6	4	8	8
Chlorophyll b	----	1	mg/m ³	4	<1	<1	<1	<1
Pheophytin a	----	1	mg/m ³	4	2	<1	<3	3

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Stony Well	North Jacks Point	South Policeman Point	Snipe Point	Morella Creek @ gauguet
Client sampling date / time				09-Sep-2020 10:45	09-Sep-2020 08:45	09-Sep-2020 08:00	09-Sep-2020 08:05	09-Sep-2020 08:00	
Compound	CAS Number	LOR	Unit	EM2015594-011	EM2015594-012	EM2015594-013	EM2015594-014	EM2015594-015	
				Result	Result	Result	Result	Result	
BM010: Algal Count									
Algal Count	----	-	-	NR	NR	NR	NR	NR	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	76800	86700	91800	86900	9910	
EA045: Turbidity									
Turbidity	----	0.1	NTU	10.8	9.2	8.8	9.8	3.2	
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	104	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	199	209	210	212	301	
Total Alkalinity as CaCO3	----	1	mg/L	199	209	210	212	405	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	43400	41900	47700	47900	5580	
EG052G: Silica by Discrete Analyser									
Reactive Silica	----	0.05	mg/L	<0.10	<0.10	0.08	0.12	15.7	
EK055G-SW: Ammonia as N by Discrete Analyser in Sea Water									
Ammonia as N	7664-41-7	0.02	mg/L	<0.02	<0.02	<0.02	<0.02	0.04	
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	<0.01	<0.01	<0.01	<0.01	<0.01	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	3.5	3.8	3.7	3.5	1.7	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	3.5	3.8	3.7	3.5	1.7	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.69	1.16	1.26	1.26	0.03	
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
EP002: Dissolved Organic Carbon (DOC)									
Dissolved Organic Carbon	----	1	mg/L	26	29	30	30	11	
EP005: Total Organic Carbon (TOC)									



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Client sample ID

				Stony Well	North Jacks Point	South Policeman Point	Snipe Point	Morella Creek @ gauged
Client sampling date / time				09-Sep-2020 10:45	09-Sep-2020 08:45	09-Sep-2020 08:00	09-Sep-2020 08:05	09-Sep-2020 08:00
Compound	CAS Number	LOR	Unit	EM2015594-011	EM2015594-012	EM2015594-013	EM2015594-014	EM2015594-015
				Result	Result	Result	Result	Result
EP005: Total Organic Carbon (TOC) - Continued								
Total Organic Carbon	----	1	mg/L	30	36	37	29	17
EP008: Chlorophyll								
Chlorophyll a	----	1	mg/m ³	11	8	10	11	10
Chlorophyll b	----	1	mg/m ³	<1	<1	<1	<1	<1
Pheophytin a	----	1	mg/m ³	3	2	4	3	2



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				Salt Creek Outlet	1.8km west of Salt Creek	3.2km south of Salt Creek (land)	Tilley Swamp Drain U/S Morella	----
Client sampling date / time				09-Sep-2020 07:15	09-Sep-2020 07:50	09-Sep-2020 07:30	09-Sep-2020 08:50	----
Compound	CAS Number	LOR	Unit	EM2015594-016	EM2015594-017	EM2015594-018	EM2015594-019	-----
				Result	Result	Result	Result	----
BM010: Algal Count								
Algal Count	----	-	-	NR	NR	NR	NR	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	85100	84200	84600	7500	----
EA045: Turbidity								
Turbidity	----	0.1	NTU	8.9	9.2	7.8	1.8	----
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	16	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	212	211	215	379	----
Total Alkalinity as CaCO3	----	1	mg/L	212	211	215	394	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	48100	48600	48800	4030	----
EG052G: Silica by Discrete Analyser								
Reactive Silica	----	0.05	mg/L	0.32	0.31	0.42	7.33	----
EK055G-SW: Ammonia as N by Discrete Analyser in Sea Water								
Ammonia as N	7664-41-7	0.02	mg/L	<0.02	<0.02	<0.02	0.06	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	0.02	----
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	<0.01	<0.01	<0.01	0.29	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	<0.01	0.31	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	3.5	3.6	3.8	0.6	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	3.5	3.6	3.8	0.9	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	1.52	1.84	1.42	0.03	----
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	----
EP002: Dissolved Organic Carbon (DOC)								
Dissolved Organic Carbon	----	1	mg/L	29	29	23	4	----



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Client sample ID

				Salt Creek Outlet	1.8km west of Salt Creek	3.2km south of Salt Creek (land)	Tilley Swamp Drain U/S Morella	----
Client sampling date / time				09-Sep-2020 07:15	09-Sep-2020 07:50	09-Sep-2020 07:30	09-Sep-2020 08:50	----
Compound	CAS Number	LOR	Unit	EM2015594-016	EM2015594-017	EM2015594-018	EM2015594-019	-----
				Result	Result	Result	Result	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	50	37	38	----	----
EP008: Chlorophyll								
Chlorophyll a	----	1	mg/m ³	13	13	9	2	----
Chlorophyll b	----	1	mg/m ³	1	<1	<1	<1	----
Pheophytin a	----	1	mg/m ³	2	4	1	<1	----