

CERTIFICATE OF ANALYSIS

Work Order : **EM2204816**
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 : **RB**
Site : **----**
Quote number : **AD/052/20 V2**
No. of samples received : **22**
No. of samples analysed : **22**

Page : 1 of 12
Laboratory : Environmental Division Melbourne
Contact : Kieren Burns
Address : 4 Westall Rd Springvale VIC Australia 3171
Telephone : +61881625130
Date Samples Received : 18-Mar-2022 11:10
Date Analysis Commenced : 18-Mar-2022
Issue Date : 28-Mar-2022 15:35



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, unless the sampling was conducted by ALS. 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.

Signatories	Position	Accreditation Category
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Dilani Fernando	Laboratory Coordinator	Melbourne Inorganics, Springvale, VIC
Jarwis Nheu	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Nikki Stepniewski	Senior Inorganic Instrument Chemist	Melbourne Inorganics, 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.

- EA015-H: EM2204816 #7-10,12-17,21. 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.
- EP002:EP005:It is recognised that total organic carbon is less than dissolved organic carbon for samples EM2204816 #1, #3,#4,#6, #11, #18-19, #22. However, the difference is within experimental variation of the methods.
- EP008 – Chlorophyll a standard doesn't contain Pheophytin.
- EP008 and EP008B -LOR raised for various samples due to sample matrix.
- EK061G: EM2204810 #1 Poor matrix spike recovery for TKN due to sample matrix. Confirmed by re-extraction and re-analysis.
- EP002: EM2204816 #2 & #22 Poor matrix spike recovery for dissolved organic carbon due to sample matrix. Insufficient sample volume provided to confirm the results by re-extraction and re-analysis.
- ED045G: The presence of Thiocyanate, Thiosulfate and Sulfite can positively contribute to the chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.
- Algal Count (BM010) has been performed by ALS Water Resources Group, NATA Accreditation no. 992, Site no. 989.

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	Murray Mouth	US Tauwitschere	DS Tauwitschere	Mark Point	Long Point
Sampling date / time				16-Mar-2022 11:42	16-Mar-2022 12:50	16-Mar-2022 13:30	16-Mar-2022 14:20	16-Mar-2022 14:22	
Compound	CAS Number	LOR	Unit	EM2204816-001	EM2204816-002	EM2204816-003	EM2204816-004	EM2204816-005	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	3290	255	298	2630	12800	
EA045: Turbidity									
Turbidity	----	0.1	NTU	25.3	125	76.3	10.7	7.0	
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	87	81	84	96	115	
Total Alkalinity as CaCO3	----	1	mg/L	87	81	84	96	115	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	1280	47	126	1070	5920	
EG052G: Silica by Discrete Analyser									
Reactive Silica	----	0.05	mg/L	0.91	0.17	0.42	1.35	3.20	
EK055G-SW: Ammonia as N by Discrete Analyser in Saline Water									
Ammonia as N	7664-41-7	0.02	mg/L	<0.02	<0.02	0.09	<0.02	0.10	
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	0.10	0.02	0.07	0.01	<0.01	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	0.10	0.02	0.07	0.01	<0.01	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.8	2.4	1.7	0.8	0.8	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	0.9	2.4	1.8	0.8	0.8	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.04	0.20	0.12	0.04	0.09	
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	12	11	9	12	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	7	12	8	8	12	
EP008: Chlorophyll									



Analytical Results

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

Sample ID

				Murray Mouth	US Tauwitschere	DS Tauwitschere	Mark Point	Long Point
Sampling date / time				16-Mar-2022 11:42	16-Mar-2022 12:50	16-Mar-2022 13:30	16-Mar-2022 14:20	16-Mar-2022 14:22
Compound	CAS Number	LOR	Unit	EM2204816-001	EM2204816-002	EM2204816-003	EM2204816-004	EM2204816-005
				Result	Result	Result	Result	Result
EP008: Chlorophyll - Continued								
Chlorophyll a	----	1	mg/m ³	10	86	53	24	11
Chlorophyll b	----	1	mg/m ³	<2	<10	<9	<2	<1
Pheophytin a	----	1	mg/m ³	2	28	21	4	1

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	Noonameena	Bonneys	McGrath Flat North	Parnka Point	Villa de Yumpa
Sampling date / time				16-Mar-2022 14:50	16-Mar-2022 15:10	16-Mar-2022 16:05	16-Mar-2022 15:40	17-Mar-2022 10:00	
Compound	CAS Number	LOR	Unit	EM2204816-006	EM2204816-007	EM2204816-008	EM2204816-009	EM2204816-010	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	44300	52300	68000	88400	94800	
EA045: Turbidity									
Turbidity	----	0.1	NTU	4.3	6.3	22.1	12.8	16.5	
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	31	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	148	157	181	200	362	
Total Alkalinity as CaCO3	----	1	mg/L	148	157	181	200	393	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	16100	19200	26300	33900	37200	
EG052G: Silica by Discrete Analyser									
Reactive Silica	----	0.05	mg/L	0.14	0.29	1.09	2.84	3.78	
EK055G-SW: Ammonia as N by Discrete Analyser in Saline Water									
Ammonia as N	7664-41-7	0.02	mg/L	<0.02	0.08	<0.02	<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	0.01	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	1.3	10.1	4.2	3.9	3.6	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	1.3	10.1	4.2	3.9	3.6	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.16	0.27	0.71	1.43	1.48	
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	19	21	26	32	34	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	18	22	32	40	43	
EP008: Chlorophyll									



Analytical Results

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

Sample ID

				Noonameena	Bonneys	McGrath Flat North	Parnka Point	Villa de Yumpa
Sampling date / time				16-Mar-2022 14:50	16-Mar-2022 15:10	16-Mar-2022 16:05	16-Mar-2022 15:40	17-Mar-2022 10:00
Compound	CAS Number	LOR	Unit	EM2204816-006	EM2204816-007	EM2204816-008	EM2204816-009	EM2204816-010
				Result	Result	Result	Result	Result
EP008: Chlorophyll - Continued								
Chlorophyll a	----	1	mg/m ³	<1	12	18	25	25
Chlorophyll b	----	1	mg/m ³	<1	<1	2	<2	<2
Pheophytin a	----	1	mg/m ³	<1	1	2	5	4



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Sample ID

				Tilley Swamp D/S Nth Outlet	Salt Creek Outlet	Snipe Point	1.8km west of Salt Creek	North Jacks Point
Sampling date / time				17-Mar-2022 09:20	17-Mar-2022 07:45	17-Mar-2022 08:25	17-Mar-2022 08:00	17-Mar-2022 09:10
Compound	CAS Number	LOR	Unit	EM2204816-011	EM2204816-012	EM2204816-013	EM2204816-014	EM2204816-015
				Result	Result	Result	Result	Result
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	5440	115000	131000	123000	122000
EA045: Turbidity								
Turbidity	----	0.1	NTU	5.0	27.4	34.9	25.7	38.8
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	203	243	244	239	231
Total Alkalinity as CaCO3	----	1	mg/L	203	243	244	239	231
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	1820	52000	50700	51400	51200
EG052G: Silica by Discrete Analyser								
Reactive Silica	----	0.05	mg/L	11.5	8.44	8.47	8.55	6.85
EK055G-SW: Ammonia as N by Discrete Analyser in Saline Water								
Ammonia as N	7664-41-7	0.02	mg/L	<0.02	<0.02	<0.02	<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	<0.01	0.02	<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	0.02	<0.01	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.4	4.9	4.2	4.4	4.7
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	0.4	4.9	4.2	4.4	4.7
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	<0.01	3.46	3.30	3.23	3.79
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	5	42	42	42	41
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	4	57	58	57	56



Analytical Results

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

Sample ID

				Tilley Swamp D/S Nth Outlet	Salt Creek Outlet	Snipe Point	1.8km west of Salt Creek	North Jacks Point
Sampling date / time				17-Mar-2022 09:20	17-Mar-2022 07:45	17-Mar-2022 08:25	17-Mar-2022 08:00	17-Mar-2022 09:10
Compound	CAS Number	LOR	Unit	EM2204816-011	EM2204816-012	EM2204816-013	EM2204816-014	EM2204816-015
				Result	Result	Result	Result	Result
EP008: Chlorophyll								
Chlorophyll a	----	1	mg/m ³	4	80	74	84	57
Chlorophyll b	----	1	mg/m ³	<1	2	2	<2	<2
Pheophytin a	----	1	mg/m ³	<1	6	10	3	12

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	Seagull Island	Stony Well	Tilley Swamp Watercourse Outlet	Morella Outlet Reg	Morella Creek @ Guage
Sampling date / time				17-Mar-2022 08:45	17-Mar-2022 09:40	17-Mar-2022 09:30	17-Mar-2022 08:35	17-Mar-2022 07:55	
Compound	CAS Number	LOR	Unit	EM2204816-016	EM2204816-017	EM2204816-018	EM2204816-019	EM2204816-020	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	122000	117000	5780	16700	16100	
EA045: Turbidity									
Turbidity	----	0.1	NTU	30.5	26.5	3.4	1.9	10.4	
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	40	200	100	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	240	229	354	137	327	
Total Alkalinity as CaCO3	----	1	mg/L	240	229	394	338	428	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	52500	51000	1800	7540	7330	
EG052G: Silica by Discrete Analyser									
Reactive Silica	----	0.05	mg/L	8.13	5.63	11.2	0.38	12.5	
EK055G-SW: Ammonia as N by Discrete Analyser in Saline Water									
Ammonia as N	7664-41-7	0.02	mg/L	<0.02	<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	<0.01	<0.01	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	<0.01	<0.01	0.02	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	0.02	0.01	0.01	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	4.4	4.2	0.4	1.3	1.9	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	4.4	4.2	0.4	1.3	1.9	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	3.52	3.51	0.01	0.04	0.06	
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	42	41	9	22	24	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	57	54	8	20	25	
EP008: Chlorophyll									



Analytical Results

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

Sample ID

				Seagull Island	Stony Well	Tilley Swamp Watercourse Outlet	Morella Outlet Reg	Morella Creek @ Guage
Sampling date / time				17-Mar-2022 08:45	17-Mar-2022 09:40	17-Mar-2022 09:30	17-Mar-2022 08:35	17-Mar-2022 07:55
Compound	CAS Number	LOR	Unit	EM2204816-016	EM2204816-017	EM2204816-018	EM2204816-019	EM2204816-020
				Result	Result	Result	Result	Result
EP008: Chlorophyll - Continued								
Chlorophyll a	----	1	mg/m ³	78	55	3	3	2
Chlorophyll b	----	1	mg/m ³	<2	<2	<1	<1	<1
Pheophytin a	----	1	mg/m ³	<2	<2	<1	<1	1

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	3.2km south of Salt Creek	Tilley Swamp U/S Morella	----	----	----
Sampling date / time				17-Mar-2022 07:50	17-Mar-2022 09:00	----	----	----	
Compound	CAS Number	LOR	Unit	EM2204816-021	EM2204816-022	-----	-----	-----	
				Result	Result	----	----	----	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	122000	5470	----	----	----	
EA045: Turbidity									
Turbidity	----	0.1	NTU	26.8	2.5	----	----	----	
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	33	----	----	----	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	247	353	----	----	----	
Total Alkalinity as CaCO3	----	1	mg/L	247	386	----	----	----	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	54200	1810	----	----	----	
EG052G: Silica by Discrete Analyser									
Reactive Silica	----	0.05	mg/L	8.11	11.3	----	----	----	
EK055G-SW: Ammonia as N by Discrete Analyser in Saline Water									
Ammonia as N	7664-41-7	0.02	mg/L	<0.02	0.05	----	----	----	
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	<0.01	0.02	----	----	----	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.02	----	----	----	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	5.1	0.4	----	----	----	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	5.1	0.4	----	----	----	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	3.83	<0.01	----	----	----	
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	----	----	----	
EP002: Dissolved Organic Carbon (DOC)									
Dissolved Organic Carbon	----	1	mg/L	44	7	----	----	----	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	57	6	----	----	----	
EP008: Chlorophyll									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	3.2km south of Salt Creek	Tilley Swamp U/S Morella	----	----	----
Sampling date / time					17-Mar-2022 07:50	17-Mar-2022 09:00	----	----	----
Compound	CAS Number	LOR	Unit		EM2204816-021	EM2204816-022	-----	-----	-----
				Result	Result		----	----	----
EP008: Chlorophyll - Continued									
Chlorophyll a	----	1	mg/m ³		47	1	----	----	----
Chlorophyll b	----	1	mg/m ³		3	<1	----	----	----
Pheophytin a	----	1	mg/m ³		2	<1	----	----	----

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP008: Chlorophyll