

CERTIFICATE OF ANALYSIS

Work Order : **EM2103113**
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 : **26**
No. of samples analysed : **26**

Page : 1 of 12
Laboratory : Environmental Division Melbourne
Contact : Kieren Burns
Address : 4 Westall Rd Springvale VIC Australia 3171
Telephone : +61881625130
Date Samples Received : 26-Feb-2021 11:10
Date Analysis Commenced : 26-Feb-2021
Issue Date : 05-Mar-2021 14:56



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	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Arenie Vijayaratnam	Non-Metals Team Leader	Melbourne Inorganics, Springvale, VIC
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Nikki Stepniewski	Senior Inorganic Instrument 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:It is recognised that total organic carbon is less than dissolved organic carbon for samples EM2103113 #5. However, the difference is within experimental variation of the methods.
- EP002:EP005:It is recognised that total organic carbon is less than dissolved organic carbon for samples EM2103113 #12. However, the difference is within experimental variation of the methods.
- EP002:EP005:It is recognised that total organic carbon is less than dissolved organic carbon for samples EM2103113 #10. However, the difference is within experimental variation of the methods.
- EP002:EP005:It is recognised that total organic carbon is less than dissolved organic carbon for samples EM2103113 #15. However, the difference is within experimental variation of the methods.
- EP008, Chlorophyll-a standard does not contained Pheophytin-a standard.
- EP008, LOR raised for Pheophytin-a and Chlorophyll-b for various samples due to sample matrix.
- EA015H: EM2103113 #3, #7-8, #20: 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.
- EK067G: EM2103113 #4 Poor duplicate precision for Total phosphorus due to sample heterogeneity. Confirmed by re-extraction and re-analysis.
- NR ind - 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)				Sample ID	Stony Well	North Jacks Point	South Policeman Point/Seagull Island	Snipe Point	Morella Basin @ Outlet Regulator
Sampling date / time				24-Feb-2021 17:20	24-Feb-2021 16:35	24-Feb-2021 16:05	24-Feb-2021 15:40	24-Feb-2021 16:05	
Compound	CAS Number	LOR	Unit	EM2103113-001	EM2103113-002	EM2103113-003	EM2103113-004	EM2103113-005	
				Result	Result	Result	Result	Result	
BM010: Algal Count									
Algal Count	----	-	-	NR ind	NR ind	NR ind	NR ind	NR ind	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	99000	108000	119000	110000	22900	
EA045: Turbidity									
Turbidity	----	0.1	NTU	18.1	15.5	13.1	14.6	3.5	
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	308	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	208	215	230	230	115	
Total Alkalinity as CaCO3	----	1	mg/L	208	215	230	230	423	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	78800	78300	75700	74900	13200	
EG052G: Silica by Discrete Analyser									
Reactive Silica	----	0.05	mg/L	2.38	3.72	4.73	4.88	7.99	
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	0.04	
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	2.1	0.8	1.9	3.7	2.3	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	2.1	0.8	1.9	3.7	2.3	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.32	0.18	0.07	0.23	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	44	----	40	40	26	
EP005: Total Organic Carbon (TOC)									



Analytical Results

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

Sample ID

				Stony Well	North Jacks Point	South Policeman Point/Seagull Island	Snipe Point	Morella Basin @ Outlet Regulator
Sampling date / time				24-Feb-2021 17:20	24-Feb-2021 16:35	24-Feb-2021 16:05	24-Feb-2021 15:40	24-Feb-2021 16:05
Compound	CAS Number	LOR	Unit	EM2103113-001	EM2103113-002	EM2103113-003	EM2103113-004	EM2103113-005
				Result	Result	Result	Result	Result
EP005: Total Organic Carbon (TOC) - Continued								
Total Organic Carbon	----	1	mg/L	58	----	54	52	25
EP008: Chlorophyll								
Chlorophyll a	----	1	mg/m ³	19	13	44	32	4
Chlorophyll b	----	1	mg/m ³	<2	<2	<2	<2	<1
Pheophytin a	----	1	mg/m ³	3	<2	9	19	1



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Sample ID

				Morella Basin @ Gauge	Salt Creek Outlet	1.8km West of Salt Creek	3.2km South of Salt Creek (Land)	Tilley Swamp Drain U/S Morella
Sampling date / time				24-Feb-2021 15:45	24-Feb-2021 15:05	24-Feb-2021 15:20	24-Feb-2021 15:30	24-Feb-2021 16:40
Compound	CAS Number	LOR	Unit	EM2103113-006	EM2103113-007	EM2103113-008	EM2103113-009	EM2103113-010
				Result	Result	Result	Result	Result
BM010: Algal Count								
Algal Count	----	-	-	NR ind	NR ind	NR ind	NR ind	NR ind
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	22100	116000	100000	127000	8620
EA045: Turbidity								
Turbidity	----	0.1	NTU	10.2	14.3	13.8	12.1	1.9
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	233	<1	<1	<1	123
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	188	230	231	211	361
Total Alkalinity as CaCO3	----	1	mg/L	422	230	231	211	484
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	13100	75200	75900	86800	4660
EG052G: Silica by Discrete Analyser								
Reactive Silica	----	0.05	mg/L	9.51	4.77	4.76	5.71	19.2
EK055G-SW: Ammonia as N by Discrete Analyser in Saline Water								
Ammonia as N	7664-41-7	0.02	mg/L	0.05	<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	<0.01	<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	0.1	2.1	2.4	2.2	0.7
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	0.1	2.1	2.4	2.2	0.7
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	<0.01	0.03	5.41	0.11	<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	<0.01	<0.01	<0.01
EP002: Dissolved Organic Carbon (DOC)								
Dissolved Organic Carbon	----	1	mg/L	26	40	40	43	5



Analytical Results

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

Sample ID

				Morella Basin @ Gauge	Salt Creek Outlet	1.8km West of Salt Creek	3.2km South of Salt Creek (Land)	Tilley Swamp Drain U/S Morella
Sampling date / time				24-Feb-2021 15:45	24-Feb-2021 15:05	24-Feb-2021 15:20	24-Feb-2021 15:30	24-Feb-2021 16:40
Compound	CAS Number	LOR	Unit	EM2103113-006	EM2103113-007	EM2103113-008	EM2103113-009	EM2103113-010
				Result	Result	Result	Result	Result
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	28	56	52	54	4
EP008: Chlorophyll								
Chlorophyll a	----	1	mg/m ³	2	30	32	11	<1
Chlorophyll b	----	1	mg/m ³	<1	2	<2	<1	<1
Pheophytin a	----	1	mg/m ³	<1	20	12	7	<1

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	Murray Mouth	US Tauwitschere	DS Tauwitschere	Mark Point	Long Point
Sampling date / time				25-Feb-2021 11:00	25-Feb-2021 10:00	25-Feb-2021 10:00	25-Feb-2021 09:35	25-Feb-2021 08:50	
Compound	CAS Number	LOR	Unit	EM2103113-011	EM2103113-012	EM2103113-013	EM2103113-014	EM2103113-015	
				Result	Result	Result	Result	Result	
BM010: Algal Count									
Algal Count	----	-	-	NR ind	NR ind	NR ind	NR ind	NR ind	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	16000	586	550	17000	30400	
EA045: Turbidity									
Turbidity	----	0.1	NTU	3.5	16.1	11.5	3.1	3.4	
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	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	135	90	90	117	130	
Total Alkalinity as CaCO3	----	1	mg/L	135	90	90	117	130	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	10000	1810	264	10600	19000	
EG052G: Silica by Discrete Analyser									
Reactive Silica	----	0.05	mg/L	0.47	<0.05	0.17	0.49	2.60	
EK055G-SW: Ammonia as N by Discrete Analyser in Saline Water									
Ammonia as N	7664-41-7	0.02	mg/L	0.03	0.02	0.04	0.03	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	0.4	1.2	2.2	0.2	<0.1	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	0.4	1.2	2.2	0.2	<0.1	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.09	0.04	1.31	0.11	<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	<0.01	<0.01	<0.01	
EP002: Dissolved Organic Carbon (DOC)									
Dissolved Organic Carbon	----	1	mg/L	6	6	7	5	6	
EP005: Total Organic Carbon (TOC)									



Analytical Results

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

Sample ID

				Murray Mouth	US Tauwitchere	DS Tauwitchere	Mark Point	Long Point
Sampling date / time				25-Feb-2021 11:00	25-Feb-2021 10:00	25-Feb-2021 10:00	25-Feb-2021 09:35	25-Feb-2021 08:50
Compound	CAS Number	LOR	Unit	EM2103113-011	EM2103113-012	EM2103113-013	EM2103113-014	EM2103113-015
				Result	Result	Result	Result	Result
EP005: Total Organic Carbon (TOC) - Continued								
Total Organic Carbon	----	1	mg/L	----	7	7	6	5
EP008: Chlorophyll								
Chlorophyll a	----	1	mg/m ³	4	14	8	6	3
Chlorophyll b	----	1	mg/m ³	<1	<5	<4	<1	<1
Pheophytin a	----	1	mg/m ³	<1	<5	<4	4	<1

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	Noonameena	Bonneys	McGrath Flat North	Parnka Point	Villa de Yumpa
Sampling date / time				25-Feb-2021 08:25	25-Feb-2021 08:00	25-Feb-2021 07:30	25-Feb-2021 07:15	25-Feb-2021 06:45	
Compound	CAS Number	LOR	Unit	EM2103113-016	EM2103113-017	EM2103113-018	EM2103113-019	EM2103113-020	
				Result	Result	Result	Result	Result	
BM010: Algal Count									
Algal Count	----	-	-	NR ind	NR ind	NR ind	NR ind	NR ind	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	52300	56400	83500	67300	121000	
EA045: Turbidity									
Turbidity	----	0.1	NTU	8.8	7.6	24.2	11.0	18.4	
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	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	161	183	194	197	200	
Total Alkalinity as CaCO3	----	1	mg/L	161	183	194	197	200	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	35600	46100	55300	54600	77900	
EG052G: Silica by Discrete Analyser									
Reactive Silica	----	0.05	mg/L	0.16	0.30	1.95	1.79	2.56	
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	<0.01	<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	0.4	0.9	2.6	2.3	4.2	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	0.4	0.9	2.6	2.3	4.2	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.40	0.35	2.95	2.32	5.24	
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	15	20	28	----	----	
EP005: Total Organic Carbon (TOC)									



Analytical Results

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

Sample ID

				Noonameena	Bonneys	McGrath Flat North	Parnka Point	Villa de Yumpa
Sampling date / time				25-Feb-2021 08:25	25-Feb-2021 08:00	25-Feb-2021 07:30	25-Feb-2021 07:15	25-Feb-2021 06:45
Compound	CAS Number	LOR	Unit	EM2103113-016	EM2103113-017	EM2103113-018	EM2103113-019	EM2103113-020
				Result	Result	Result	Result	Result
EP005: Total Organic Carbon (TOC) - Continued								
Total Organic Carbon	----	1	mg/L	16	23	32	----	----
EP008: Chlorophyll								
Chlorophyll a	----	1	mg/m ³	8	20	12	10	9
Chlorophyll b	----	1	mg/m ³	<1	<1	<1	<1	<1
Pheophytin a	----	1	mg/m ³	3	6	6	5	3



Analytical Results

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

Sample ID

				North Jacks Point DOC	Parnka Point TOC	Villa de Yumpa TOC	North Jacks Point TOC	Parnka Point DOC
Sampling date / time				24-Feb-2021 16:35	24-Feb-2021 16:35	24-Feb-2021 16:35	24-Feb-2021 16:35	24-Feb-2021 16:35
Compound	CAS Number	LOR	Unit	EM2103113-021	EM2103113-022	EM2103113-023	EM2103113-024	EM2103113-025
				Result	Result	Result	Result	Result
EP002: Dissolved Organic Carbon (DOC)								
Dissolved Organic Carbon	----	1	mg/L	40	----	----	----	26
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	----	30	52	53	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	Villa de Yumpa DOC	----	----	----	----
				Sampling date / time	24-Feb-2021 16:35	----	----	----	----
Compound	CAS Number	LOR	Unit		EM2103113-026	-----	-----	-----	-----
					Result	----	----	----	----
EP002: Dissolved Organic Carbon (DOC)									
Dissolved Organic Carbon	----	1	mg/L		42	----	----	----	----

Inter-Laboratory Testing

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

(WATER) EP008: Chlorophyll