

CERTIFICATE OF ANALYSIS

Work Order : **EM2106129**
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 : **DM, PB, RB**
Site : **----**
Quote number : **AD/052/20 V2**
No. of samples received : **20**
No. of samples analysed : **20**

Page : 1 of 10
Laboratory : Environmental Division Melbourne
Contact : Kieren Burns
Address : 4 Westall Rd Springvale VIC Australia 3171
Telephone : +61881625130
Date Samples Received : 09-Apr-2021 11:35
Date Analysis Commenced : 09-Apr-2021
Issue Date : 16-Apr-2021 14:18



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
Arenie Vijayaratham	Non-Metals Team Leader	Melbourne Inorganics, Springvale, VIC
Ashesh Patel	Senior Chemist	Sydney Inorganics, Smithfield, NSW
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 EM2106129 #2. Results confirmed by re-extraction and re-analysis.
- It is recognised that TOC is less than DOC for samples #1 to #3 and #9 and #16. However, the difference is within experimental variation of the methods.
- EP008, Chlorophyll-a standard does not contain Pheophytin-a standard.
- EP008, LOR raised for Pheophytin-a and Chlorophyll-b, for various samples due to samples matrix.
- EA015H: EM2106129 #17, #19-20: 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.
- EA015H: EM2106129 #2: 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:EM2106129 #1, #3, #9, #16 It has been noted that dissolved organic carbon is greater than total organic carbon, however this difference is within the limits of experimental variation.
- ED045G: The presence of thiocyanate can positively contribute to the chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.
- NRind - 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	Murray Mouth	US Tauwitschere	DS Tauwitschere	Mark Point	Long Point
Sampling date / time				08-Apr-2021 10:30	08-Apr-2021 09:30	08-Apr-2021 09:25	08-Apr-2021 08:45	08-Apr-2021 08:00	
Compound	CAS Number	LOR	Unit	EM2106129-001	EM2106129-002	EM2106129-003	EM2106129-004	EM2106129-005	
				Result	Result	Result	Result	Result	
BM010: Algal Count									
Algal Count	----	-	-	NRind	NRind	NRind	NRind	NRind	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	20700	788	2240	20200	23800	
EA045: Turbidity									
Turbidity	----	0.1	NTU	3.9	33.0	21.2	8.4	8.9	
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	<1	<1	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	447	396	80	110	112	
Total Alkalinity as CaCO3	----	1	mg/L	447	396	80	110	112	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	11300	210	1210	10500	12000	
EG052G: Silica by Discrete Analyser									
Reactive Silica	----	0.05	mg/L	0.23	<0.05	<0.05	1.21	3.21	
EK055G-SW: Ammonia as N by Discrete Analyser in Saline Water									
Ammonia as N	7664-41-7	0.02	mg/L	0.09	0.03	0.04	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	<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	0.06	<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	0.06	<0.01	<0.01	0.01	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.3	1.5	1.3	0.8	<0.1	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	0.3	1.6	1.3	0.8	<0.1	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.17	0.09	0.10	0.06	0.04	
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	17	8	9	4	
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				08-Apr-2021 10:30	08-Apr-2021 09:30	08-Apr-2021 09:25	08-Apr-2021 08:45	08-Apr-2021 08:00
Compound	CAS Number	LOR	Unit	EM2106129-001	EM2106129-002	EM2106129-003	EM2106129-004	EM2106129-005
				Result	Result	Result	Result	Result
EP005: Total Organic Carbon (TOC) - Continued								
Total Organic Carbon	----	1	mg/L	4	9	7	9	8
EP008: Chlorophyll								
Chlorophyll a	----	1	mg/m³	1	10	10	5	1
Chlorophyll b	----	1	mg/m³	<1	<6	<4	<1	<1
Pheophytin a	----	1	mg/m³	<1	<6	<4	1	<1

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	Noonameena	Bonneys	McGrath Flat North	Parnka Point	Villa de Yumpa
Sampling date / time				08-Apr-2021 07:25	08-Apr-2021 07:00	07-Apr-2021 17:05	07-Apr-2021 16:45	07-Apr-2021 15:30	
Compound	CAS Number	LOR	Unit	EM2106129-006	EM2106129-007	EM2106129-008	EM2106129-009	EM2106129-010	
				Result	Result	Result	Result	Result	
BM010: Algal Count									
Algal Count	----	-	-	NRind	NRind	NRind	NRind	NRind	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	40200	37400	53600	55500	77700	
EA045: Turbidity									
Turbidity	----	0.1	NTU	5.6	9.0	24.0	13.1	15.3	
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	143	157	146	158	185	
Total Alkalinity as CaCO3	----	1	mg/L	143	157	146	158	185	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	19600	25300	30000	31300	60600	
EG052G: Silica by Discrete Analyser									
Reactive Silica	----	0.05	mg/L	<0.05	0.06	<0.05	0.13	2.16	
EK055G-SW: Ammonia as N by Discrete Analyser in Saline Water									
Ammonia as N	7664-41-7	0.02	mg/L	0.09	0.10	<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	0.02	<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	0.02	<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	0.2	1.0	0.8	3.4	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	<0.1	0.2	1.0	0.8	3.4	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	<0.01	0.08	0.53	0.28	0.21	
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	12	17	19	21	36	
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				08-Apr-2021 07:25	08-Apr-2021 07:00	07-Apr-2021 17:05	07-Apr-2021 16:45	07-Apr-2021 15:30
Compound	CAS Number	LOR	Unit	EM2106129-006	EM2106129-007	EM2106129-008	EM2106129-009	EM2106129-010
				Result	Result	Result	Result	Result
EP005: Total Organic Carbon (TOC) - Continued								
Total Organic Carbon	----	1	mg/L	18	20	22	20	40
EP008: Chlorophyll								
Chlorophyll a	----	1	mg/m ³	<1	6	<1	2	6
Chlorophyll b	----	1	mg/m ³	<1	<1	<2	<1	<2
Pheophytin a	----	1	mg/m ³	<1	2	<2	<1	<2

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	Stony Well		North Jacks Point		Salt Ck Outlet		Snipe Point		Morella Basin @ Outlet Regulator	
Sampling date / time					07-Apr-2021 15:05		07-Apr-2021 14:40		07-Apr-2021 13:25		07-Apr-2021 14:00		07-Apr-2021 14:20	
Compound	CAS Number	LOR	Unit	EM2106129-011		EM2106129-012		EM2106129-013		EM2106129-014		EM2106129-015		
				Result		Result		Result		Result		Result		
BM010: Algal Count														
Algal Count		----	-	-	NRind		NRind		NRind		NRind		NRind	
EA015: Total Dissolved Solids dried at 180 ± 5 °C														
Total Dissolved Solids @180°C		----	10	mg/L	103000		114000		118000		102000		30700	
EA045: Turbidity														
Turbidity		----	0.1	NTU	13.4		13.6		13.1		16.7		42.2	
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		23	
Bicarbonate Alkalinity as CaCO3		71-52-3	1	mg/L	196		206		242		228		676	
Total Alkalinity as CaCO3		----	1	mg/L	196		206		242		228		699	
ED045G: Chloride by Discrete Analyser														
Chloride		16887-00-6	1	mg/L	60400		68500		72000		72900		17000	
EG052G: Silica by Discrete Analyser														
Reactive Silica		----	0.05	mg/L	2.01		3.16		5.77		5.37		26.0	
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		0.07	
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	3.0		2.8		2.5		2.5		0.6	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser														
^ Total Nitrogen as N		----	0.1	mg/L	3.0		2.8		2.5		2.5		0.6	
EK067G: Total Phosphorus as P by Discrete Analyser														
Total Phosphorus as P		----	0.01	mg/L	5.17		0.23		0.21		0.16		<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	36		40		44		44		30	
EP005: Total Organic Carbon (TOC)														



Analytical Results

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

Sample ID

				Stony Well	North Jacks Point	Salt Ck Outlet	Snipe Point	Morella Basin @ Outlet Regulator
Sampling date / time				07-Apr-2021 15:05	07-Apr-2021 14:40	07-Apr-2021 13:25	07-Apr-2021 14:00	07-Apr-2021 14:20
Compound	CAS Number	LOR	Unit	EM2106129-011	EM2106129-012	EM2106129-013	EM2106129-014	EM2106129-015
				Result	Result	Result	Result	Result
EP005: Total Organic Carbon (TOC) - Continued								
Total Organic Carbon	----	1	mg/L	41	46	50	50	35
EP008: Chlorophyll								
Chlorophyll a	----	1	mg/m³	16	17	32	32	14
Chlorophyll b	----	1	mg/m³	<1	<1	2	2	<1
Pheophytin a	----	1	mg/m³	1	2	<1	11	3



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Sample ID

				Morella Creek @ Gauge	1.8km West of Salt Creek	3.2km South of Salt Creek (Land)	Tilley Swamp Drain U/S Morella	Seagull Island
Sampling date / time				07-Apr-2021 14:00	07-Apr-2021 13:45	07-Apr-2021 13:40	07-Apr-2021 14:45	07-Apr-2021 14:15
Compound	CAS Number	LOR	Unit	EM2106129-016	EM2106129-017	EM2106129-018	EM2106129-019	EM2106129-020
				Result	Result	Result	Result	Result
BM010: Algal Count								
Algal Count	----	-	-	NRind	NRind	NRind	NRind	NRind
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	35600	134000	106000	21600	126000
EA045: Turbidity								
Turbidity	----	0.1	NTU	3.5	15.7	13.1	3.0	15.2
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	75	<1	<1	72	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	612	230	229	411	201
Total Alkalinity as CaCO3	----	1	mg/L	687	230	229	483	201
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	17200	74400	74400	4150	73600
EG052G: Silica by Discrete Analyser								
Reactive Silica	----	0.05	mg/L	24.1	6.09	5.62	15.4	4.84
EK055G-SW: Ammonia as N by Discrete Analyser in Saline Water								
Ammonia as N	7664-41-7	0.02	mg/L	0.04	<0.02	<0.02	0.05	<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	0.03	<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	0.03	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.2	4.0	4.1	0.8	2.8
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	0.2	4.0	4.1	0.8	2.8
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	<0.01	4.40	4.55	0.02	0.22
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	28	49	48	4	46



Analytical Results

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

Sample ID

				Morella Creek @ Gauge	1.8km West of Salt Creek	3.2km South of Salt Creek (Land)	Tilley Swamp Drain U/S Morella	Seagull Island
Sampling date / time				07-Apr-2021 14:00	07-Apr-2021 13:45	07-Apr-2021 13:40	07-Apr-2021 14:45	07-Apr-2021 14:15
Compound	CAS Number	LOR	Unit	EM2106129-016	EM2106129-017	EM2106129-018	EM2106129-019	EM2106129-020
				Result	Result	Result	Result	Result
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	27	53	55	4	54
EP008: Chlorophyll								
Chlorophyll a	----	1	mg/m ³	9	24	34	<1	38
Chlorophyll b	----	1	mg/m ³	<1	1	2	<1	2
Pheophytin a	----	1	mg/m ³	2	<1	<1	<1	3

Inter-Laboratory Testing

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

(WATER) EP008: Chlorophyll