ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EM2104707**	Page	: 1 of 10
Client	: **Dept for Environment & Water**	Laboratory	: Environmental Division Melbourne
Contact	: Mr FRANK MANGERUCA	Contact	: Kieren Burns
Address	: GPO BOX 2834 ADELAIDE SA, AUSTRALIA 5001	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: ----	Telephone	: +61881625130
Project	: HCHB	Date Samples Received	: 19-Mar-2021 11:15
Order number	: ----	Date Analysis Commenced	: 19-Mar-2021
C-O-C number	: ----	Issue Date	: 26-Mar-2021 16:02
Sampler	: JOSHUA CASTLE		
Site	: ----		
Quote number	: AD/052/20 V2		
No. of samples received	: 20		
No. of samples analysed	: 20		

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
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.

- EP008, Chlorophyll-a standard does not contained Pheophytin-a standard. (LOR raised for Chlorophyll-b and Pheophytin a due to sample matrix.)
- EA015H: EM2104707 #2-3, #9, #12, #19: 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.
- EP005:EP002: EM2104707 #5 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.
- EK055G-SW: EM2104707 #2 Poor matrix spike recovery for Ammonia as N(Saline water) due to matrix effects.
- NRind - Reported in separate COA
- Algal Count (BM010) has been performed by ALS Water Resources Group, NATA Accreditation no. 992, Site no. 989.

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	17-Mar-2021 14:30	17-Mar-2021 13:55	17-Mar-2021 13:30	17-Mar-2021 12:55	17-Mar-2021 13:30
Compound	CAS Number	LOR	Unit		EM2104707-001	EM2104707-002	EM2104707-003	EM2104707-004	EM2104707-005
					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		118000	125000	116000	102000	28200
EA045: Turbidity									
Turbidity	----	0.1	NTU		18.8	15.9	12.8	13.1	23.3
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	59
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		206	210	222	223	483
Total Alkalinity as CaCO3	----	1	mg/L		206	210	222	223	542
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		71400	73200	69300	67900	12800
EG052G: Silica by Discrete Analyser									
Reactive Silica	----	0.05	mg/L		3.07	3.11	4.69	4.94	17.6
EK055G-SW: Ammonia as N by Discrete Analyser in Saline Water									
Ammonia as N	7664-41-7	0.02	mg/L		<0.02	0.14	<0.02	<0.02	0.12
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		2.6	3.0	4.0	2.0	3.1
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		2.6	3.0	4.0	2.0	3.1
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		0.29	0.26	0.22	0.34	0.11
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		50	49	47	47	25
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	17-Mar-2021 14:30	17-Mar-2021 13:55	17-Mar-2021 13:30	17-Mar-2021 12:55	17-Mar-2021 13:30
Compound	CAS Number	LOR	Unit		EM2104707-001	EM2104707-002	EM2104707-003	EM2104707-004	EM2104707-005
					Result	Result	Result	Result	Result
EP005: Total Organic Carbon (TOC) - Continued									
Total Organic Carbon	----	1	mg/L		**63**	**61**	**58**	**55**	**24**
EP008: Chlorophyll									
Chlorophyll a	----	1	mg/m³		**6**	**10**	**23**	**23**	**3**
Chlorophyll b	----	1	mg/m³		<2	<2	<2	<2	<1
Pheophytin a	----	1	mg/m³		<2	<2	**2**	**11**	<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	17-Mar-2021 13:15	17-Mar-2021 12:30	17-Mar-2021 12:40	17-Mar-2021 12:45	17-Mar-2021 14:00
Compound	CAS Number	LOR	Unit		EM2104707-006	EM2104707-007	EM2104707-008	EM2104707-009	EM2104707-010
					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		28100	110000	106000	138000	7920
EA045: Turbidity									
Turbidity	----	0.1	NTU		10.2	11.7	13.9	11.2	2.0
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		99	<1	<1	<1	86
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		457	246	228	214	382
Total Alkalinity as CaCO3	----	1	mg/L		556	246	228	214	468
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		13400	62300	68800	76900	4010
EG052G: Silica by Discrete Analyser									
Reactive Silica	----	0.05	mg/L		18.2	5.27	4.87	6.21	14.2
EK055G-SW: Ammonia as N by Discrete Analyser in Saline Water									
Ammonia as N	7664-41-7	0.02	mg/L		0.10	<0.02	<0.02	<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	<0.01	<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		3.1	3.2	3.9	2.8	0.8
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		3.1	3.2	3.9	2.8	0.8
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		0.11	0.20	0.28	0.31	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		22	45	46	48	4

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	17-Mar-2021 13:15	17-Mar-2021 12:30	17-Mar-2021 12:40	17-Mar-2021 12:45	17-Mar-2021 14:00
Compound	CAS Number	LOR	Unit		EM2104707-006	EM2104707-007	EM2104707-008	EM2104707-009	EM2104707-010
					Result	Result	Result	Result	Result
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		**23**	**57**	**58**	**56**	**5**
EP008: Chlorophyll									
Chlorophyll a	----	1	mg/m³		**2**	**17**	**31**	**11**	<1
Chlorophyll b	----	1	mg/m³		<1	**2**	**3**	<1	<1
Pheophytin a	----	1	mg/m³		**1**	**2**	**10**	**7**	<1

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	Murray Mouth	US Tauwitchere	DS Tauwitchere	Mark Point	Long Point
			Sampling date / time	18-Mar-2021 10:45	18-Mar-2021 09:40	18-Mar-2021 09:30	18-Mar-2021 08:50	18-Mar-2021 07:30
Compound	CAS Number	LOR	Unit	EM2104707-011	EM2104707-012	EM2104707-013	EM2104707-014	EM2104707-015
				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	21700	715	530	16000	25800
EA045: Turbidity								
Turbidity	----	0.1	NTU	2.7	27.0	19.0	7.2	4.1
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	10	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	111	89	89	116	120
Total Alkalinity as CaCO3	----	1	mg/L	121	89	89	116	120
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	11900	204	275	9600	12900
EG052G: Silica by Discrete Analyser								
Reactive Silica	----	0.05	mg/L	0.46	0.11	0.17	1.01	2.33
EK055G-SW: Ammonia as N by Discrete Analyser in Saline Water								
Ammonia as N	7664-41-7	0.02	mg/L	0.03	0.05	0.06	0.05	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	0.01	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	0.5	1.4	1.4	1.1	1.0
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	0.5	1.4	1.4	1.1	1.0
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	0.10	0.09	0.08	0.08	0.13
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	4	7	6	6	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	18-Mar-2021 10:45	18-Mar-2021 09:40	18-Mar-2021 09:30	18-Mar-2021 08:50	18-Mar-2021 07:30
Compound	CAS Number	LOR	Unit		EM2104707-011	EM2104707-012	EM2104707-013	EM2104707-014	EM2104707-015
					Result	Result	Result	Result	Result
EP005: Total Organic Carbon (TOC) - Continued									
Total Organic Carbon	----	1	mg/L		**4**	**7**	**6**	**6**	**6**
EP008: Chlorophyll									
Chlorophyll a	----	1	mg/m³		<1	**8**	**9**	**2**	**4**
Chlorophyll b	----	1	mg/m³		<1	<5	<5	**2**	<1
Pheophytin a	----	1	mg/m³		**1**	**5**	<5	**3**	**3**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	Noonameena	Bonneys	McGrath Flat North	Parnka Point	Villa de Yumpa
			Sampling date / time	18-Mar-2021 06:50	18-Mar-2021 06:30	17-Mar-2021 17:00	17-Mar-2021 16:15	17-Mar-2021 14:55
Compound	CAS Number	LOR	Unit	EM2104707-016	EM2104707-017	EM2104707-018	EM2104707-019	EM2104707-020
				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	49400	63000	78000	80700	112000
EA045: Turbidity								
Turbidity	----	0.1	NTU	8.4	10.2	21.9	10.8	20.9
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	9	25	9	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	142	160	148	173	210
Total Alkalinity as CaCO3	----	1	mg/L	142	169	174	182	210
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	24800	33900	44000	44600	71000
EG052G: Silica by Discrete Analyser								
Reactive Silica	----	0.05	mg/L	<0.05	0.34	1.07	1.30	3.12
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	<0.02	<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	2.0	2.4	2.4	2.5	2.3
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	2.0	2.4	2.4	2.5	2.3
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	0.37	0.94	2.90	2.87	0.34
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	20	26	26	44
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	18-Mar-2021 06:50	18-Mar-2021 06:30	17-Mar-2021 17:00	17-Mar-2021 16:15	17-Mar-2021 14:55
Compound	CAS Number	LOR	Unit		EM2104707-016	EM2104707-017	EM2104707-018	EM2104707-019	EM2104707-020
					Result	Result	Result	Result	Result
EP005: Total Organic Carbon (TOC) - Continued									
Total Organic Carbon	----	1	mg/L		**15**	**22**	**30**	**29**	**54**
EP008: Chlorophyll									
Chlorophyll a	----	1	mg/m³		**6**	**7**	**9**	**7**	**8**
Chlorophyll b	----	1	mg/m³		<1	<1	<1	<1	<1
Pheophytin a	----	1	mg/m³		**2**	**4**	**2**	<1	<1

Inter-Laboratory Testing

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

(WATER) EP008: Chlorophyll