



Environmental Forensics Report of Analysis
Project 20230216

Report #: 1745
Date Issued: 26-Jul-2023
Page 1 of 12

Client Project Reference: Menindee Fish Kill - 38 (IMT 15 Jun

Customer: Department of Planning & Environment

Attention: [REDACTED]

Report Date: 26 July 2023

Project Received: 20 June 2023

EF Project Contact: [REDACTED]
[REDACTED]
[REDACTED]



The following samples were analysed:

<i>Sample ID</i>	<i>Client ID</i>	<i>Sample Type</i>	<i>Client Sampled Date/Time</i>
235381	E12-1	Liquid	15/06/2023 9:45AM
235382	E15-1	Liquid	15/06/2023 10:45AM
235383	E14-1	Liquid	15/06/2023 11:45AM
235384	E12-2	Liquid	15/06/2023 9:45AM
235385	E15-2	Liquid	15/06/2023 10:45AM
235386	E14-2	Liquid	15/06/2023 11:45AM
235387	E12-3	Liquid	15/06/2023 9:45AM
235388	E15-3	Liquid	15/06/2023 10:45AM
235389	E14-3	Liquid	15/06/2023 11:45AM
235390	E12-4	Liquid	15/06/2023 9:45AM
235391	E15-4	Liquid	15/06/2023 10:45AM
235392	E14-4	Liquid	15/06/2023 11:45AM
235393	E12-5	Liquid	15/06/2023 9:45AM
235394	E15-5	Liquid	15/06/2023 10:45AM
235395	E14-5	Liquid	15/06/2023 11:45AM
235396	E12-6	Liquid	15/06/2023 9:45AM
235397	E15-6	Liquid	15/06/2023 10:45AM
235398	E14-6	Liquid	15/06/2023 11:45AM
235399	E12 Unfiltered	Liquid	15/06/2023 9:45AM
235400	E15 Unfiltered	Liquid	15/06/2023 10:45AM
235401	E14 Unfiltered	Liquid	15/06/2023 11:45AM
235402	E12 Filtered 1	Liquid	15/06/2023 9:45AM
235403	E15 Filtered 1	Liquid	15/06/2023 10:45AM
235404	E14 Filtered 1	Liquid	15/06/2023 11:45AM
235405	E12 Filtered 2	Liquid	15/06/2023 9:45AM
235406	E15 Filtered 2	Liquid	15/06/2023 10:45AM
235407	E14 Filtered 2	Liquid	15/06/2023 11:45AM

Tests not covered by NATA accreditation 3040 are denoted with *

Codes: SN = Sample Note

RN = Result Note

RC = Project Comment



Report Notes

- This document has been authorised by the person whose name appears in this report.
- This report shall not be reproduced except in full. Samples analysed as received from the client.
- Results reported as 'less than' (<) indicates a result below the practical quantitation limit for the sample matrix and method used.

Project Comments

· Samples 235399 to 235407 were sent to ALS Environmental Laboratory (NATA Accreditation no: 825) for the analysis of Nutrients: EK055G - Ammonia as N by Discrete Analyser, EK057G - Nitrite as N by Discrete Analyser, EK058G - Nitrate as N by Discrete Analyser, EK059G - Nitrite plus Nitrate as N (NOx) by Discrete Analyser, EK061G - Total Kjeldahl Nitrogen By Discrete Analyser, EK062G - Total Nitrogen as N (TKN + NOx) by Discrete Analyser, EK067G - Total Phosphorus as P by Discrete Analyser. This report summarises data from the attached external report: ES2320630, dated 27-Jun-2023.

Samples 235390 to 235392 were also sent to ALS Environmental Laboratory (NATA Accreditation no: 825) for the analysis of EP202A - Phenoxyacetic Acid Herbicides by LCMS and EP204 - Glyphosate and AMPA. This report also summarises data from the attached external report: ES2320630, dated 27-Jun-2023.

· Samples 235384, 235385 and 235386 were analysed outside the method holding time for Pesticides by GCMSMS. Samples 235393, 235394 and 235395 were analysed outside the method holding time for Mercury.

Samples 235381, 235382 and 235383 were analysed outside the method holding time for Total suspended solids.

· Samples 235396, 235397, 235398 were sent to Sydney Water Laboratory Services (NATA Accreditation no: 63 and 610) for the analysis of Blue-Green Algal ID and Enumeration. Please see detailed results in the attached Phytoplankton Analysis Report no. 288488 dated 26 July 2023.

Samples 235387, 235388, 235389 were sent to Sydney Water Laboratory Services (NATA Accreditation no: 63 and 610) for the analysis of Algal Toxins. Please see the attached Analytical Report No: 288488 dated 26 July 2023, which gives Algal Toxins analysis results and the Blue-Green Algal ID and Enumeration summary results.



Analysis Results - External Methods*

Area - EXTERNAL

<i>Sample ID</i>	<i>Start Date</i>	<i>Client ID</i>	235387	235388	235389	235396	235397	235398
			22/06/2023	22/06/2023	22/06/2023	3/07/2023	3/07/2023	3/07/2023
			E12-3	E15-3	E14-3	E12-6	E15-6	E14-6
<i>Analyte</i>								
Algal Enumeration	-					RC	RC	RC
Algal Identification	-					RC	RC	RC
Algal Toxins	-		RC	RC	RC			

Analysis Results - External Methods*

Area - EXTERNAL

<i>Sample ID</i>	<i>Start Date</i>	<i>Client ID</i>	235390	235391	235392
			22/06/2023	22/06/2023	22/06/2023
			E12-4	E15-4	E14-4
<i>Analyte</i>					
2.4.5-T	µg/L		<10	<10	<10
2.4.6-T	µg/L		<10	<10	<10
2.4-D	µg/L		<10	<10	<10
2.4-DB	µg/L		<10	<10	<10
2.4-DP	µg/L		<10	<10	<10
2.6-D	µg/L		<10	<10	<10
4-Chlorophenoxy acetic acid	µg/L		<10	<10	<10
AMPA	µg/L		<10	<10	<10
Clopyralid	µg/L		<10	<10	<10
Dicamba	µg/L		<10	<10	<10
Fluroxypyr	µg/L		<10	<10	<10
Glyphosate	µg/L		<10	<10	<10
MCPA	µg/L		<10	<10	<10
MCPB	µg/L		<10	<10	<10
Mecoprop	µg/L		<10	<10	<10
Picloram	µg/L		<10	<10	<10
Silvex (2.4.5-TP/Fenoprop)	µg/L		<10	<10	<10
Triclopyr	µg/L		<10	<10	<10

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Analysis Results - External Methods*

Area - EXTERNAL

Sample ID
 Start Date
 Client ID

Analyte

		235399 22/06/2023 E12 Unfiltered	235400 22/06/2023 E15 Unfiltered	235401 22/06/2023 E14 Unfiltered	235402 22/06/2023 E12 Filtered 1	235403 22/06/2023 E15 Filtered 1	235404 22/06/2023 E14 Filtered 1	235405 22/06/2023 E12 Filtered 2	235406 22/06/2023 E15 Filtered 2	235407 22/06/2023 E14 Filtered 2
Ammonia as N	mg/L	0.07	0.04	0.06	0.07	0.03	0.05	0.06	0.04	0.06
Nitrate as N	mg/L	0.19	0.43	0.53	0.20	0.43	0.53	0.19	0.43	0.53
Nitrite as N	mg/L	0.03	0.02	0.03	0.03	0.02	0.03	0.04	0.02	0.03
Nitrite+Nitrate as N	mg/L	0.22	0.45	0.56	0.23	0.45	0.56	0.23	0.45	0.56
Total Kjeldahl Nitrogen as N	mg/L	2.0	1.7	1.7	1.1	0.9	1.0	1.0	1.0	1.1
Total Nitrogen as N	mg/L	2.2	2.2	2.3	1.3	1.4	1.6	1.2	1.4	1.7
Total Phosphorus as P	mg/L	0.33	0.32	0.26	0.14	0.15	0.15	0.14	0.16	0.16

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Analysis Results - ICVAASW

Area - INORGANIC

<i>Sample ID</i>	235393	235394	235395
<i>Start Date</i>	18/07/2023	18/07/2023	18/07/2023
<i>Client ID</i>	E12-5	E15-5	E14-5

Analyte

Analyte	Unit	235393	235394	235395
Mercury	µg/L	<0.05	<0.05	<0.05

Analysis Results - ICPAES

Area - INORGANIC

<i>Sample ID</i>	235393	235394	235395
<i>Start Date</i>	20/06/2023	20/06/2023	20/06/2023
<i>Client ID</i>	E12-5	E15-5	E14-5

Analyte

Analyte	Unit	235393	235394	235395
Aluminium (Lab. filtered)	mg/L	<0.04	<0.04	<0.04
Barium (Lab. filtered)	mg/L	0.10	0.10	0.11
Boron (Lab. filtered)	mg/L	<0.1	<0.1	<0.1
Calcium (Lab. filtered)	mg/L	35	35	34
Iron (Lab. filtered)	mg/L	<0.1	<0.1	<0.1
Magnesium (Lab. filtered)	mg/L	16	16	15
Potassium (Lab. filtered)	mg/L	12	12	12
Sodium (Lab. filtered)	mg/L	47	44	44
Strontium (Lab. filtered)	mg/L	0.37	0.36	0.36
Sulfur (Lab. filtered)	mg/L	2.9	2.9	3.1
Titanium (Lab. filtered)	mg/L	<0.01	<0.01	<0.01

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Analysis Results - ICPMS

Area - INORGANIC

Sample ID	235393	235394	235395
Start Date	20/06/2023	20/06/2023	20/06/2023
Client ID	E12-5	E15-5	E14-5

Analyte		235393	235394	235395
Antimony (Lab. filtered)	mg/L	<0.0005	<0.0005	<0.0005
Arsenic (Lab. filtered)	mg/L	0.005	0.005	0.005
Beryllium (Lab. filtered)	mg/L	<0.0001	<0.0001	<0.0001
Cadmium (Lab. filtered)	mg/L	<0.0001	<0.0001	<0.0001
Chromium (Lab. filtered)	mg/L	<0.001	<0.001	<0.001
Cobalt (Lab. filtered)	mg/L	0.0003	0.0003	0.0002
Copper (Lab. filtered)	mg/L	0.0022	0.0020	0.0020
Lead (Lab. filtered)	mg/L	<0.0001	<0.0001	<0.0001
Lithium (Lab. filtered)	mg/L	0.0018	0.0018	0.0018
Manganese (Lab. filtered)	mg/L	<0.001	<0.001	<0.001
Molybdenum (Lab. filtered)	mg/L	0.0014	0.0012	0.0012
Nickel (Lab. filtered)	mg/L	0.0036	0.0035	0.0034
Selenium (Lab. filtered)	mg/L	<0.005	<0.005	<0.005
Silver (Lab. filtered)	mg/L	<0.0001	<0.0001	<0.0001
Thallium (Lab. filtered)	mg/L	<0.0001	<0.0001	<0.0001
Tin (Lab. filtered)	mg/L	<0.0002	<0.0002	<0.0002
Vanadium (Lab. filtered)	mg/L	0.0097	0.011	0.012
Zinc (Lab. filtered)	mg/L	<0.001	<0.001	<0.001

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Analysis Results - ICPAES

Area - INORGANIC

<i>Sample ID</i>	<i>Start Date</i>	<i>Client ID</i>	235393	235394	235395
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Analyte

<i>Sample ID</i>	<i>Start Date</i>	<i>Client ID</i>	235393	235394	235395
Aluminium (acid extractable)	mg/L	E12-5	5.6	4.6	8.2
Barium (acid extractable)	mg/L	E12-5	0.14	0.13	0.15
Boron (acid extractable)	mg/L	E12-5	<0.1	<0.1	<0.1
Calcium (acid extractable)	mg/L	E12-5	36	42	38
Iron (acid extractable)	mg/L	E12-5	4.6	3.7	6.6
Magnesium (acid extractable)	mg/L	E12-5	17	17	17
Manganese (acid extractable)	mg/L	E12-5	0.13	0.11	0.13
Potassium (acid extractable)	mg/L	E12-5	14	14	14
Sodium (acid extractable)	mg/L	E12-5	49	46	45
Strontium (acid extractable)	mg/L	E12-5	0.39	0.39	0.40
Sulfur (acid extractable)	mg/L	E12-5	3.0	2.9	3.1
Titanium (acid extractable)	mg/L	E12-5	0.03	0.03	0.05

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Analysis Results - ICPMS

Area - INORGANIC

<i>Sample ID</i>	<i>235393</i>	<i>235394</i>	<i>235395</i>
<i>Start Date</i>	26/06/2023	26/06/2023	26/06/2023
<i>Client ID</i>	E12-5	E15-5	E14-5

Analyte

Analyte	Unit	235393	235394	235395
Antimony (acid extractable)	mg/L	<0.0005	<0.0005	<0.0005
Arsenic (acid extractable)	mg/L	0.005	0.005	0.005
Beryllium (acid extractable)	mg/L	0.0002	0.0002	0.0002
Cadmium (acid extractable)	mg/L	<0.0001	<0.0001	<0.0001
Chromium (acid extractable)	mg/L	0.006	0.004	0.008
Cobalt (acid extractable)	mg/L	0.0023	0.0020	0.0029
Copper (acid extractable)	mg/L	0.0053	0.0047	0.0065
Lead (acid extractable)	mg/L	0.0014	0.0014	0.0019
Lithium (acid extractable)	mg/L	0.0033	0.0030	0.0038
Molybdenum (acid extractable)	mg/L	0.0015	0.0012	0.0012
Nickel (acid extractable)	mg/L	0.0076	0.0066	0.0086
Selenium (acid extractable)	mg/L	<0.005	<0.005	<0.005
Silver (acid extractable)	mg/L	<0.0001	<0.0001	<0.0001
Thallium (acid extractable)	mg/L	<0.0001	<0.0001	<0.0001
Tin (acid extractable)	mg/L	<0.0002	<0.0002	<0.0002
Vanadium (acid extractable)	mg/L	0.020	0.020	0.027
Zinc (acid extractable)	mg/L	0.011	0.009	0.013

Analysis Results - IGRSS

Area - INORGANIC

<i>Sample ID</i>	<i>235381</i>	<i>235382</i>	<i>235383</i>
<i>Start Date</i>	23/06/2023	23/06/2023	21/07/2023
<i>Client ID</i>	E12-1	E15-1	E14-1

Analyte

Analyte	Unit	235381	235382	235383
Fixed Suspended Solids	mg/L	96	91	120
Total Suspended Solids	mg/L	110	110	140
Volatile Suspended Solids	mg/L	13	15	21

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Analysis Results - QQPEST

Area - ORGANIC

Sample ID
Start Date
Client ID

235384 23/06/2023 E12-2	235385 23/06/2023 E15-2	235386 23/06/2023 E14-2
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Analyte

Analyte	µg/L	<0.3	<0.3	<0.3
Aldrin	µg/L	<0.3	<0.3	<0.3
Allethrin	µg/L	<0.5	<0.5	<0.5
Alpha-Chlordane	µg/L	<0.4	<0.4	<0.4
alpha-HCH	µg/L	<0.4	<0.4	<0.4
Ametryn	µg/L	<0.5	<0.5	<0.5
Atraton	µg/L	<0.5	<0.5	<0.5
Atrazine	µg/L	<0.5	<0.5	<0.5
beta-HCH	µg/L	<0.5	<0.5	<0.5
Bifenthrin	µg/L	<0.5	<0.5	<0.5
Bioresmethrin	µg/L	<0.3	<0.3	<0.3
Carbophenothion	µg/L	<0.5	<0.5	<0.5
Chlorpyrifos	µg/L	<0.4	<0.4	<0.4
Cis-permethrin	µg/L	<0.3	<0.3	<0.3
Crotoxyphos	µg/L	<0.5	<0.5	<0.5
Cyfluthrin	µg/L	<0.5	<0.5	<0.5
Cypermethrin	µg/L	<0.5	<0.5	<0.5
delta-HCH	µg/L	<0.5	<0.5	<0.5
Deltamethrin	µg/L	<0.5	<0.5	<0.5
Diazinon	µg/L	<0.5	<0.5	<0.5
Dichlorvos	µg/L	<0.4	<0.4	<0.4
Dieldrin	µg/L	<0.5	<0.5	<0.5
Dimethoate	µg/L	<0.5	<0.5	<0.5
Endosulfan II	µg/L	<1.0	<1.0	<1.0
Endosulfan I	µg/L	<0.9	<0.9	<0.9
Endosulfan Sulfate	µg/L	<1.0	<1.0	<1.0
Endrin Aldehyde	µg/L	<0.5	<0.5	<0.5
Endrin Ketone	µg/L	<0.5	<0.5	<0.5
Endrin	µg/L	<0.5	<0.5	<0.5
Ethion	µg/L	<0.5	<0.5	<0.5
Fenamiphos	µg/L	<0.5	<0.5	<0.5
Fenitrothion	µg/L	<0.5	<0.5	<0.5
Fenthion	µg/L	<0.4	<0.4	<0.4

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Analysis Results - QQPEST

Area - ORGANIC

Sample ID	235384	235385	235386
Start Date	23/06/2023	23/06/2023	23/06/2023
Client ID	E12-2	E15-2	E14-2

Analyte		235384	235385	235386
Fenvalerate	µg/L	<0.5	<0.5	<0.5
Gamma-Chlordane	µg/L	<0.4	<0.4	<0.4
gamma-HCH	µg/L	<0.4	<0.4	<0.4
Heptachlor Epoxide	µg/L	<0.5	<0.5	<0.5
Heptachlor	µg/L	<0.4	<0.4	<0.4
Hexachlorobenzene	µg/L	<0.3	<0.3	<0.3
Hexazinone	µg/L	<0.5	<0.5	<0.5
L-cyhalothrin	µg/L	<0.5	<0.5	<0.5
Malathion	µg/L	<0.5	<0.5	<0.5
Methidathion	µg/L	<0.5	<0.5	<0.5
Methyl Azinphos	µg/L	<0.4	<0.4	<0.4
Methyl Chlorpyrifos	µg/L	<0.4	<0.4	<0.4
Methyl Parathion	µg/L	<0.5	<0.5	<0.5
Mevinphos	µg/L	<0.4	<0.4	<0.4
Oxyfluorfen	µg/L	<0.5	<0.5	<0.5
Parathion	µg/L	<0.5	<0.5	<0.5
Phorate	µg/L	<0.4	<0.4	<0.4
Profenofos	µg/L	<0.5	<0.5	<0.5
Prometon	µg/L	<0.5	<0.5	<0.5
Prometryn	µg/L	<0.5	<0.5	<0.5
Propargite	µg/L	<0.5	<0.5	<0.5
Propazine	µg/L	<0.5	<0.5	<0.5
Propetamphos	µg/L	<0.5	<0.5	<0.5
Simazine	µg/L	<0.5	<0.5	<0.5
Simetryn	µg/L	<0.5	<0.5	<0.5
Sulprofos	µg/L	<0.4	<0.4	<0.4
Tebuconazole	µg/L	<0.5	<0.5	<0.5
Tebuthiuron	µg/L	<0.5	<0.5	<0.5
Terbutylazine	µg/L	<0.5	<0.5	<0.5
Terbutryn	µg/L	<0.5	<0.5	<0.5
Tetrachlorvinphos	µg/L	<0.5	<0.5	<0.5
Trans-permethrin	µg/L	<0.7	<0.7	<0.7

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Area - ORGANIC

Sample ID	Client ID	Method	Start Date	Result
235384	E12-2	OLCSCAN* - LC/MS Scan	26/06/2023	LC/MS scan for approximately 600 pesticides was negative. A list of analysed compounds can be provided on request. Note the list doesn't include glyphosate and quaternary ammonium herbicides (e.g. Paraquat and Diquat).
235385	E15-2	OLCSCAN* - LC/MS Scan	26/06/2023	LC/MS scan for approximately 600 pesticides was negative. A list of analysed compounds can be provided on request. Note the list doesn't include glyphosate and quaternary ammonium herbicides (e.g. Paraquat and Diquat).
235386	E14-2	OLCSCAN* - LC/MS Scan	26/06/2023	LC/MS scan for approximately 600 pesticides was negative. A list of analysed compounds can be provided on request. Note the list doesn't include glyphosate and quaternary ammonium herbicides (e.g. Paraquat and Diquat).

The sample(s) referred to in this report were analysed by the following method(s):

Method code	Method description	Area
External Methods*	External Methods - Analysis completed externally	EXTERNAL
External Methods*	External Methods - Analysis completed externally	EXTERNAL
External Methods*	External Methods - Analysis completed externally	EXTERNAL
ICVAASW	Mercury by Cold Vapour Atomic Absorption Spectroscopy	INORGANIC
ICPAES	Dissolved element analysis by Inductively Coupled Plasma-Atomic Emission Spectrometry (ICPAES)	INORGANIC
ICPMS	Dissolved Metals by Inductively Coupled Plasma Mass Spectrometry (ICP-MS)	INORGANIC
ICPAES	Acid extractable element analysis by Inductively Coupled Plasma-Atomic Emission Spectrometry (ICPAES)	INORGANIC
ICPMS	Acid extractable Metals by Inductively Coupled Plasma Mass Spectrometry (ICP-MS)	INORGANIC
IGRTSS	Total Suspended Solids (TSS) (includes Volatile and Fixed Suspended Solids)	INORGANIC
QQQPEST	Determination of Multiresidue Pesticides by GCMSMS	ORGANIC
OLCSCAN*	Qualitative LC/MS scan	ORGANIC

The results in this report were authorised by:

Name	Title	Area
[REDACTED]	Senior Scientist	EXTERNAL
[REDACTED]	Scientist	INORGANIC
[REDACTED]	Scientist	ORGANIC

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