



Environmental Forensics Report of Analysis

Project 20230093

Report #: 1583

Date Issued: 03-Apr-2023

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This report replaces Report Number: 1578

Client Project Reference: Menindee Fish Kill 1

Customer: Environmental Protection Agency

Attention: [REDACTED]

Report Date: 03 April 2023

Project Received: 21 March 2023

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

The following samples were analysed:

Sample ID	Client ID	Sample Type	Client Sampled Date/Time	Aliquot
231805	1	Liquid	21/03/2023 9:52AM	
231811	1	Liquid	21/03/2023 9:52AM	Field Aliquot
231813	1	Liquid	21/03/2023 9:52AM	Laboratory Aliquot
231806	2	Liquid	21/03/2023 10:09AM	
231816	2	Liquid	21/03/2023 10:09AM	Field Aliquot
231818	2	Liquid	21/03/2023 10:09AM	Laboratory Aliquot
231807	3	Liquid	21/03/2023 10:44AM	
231821	3	Liquid	21/03/2023 10:44AM	Field Aliquot
231823	3	Liquid	21/03/2023 10:44AM	Laboratory Aliquot
231808	4	Liquid	21/03/2023 11:06AM	
231826	4	Liquid	21/03/2023 11:06AM	Field Aliquot
231828	4	Liquid	21/03/2023 11:06AM	Laboratory Aliquot
231809	5	Liquid	21/03/2023 11:28AM	
231831	5	Liquid	21/03/2023 11:28AM	Field Aliquot
231833	5	Liquid	21/03/2023 11:28AM	Laboratory Aliquot
231810	6	Liquid	21/03/2023 12:29AM	
231836	6	Liquid	21/03/2023 12:29AM	Field Aliquot
231838	6	Liquid	21/03/2023 12:29AM	Laboratory Aliquot



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.
- Solid samples are reported on a dry weight basis and biota samples are reported on an as received basis unless specified otherwise.

Project Comments

· Samples 1 to 6 (laboratory numbers 231813, 231818, 231823, 231828, 231833, 231838, 231805, 231806, 231807, 231808, 231809 and 231810 respectively) were sent to Sydney Water Corporation (NATA Accreditation no: 63 and 610) for the analysis of Algal Enumeration – MA70CENT, Algal Identification, Blue Green Algae, Microcystins and Algal Cell Count. This report summarises data from the attached external report: 281823 dated 28/03/2023.

· Samples 1 to 6 (laboratory numbers 231812, 231817, 231822, 231827, 231832 and 231837 respectively) were sent to ALS Environmental Laboratory (NATA Accreditation no: 825) for the analysis of Nutrients. Refer to the attached external report: ES2309425-AA, dated 3-Apr-2023 for the Nutrients results. Samples 1 to 6 were sent to ALS Environmental Laboratory (NATA Accreditation no: 825) for the analysis of Total and Dissolved Metals. However, the samples for the Dissolved Metals were contaminated by the filtration process prior to sending to ALS for analysis. Therefore, the Total and Dissolved Metals were re-analysed on Samples 1 to 6 (laboratory numbers 231811, 231816, 231821, 231826, 231831 and 231836 respectively). Refer to Environmental Forensics certificate of analysis dated on 3-Apr-2023 for the results of Total and Dissolved Metals.

- This is a reissued report and contains amendments on the comment for the analysis of Total and Dissolved Metals by ALS. This report replaces the one dated on 31-Mar-2023.
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Analysis Results - External Methods*

Area - EXTERNAL

<i>Sample ID</i>	231813	231818	231823	231828	231833	231838
<i>Start Date</i>	24/03/2023	24/03/2023	24/03/2023	24/03/2023	24/03/2023	24/03/2023
<i>Client ID</i>	1	2	3	4	5	6
<i>Analyte</i>						
Algal Cell Count	-	RC	RC	RC	RC	RC
Algal Enumeration	-	RC	RC	RC	RC	RC
Algal Identification	-	RC	RC	RC	RC	RC

Analysis Results - External Methods*

Area - EXTERNAL

<i>Sample ID</i>	231805	231806	231807	231808	231809	231810
<i>Start Date</i>	24/03/2023	24/03/2023	24/03/2023	24/03/2023	24/03/2023	24/03/2023
<i>Client ID</i>	1	2	3	4	5	6
<i>Analyte</i>						
Algal Toxins	-	RC	RC	RC	RC	RC
ASP DSP Lipophilic Shellfish Toxin	-	RC	RC	RC	RC	RC

Tests not covered by NATA accreditation 3040 are denoted with *

Codes: SN = Sample Note

RN = Result Note

RC = Project Comment



Analysis Results - ICPAES

Area - INORGANIC

Sample ID	231811	231816	231821	231826	231831	231836
Start Date	30/03/2023	30/03/2023	30/03/2023	30/03/2023	30/03/2023	30/03/2023
Client ID	1	2	3	4	5	6

Analyte		231811	231816	231821	231826	231831	231836
Aluminium (Lab. filtered)	mg/L	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Barium (Lab. filtered)	mg/L	0.11	0.11	0.11	0.11	0.09	0.09
Boron (Lab. filtered)	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Calcium (Lab. filtered)	mg/L	33	34	33	33	29	29
Iron (Lab. filtered)	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Magnesium (Lab. filtered)	mg/L	15	15	14	14	12	12
Potassium (Lab. filtered)	mg/L	13	13	13	13	11	11
Sodium (Lab. filtered)	mg/L	40	46	37	37	33	33
Strontium (Lab. filtered)	mg/L	0.35	0.37	0.34	0.35	0.30	0.30
Sulfur (Lab. filtered)	mg/L	2.8	3.5	2.6	2.8	3.1	3.2
Titanium (Lab. filtered)	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

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Analysis Results - ICPMS
Area - INORGANIC

	Sample ID	231811	231816	231821	231826	231831	231836
	Start Date	30/03/2023	30/03/2023	30/03/2023	30/03/2023	30/03/2023	30/03/2023
	Client ID	1	2	3	4	5	6
Analyte							
Antimony (Lab. filtered)	mg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Arsenic (Lab. filtered)	mg/L	0.004	0.004	0.005	0.004	0.006	0.005
Beryllium (Lab. filtered)	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cadmium (Lab. filtered)	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium (Lab. filtered)	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cobalt (Lab. filtered)	mg/L	0.0003	0.0003	0.0003	0.0006	0.0002	0.0001
Copper (Lab. filtered)	mg/L	0.0025	0.0018	0.0016	0.0007	0.0031	0.0032
Lead (Lab. filtered)	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Lithium (Lab. filtered)	mg/L	0.0018	0.0018	0.0019	0.0018	0.0016	0.0016
Manganese (Lab. filtered)	mg/L	<0.001	<0.001	0.008	0.073	<0.001	<0.001
Molybdenum (Lab. filtered)	mg/L	0.0017	0.0019	0.0018	0.0017	0.0014	0.0014
Nickel (Lab. filtered)	mg/L	0.0037	0.0034	0.0037	0.0036	0.0028	0.0029
Selenium (Lab. filtered)	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Silver (Lab. filtered)	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Thallium (Lab. filtered)	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Tin (Lab. filtered)	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Vanadium (Lab. filtered)	mg/L	0.0092	0.0075	0.0098	0.0066	0.015	0.016
Zinc (Lab. filtered)	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

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RC = Project Comment



Analysis Results - ICPAES

Area - INORGANIC

<i>Sample ID</i>	<i>Start Date</i>	<i>Client ID</i>	231811	231816	231821	231826	231831	231836
			30/03/2023	30/03/2023	30/03/2023	30/03/2023	30/03/2023	30/03/2023
			1	2	3	4	5	6

<i>Analyte</i>								
Aluminium (acid extractable)	mg/L	4.1	0.88	2.1	0.73	1.9	1.4	
Barium (acid extractable)	mg/L	0.14	0.12	0.12	0.11	0.10	0.10	
Boron (acid extractable)	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Calcium (acid extractable)	mg/L	35	34	34	33	29	30	
Iron (acid extractable)	mg/L	3.5	0.6	1.7	0.6	1.3	1.0	
Magnesium (acid extractable)	mg/L	16	16	15	15	13	13	
Manganese (acid extractable)	mg/L	0.15						
Potassium (acid extractable)	mg/L	15	13	14	14	12	12	
Sodium (acid extractable)	mg/L	41	47	38	38	34	35	
Strontium (acid extractable)	mg/L	0.38	0.38	0.36	0.36	0.31	0.31	
Sulfur (acid extractable)	mg/L	2.9	3.5	2.7	2.8	3.1	3.1	
Titanium (acid extractable)	mg/L	0.09	0.03	0.05	0.02	0.07	0.05	

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Analysis Results - ICPMS
Area - INORGANIC

Sample ID	231811	231816	231821	231826	231831	231836
Start Date	30/03/2023	30/03/2023	30/03/2023	30/03/2023	30/03/2023	30/03/2023
Client ID	1	2	3	4	5	6

Analyte		231811	231816	231821	231826	231831	231836
Antimony (acid extractable)	mg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Arsenic (acid extractable)	mg/L	0.005	0.004	0.005	0.004	0.006	0.005
Beryllium (acid extractable)	mg/L	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cadmium (acid extractable)	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium (acid extractable)	mg/L	0.005	<0.001	0.002	<0.001	0.002	0.002
Cobalt (acid extractable)	mg/L	0.0023	0.0006	0.0011	0.0008	0.0006	0.0005
Copper (acid extractable)	mg/L	0.0050	0.0026	0.0033	0.0017	0.0041	0.0091
Lead (acid extractable)	mg/L	0.0018	0.0004	0.0009	0.0004	0.0005	0.0004
Lithium (acid extractable)	mg/L	0.0034	0.0022	0.0025	0.0020	0.0022	0.0021
Manganese (acid extractable)	mg/L		0.022	0.055	0.080	0.013	0.011
Molybdenum (acid extractable)	mg/L	0.0017	0.0020	0.0018	0.0017	0.0015	0.0015
Nickel (acid extractable)	mg/L	0.0071	0.0042	0.0054	0.0044	0.0040	0.0037
Selenium (acid extractable)	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Silver (acid extractable)	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Thallium (acid extractable)	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Tin (acid extractable)	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Vanadium (acid extractable)	mg/L	0.019	0.0096	0.015	0.0085	0.018	0.018
Zinc (acid extractable)	mg/L	0.009	0.002	0.004	0.002	0.003	0.003

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Analysis Results - QQPEST
Area - ORGANIC

Analyte	Sample ID Start Date Client ID	231811	231816	231821	231826	231831	231836
		22/03/2023 1	22/03/2023 2	22/03/2023 3	22/03/2023 4	22/03/2023 5	22/03/2023 6
Aldrin	µg/L	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Allethrin	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Alpha-Chlordane	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
alpha-HCH	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Ametryn	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Atraton	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Atrazine	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
beta-HCH	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bifenthrin	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bioresmethrin	µg/L	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Carbophenothion	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chlorpyrifos	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Cis-permethrin	µg/L	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Crotoxyphos	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Cyfluthrin	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Cypermethrin	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
delta-HCH	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Deltamethrin	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Diazinon	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dichlorvos	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Dieldrin	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dimethoate	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Endosulfan II	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Endosulfan I	µg/L	<0.9	<0.9	<0.9	<0.9	<0.9	<0.9
Endosulfan Sulfate	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Endrin Aldehyde	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Endrin Ketone	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Endrin	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethion	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fenamiphos	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fenitrothion	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fenthion	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4

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Analysis Results - QQPEST
Area - ORGANIC

	Sample ID	231811	231816	231821	231826	231831	231836
	Start Date	22/03/2023	22/03/2023	22/03/2023	22/03/2023	22/03/2023	22/03/2023
	Client ID	1	2	3	4	5	6
Analyte							
Fenvalerate	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Gamma-Chlordane	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
gamma-HCH	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Heptachlor Epoxide	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Heptachlor	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Hexachlorobenzene	µg/L	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Hexazinone	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
L-cyhalothrin	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Malathion	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Methidathion	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Methyl Azinphos	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Methyl Chlorpyrifos	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Methyl Parathion	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Mevinphos	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Oxyfluorfen	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Parathion	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phorate	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Profenofos	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Prometon	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Prometryn	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Propargite	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Propazine	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Propetamphos	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Simazine	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Simetryn	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Sulprofos	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Tebuconazole	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Tebuthiuron	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Terbutylazine	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Terbutryn	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Tetrachlorvinphos	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Trans-permethrin	µg/L	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7

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Area - ORGANIC

Sample ID	Client ID	Method	Start Date	Result
231811	1	OLCSCAN* - LC/MS Scan	22/03/2023	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).
231816	2	OLCSCAN* - LC/MS Scan	22/03/2023	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).
231821	3	OLCSCAN* - LC/MS Scan	22/03/2023	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).
231826	4	OLCSCAN* - LC/MS Scan	22/03/2023	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).
231831	5	OLCSCAN* - LC/MS Scan	22/03/2023	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).
231836	6	OLCSCAN* - LC/MS Scan	22/03/2023	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
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
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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