



Environmental Forensics Report of Analysis

Project 20230135

Report #: 1639

Date Issued: 19-May-2023

Client Project Reference: Menindee Fish Kill 11 (IMT 27 April

Customer: Department of Planning & Environment

Report Date: 19 May 2023

Project Received: 30 April 2023

Attention: [Redacted]

EF Project Contact: [Redacted]

The following samples were analysed:

Sample ID	Client ID	Sample Type	Client Sampled Date/Time	Aliquot
232683	B4	Liquid	27/04/2023 12:20PM	
232686	B4	Liquid	27/04/2023 12:20PM	Field Aliquot
232687	B4	Liquid	27/04/2023 12:20PM	Field Aliquot
232688	B4	Liquid	27/04/2023 12:20PM	Laboratory Aliquot
232689	B4	Liquid	27/04/2023 12:20PM	Field Aliquot
232684	E6	Liquid	27/04/2023 2:18PM	
232690	E6	Liquid	27/04/2023 2:18PM	Field Aliquot
232691	E6	Liquid	27/04/2023 2:18PM	Field Aliquot
232692	E6	Liquid	27/04/2023 2:18PM	Laboratory Aliquot
232693	E6	Liquid	27/04/2023 2:18PM	Field Aliquot
232685	E7	Liquid	27/04/2023 3:33PM	
232694	E7	Liquid	27/04/2023 3:33PM	Field Aliquot
232695	E7	Liquid	27/04/2023 3:33PM	Field Aliquot
232696	E7	Liquid	27/04/2023 3:33PM	Laboratory Aliquot
232697	E7	Liquid	27/04/2023 3:33PM	Field Aliquot
233043	B4 MFK-Z-9_20230427	Liquid	27/04/2023	
233044	E6 MFK-Z-10_20230427	Liquid	27/04/2023	

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 232686, 232690, 232694 were sent to ALS Environmental Laboratory (NATA Accreditation no: 825) for the analysis of EK055G: Ammonia as N by Discrete Analyser, EK 059G: 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, EK071G: Reactive Phosphorus as P by discrete analyser, EP202A: Phenoxycetic Acid Herbicides by LCMS, EP202S: Phenoxycetic Acid Herbicide Surrogate, EP204: Glyphosate and AMPA. This report summarises data from the attached external report: ES2314134, dated 03-May-2023.
 - Samples 232689, 232693 and 232697 were sent to Sydney Water Services (NATA Accreditation no: 56) for Blue-Green Algal ID and Enumeration analyses. Please see detailed results in the attached Phytoplankton Analysis Report no. 284597 dated 16 May 2023.
 - Samples 232688, 232692 and 232696 were also sent to Sydney Water Laboratory Services for the analysis of Algal Toxins. Please see the attached Analytical Report no. 284597 dated 16 May 2023, which gives Algal Toxins analysis results and the Blue-Green Algal ID and Enumeration summary results.
 - The samples were analysed outside the method holding time for TSS analysis. Sample 233043 contained very fine particulates, a fraction of which passed through the filter used for analysing total, fixed and volatile suspended solids.

Analysis Results - External Methods*

Area - EXTERNAL

Analyte	Sample ID Start Date Client ID	232688 2/05/2023 B4	232689 15/05/2023 B4	232692 2/05/2023 E6	232693 16/05/2023 E6	232696 2/05/2023 E7	232697 15/05/2023 E7
Algal Enumeration	-		RC		RC		RC
Algal Identification	-		RC		RC		RC
Algal Toxins	-	RC		RC		RC	

Analysis Results - External Methods*

Area - EXTERNAL

Analyte	Sample ID Start Date Client ID	232686 1/05/2023 B4	232690 1/05/2023 E6	232694 1/05/2023 E7
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
Ammonia as N	mg/L	<0.01	<0.01	<0.01
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
Nitrite+Nitrate as N	mg/L	<0.01	<0.01	<0.01
Picloram	µg/L	<10	<10	<10
Reactive Phosphorus as P	mg/L	0.22	<0.01	0.16
Silvex (2,4,5-TP/Fenoprop)	µg/L	<10	<10	<10
Total Kjeldahl Nitrogen as N	mg/L	0.9	5.4	2
Total Nitrogen as N	mg/L	0.9	5.4	2
Total Phosphorus as P	mg/L	0.46	0.53	0.4
Triclopyr	µg/L	<10	<10	<10

Tests not covered by NATA accreditation 3040 are denoted with *

Codes: SN = Sample Note RN = Result Note

RC = Project Comment



Analysis Results - ICVAASW
Area - INORGANIC

Analyte	Sample ID	Start Date	Client ID	Analyte	Sample ID	Start Date	Client ID
Mercury	232687	28/04/2023	B4	Mercury	232691	28/04/2023	E6
		<0.05				<0.05	
							E7
							<0.05

Analysis Results - ICPAES
Area - INORGANIC

Analyte	Sample ID	Start Date	Client ID	Analyte	Sample ID	Start Date	Client ID
Aluminium (Lab. filtered)	232687	1/05/2023	B4	Aluminium (Lab. filtered)	232691	1/05/2023	E6
Barium (Lab. filtered)		<0.04		Barium (Lab. filtered)		<0.04	
Boron (Lab. filtered)		0.10		Boron (Lab. filtered)		0.08	
Calcium (Lab. filtered)		<0.1		Calcium (Lab. filtered)		<0.1	
Iron (Lab. filtered)		31		Iron (Lab. filtered)		20	
Magnesium (Lab. filtered)		<0.1		Magnesium (Lab. filtered)		<0.1	
Potassium (Lab. filtered)		13		Potassium (Lab. filtered)		14	
Sodium (Lab. filtered)		12		Sodium (Lab. filtered)		14	
Strontium (Lab. filtered)		38		Strontium (Lab. filtered)		56	
Sulfur (Lab. filtered)		0.33		Sulfur (Lab. filtered)		0.29	
Titanium (Lab. filtered)		4.1		Titanium (Lab. filtered)		2.8	
		<0.01				<0.01	
							E7
							<0.01

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Analysis Results - ICPMS
Area - INORGANIC

Analyte	Sample ID	Start Date	Client ID	232687	232691	232695
				1/05/2023	1/05/2023	1/05/2023
				B4	E6	E7
Antimony (Lab. filtered)			mg/L	<0.0005	<0.0005	<0.0005
Arsenic (Lab. filtered)			mg/L	0.006	0.005	0.007
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	<0.0001	0.0014	0.0003
Copper (Lab. filtered)			mg/L	0.0027	0.0010	0.0017
Lead (Lab. filtered)			mg/L	<0.0001	<0.0001	<0.0001
Lithium (Lab. filtered)			mg/L	0.0019	0.0021	0.0021
Manganese (Lab. filtered)			mg/L	<0.001	<0.001	<0.001
Molybdenum (Lab. filtered)			mg/L	0.0012	0.0020	0.0014
Nickel (Lab. filtered)			mg/L	0.0023	0.0027	0.0022
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	0.020	0.011	0.023
Zinc (Lab. filtered)			mg/L	<0.001	<0.001	<0.001

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Analysis Results - ICPAES
Area - INORGANIC

Analyte	Sample ID	Start Date	Client ID	232687 1/05/2023 B4	232691 1/05/2023 E6	232695 1/05/2023 E7
Aluminium (acid extractable)				3.1	1.3	3.0
Barium (acid extractable)				0.12	0.12	0.12
Boron (acid extractable)				<0.1	<0.1	<0.1
Calcium (acid extractable)				34	23	32
Iron (acid extractable)				2.8	1.3	2.8
Magnesium (acid extractable)				14	15	15
Manganese (acid extractable)				0.05	0.32	0.11
Potassium (acid extractable)				13	16	15
Sodium (acid extractable)				39	57	46
Strontium (acid extractable)				0.36	0.31	0.37
Sulfur (acid extractable)				4.1	3.0	4.2
Titanium (acid extractable)				0.02	<0.01	0.02

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Analysis Results - ICPMS
Area - INORGANIC

Analyte	Sample ID	Start Date	Client ID	Sample ID	Start Date	Client ID	Sample ID	Start Date	Client ID
Antimony (acid extractable)	232687	1/05/2023	B4	232691	1/05/2023	E6	232695	1/05/2023	E7
	<0.0005			<0.0005			<0.0005		
Arsenic (acid extractable)		0.006		0.005			0.007		
Beryllium (acid extractable)		0.0001		<0.0001			0.0001		
Cadmium (acid extractable)		<0.0001		<0.0001			<0.0001		
Chromium (acid extractable)		0.004		0.002			0.003		
Cobalt (acid extractable)		0.0012		0.0030			0.0019		
Copper (acid extractable)		0.0054		0.0025			0.0065		
Lead (acid extractable)		0.0012		0.0013			0.0014		
Lithium (acid extractable)		0.0028		0.0025			0.0031		
Molybdenum (acid extractable)		0.0012		0.0021			0.0014		
Nickel (acid extractable)		0.0050		0.0051			0.0050		
Selenium (acid extractable)		<0.005		<0.005			<0.005		
Silver (acid extractable)		<0.0001		<0.0001			<0.0001		
Thallium (acid extractable)		<0.0001		<0.0001			<0.0001		
Tin (acid extractable)		<0.0002		<0.0002			<0.0002		
Vanadium (acid extractable)		0.027		0.017			0.032		
Zinc (acid extractable)		0.007		0.006			0.009		

Analysis Results - IGR TSS
Area - INORGANIC

Analyte	Sample ID	Start Date	Client ID	Sample ID	Start Date	Client ID
Fixed Suspended Solids	233043	11/05/2023	B4 MFK-Z-9	233044	11/05/2023	E6 MFK-Z-1
	_20230427			_20230427		
	41			42		
Total Suspended Solids		50		76		
Volatile Suspended Solids		8		34		

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Analysis Results - QQQPEST
Area - ORGANIC

Analyte	Sample ID	Start Date	Client ID	232683 2/05/2023 B4	232684 2/05/2023 E6	232685 2/05/2023 E7
Aldrin				<0.3	<0.3	<0.3
Allethrin				<0.5	<0.5	<0.5
Alpha-Chlordane				<0.4	<0.4	<0.4
alpha-HCH				<0.4	<0.4	<0.4
Amethyn				<0.5	<0.5	<0.5
Atraton				<0.5	<0.5	<0.5
Atrazine				<0.5	<0.5	<0.5
beta-HCH				<0.5	<0.5	<0.5
Bifenthrin				<0.5	<0.5	<0.5
Bioresmethrin				<0.3	<0.3	<0.3
Carbophenothion				<0.5	<0.5	<0.5
Chlorpyrifos				<0.4	<0.4	<0.4
Cis-permethrin				<0.3	<0.3	<0.3
Crotoxphos				<0.5	<0.5	<0.5
Cyfluthrin				<0.5	<0.5	<0.5
Cypermethrin				<0.5	<0.5	<0.5
delta-HCH				<0.5	<0.5	<0.5
Deltamethrin				<0.5	<0.5	<0.5
Diazinon				<0.5	<0.5	<0.5
Dichlorvos				<0.4	<0.4	<0.4
Dieldrin				<0.5	<0.5	<0.5
Dimethoate				<0.5	<0.5	<0.5
Endosulfan II				<1.0	<1.0	<1.0
Endosulfan I				<0.9	<0.9	<0.9
Endosulfan Sulfate				<1.0	<1.0	<1.0
Endrin Aldehyde				<0.5	<0.5	<0.5
Endrin Ketone				<0.5	<0.5	<0.5
Endrin				<0.5	<0.5	<0.5
Ethion				<0.5	<0.5	<0.5
Fenamiphos				<0.5	<0.5	<0.5
Fenitrothion				<0.5	<0.5	<0.5
Fenithion				<0.4	<0.4	<0.4

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Analysis Results - QQPEST
Area - ORGANIC

Analyte	Sample ID Start Date Client ID	232683 2/05/2023 B4	232684 2/05/2023 E6	232685 2/05/2023 E7
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
Hexachlorbenzene	µg/L	<0.3	<0.3	<0.3
Hexachlone	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
Promethyn	µg/L	<0.5	<0.5	<0.5
Propagite	µg/L	<0.5	<0.5	<0.5
Propazine	µg/L	<0.5	<0.5	<0.5
Propelamphos	µg/L	<0.5	<0.5	<0.5
Simazine	µg/L	<0.5	<0.5	<0.5
Simeethyn	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
Terbutyn	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
232683	B4	OLSCAN* - LC/MS Scan	05/05/2023	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).
232684	E6	OLSCAN* - LC/MS Scan	05/05/2023	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).
232685	E7	OLSCAN* - LC/MS Scan	05/05/2023	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
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
QQPEST	Determination of Multiresidue Pesticides by GCMSMS	ORGANIC
OLSCAN*	Qualitative LC/MS scan	ORGANIC

The results in this report were authorised by:

Name	Title	Area
	Senior Scientist	EXTERNAL
	Scientist	INORGANIC
	Scientist	ORGANIC

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