Environmental Forensics Report of Analysis

Project 20230136

Report #: ***1640***

Date Issued: 19-May-2023

Client Project Reference: Menindee Fish Kill 12 (IMT 28 April

Report Date: 19 May 2023

Customer: Department of Planning & Environment

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*
232698	E9	Liquid	28/04/2023 12:46PM	
232701	E9	Liquid	28/04/2023 12:46PM	Field Aliquot
232702	E9	Liquid	28/04/2023 12:46PM	Field Aliquot
232703	E9	Liquid	28/04/2023 12:46PM	Field Aliquot
232704	E9	Liquid	28/04/2023 12:46PM	Laboratory Aliquot
232699	E8	Liquid	28/04/2023 2:36PM	
232705	E8	Liquid	28/04/2023 2:36PM	Field Aliquot
232706	E8	Liquid	28/04/2023 2:36PM	Field Aliquot
232707	E8	Liquid	28/04/2023 2:36PM	Field Aliquot
232708	E8	Liquid	28/04/2023 2:36PM	Laboratory Aliquot
232700	E11	Liquid	28/04/2023 5:19PM	
232709	E11	Liquid	28/04/2023 5:19PM	Field Aliquot
232710	E11	Liquid	28/04/2023 5:19PM	Field Aliquot
232711	E11	Liquid	28/04/2023 5:19PM	Field Aliquot
232712	E11	Liquid	28/04/2023 5:19PM	Laboratory Aliquot
233045	E11 MFK-Z-15_20230428	Liquid	28/04/2023	

Environmental Forensics
Department of Planning and Environment
Dharug Country
480 Weeroona Road, Lidcombe NSW 2141

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 232701, 232705, 232709 were sent to ALS Environmental Laboratory (NATA Accreditation no: 825) for the analysis of EK055G: Ammonia 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, EK071G: Reactive Phosphorus as P by discrete analyser, EP202A: Phenoxyacetic Acid Herbicides by LCMS, EP202S: Phenoxyacetic Acid Herbicide Surrogate, EP204: Glyphosate and AMPA. This report summarises data from the attached external report: ES2314135, dated 03-May-2023.

·Samples 232703, 232707 and 232711 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. 284596 dated 16 May 2023.
Samples 232704, 232708 and 232712 were also sent to Sydney Water Laboratory Services for the analysis of Agal Toxins. Please see the attached Analytical Report no. 284596 dated 16 May 2023, which gives Algal Toxins analysis results and the Blue-Green Algal ID & Enumeration summary results.

·Sample 233045 was analysed outside the method holding time for TSS analysis.

Analysis Results - External Methods*
Area - EXTERNAL

Analyte		Sample ID	232703	232704	232707	232708	232711	232712
		Start Date	11/05/2023	2/05/2023	15/05/2023	2/05/2023	16/05/2023	2/05/2023
		Client ID	E9	E9	E8	E8	E11	E11
Algal Enumeration	-		RC		RC		RC	
Algal Identification	-		RC		RC		RC	
Algal Toxins	-			RC		RC		RC

Analysis Results - External Methods*
Area - EXTERNAL

Analyte		Sample ID	232701	232705	232709
		Start Date	1/05/2023	1/05/2023	1/05/2023
		Client ID	E9	E8	E11
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		0.04	0.04	0.06
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		0.04	0.08	0.08
Picloram	µg/L		<10	<10	<10
Reactive Phosphorus as P	mg/L		0.12	0.12	0.09
Silvex (2,4,5-TP/Fenoprop)	µg/L		<10	<10	<10
Total Kjeldahl Nitrogen as N	mg/L		1.4	1.6	1.7
Total Nitrogen as N	mg/L		1.4	1.7	1.8
Total Phosphorus as P	mg/L		0.27	0.21	0.26
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	232702	232706	232710
		Start Date	28/04/2023	28/04/2023	28/04/2023
		Client ID	E9	E8	E11
Mercury	µg/L		<0.05	<0.05	<0.05

Analysis Results - ICPAES
Area - INORGANIC

Analyte		Sample ID	232702	232706	232710
		Start Date	1/05/2023	1/05/2023	1/05/2023
		Client ID	E9	E8	E11
Aluminium (Lab. filtered)	mg/L		<0.04	<0.04	<0.04
Barium (Lab. filtered)	mg/L		0.11	0.11	0.11
Boron (Lab. filtered)	mg/L		<0.1	<0.1	<0.1
Calcium (Lab. filtered)	mg/L		32	33	31
Iron (Lab. filtered)	mg/L		<0.1	<0.1	<0.1
Magnesium (Lab. filtered)	mg/L		16	16	16
Potassium (Lab. filtered)	mg/L		12	12	12
Sodium (Lab. filtered)	mg/L		43	43	46
Strontium (Lab. filtered)	mg/L		0.36	0.37	0.37
Sulfur (Lab. filtered)	mg/L		3.5	3.7	3.2
Titanium (Lab. filtered)	mg/L		<0.01	<0.01	<0.01

Analysis Results - ICPMS

Area - INORGANIC

Analyte		Sample ID	232702	232706	232710
		Start Date	1/05/2023	1/05/2023	1/05/2023
		Client ID	E9	E8	E11
Antimony (Lab. filtered)	mg/L		<0.0005	<0.0005	<0.0005
Arsenic (Lab. filtered)	mg/L		0.004	0.004	0.004
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		0.0002	0.0002	0.0003
Copper (Lab. filtered)	mg/L		0.0019	0.0018	0.0018
Lead (Lab. filtered)	mg/L		<0.0001	<0.0001	<0.0001
Lithium (Lab. filtered)	mg/L		0.0017	0.0016	0.0018
Manganese (Lab. filtered)	mg/L		<0.001	<0.001	<0.001
Molybdenum (Lab. filtered)	mg/L		0.0013	0.0012	0.0013
Nickel (Lab. filtered)	mg/L		0.0028	0.0029	0.0031
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		0.012	0.011	0.011
Zinc (Lab. filtered)	mg/L		<0.001	<0.001	<0.001

Analysis Results - ICPAES

Area - INORGANIC

Analyte		Sample ID	232702	232706	232710
		Start Date	1/05/2023	1/05/2023	1/05/2023
		Client ID	E9	E8	E11
Aluminium (acid extractable)	mg/L		3.3	3.0	3.5
Barium (acid extractable)	mg/L		0.14	0.14	0.14
Boron (acid extractable)	mg/L		<0.1	<0.1	<0.1
Calcium (acid extractable)	mg/L		35	35	34
Iron (acid extractable)	mg/L		3.3	2.9	3.4
Magnesium (acid extractable)	mg/L		17	16	17
Manganese (acid extractable)	mg/L		0.14	0.11	0.15
Potassium (acid extractable)	mg/L		13	12	13
Sodium (acid extractable)	mg/L		45	43	46
Strontium (acid extractable)	mg/L		0.39	0.38	0.39
Sulfur (acid extractable)	mg/L		3.6	3.7	3.3
Titanium (acid extractable)	mg/L		0.02	0.02	0.02

Analysis Results - ICPMS

Area - INORGANIC

Analyte		Sample ID	232702	232706	232710
		Start Date	1/05/2023	1/05/2023	1/05/2023
		Client ID	E9	E8	E11
Antimony (acid extractable)	mg/L		<0.0005	<0.0005	<0.0005
Arsenic (acid extractable)	mg/L		0.005	0.004	0.005
Beryllium (acid extractable)	mg/L		0.0002	0.0002	0.0001
Cadmium (acid extractable)	mg/L		<0.0001	<0.0001	<0.0001
Chromium (acid extractable)	mg/L		0.004	0.004	0.004
Cobalt (acid extractable)	mg/L		0.0021	0.0017	0.0023
Copper (acid extractable)	mg/L		0.0046	0.0043	0.0047
Lead (acid extractable)	mg/L		0.0015	0.0017	0.0015
Lithium (acid extractable)	mg/L		0.0026	0.0026	0.0028
Molybdenum (acid extractable)	mg/L		0.0013	0.0012	0.0013
Nickel (acid extractable)	mg/L		0.0059	0.0055	0.0063
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		0.021	0.018	0.021
Zinc (acid extractable)	mg/L		0.008	0.007	0.008

Analysis Results - IGRTSS

Area - INORGANIC

Analyte		Sample ID	233045
		Start Date	11/05/2023
		Client ID	E11 MFK-Z-15_2023042
Fixed Suspended Solids	mg/L		70
Total Suspended Solids	mg/L		85
Volatile Suspended Solids	mg/L		15

Analysis Results - QQQPEST
Area - ORGANIC

Analyte		*Sample ID*	232698	232699	232700
		Start Date	2/05/2023	2/05/2023	2/05/2023
		Client ID	E9	E8	E11
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 - QQQPEST
Area - ORGANIC

Analyte		Sample ID Start Date Client ID	232698 2/05/2023 E9	232699 2/05/2023 E8	232700 2/05/2023 E11
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
Terbuthylazine	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
232698	E9	OLCSCAN* - 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).
232699	E8	OLCSCAN* - 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).
232700	E11	OLCSCAN* - 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
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
	Scientist	INORGANIC
	Scientist	ORGANIC

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