



Environmental Forensics Report of Analysis
Project 20230108

Report #: 1601
Date Issued: 13-Apr-2023
 Page 1 of 11

Client Project Reference: Menindee Fish Kill - 5

Customer: Environmental Protection Agency

Attention: [Redacted]

Report Date: 13 April 2023

Project Received: 03 April 2023

EF Project Contact: [Redacted]

The following samples were analysed:

Sample ID	Client ID	Sample Type	Client Sampled Date/Time	Aliquot
232120	D/S Main Weir	Liquid	03/04/2023 7:40AM	
232125	D/S Main Weir	Liquid	03/04/2023 7:40AM	Field Aliquot
232126	D/S Main Weir	Liquid	03/04/2023 7:40AM	Field Aliquot
232127	D/S Main Weir	Liquid	03/04/2023 7:40AM	Field Aliquot
232121	WTP	Liquid	03/04/2023 8:25AM	
232128	WTP	Liquid	03/04/2023 8:25AM	Field Aliquot
232129	WTP	Liquid	03/04/2023 8:25AM	Field Aliquot
232130	WTP	Liquid	03/04/2023 8:25AM	Field Aliquot
232122	U/S Menindee Creek	Liquid	03/04/2023 8:56AM	
232131	U/S Menindee Creek	Liquid	03/04/2023 8:56AM	Field Aliquot
232132	U/S Menindee Creek	Liquid	03/04/2023 8:56AM	Field Aliquot
232133	U/S Menindee Creek	Liquid	03/04/2023 8:56AM	Field Aliquot
232123	D/S Menindee Creek	Liquid	03/04/2023 9:33AM	
232134	D/S Menindee Creek	Liquid	03/04/2023 9:33AM	Field Aliquot
232135	D/S Menindee Creek	Liquid	03/04/2023 9:33AM	Field Aliquot
232136	D/S Menindee Creek	Liquid	03/04/2023 9:33AM	Field Aliquot
232124	U/S Weir 32	Liquid	03/04/2023 10:28AM	
232137	U/S Weir 32	Liquid	03/04/2023 10:28AM	Field Aliquot
232138	U/S Weir 32	Liquid	03/04/2023 10:28AM	Field Aliquot
232139	U/S Weir 32	Liquid	03/04/2023 10:28AM	Field 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 232126, 232132, 232135, 232138, 232129 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. This report summarises data from the attached external report: ES2311153, dated 05-Apr-2023.

· Samples 232125, 232128, 232131, 232134 and 232137 were sent to Sydney Water Corporation (NATA Accreditation no: 63 and 610) for the analysis of MA70CENTI (Algal Cell Count) MA70CENTI (Algal Enumeration) MA70CENTI (Algal Identification), TC0061DWI (ASP DSP Lipophilic Shellfish Toxin) TC0049DWI (Algal Toxins). This report summarises data from the attached external report: 282367, dated 06/04/2023.



Analysis Results - External Methods*		Sample ID	232125	232128	232131	232134	232137
Area - EXTERNAL		Start Date	6/04/2023	6/04/2023	6/04/2023	6/04/2023	6/04/2023
		Client ID	D/S Main Weir	WTP	U/S Menindee	D/S Menindee	U/S Weir 32
Analyte							
Algal Enumeration	-		RC	RC	RC	RC	RC
Algal Identification	-		RC	RC	RC	RC	RC

Analysis Results - External Methods*		Sample ID	232126	232129	232132	232135	232138
Area - EXTERNAL		Start Date	4/04/2023	4/04/2023	4/04/2023	4/04/2023	4/04/2023
		Client ID	D/S Main Weir	WTP	U/S Menindee	D/S Menindee	U/S Weir 32
Analyte							
Ammonia as N	mg/L		0,04	0,08	0,1	0,05	0,04
Nitrite+Nitrate as N	mg/L		0,02	0,06	0,07	0,09	0,1
Reactive Phosphorus as P	mg/L		0,02	0,03	0,03	0,14	0,13
Total Kjeldahl Nitrogen as N	mg/L		1,6	1,7	1,9	1,3	1,3
Total Nitrogen as N	mg/L		1,6	1,8	2	1,4	1,4
Total Phosphorus as P	mg/L		0,18	0,23	0,22	0,31	0,33

Analysis Results - External Methods*		Sample ID	232125	232128	232131	232134	232137
Area - EXTERNAL		Start Date	6/04/2023	6/04/2023	6/04/2023	6/04/2023	6/04/2023
		Client ID	D/S Main Weir	WTP	U/S Menindee	D/S Menindee	U/S Weir 32
Analyte							
Algal Toxins	-		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 - ICVAASW
Area - INORGANIC

Analyte	Sample ID	Start Date	Client ID	232127	232130	232133	232136	232139
				4/04/2023	4/04/2023	4/04/2023	4/04/2023	4/04/2023
				D/S Main Weir	WTP	U/S Menindee	D/S Menindee	U/S Weir 32
Mercury		µg/L		<0,05	<0,05	<0,05	<0,05	<0,05

Analysis Results - ICPAES
Area - INORGANIC

Analyte	Sample ID	Start Date	Client ID	232127	232130	232133	232136	232139
				4/04/2023	4/04/2023	4/04/2023	4/04/2023	4/04/2023
				D/S Main Weir	WTP	U/S Menindee	D/S Menindee	U/S Weir 32
Aluminium (Lab. filtered)		mg/L		<0.04	<0.04	<0.04	<0.04	<0.04
Barium (Lab. filtered)		mg/L		0,12	0,12	0,12	0,10	0,09
Boron (Lab. filtered)		mg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Calcium (Lab. filtered)		mg/L		35	34	34	31	30
Iron (Lab. filtered)		mg/L		<0,1	<0,1	<0,1	<0,1	<0,1
Magnesium (Lab. filtered)		mg/L		16	15	15	13	13
Potassium (Lab. filtered)		mg/L		12	12	12	11	11
Sodium (Lab. filtered)		mg/L		44	42	42	37	36
Strontium (Lab. filtered)		mg/L		0.39	0.38	0.37	0.32	0.32
Sulfur (Lab. filtered)		mg/L		3,4	3,3	3,3	3,6	3,5
Titanium (Lab. filtered)		mg/L		<0.01	<0.01	<0.01	<0.01	<0.01

Tests not covered by NATA accreditation 3040 are denoted with *

Codes: SN = Sample Note

RN = Result Note

RC = Project Comment



Analysis Results - ICPMS
Area - INORGANIC

Analyte	Sample ID Start Date Client ID	232127	232130	232133	232136	232139
		4/04/2023 D/S Main Weir	4/04/2023 WTP	4/04/2023 U/S Menindee	4/04/2023 D/S Menindee	4/04/2023 U/S Weir 32
Antimony (Lab. filtered)	mg/L	<0,0005	<0,0005	<0,0005	<0,0005	<0,0005
Arsenic (Lab. filtered)	mg/L	0.003	0.003	0.003	0.003	0.003
Beryllium (Lab. filtered)	mg/L	<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
Chromium (Lab. filtered)	mg/L	<0,001	<0,001	<0,001	<0,001	<0,001
Cobalt (Lab. filtered)	mg/L	0.0002	0.0002	0.0002	0.0002	0.0002
Copper (Lab. filtered)	mg/L	0.0012	0.0011	0.0010	0.0019	0.0020
Lead (Lab. filtered)	mg/L	<0,0001	<0,0001	<0,0001	<0,0001	<0,0001
Lithium (Lab. filtered)	mg/L	0.0019	0.0019	0.0019	0.0017	0.0016
Manganese (Lab. filtered)	mg/L	<0,001	<0,001	<0,001	<0,001	<0,001
Molybdenum (Lab. filtered)	mg/L	0.0006	0.0006	0.0010	0.0006	0.0006
Nickel (Lab. filtered)	mg/L	0.0032	0.0034	0.0034	0.0026	0.0026
Selenium (Lab. filtered)	mg/L	<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
Thallium (Lab. filtered)	mg/L	<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
Vanadium (Lab. filtered)	mg/L	0.0063	0.0068	0.0068	0.015	0.014
Zinc (Lab. filtered)	mg/L	<0,001	<0,001	<0,001	<0,001	<0,001

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

Analyte	Sample ID	Start Date	Client ID	232127	232130	232133	232136	232139
				4/04/2023	4/04/2023	4/04/2023	4/04/2023	4/04/2023
			D/S Main Weir	WTP	U/S Menindee	D/S Menindee	U/S Weir 32	
Aluminium (acid extractable)	mg/L		2,2	3,5	3,3	4,7	4,7	
Barium (acid extractable)	mg/L		0.14	0.15	0.14	0.13	0.13	
Boron (acid extractable)	mg/L		<0,1	<0,1	<0,1	<0,1	<0,1	
Calcium (acid extractable)	mg/L		38	36	36	32	32	
Iron (acid extractable)	mg/L		1,8	2,8	2,7	3,8	3,9	
Magnesium (acid extractable)	mg/L		17	17	16	15	15	
Manganese (acid extractable)	mg/L		0.15	0.14	0.13	0.09	0.09	
Potassium (acid extractable)	mg/L		12	13	12	12	12	
Sodium (acid extractable)	mg/L		44	43	43	37	37	
Strontium (acid extractable)	mg/L		0.40	0.39	0.39	0.34	0.34	
Sulfur (acid extractable)	mg/L		3.5	3.4	3.3	3.7	3.8	
Titanium (acid extractable)	mg/L		0.04	0.06	0.05	0.06	0.06	

Tests not covered by NATA accreditation 3040 are denoted with *

Codes: SN = Sample Note

RN = Result Note

RC = Project Comment



Analysis Results - ICPMS
Area - INORGANIC

Analyte	Sample ID Start Date Client ID	232127	232130	232133	232136	232139
		4/04/2023 D/S Main Weir	4/04/2023 WTP	4/04/2023 U/S Menindee	4/04/2023 D/S Menindee	4/04/2023 U/S Weir 32
Antimony (acid extractable)	mg/L	<0,0005	<0,0005	<0,0005	<0,0005	<0,0005
Arsenic (acid extractable)	mg/L	0.003	0.003	0.003	0.005	0.005
Beryllium (acid extractable)	mg/L	<0,0001	0,0002	0,0001	0,0002	0,0002
Cadmium (acid extractable)	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium (acid extractable)	mg/L	0,002	0,004	0,004	0,005	0,005
Cobalt (acid extractable)	mg/L	0.0016	0.0021	0.0020	0.0019	0.0019
Copper (acid extractable)	mg/L	0.0028	0.0037	0.0035	0.0051	0.0052
Lead (acid extractable)	mg/L	0.0010	0.0017	0.0015	0.0016	0.0016
Lithium (acid extractable)	mg/L	0.0026	0.0029	0.0029	0.0031	0.0031
Molybdenum (acid extractable)	mg/L	0.0017	0.0015	0.0015	0.0012	0.0012
Nickel (acid extractable)	mg/L	0.0051	0.0063	0.0060	0.0063	0.0062
Selenium (acid extractable)	mg/L	<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
Thallium (acid extractable)	mg/L	<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
Vanadium (acid extractable)	mg/L	0.012	0.016	0.016	0.024	0.024
Zinc (acid extractable)	mg/L	0.005	0.007	0.007	0.009	0.009

Tests not covered by NATA accreditation 3040 are denoted with *

Codes: SN = Sample Note

RN = Result Note

RC = Project Comment



Analysis Results - QQPEST
Area - ORGANIC

Analyte	Sample ID Start Date Client ID	232120	232121	232122	232123	232124
		4/04/2023 D/S Main Weir	4/04/2023 WTP	4/04/2023 U/S Menindee	4/04/2023 D/S Menindee	4/04/2023 U/S Weir 32
Aldrin	µg/L	<0,3	<0,3	<0,3	<0,3	<0,3
Allethrin	µg/L	<0,5	<0,5	<0,5	<0,5	<0,5
Alpha-Chlordane	µg/L	<0,4	<0,4	<0,4	<0,4	<0,4
alpha-HCH	µg/L	<0,4	<0,4	<0,4	<0,4	<0,4
Ametryn	µg/L	<0,5	<0,5	<0,5	<0,5	<0,5
Atraton	µg/L	<0,5	<0,5	<0,5	<0,5	<0,5
Atrazine	µg/L	<0,5	<0,5	<0,5	<0,5	<0,5
beta-HCH	µg/L	<0,5	<0,5	<0,5	<0,5	<0,5
Bifenthrin	µg/L	<0,5	<0,5	<0,5	<0,5	<0,5
Bioresmethrin	µg/L	<0,3	<0,3	<0,3	<0,3	<0,3
Carbophenothion	µg/L	<0,5	<0,5	<0,5	<0,5	<0,5
Chlorpyrifos	µg/L	<0,4	<0,4	<0,4	<0,4	<0,4
Cis-permethrin	µg/L	<0,3	<0,3	<0,3	<0,3	<0,3
Crotoxypfos	µg/L	<0,5	<0,5	<0,5	<0,5	<0,5
Cyfluthrin	µg/L	<0,5	<0,5	<0,5	<0,5	<0,5
Cypermethrin	µg/L	<0,5	<0,5	<0,5	<0,5	<0,5
DDD-p,p'	µg/L	<0,5	<0,5	<0,5	<0,5	<0,5
DDE-p,p'	µg/L	<0,4	<0,4	<0,4	<0,4	<0,4
DDT-p,p'	µg/L	<0,4	<0,4	<0,4	<0,4	<0,4
delta-HCH	µg/L	<0,5	<0,5	<0,5	<0,5	<0,5
Deltamethrin	µg/L	<0,5	<0,5	<0,5	<0,5	<0,5
Diazinon	µg/L	<0,5	<0,5	<0,5	<0,5	<0,5
Dichlorvos	µg/L	<0,4	<0,4	<0,4	<0,4	<0,4
Dieldrin	µg/L	<0,5	<0,5	<0,5	<0,5	<0,5
Dimethoate	µg/L	<0,5	<0,5	<0,5	<0,5	<0,5
Endosulfan II	µg/L	<1,0	<1,0	<1,0	<1,0	<1,0
Endosulfan I	µg/L	<0,9	<0,9	<0,9	<0,9	<0,9
Endosulfan Sulfate	µg/L	<1,0	<1,0	<1,0	<1,0	<1,0
Endrin Aldehyde	µg/L	<0,5	<0,5	<0,5	<0,5	<0,5
Endrin Ketone	µg/L	<0,5	<0,5	<0,5	<0,5	<0,5
Endrin	µg/L	<0,5	<0,5	<0,5	<0,5	<0,5
Ethion	µg/L	<0,5	<0,5	<0,5	<0,5	<0,5

Tests not covered by NATA accreditation 3040 are denoted with *

Codes: SN = Sample Note

RN = Result Note

RC = Project Comment



Analysis Results - QQPEST
Area - ORGANIC

Analyte	Sample ID Start Date Client ID	232120	232121	232122	232123	232124
		4/04/2023 D/S Main Weir	4/04/2023 WTP	4/04/2023 U/S Menindee	4/04/2023 D/S Menindee	4/04/2023 U/S Weir 32
Fenamiphos	µg/L	<0,5	<0,5	<0,5	<0,5	<0,5
Fenitrothion	µg/L	<0,5	<0,5	<0,5	<0,5	<0,5
Fenthion	µg/L	<0,4	<0,4	<0,4	<0,4	<0,4
Fenvalerate	µg/L	<0,5	<0,5	<0,5	<0,5	<0,5
Gamma-Chlordane	µg/L	<0,4	<0,4	<0,4	<0,4	<0,4
gamma-HCH	µg/L	<0,4	<0,4	<0,4	<0,4	<0,4
Heptachlor Epoxide	µg/L	<0,5	<0,5	<0,5	<0,5	<0,5
Heptachlor	µg/L	<0,4	<0,4	<0,4	<0,4	<0,4
Hexachlorobenzene	µg/L	<0,3	<0,3	<0,3	<0,3	<0,3
Hexazinone	µg/L	<0,5	<0,5	<0,5	<0,5	<0,5
L-cyhalothrin	µg/L	<0,5	<0,5	<0,5	<0,5	<0,5
Malathion	µg/L	<0,5	<0,5	<0,5	<0,5	<0,5
Methidathion	µg/L	<0,5	<0,5	<0,5	<0,5	<0,5
Methoxychlor, p,p'	µg/L	<0,5	<0,5	<0,5	<0,5	<0,5
Methyl Azinphos	µg/L	<0,4	<0,4	<0,4	<0,4	<0,4
Methyl Chlorpyrifos	µg/L	<0,4	<0,4	<0,4	<0,4	<0,4
Methyl Parathion	µg/L	<0,5	<0,5	<0,5	<0,5	<0,5
Mevinphos	µg/L	<0,4	<0,4	<0,4	<0,4	<0,4
Oxyfluorfen	µg/L	<0,5	<0,5	<0,5	<0,5	<0,5
Parathion	µg/L	<0,5	<0,5	<0,5	<0,5	<0,5
Phorate	µg/L	<0,4	<0,4	<0,4	<0,4	<0,4
Profenofos	µg/L	<0,5	<0,5	<0,5	<0,5	<0,5
Prometon	µg/L	<0,5	<0,5	<0,5	<0,5	<0,5
Prometryn	µg/L	<0,5	<0,5	<0,5	<0,5	<0,5
Propargite	µg/L	<0,5	<0,5	<0,5	<0,5	<0,5
Propazine	µg/L	<0,5	<0,5	<0,5	<0,5	<0,5
Propetamphos	µg/L	<0,5	<0,5	<0,5	<0,5	<0,5
Simazine	µg/L	<0,5	<0,5	<0,5	<0,5	<0,5
Simetryn	µg/L	<0,5	<0,5	<0,5	<0,5	<0,5
Sulprofos	µg/L	<0,4	<0,4	<0,4	<0,4	<0,4
Tebuconazole	µg/L	<0,5	<0,5	<0,5	<0,5	<0,5
Tebuthiuron	µg/L	<0,5	<0,5	<0,5	<0,5	<0,5

Tests not covered by NATA accreditation 3040 are denoted with *

Codes: SN = Sample Note

RN = Result Note

RC = Project Comment



Analysis Results - QQPEST
Area - ORGANIC

Analyte	Sample ID	Start Date	Client ID	232120	232121	232122	232123	232124
				4/04/2023	4/04/2023	4/04/2023	4/04/2023	4/04/2023
				D/S Main Weir	WTP	U/S Menindee	D/S Menindee	U/S Weir 32
Terbutylazine				µg/L	<0,5	<0,5	<0,5	<0,5
Terbutryn				µg/L	<0,5	<0,5	<0,5	<0,5
Tetrachlorvinphos				µg/L	<0,5	<0,5	<0,5	<0,5
Trans-permethrin				µg/L	<0,7	<0,7	<0,7	<0,7

Sample ID	Client ID	Method	Start Date	Result
232120	D/S Main Weir	OLCSCAN* - LC/MS Scan	04/04/2023	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).
232121	WTP	OLCSCAN* - LC/MS Scan	04/04/2023	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).
232122	U/S Menindee Creek	OLCSCAN* - LC/MS Scan	04/04/2023	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).
232123	D/S Menindee Creek	OLCSCAN* - LC/MS Scan	04/04/2023	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).
232124	U/S Weir 32	OLCSCAN* - LC/MS Scan	04/04/2023	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
QQPEST	Determination of Multiresidue Pesticides by GCMSMS	ORGANIC
OLCSCAN*	Qualitative LC/MS scan	ORGANIC

Tests not covered by NATA accreditation 3040 are denoted with *

Codes: SN = Sample Note

RN = Result Note

RC = Project Comment



The results in this report were authorised by:

<i>Name</i>	<i>Title</i>	<i>Area</i>
	Senior Scientist	EXTERNAL
	Scientist	INORGANIC
	Scientist	ORGANIC