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ANALYSIS REPORT

Client:	Marlborough District Council	**Lab No:**	1757896 DWUPv1
Contact:	M Davies	**Date Received:**	12-Apr-2017
	C/- Marlborough District Council	**Date Reported:**	03-May-2017
	PO Box 443	**Quote No:**	83918
	Blenheim 7240	**Order No:**	51493Chu
		Client Reference:	P2 Compliance - Picton
		Submitted By:	M Davies

Sample Type: Aqueous

Sample Name:		Essons source (cast iron pipeline) 12-Apr-2017 10:55 am	Speeds (new WTP) after WTP d/s of balance tank 12-Apr-2017 12:55 pm	Guideline Value	Maximum Acceptable Values (MAV)
Lab Number:		1757896.1	1757896.2		
Individual Tests					
Turbidity	NTU	0.945 ± 0.056	-	< 2.5	-
Total Alkalinity	g/m³ as $CaCO_3$	19.5 ± 1.1	-	-	-
Free Carbon Dioxide	g/m³ at 25°C	3.4 ± 1.6	-	-	-
Total Hardness	g/m³ as $CaCO_3$	18.53 ± 0.77	-	< 200	-
Total Dissolved Solids (TDS)	g/m³	55.2 ± 9.4	-	-	-
Total Aluminium	g/m³	0.0307 ± 0.0048	-	< 0.1	-
Total Antimony	g/m³	< 0.00021 ± 0.00014	-	-	0.02
Total Arsenic	g/m³	< 0.0011 ± 0.00074	-	-	0.01
Total Barium	g/m³	< 0.0053 ± 0.00045	-	-	0.7
Total Boron	g/m³	0.0127 ± 0.0039	-	-	1.4
Total Cadmium	g/m³	< 0.000053 ± 0.000036	-	-	0.004
Total Calcium	g/m³	4.32 ± 0.18	-	-	-
Total Chromium	g/m³	< 0.00053 ± 0.00036	-	-	0.05
Total Copper	g/m³	0.00083 ± 0.00036	-	< 1	2
Total Iron	g/m³	0.087 ± 0.019	-	< 0.2	-
Total Lead	g/m³	0.001107 ± 0.000099	-	-	0.01
Total Magnesium	g/m³	1.88 ± 0.16	-	-	-
Total Manganese	g/m³	0.0118 ± 0.0013	-	< 0.04 (Staining) < 0.10 (Taste)	0.4
Total Mercury	g/m³	< 0.00008 ± 0.000053	-	-	0.007
Total Molybdenum	g/m³	< 0.00021 ± 0.00015	-	-	0.07
Total Nickel	g/m³	< 0.00053 ± 0.00036	-	-	0.08
Total Potassium	g/m³	0.686 ± 0.055	-	-	-
Total Selenium	g/m³	< 0.0011 ± 0.00074	-	-	0.01
Total Sodium	g/m³	8.22 ± 0.50	-	< 200	-
Total Uranium	g/m³	< 0.000021 ± 0.000014	-	-	0.02
Total Zinc	g/m³	0.00162 ± 0.00074	-	< 1.5	-
Bromate	g/m³	< 0.005 ± 0.0034	-	-	0.01
Total Cyanide	g/m³	< 0.0010 ± 0.00067	-	-	0.6
Cyanogen Chloride*	mg/L	-	< 0.005	-	0.4
Monochloramine	g/m³	-	< 0.05	-	3
Chloride	g/m³	10.92 ± 0.74	-	< 250	-
Chlorite	g/m³	-	< 0.005 ± 0.0034	-	0.8
Chlorate	g/m³	-	< 0.005 ± 0.0034	-	0.8
Fluoride	g/m³	< 0.05 ± 0.041	-	-	1.5
Total Ammoniacal-N	g/m³	< 0.010 ± 0.0067	-	< 1.2	-
Nitrite	g/m³	< 0.007	-	-	0.2 3 (short term)

Sample Type: Aqueous					
Sample Name:		Essons source (cast iron pipeline) 12-Apr-2017 10:55 am	Speeds (new WTP) after WTP d/s of balance tank 12-Apr-2017 12:55 pm	**Guideline Value**	**Maximum Acceptable Values (MAV)**
Lab Number:		1757896.1	1757896.2		
Individual Tests					
Nitrate	g/m³	0.095 ± 0.015	-	-	50
Sulphate	g/m³	2.03 ± 0.37	-	< 250	-
Absorbance at 254 nm (unfiltered sample)	AU cm^{-1}	0.046	-	-	-
Transmittance at 254 nm (unfiltered sample)*	%T, 1 cm cell	89.8	-	-	-
Hydrogen sulphide profile					
pH	pH Units	7.1 ± 0.2	-	7.0 - 8.5	-
Electrical Conductivity (EC)	mS/m	8.3 ± 0.2	-	-	-
Sample Temperature*	°C	15.1	-	-	-
Un-ionised hydrogen sulphide	g/m³	< 0.002	-	< 0.05	-
Total Sulphide	g/m³	< 0.002 ± 0.0014	-	-	-
Halogenated Acetic Acids in Water by GC-MS					
Bromochloroacetic acid	g/m³	-	< 0.0005 ± 0.00034	-	-
Dibromoacetic acid	g/m³	-	0.00078 ± 0.00039	-	-
Dichloroacetic acid	g/m³	-	< 0.0005 ± 0.00034	-	0.05
Monobromoacetic acid	g/m³	-	< 0.0005 ± 0.00034	-	-
Monochloroacetic acid	g/m³	-	< 0.005 ± 0.0034	-	0.02
Trichloroacetic acid	g/m³	-	< 0.0010 ± 0.00067	-	0.2
Total HAA	g/m³	-	< 0.010 ± 0.011	-	-
Sum of HAA DWSNZ MAV ratios		-	< 0.3 ± 0.17	-	1
Halogenated Volatile Disinfection By-Products in Water by GCMS					
Bromochloroacetonitrile	g/m³	-	< 0.00014 ± 0.000078	-	-
Bromodichloromethane	g/m³	-	0.000218 ± 0.000091	-	0.06
Bromoform (tribromomethane)	g/m³	-	0.00034 ± 0.00012	-	0.1
Carbon tetrachloride	g/m³	-	< 0.0007 ± 0.00047	-	0.005
Chloroform (Trichloromethane)	g/m³	-	< 0.007 ± 0.0047	-	0.4
Chloropicrin	g/m³	-	< 0.0003 ± 0.00020	-	-
1,2-Dibromo-3-chloropropane	g/m³	-	< 0.0003 ± 0.00020	-	0.001
Dibromoacetonitrile	g/m³	-	< 0.0003 ± 0.00020	-	0.08
Dibromochloromethane	g/m³	-	0.00045 ± 0.00017	-	0.15
1,2-Dibromoethane (ethylene dibromide, EDB)	g/m³	-	< 0.0003 ± 0.00020	-	0.0004
1,1-Dichloro-2-propanone	g/m³	-	< 0.0003 ± 0.00020	-	-
Dichloroacetonitrile	g/m³	-	< 0.0003 ± 0.00020	-	0.02
Tetrachloroethene (tetrachloroethylene)	g/m³	-	< 0.00014 ± 0.000045	-	0.05
1,1,1-Trichloro-2-propanone	g/m³	-	< 0.0003 ± 0.00020	-	-
Trichloroacetonitrile	g/m³	-	< 0.0003 ± 0.00020	-	-
1,1,1-Trichloroethane	g/m³	-	< 0.00014 ± 0.000072	-	-
Trichloroethene (trichloroethylene)	g/m³	-	< 0.00007 ± 0.000047	-	0.02
Total Trihalomethanes (THM)	g/m³	-	< 0.007 ± 0.0037	-	-
Chloroform MAV ratio		-	< 0.018 ± 0.012	-	-
Bromodichloromethane MAV ratio		-	0.004 ± 0.002	-	-
Dibromochloromethane MAV ratio		-	0.003 ± 0.002	-	-
Bromoform MAV ratio		-	0.003 ± 0.002	-	-
Sum of THM MAV ratios (NZ DW Stds)		-	< 0.018 ± 0.012	-	1
Sum of Haloacetonitriles MAV ratios (NZ DW Stds)		-	< 0.016 ± 0.011	-	1

Sample Type: Aqueous				
Sample Name:		Essons after treatment 12-Apr-2017 11:15 am	**Guideline Value**	**Maximum Acceptable Values (MAV)**
Lab Number:		1757896.3		
Individual Tests				
Total Aluminium	g/m³	0.176 ± 0.025	< 0.1	-
Cyanogen Chloride*	mg/L	< 0.005	-	0.4
Monochloramine	g/m³	< 0.05	-	3
Chlorite	g/m³	< 0.005 ± 0.0034	-	0.8
Chlorate	g/m³	< 0.005 ± 0.0034	-	0.8
Halogenated Acetic Acids in Water by GC-MS				
Bromochloroacetic acid	g/m³	0.00195 ± 0.00068	-	-
Dibromoacetic acid	g/m³	0.00137 ± 0.00054	-	-
Dichloroacetic acid	g/m³	0.0033 ± 0.0012	-	0.05
Monobromoacetic acid	g/m³	0.00140 ± 0.00053	-	-
Monochloroacetic acid	g/m³	< 0.005 ± 0.0034	-	0.02
Trichloroacetic acid	g/m³	0.00161 ± 0.00081	-	0.2
Total HAA	g/m³	0.010 ± 0.011	-	-
Sum of HAA DWSNZ MAV ratios		< 0.3 ± 0.17	-	1
Halogenated Volatile Disinfection By-Products in Water by GCMS				
Bromochloroacetonitrile	g/m³	0.000186 ± 0.000097	-	-
Bromodichloromethane	g/m³	0.00218 ± 0.00083	-	0.06
Bromoform (tribromomethane)	g/m³	0.000250 ± 0.000087	-	0.1
Carbon tetrachloride	g/m³	< 0.0007 ± 0.00047	-	0.005
Chloroform (Trichloromethane)	g/m³	< 0.007 ± 0.0047	-	0.4
Chloropicrin	g/m³	< 0.0003 ± 0.00020	-	-
1,2-Dibromo-3-chloropropane	g/m³	< 0.0003 ± 0.00020	-	0.001
Dibromoacetonitrile	g/m³	< 0.0003 ± 0.00020	-	0.08
Dibromochloromethane	g/m³	0.00138 ± 0.00050	-	0.15
1,2-Dibromoethane (ethylene dibromide, EDB)	g/m³	< 0.0003 ± 0.00020	-	0.0004
1,1-Dichloro-2-propanone	g/m³	0.00034 ± 0.00021	-	-
Dichloroacetonitrile	g/m³	< 0.0003 ± 0.00020	-	0.02
Tetrachloroethene (tetrachloroethylene)	g/m³	< 0.00014 ± 0.000045	-	0.05
1,1,1-Trichloro-2-propanone	g/m³	< 0.0003 ± 0.00020	-	-
Trichloroacetonitrile	g/m³	< 0.0003 ± 0.00020	-	-
1,1,1-Trichloroethane	g/m³	< 0.00014 ± 0.000072	-	-
Trichloroethene (trichloroethylene)	g/m³	< 0.00007 ± 0.000047	-	0.02
Total Trihalomethanes (THM)	g/m³	< 0.007 ± 0.0037	-	-
Chloroform MAV ratio		< 0.018 ± 0.012	-	-
Bromodichloromethane MAV ratio		0.036 ± 0.014	-	-
Dibromochloromethane MAV ratio		0.009 ± 0.004	-	-
Bromoform MAV ratio		0.003 ± 0.001	-	-
Sum of THM MAV ratios (NZ DW Stds)		0.053 ± 0.019	-	1
Sum of Haloacetonitriles MAV ratios (NZ DW Stds)		< 0.016 ± 0.011	-	1

Note: The Guideline Values and Maximum Acceptable Values (MAV) are taken from the publication 'Drinking-water Standards for New Zealand 2005 (Revised 2008)', Ministry of Health. Copies of this publication are available from http://www.health.govt.nz/publication/drinking-water-standards-new-zealand-2005-revised-2008

The Maximum Acceptable Values (MAVs) have been defined by the Ministry of Health for parameters of health significance and should not be exceeded. The Guideline Values are the limits for aesthetic determinands that, if exceeded, may render the water unattractive to consumers.

The reported uncertainty is an expanded uncertainty with a level of confidence of approximately 95 percent (i.e. two standard deviations, calculated using a coverage factor of 2). Reported uncertainties are calculated from the performance of typical matrices, and do not include variation due to sampling.
For further information on uncertainty of measurement at Hill Laboratories, refer to the technical note on our website: www.hill-laboratories.com/files/Intro_To_UOM.pdf, or contact the laboratory.

Note that the units g/m³ are the same as mg/L and ppm.

Analyst's Comments

Total coliforms/ E.coli testing for sample "Essons source (cast iron pipeline)" unable to be completed due to laboratory error testing samples. Internal investigation QOWQ 65362.

Appendix No.1 - Cyanogen Chloride Report-1757896

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Aqueous

Test	Method Description	Default Detection Limit	Sample No
Individual Tests			
Filtration, Unpreserved	Sample filtration through 0.45µm membrane filter.	-	1
Total Digestion	Nitric acid digestion. APHA 3030 E 22nd ed. 2012 (modified).	-	1, 3
Total Cyanide Distillation	Distillation following the addition of sulphuric acid, alkaline trapping solution. APHA 4500-CN^- C (modified) 22nd ed. 2012.	-	1
Turbidity	Analysis using a Hach 2100N, Turbidity meter. APHA 2130 B 22nd ed. 2012.	0.05 NTU	1
pH	pH meter. APHA 4500-H^+ B 22nd ed. 2012. Note: It is not possible to achieve the APHA Maximum Storage Recommendation for this test (15 min) when samples are analysed upon receipt at the laboratory, and not in the field.	0.1 pH Units	1
Total Alkalinity	Titration to pH 4.5 (M-alkalinity), autotitrator. APHA 2320 B (Modified for alk <20) 22nd ed. 2012.	1.0 g/m³ as $CaCO_3$	1
Free Carbon Dioxide	Calculation: from alkalinity and pH, valid where TDS is not >500 mg/L and alkalinity is almost entirely due to hydroxides, carbonates or bicarbonates. APHA 4500-CO_2 D 22nd ed. 2012.	1.0 g/m³ at 25°C	1
Total Hardness	Calculation from Calcium and Magnesium. APHA 2340 B 22nd ed. 2012.	1.0 g/m³ as $CaCO_3$	1
Electrical Conductivity (EC)	Conductivity meter, 25°C. APHA 2510 B 22nd ed. 2012.	0.1 mS/m	1
Total Dissolved Solids (TDS)	Filtration through GF/C (1.2 µm), gravimetric. APHA 2540 C (modified; drying temperature of 103 - 105°C used rather than 180 ± 2°C) 22nd ed. 2012.	10 g/m³	1
Sample Temperature*	Supplied by customer, otherwise 20°C.	0.1 °C	1
Total Aluminium	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 22nd ed. 2012 / US EPA 200.8.	0.0032 g/m³	1, 3
Total Antimony	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 22nd ed. 2012 / US EPA 200.8.	0.00021 g/m³	1
Total Arsenic	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 22nd ed. 2012 / US EPA 200.8.	0.0011 g/m³	1
Total Barium	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 22nd ed. 2012 / US EPA 200.8.	0.0053 g/m³	1
Total Boron	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 22nd ed. 2012.	0.0053 g/m³	1
Total Cadmium	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 22nd ed. 2012 / US EPA 200.8.	0.000053 g/m³	1
Total Calcium	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 22nd ed. 2012.	0.053 g/m³	1
Total Chromium	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 22nd ed. 2012 / US EPA 200.8.	0.00053 g/m³	1
Total Copper	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 22nd ed. 2012 / US EPA 200.8.	0.00053 g/m³	1
Total Iron	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 22nd ed. 2012.	0.021 g/m³	1
Total Lead	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 22nd ed. 2012 / US EPA 200.8.	0.00011 g/m³	1
Total Magnesium	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 22nd ed. 2012.	0.021 g/m³	1
Total Manganese	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 22nd ed. 2012 / US EPA 200.8.	0.00053 g/m³	1
Total Mercury	Bromine Oxidation followed by Atomic Fluorescence. US EPA Method 245.7, Feb 2005.	0.00008 g/m³	1
Total Molybdenum	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 22nd ed. 2012 / US EPA 200.8.	0.00021 g/m³	1
Total Nickel	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 22nd ed. 2012 / US EPA 200.8.	0.00053 g/m³	1
Total Potassium	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 22nd ed. 2012.	0.053 g/m³	1

Sample Type: Aqueous			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Total Selenium	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 22nd ed. 2012 / US EPA 200.8.	0.0011 g/m³	1
Total Sodium	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 22nd ed. 2012.	0.021 g/m³	1
Total Uranium	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 22nd ed. 2012 / US EPA 200.8.	0.000021 g/m³	1
Total Zinc	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 22nd ed. 2012 / US EPA 200.8.	0.0011 g/m³	1
Bromate	Sample analysed as received, filtered if required. Ion Chromatography. US EPA Method 300.1 Part B.	0.005 g/m³	1
Total Cyanide	Distillation, colorimetry. APHA 4500-CN^- C (modified) & E (modified) 22nd ed. 2012.	0.0010 g/m³	1
Cyanogen Chloride*	Subcontracted to Watercare Services Ltd., Auckland. APHA (2005) 4500-CN^-J.	0.005 mg/L	2-3
Monochloramine	Colorimetric. APHA 4500-Cl G 22nd ed. 2012.	0.05 g/m³	2-3
Chloride	Filtered sample. Ferric thiocyanate colorimetry. Discrete Analyser. APHA 4500 Cl^- E (modified from continuous flow analysis) 22nd ed. 2012.	0.5 g/m³	1
Chlorite	Sample analysed as received, filtered if required. Ion Chromatography. US EPA Method 300.1 Part B.	0.005 g/m³	2-3
Chlorate	Sample analysed as received, filtered if required. Ion Chromatography. US EPA Method 300.1 Part B.	0.005 g/m³	2-3
Fluoride	Direct measurement, ion selective electrode. APHA 4500-F^- C 22nd ed. 2012.	0.05 g/m³	1
Total Ammoniacal-N	Filtered sample. Phenol/hypochlorite colorimetry. Discrete Analyser. (NH_4-N = NH_4+-N + NH_3-N). APHA 4500-NH_3 F (modified from manual analysis) 22nd ed. 2012.	0.010 g/m³	1
Nitrite	Calculation from Nitrite-N.	0.007 g/m³	1
Nitrate	Calculation from Nitrate-N.	0.010 g/m³	1
Un-ionised hydrogen sulphide	Calculation from Total Sulphide, Electrical Conductivity, pH and Temperature*. ***Note: For accurate calculation of the un-ionised Hydrogen Sulphide the sample temperature should be taken using a calibrated thermometer at the time of sampling and recorded on the paperwork submitted with the sample. If a sample temperature is not supplied, a nominal temperature of 20°C will show in the results table above and be used in the calculation. In this case, please interpret the un-ionised Hydrogen Sulphide result with caution**. APHA 4500-S^{2-} H (modified) 22nd ed. 2012.	0.002 g/m³	1
Sulphide Distillation	Acid distillation of sample into alkaline trapping solution using Simple Distillation system. APHA 4500-S^{2-} I 22nd ed. 2012.	-	1
Total Sulphide	Sulphide distillation. Automated methylene blue colorimetry, discrete analyser. APHA 4500-S^{2-} I (modified) 22nd ed. 2012.	0.002 g/m³	1
Sulphate	Filtered sample. Ion Chromatography. APHA 4110 B 22nd ed. 2012.	0.5 g/m³	1
Absorbance at 254 nm (unfiltered sample)	Unfiltered sample. Spectrophotometry, 1cm cell. In-House.	0.002 AU cm^{-1}	1
Transmittance at 254 nm (unfiltered sample)*	Calculation from Absorbance at the specified wavelength. In-House.	0.5 %T, 1 cm cell	1
Sum of HAA DWSNZ MAV ratios	Calculated as the sum of the individual haloacetic acids specified in DWSNZ (monochloroacetic acid, dichloroacetic acid and trichloroacetic acid) to their respective Maximum Allowable Values (MAVs). Drinking-water Standards for New Zealand 2005 (Revised 2008), Section 8.2.1.1.	0.001	2-3
Sum of Haloacetonitriles MAV ratios (NZ DW Stds)	Calculated as the sum of the individual haloacetonitriles specified in DWSNZ (dibromoacetonitrile & dichloroacetonitrile) to their respective Maximum Allowable Values (MAVs).	0	2-3
Halogenated Acetic Acids in Water by GC-MS*	Solvent extraction, methylation, GC-MS SIM analysis	-	2-3
Halogenated Volatile Disinfection By-Products in Water by GCMS	Solvent extraction, GC-MS SIM analysis	-	2-3

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

Ara Heron BSc (Tech)
Client Services Manager - Environmental

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Certificate of Analysis
Laboratory Reference:170419-130

Attention:	Hills Lab Reporting	*Final Report:*	**223509-0**
Client:	**R J HILLS**	*Report Issue Date:*	**21-Apr-2017**
Address:		*Received Date:*	**19-Apr-2017**
Client Reference:	**Cyanogen Chloride - EnvSubWC 3**		
Purchase Order:	**147951**	*Quote Reference :*	**3546**

Sample Details		WATERS	WATERS
Lab Sample ID:		**170419-130-1**	**170419-130-2**
Client Sample ID:		1	2
Sample Date/Time:		18/04/2017	18/04/2017
Description:		1757896.2 Ground Water	1757896.3 Ground Water
General Testing			
Cyanogen Chloride	mg/L	<0.005	<0.005

Where samples have been supplied by the client they are tested as received. A dash indicates no test performed.

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

Analyte	Method Reference	MDL	Samples	Location
General Testing				
Cyanogen Chloride by Spectrophotometry	APHA (online edition) 4500-CN J	0.005 mg/L	All	Auckland

The method detection limit (MDL) listed is the limit attainable in a relatively clean matrix. If dilutions are required for analysis the detection limit may be higher. For more information please contact the Operations Manager.

Samples, with suitable preservation and stability of analytes, will be held by the laboratory for a period of two weeks after results have been reported, unless otherwise advised by the submitter.

Report Signatory 21/04/2017

You-Sing Yong
KTP Signatory