



Certificate of Analysis

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|-----------------|---|--------------------------|--------------|--------|
| Client: | Lotus at Siam.Co.NZ Limited | Lab No: | 2086324 | DWAPv1 |
| Contact: | Duncan Laing 9 Ernlea Terrace Cashmere Christchurch 8022 | Date Received: | 26-Nov-2018 | |
| | | Date Reported: | 28-Nov-2018 | |
| | | Quote No: | 90913 | |
| | | Order No: | | |
| | | Client Reference: | Spring Water | |
| | | Submitted By: | Duncan Laing | |

Interim Report

This is an interim report, prepared before all test results are completed. As all final Q.C. checks may not have been possible, it is not regarded as an official certificate of analysis. The final, official report will be issued upon completion of all tests.

Sample Type: Aqueous

| Sample Name: | | Lotus Spa 26-Nov-2018 8:40 am | | Guideline Value | Maximum Acceptable Values (MAV) |
|------------------------------------|---------------------------------------|-------------------------------|--|-------------------------------------|---------------------------------|
| Lab Number: | | 2086324.1 | | | |
| Routine Water + E.coli profile Kit | | | | | |
| Escherichia coli | MPN / 100mL | < 1 | | - | < 1 |
| Routine Water Profile | | | | | |
| pH | pH Units | 7.7 | | 7.0 - 8.5 | - |
| Total Alkalinity | g/m ³ as CaCO ₃ | 52 | | - | - |
| Free Carbon Dioxide | g/m ³ at 25°C | 2.1 | | - | - |
| Total Hardness | g/m ³ as CaCO ₃ | In Progress | | < 200 | - |
| Electrical Conductivity (EC) | mS/m | 11.7 | | - | - |
| Electrical Conductivity (EC) | µS/cm | 117 | | - | - |
| Approx Total Dissolved Salts | g/m ³ | 78 | | < 1000 | - |
| Total Boron | g/m ³ | In Progress | | - | 1.4 |
| Total Calcium | g/m ³ | In Progress | | - | - |
| Total Copper | g/m ³ | In Progress | | < 1 | 2 |
| Total Iron | g/m ³ | In Progress | | < 0.2 | - |
| Total Magnesium | g/m ³ | In Progress | | - | - |
| Total Manganese | g/m ³ | In Progress | | < 0.04 (Staining) < 0.10 (Taste) | 0.4 |
| Total Potassium | g/m ³ | In Progress | | - | - |
| Total Sodium | g/m ³ | In Progress | | < 200 | - |
| Total Zinc | g/m ³ | In Progress | | < 1.5 | - |
| Chloride | g/m ³ | In Progress | | < 250 | - |
| Nitrate-N | g/m ³ | In Progress | | - | 11.3 |
| Sulphate | g/m ³ | In Progress | | < 250 | - |

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.

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

pH/Alkalinity and Corrosiveness Assessment

The pH of a water sample is a measure of its acidity or basicity. Waters with a low pH can be corrosive and those with a high pH can promote scale formation in pipes and hot water cylinders.

The guideline level for pH in drinking water is 7.0-8.5. Below this range the water will be corrosive and may cause problems with disinfection if such treatment is used.

The alkalinity of a water is a measure of its acid neutralising capacity and is usually related to the concentration of carbonate, bicarbonate and hydroxide. Low alkalinities (25 g/m³) promote corrosion and high alkalinities can cause problems with scale formation in metal pipes and tanks.

The pH of this water is within the NZ Drinking Water Guidelines, the ideal range being 7.0 to 8.0.

With the pH and alkalinity levels found, it is unlikely this water will be corrosive towards metal piping and fixtures.

Bacteriological Tests

The NZ Drinking Water Standards state that there should be no Escherichia coli (E coli) in water used for human consumption. The presence of these organisms would indicate that other pathogens of faecal origin may be present. Results obtained for Total Coliforms are only significant if the sample has not also been tested for E coli.

Escherichia coli was not detected in this sample.

Final Assessment

All parameters tested for meet the guidelines laid down in the publication 'Drinking-water Standards for New Zealand 2005 (Revised 2008)' published by the Ministry of Health for water which is suitable for drinking purposes.

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. Unless otherwise indicated, analyses were performed at Hill Laboratories, 28 Duke Street, Frankton, Hamilton 3204.

| Sample Type: Aqueous | | | |
|------------------------------|---|---|-----------|
| Test | Method Description | Default Detection Limit | Sample No |
| Routine Water Profile | | - | 1 |
| Filtration, Unpreserved | Sample filtration through 0.45µm membrane filter. Performed at Hill Laboratories - Chemistry; 101c Waterloo Road, Christchurch. | - | 1 |
| Total Digestion | Nitric acid digestion. APHA 3030 E 22 nd ed. 2012 (modified). | - | 1 |
| pH | pH meter. Analysed at Hill Laboratories - Chemistry; 101c Waterloo Road, Christchurch. APHA 4500-H ⁺ B 22 nd 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. Samples and Standards are analysed at an equivalent laboratory temperature (typically 18 to 22 °C). Temperature compensation is used. | 0.1 pH Units | 1 |
| Total Alkalinity | Titration to pH 4.5 (M-alkalinity), autotitrator. Analysed at Hill Laboratories - Chemistry; 101c Waterloo Road, Christchurch. APHA 2320 B (Modified for alk <20) 22 nd ed. 2012. | 1.0 g/m ³ 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 22 nd ed. 2012. | 1.0 g/m ³ at 25°C | 1 |
| Total Hardness | Calculation from Calcium and Magnesium. APHA 2340 B 22 nd ed. 2012. | 1.0 g/m ³ as CaCO ₃ | 1 |
| Electrical Conductivity (EC) | Conductivity meter, 25°C. Analysed at Hill Laboratories - Chemistry; 101c Waterloo Road, Christchurch. APHA 2510 B 22 nd ed. 2012. | 0.1 mS/m | 1 |
| Electrical Conductivity (EC) | Conductivity meter, 25°C. APHA 2510 B 22 nd ed. 2012. | 1 µS/cm | 1 |
| Approx Total Dissolved Salts | Calculation: from Electrical Conductivity. | 2 g/m ³ | 1 |
| Total Boron | Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 22 nd ed. 2012. | 0.0053 g/m ³ | 1 |
| Total Calcium | Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 22 nd ed. 2012. | 0.053 g/m ³ | 1 |
| Total Copper | Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 22 nd ed. 2012 / US EPA 200.8. | 0.00053 g/m ³ | 1 |
| Total Iron | Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 22 nd ed. 2012. | 0.021 g/m ³ | 1 |
| Total Magnesium | Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 22 nd ed. 2012. | 0.021 g/m ³ | 1 |
| Total Manganese | Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 22 nd ed. 2012 / US EPA 200.8. | 0.00053 g/m ³ | 1 |
| Total Potassium | Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 22 nd ed. 2012. | 0.053 g/m ³ | 1 |
| Total Sodium | Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 22 nd ed. 2012. | 0.021 g/m ³ | 1 |
| Total Zinc | Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 22 nd ed. 2012 / US EPA 200.8. | 0.0011 g/m ³ | 1 |
| Chloride | Filtered sample from Christchurch. Ion Chromatography. APHA 4110 B (modified) 22 nd ed. 2012. | 0.5 g/m ³ | 1 |
| Nitrate-N | Filtered sample from Christchurch. Ion Chromatography. APHA 4110 B (modified) 22 nd ed. 2012. | 0.05 g/m ³ | 1 |
| Sulphate | Filtered sample from Christchurch. Ion Chromatography. APHA 4110 B (modified) 22 nd ed. 2012. | 0.5 g/m ³ | 1 |
| Escherichia coli | MPN count using Colilert (Incubated at 35°C for 24 hours), or Colilert 18 (Incubated at 35°C for 18 hours), Analysed at Hill Laboratories - Microbiology; 101c Waterloo Road, Hornby, Christchurch. APHA 9223 B (2004), 22 nd ed. 2012. | 1 MPN / 100mL | 1 |

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.

This certificate of analysis must not be reproduced, except in full, without the written consent of the signatory.

A handwritten signature in blue ink, appearing to read 'C Radford', is positioned above the printed name.

Craig Radford NZCS
Client Services Manager - Christchurch Branch