



Watercare

Laboratory Services

Catalogue of Analyses and Services

Your specialists in water, air and environmental analyses



Watercare Laboratory Services

Catalogue of Analyses and Services

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Watercare Laboratory Services

Introduction

Watercare Laboratory Services (WLS) is one of New Zealand's leading laboratories. Our qualified professionals are experienced in sample collection and analysis for a range of IANZ accredited chemical and biological tests for water, wastewater, leachate, marine and environmental samples including soils and sludges. The laboratory is NZFSA accredited for water testing, including EU-OMAR, and Ministry of Health approved for analysis of drinking water. Air quality expertise includes ambient air quality monitoring, workplace monitoring, and odour assessment.

Laboratory Hours

The laboratory hours of operation are:
Monday to Friday **8:00am to 5:00pm** *

Saturday, Sunday and public holidays 8:00am to 4:30pm *by arrangement***

* By prior arrangement with laboratory staff samples can be received outside these hours.

** Prior arrangement with laboratory staff, typically more than 24 hours notice is necessary, although we will endeavour to be as accommodating as possible.



Laboratory Contact Details

Auckland Sample Reception: (09) 539 7614
Auckland Administration: (09) 539 7600
Queenstown Reception: (03) 409 0559
Invercargill Reception: (03) 214 4040

Email: clientsupport@water.co.nz
quotations@water.co.nz

Auckland Laboratory

Our main laboratory is based in Auckland. You can find us at:

52 Aintree Ave
Airport Oaks, Mangere
Manukau 2022
(09) 539 7614

Queenstown Laboratory

Our laboratory in Queenstown is based at:

74 Glenda Drive
Frankton
Queenstown 9300
(03) 409 0559

Invercargill Laboratory

Our laboratory in Invercargill is based at:

142 Esk Street
Invercargill 9810
(03) 214 4040

Contact List

Function	Name	Designation	DDI	Email
General Enquiries	Nef Andrada	Technical Sales Rep (Laboratory)	(09) 539 7785	nef@water.co.nz
	Anish Aya	Technical Sales Rep (Air Quality)	(09) 539 7914	aaya@water.co.nz
	Sue McGhie	Sample Reception	(09) 539 7614	smcghie@water.co.nz
Technical Enquiries	Dr Pierre Bombardier	Air Quality Dept Head	021 519 535	pbombardier@water.co.nz
	Dr You-Sing Yong	Sample Logistics Dept Head	(09) 539 7774	yyong@water.co.nz
	Dr Steve Money	Inorganic Chemistry Dept Head	(09) 539 7768	smoney@water.co.nz
	Dr Peter Boniface	Organic Chemistry Dept Head	(09) 539 7760	pboniface@water.co.nz
	Dr Annie Cox	Microbiology Dept Head	021 848 365	acox@water.co.nz
Other Enquiries	Ian Shand	Commercial Services Manager	(09) 539 7783	ishand@water.co.nz
	Dr You-Sing Yong	Operations Manager	(09) 539 7774	yyong@water.co.nz
	Phil Dobson	Marketing Executive	(09) 539 7465	pdobson@water.co.nz
	Peter Nobilo	Administration and Finance Manager	(09) 539 7612	pnobilo@water.co.nz
	Carol Taylor	Compliance Manager	(09) 539 7907	ctaylor@water.co.nz
	Kessem Jackson	IT Systems Administrator	021 837 446	kjackson@water.co.nz
	Edward Mudliar	Administrator	(09) 539 7616	emudliar@water.co.nz

Sample Reception Team

Our friendly team at sample reception is usually the best initial point of contact with the laboratory, as they are both knowledgeable and helpful.

Sue McGhie

DDI: (09) 539 7614

Email: smcghie@water.co.nz

Holly McBride

DDI: (09) 539 7615

Email: hmcbride@water.co.nz

Pricing

Disclaimer

While we will try to make sure that our test prices remain the same, we do reserve the right to alter our prices at any time. To verify test prices, you are welcome to request a quotation before bringing samples to the laboratory. This will also allow us to prepare for the sample arrival and dispatch necessary containers.

Subcontracting

Where necessary, our laboratory has subcontracting arrangements with other laboratories in New Zealand and abroad. In the unlikely event your testing requirements cannot be fully met by our laboratory we can organise the subcontracting, thereby providing a complete one-stop-shop service.

Receiving a Quotation

Our marketing department is always available and ready to help.
To have a quotation prepared or to request a test not listed, please contact:

Nef Andrada BSc
Technical Sales Rep (Laboratory)
DDI: (09) 539 7785
Email: nef@water.co.nz

Or

Anish Aya BTech, MEnergy
Technical Sales Rep (Air Quality)
DDI: (09) 539 7914
Email: aaya@water.co.nz

Quality Systems and Accreditation

Analytical Quality Control and Standards

WLS is IANZ accredited to NZS/ISO/IEC 17025. Accreditation ensures that WLS meets stringent international standards of technical competence, reliability and quality management. Formal audits are carried out by IANZ for accreditation on an annual basis. The laboratory is also audited for the Ministry of Health (MoH) and New Zealand Food Safety Authority (NZFSA). The laboratory has LAS accreditation with NZFSA including EU-OMAR and is a Ministry of Health approved laboratory for the testing of drinking water.

Methods and Accreditation

The majority of tests performed by Watercare Laboratory Services are IANZ accredited. Each year we expand our range of IANZ accredited tests and add new methods to our manuals. Please call to confirm a test's current IANZ accreditation status.

Detection Limits

The price list provides a standard method detection limit for each test in the price list. However, a number of factors including the sample matrix can affect these detection limits. To discuss this please call sample reception (09) 539 7614 who will direct you to the appropriate Head of Department.

Turn Around Time (TAT)

For routine analysis our turn around time is 10 working days. Most microbiological and biologically active analyses have a shorter turnaround due to the nature of the tests. For an additional fee, faster turn-around times may be available. Please call our sample reception to enquire.

Sample Containers

We supply sample containers. Unless otherwise instructed, bottles/jars are sent out with a label attached. *Please ensure that a permanent marker pen is used for labelling purposes.*

If you require a number of analyses performed on a sample, you may not receive a container per analyte, as in most cases multiple analyses can be performed on a sample in a single container. For example, a sample tested for turbidity, pH and conductivity will only require one plastic one litre container per sample. To arrange to have bottles sent to you, please contact sample reception on **(09) 539 7614** or **(09) 539 7615**.

Electronic Reporting and Invoicing

WLS provides electronic results and invoices. Both the certificate of analysis and invoice are in PDF format. Excel database reports are also available as a means to provide easier access to data. If you wish to receive results in this format please advise us when submitting samples.

Website

For further information, please visit www.watercarelabs.co.nz.

Services

Programme Management

At Watercare we understand the importance of reliable and efficient laboratory services. We are available 365 days a year to meet customer requirements. We can assist in devising and operating complete sample collection, testing and analysis programmes to meet most requirements.

Special features of WLS sample collection and testing services include:

1. Reliability of service
2. Expert staff to ensure test programme continuity and assistance in crisis or event management
3. A range of analyses to meet requirements of Drinking Water Standards NZ.
4. Backup facilities to ensure continuous laboratory operation
 - a backup generator ensures uninterrupted power supply
 - a backup water tank guarantees supply in the event of breakdown or reticulation contamination
 - alternative testing facilities, equipped for immediate use. These ensure continuity for essential tests of health significance should the laboratory be damaged by, e.g., a natural disaster.

WLS offers an accredited sample collection service; advantages conferred include:

1. Timely and reliable sample collection 365 days per annum
2. Quick response to any transgression (non-compliant result) of health concern
3. Automatic Transgression Response: on discovering transgressions for tests of health significance, results are reported immediately to the customer, and same day re-sampling is initiated. This continues until the event ends.
4. Controlled chain of custody to ensure samples are:
 - delivered to the laboratory promptly for testing
 - maintained at acceptable temperature during transit
 - isolated from any sources of contamination. Dedicated equipment is used to segregate potable and non-potable waters to prevent cross-contamination

Air Quality Monitoring Services



AIR QUALITY MONITORING SERVICES

Air Quality Monitoring Services

Dr Pierre Bombardier PhD

Head of Department, Air Quality

pbombardier@water.co.nz

021 519 535

Introduction

The air quality department at Watercare can offer a wide range of services for the monitoring of ambient air, meteorology, stack emissions, odour and other gases. The department also offers a workplace monitoring service. It is IANZ accredited for monitoring and assessing a wide range of pollutants and parameters.

In addition to utilising our site monitoring services and expertise, clients are able to choose from a range of services that include; resource consent review, data management, data analysis and interpretive advice.

Accreditation

The air quality department has been IANZ accredited for air monitoring since 2003. All air quality monitoring where applicable will be undertaken in accordance with our IANZ accredited quality system. In addition, the monitoring will comply with AS/NZ standard monitoring methods. This ensures a consistent approach that is valued by our clients and delivers reliable and robust results. Accreditation is an essential component to the work that we undertake and as such is something we are constantly developing.

Quality management

Our internal quality system complies with the NZS/ISO/ICE17025 standard. This provides customers assurance of technical competence. Under the NZS/ISO/ICE17025 framework, a comprehensive Quality Management System (QMS) has been developed. This includes our Quality Manual, which is essentially a central repository for the knowledge, skills and experience of staff. The Quality Manual describes the elements of the QMS and documents how these elements are to be implemented and maintained.

The QMS also includes departmental equipment manuals, method manuals and standard forms. These manuals document all maintenance and calibration procedures that are to be followed whilst conducting day to day work.

We have a commitment to providing the highest standard of quality for all tests, both accredited and non-accredited.

Resources

The air quality department is well resourced. It employs fourteen highly qualified staff. Our hardware includes; a stock of mobile ambient air monitoring trailers, a state of the art olfactory laboratory and automated stack testing equipment. This gives our customers the confidence that they are getting the very best results for their monitoring, whether it is ambient, stack, workplace or odour monitoring.

Facility and backup instrumentation

The department has its own temperature controlled maintenance and instrument workshop. It is able to carry out repairs and calibrations on a daily basis. The department carries a good stock level of spare parts at all times to ensure that repair work and the servicing of instruments are carried out in an efficient manner. We maintain a suite of backup instrumentation at the Auckland site at all times. Backup instruments are reserved for existing customers and can be deployed to site very quickly.

Ambient Monitoring



AMBIENT MONITORING

Ambient Monitoring

Stephen Sing BSc

Team leader – ambient monitoring

ssing@water.co.nz

09 539 7789

Introduction

Our ambient monitoring team has been involved with national and local monitoring projects since 1998. Senior staff are technically qualified and experienced in their respective fields. The ambient team provides equipment and services for over 30 continuous air quality monitoring stations across the country.

The ambient team operates a suite of monitoring equipment which is comprised of the most up to date and approved technology. Our data acquisition, data management and reporting capabilities are preferred by clients who need reliable and robust data capture and analysis.

Ambient monitoring range of services

The ambient team can provide a range of services. Clients can select a limited range of services or choose a full turn-key solution.

- Site selection in accordance with AS/NZS 3580.1.1
- Site commissioning and installation
- Site audits
- Routine calibrations and maintenance to comply with AS/NZS Standards
- Non - routine maintenance (call outs, breakdowns, etc)
- Data logging and data management
- Data warehousing and data reporting services available.

Continuous gases

Criteria gaseous pollutants can be monitored by real time gas analysers for the National Environmental Standards or compliance monitoring. All gas analysers are USEPA approved and comply with methods stated in the National Environmental Standards. Daily automatic calibrations can be run to check the accuracy of the analysers. Data is stored by our “Envidas” data loggers and remotely collected by GSM modems. Gases monitored include:

- Sulfur Dioxide (SO₂)
- Oxides of Nitrogen (NO, NO₂ NO_x)
- Carbon Monoxide (CO)
- Ozone (O₃)
- Hydrogen Sulphide (H₂S)
- Fluoride (F)

Compliance with relevant standards

The Air Quality department operation is compliant with a comprehensive number of local and international standards including:

- “Good-practice Guide for Air Quality Monitoring and Data Management”, *April 2009, Ministry for the Environment*
- “Good practice guide to assessing and managing the environmental effects of dust emissions”, *September 2001, Ministry for the Environment*



Photos:

Top right: Ambient air quality monitoring station

Bottom right: Ambient monitoring equipment 19" rack mount system

- “Guide to siting air monitoring equipment”, *Australian / New Zealand AS/NZS 3580.1.1-2007*
- “Ambient Air – Guide for Measurement of Horizontal Wind for Air Quality Applications”, *Australian Standard AS 2923 – 1987*
- “Guide to Meteorological Instruments and Methods of Observation”, World Meteorological Organisation, (Sixth Edition – No. 8, 1996).

Methods for Sampling and Analysis of Ambient Air:

Watercare Laboratory Services is accredited by IANZ for a range of methods as follows:

- **AS 3580.4.1:2008** Determination of sulphur dioxide – direct reading instrumental method
- **AS 3580.5.1:1993** Determination of oxides of nitrogen – chemiluminescence method
- **AS 3580.7.1:1992** Determination of carbon monoxide – direct reading instrumental method
- **AS/NZS 3580.9.3:2003** Determination of suspended particulate matter – Total suspended particulate matter – high volume sampler gravimetric method
- **AS/NZS 3580.9.6:2003** Determination of suspended particulate matter – PM₁₀ high volume sampler with size selective inlet – gravimetric method
- **AS/NZS 3580.9.9:2006** Determination of suspended particulate matter – PM₁₀ low volume sampler - gravimetric method
- **AS/NZS 3580.9.11:2008** Determination of suspended particulate matter - PM₁₀ beta attenuation monitors

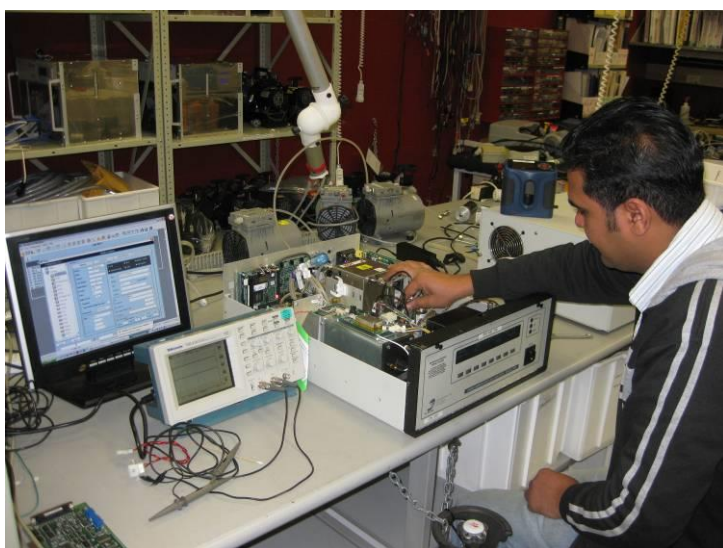
Air Particulate Filters

In accordance with in-house procedures based on the following references:

- USEPA 40CFR Chapter 1 (07.05.95 Edition) Part 50, App. J Reference Method for the Determination of Particulate Matter as PM₁₀ in the Atmosphere
- Methods of Air Sampling and Analysis (3rd Edition), Method 501 – High Volume Measurement of Size Classified Matter (pp 427-439)
- AS 3580.9.3:2003 Ambient Air Particulate Matter – Determination of Total Suspended Particulates (TSP), High Volume Sampler Gravimetric Method
- AS 2922:1987 Ambient Air – Guide for the Siting of Sampling Units

Ambient resources and rental equipment

If required, we maintain and offer to customers hireage of a fully equipped mobile ambient monitoring trailer. All pre-site work and instrument maintenance is completed in our temperature controlled instrument room. Various instruments and rental equipment are also available for hire. Please enquire with Stephen Sing on 09 539 7789.



Photos:
Left: Instrument laboratory
Right Mobile trailer for hire

Particulates

Particulates can be measured by using a gravimetric sampler. Particulates are sampled on a pre-weighed filter for a period of time (usually 24 hrs) and returned to our laboratory for post weighing. Filters can also be further analysed for a series of compounds (i.e. metals, anions, organics, etc...).

Particulates can be measured for:

- TSP Total Suspended Particulates
- PM₁₀ Particulate Mater less than 10µm in diameter
- PM_{2.5} Particulate Mater less than 2.5µm in diameter

Methods / Samplers

- Hivol
- Partisol
- Minivol
- Dust fallout by deposition gauges.

Filters can also be analysed for speciation.

- Organic material
- Inorganic material
- Elemental Analysis
- Ion Analysis

Photos:

Left: Partisol sampler
Right: Hivol sampler



Real Time Particulates

Particulates can be measured in “real time” by the use of a Beta Attenuation Monitor (BAM). The BAM can give 10 min, 1 hr or 24 hr averages of the mass concentration. The BAM is a USEPA approved method and complies with the National Environmental Standards for the measurement of PM₁₀.

Particulates can be measured for:

- TSP Total Suspended Particulates
- PM₁₀ Particulate Mater less than 10µm in diameter
- PM_{2.5} Particulate Mater less than 2.5µm in diameter

Photos:

Left: BAM monitoring station
Right: BAM unit

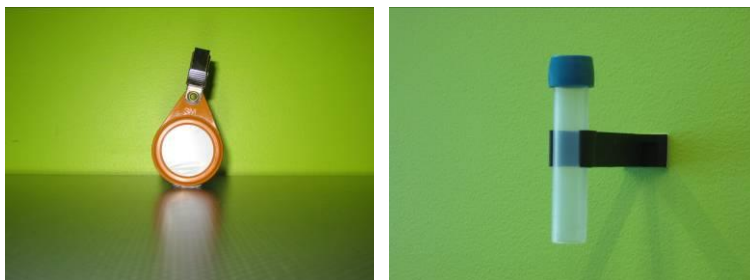


Passive Sampling

Pollutants can be measured by the passive sampler method. The passive samplers are a very useful tool for assessing the area to see if there is a problem before using more advanced methods. They can also be used to cover a large geographical area. The samplers are exposed for period of 30 days and returned to the laboratory for analysis. Analytes measured are:

- Sulfur Dioxide (SO_2)
- Nitrogen Dioxide (NO_2)
- Volatile Organic Compounds (VOC)

Photos:
Left: Passive VOC monitor
Right: Passive NO_2 monitor



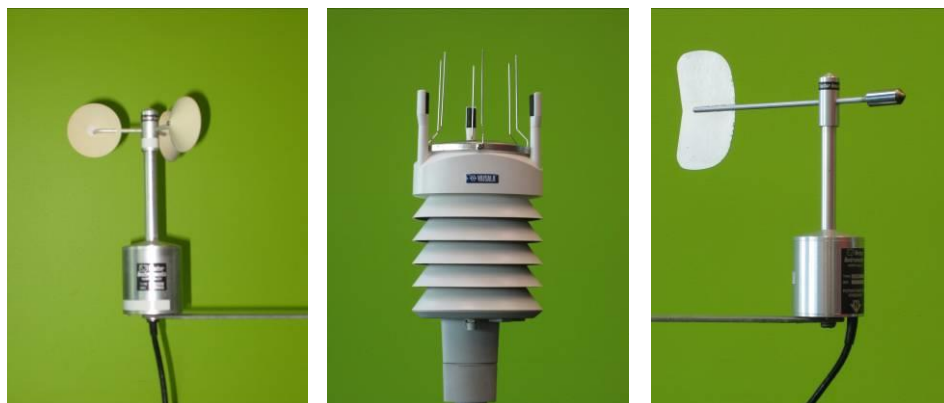
Meteorology

Meteorology is a very useful tool in helping to interpret the results from air quality monitoring. It helps in determining the direction of the pollution especially if there is more than one source in the area. Also any other climatic conditions that may influence the results. Parameters are all logged in real time and can be remotely collected by modems.

Parameters Monitored:

- Wind Direction
- Wind Speed
- Temperature
- Relative Humidity
- Solar Radiation,
- Rainfall

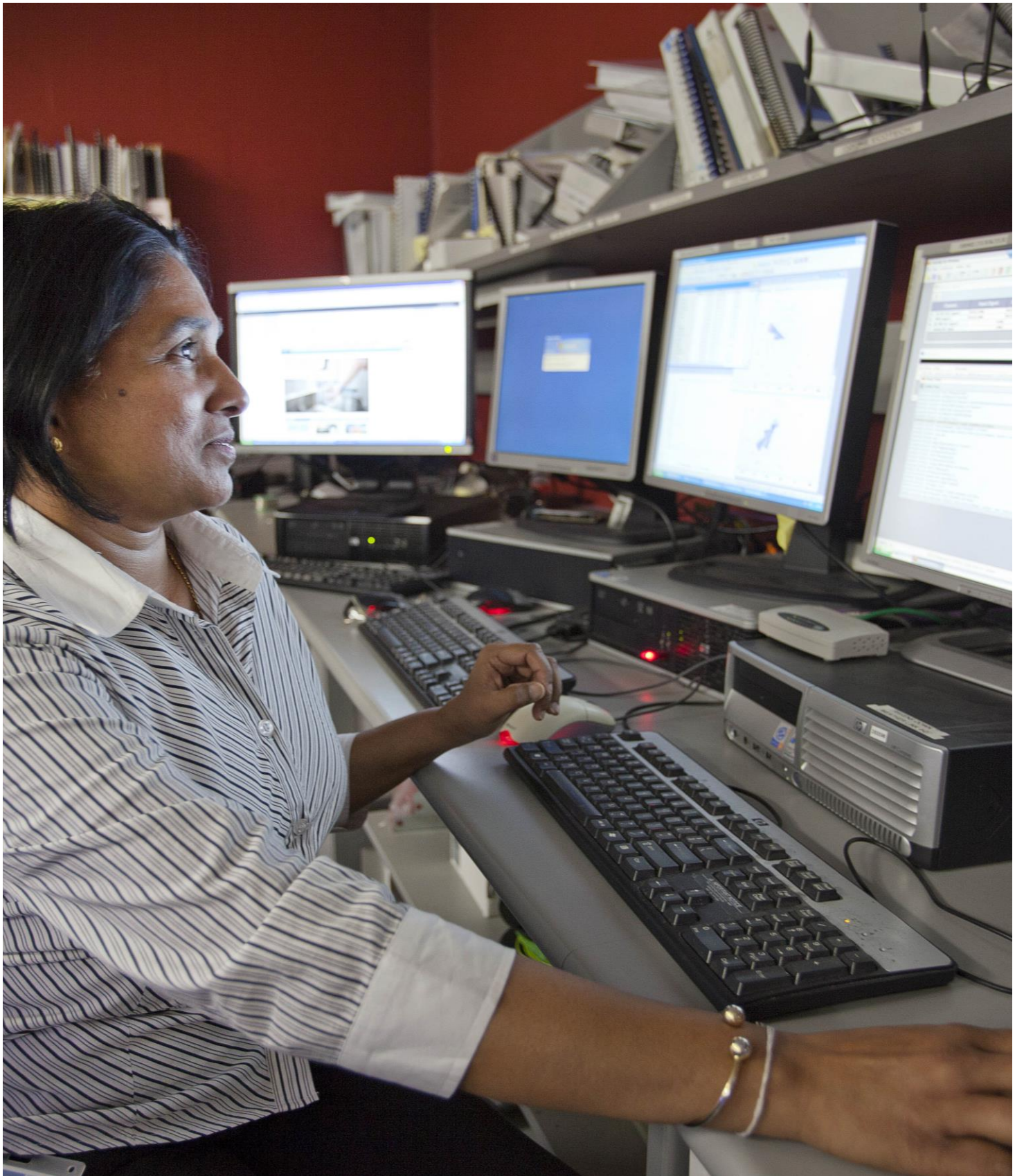
Photos:
Left: Wind speed sensor
Middle: Ultrasonic wind sensor
Right: Wind direction sensor



Data Logging

The ambient team uses the Envidas data acquisition system to log continuous data from ambient monitoring stations. Envidas is an intelligent, multi function, high-performance data acquisition system. It uses non-proprietary industrial PC computer components to run flexible, environmental data acquisition software.

Data Management



DATA MANAGEMENT

Data Management

Dr Vilani Abeyratne PhD

Ambient data management team leader

vabeyratne@water.co.nz

09 539 7753

Introduction

Our data management team has been involved with national and regional monitoring projects since 1998. Senior staff are technically qualified and experienced in their respective fields. Our data acquisition, management and reporting capabilities are utilised by clients who need reliable and robust data capture and analysis.

Quality management

We have a commitment to providing the highest standard of data management, for both accredited and non-accredited methods. The internal air quality data management system complies with NZS/ISO/ICE17025 regulations. This provides customers assurance of technical competence. Other relevant data management standards that the department comply with include:

- The requirements of the National Environmental Standards (NES) for Air Quality
- The Ministry for Environment's (MfE) 'Good-practice Guide for Air Quality Monitoring and Data Management'
- The appropriate Australian / New Zealand standards and US EPA standard monitoring methods. This ensures a consistent approach that is transparent and allows cross comparability of results with other projects, undertaken in a similar manner

Data services

The data management team utilise the Envista Air Resource Manager (ARM) software as our data management and reporting tool. Envista ARM is a Windows, client-server application for supervisory control, management and analysis of data from environmental, meteorological and hydrological monitoring networks. Envista ARM provides the ability to view, analyse, report and distribute environmental quality data across the full range of media. It provides comprehensive access to information collected by the CommCenter communication application and stored in a SQL Server database on a Windows Server. The SQL database is backed up daily, incorporating a disaster recovery program which is fully supported by Watercare Services Limited Information Systems team.

We are delivering data management and reporting for the following types of air monitoring services; active, passive and continuous (automated) monitoring.

- **Active monitoring data** – Including: Sorbent tubes, (formaldehyde), Partisol (TSP, PM_{2.5} & PM₁₀), Hivol, Mnivol and Microvol, (TSP & PM₁₀)
- **Passive monitoring data** – Including: Passive samplers (NO₂, SO₂, BTEX, VOCs), dust fall using Minivol deposition gauges.
- **Continuous monitoring data** – Including: gas analysers (CO, NO_x, SO₂, O₃, H₂S), BAM (TSP, PM) Grimm (TSP, PM) & meteorological data

Service guideline

The following is a guideline showing the services available against various collection methods. For requirements that are outside those listed please make further enquiries with our team.

Services	Product Type		
	Active	Passive	Continuous
1. Data Validation & Management			
Daily checks			✓
Field records maintenance	✓	✓	✓
Quality assurance / Scaling / Validation	✓	✓	✓
Data calculations	✓	✓	✓
2. Data Reporting			
Datasets and summary statistics (any period)	✓	✓	✓
Equipment performance reporting	✓	✓	✓
Site commissioning / Decommissioning reports	✓	✓	✓
Online data submission (ftp/email)	✓	✓	✓
SMS alerts on exceedences			✓
Exceedence reporting	✓	✓	✓
EPI calculation			✓
Valid data % reporting	✓	✓	✓
Elemental analysis reporting	✓		✓
3. Detailed Reporting			
Periodical reporting (any period)	✓	✓	✓
Data analysis	✓	✓	✓
Data comparison	✓	✓	✓
Data comparison with meteorological data	✓	✓	✓
Compliance reporting	✓	✓	✓
Correlation reports	✓	✓	✓
4. Additional Services			
Data storage (database/spreadsheet)	✓	✓	✓
Peer review of external data or reports	✓	✓	✓
Urgent data validation & reporting	✓	✓	✓
Web updates	✓	✓	✓
GIS Mapping	✓	✓	✓
Management and co-ordination of monitoring	✓	✓	✓
Automated reports send to email or FTP			✓

Reporting

We can produce all types of hard copy and electronic reports according to the client's requirements. Reports of all validated measurements made are provided periodically monthly, quarterly, annually or any required time period. This can include:

- Summary
- Introduction
- Methodology
- Site descriptions/ Site commissioning /decommissioning reports
- Instrument maintenance history
- Valid data rates
- Graphical and tabulated displays of the data
- Percentile values
- Diurnal & monthly distribution patterns
- Comparisons against relevant air quality standards, guidelines and consent limits as appropriate.

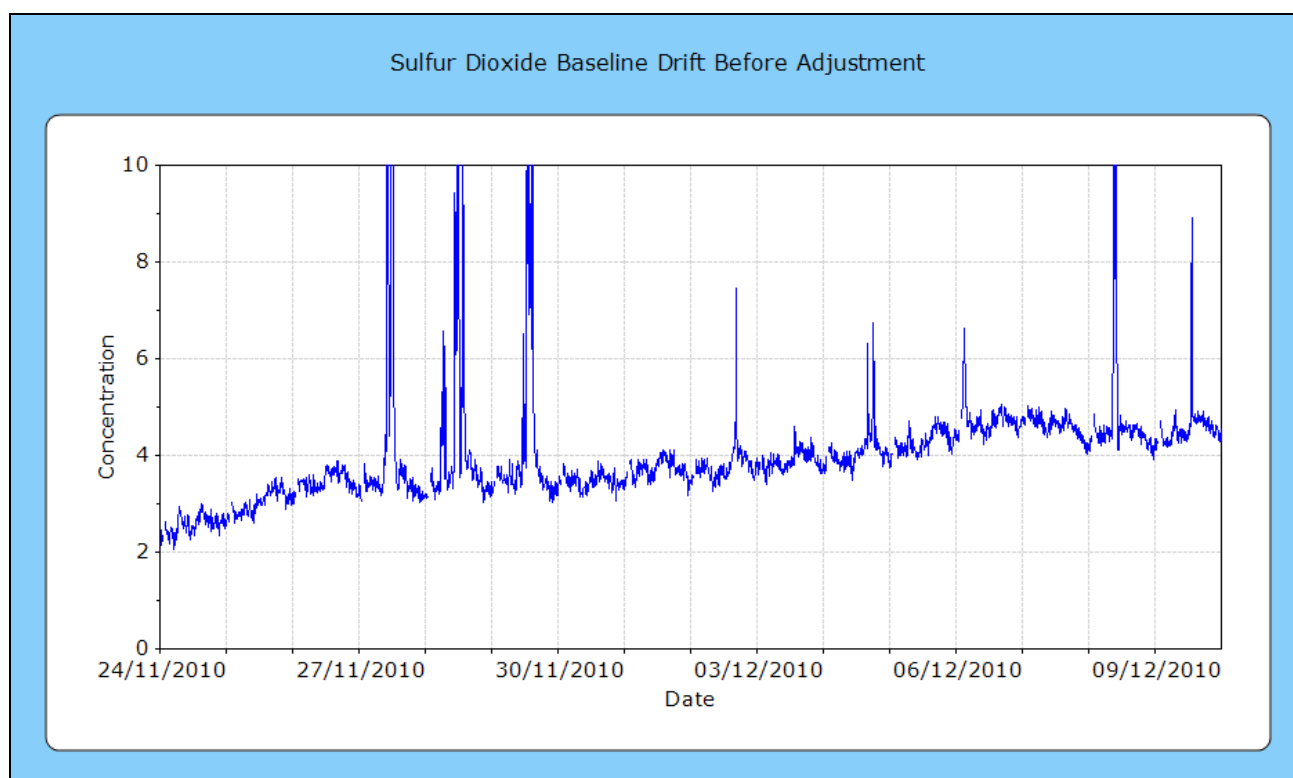
- Description of any correlations between contaminations and wind direction, wind speed and distance to possible contributing sources.
- Description of any issues from the monitoring, including site location issues, monitoring equipment failures and issues with data quality, and any resolutions

The ambient team can also provide other services on request including;

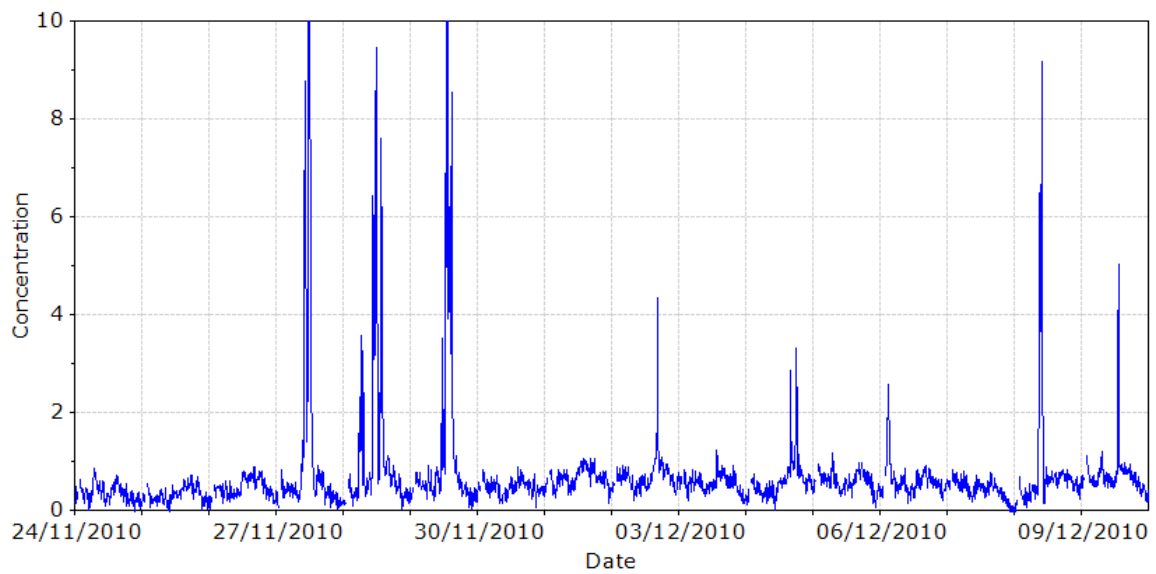
- In-depth analysis of data
- Protected data warehousing
- Management and co-ordination of monitoring projects
- Peer review of reports
- GIS mapping
- Daily checks for exceedences and monitoring issues
- Description of the data with interpretation of any irregularities in the results
- Online and electronic data submission – for any required periods
- Automated reports delivered by email or via FTP.
- Various data formats available including: XML, XLS, EMF.

Data Validation

We check continuous data on every working day in accordance with our Quality System to ensure that maximum valid data capture is achieved and that all instruments maintain optimal performance throughout the monitoring programme. Gaseous data validation includes checks for; span drift, zero offset, spurious data points flat lines and maintenance periods.



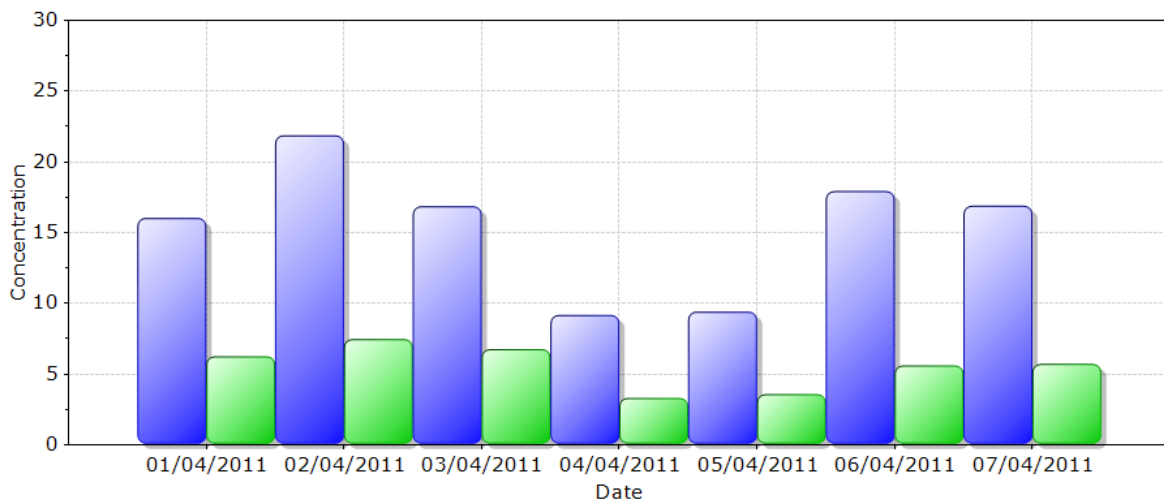
Sulfur Dioxide Baseline Drift After Adjustment



Data Presentation

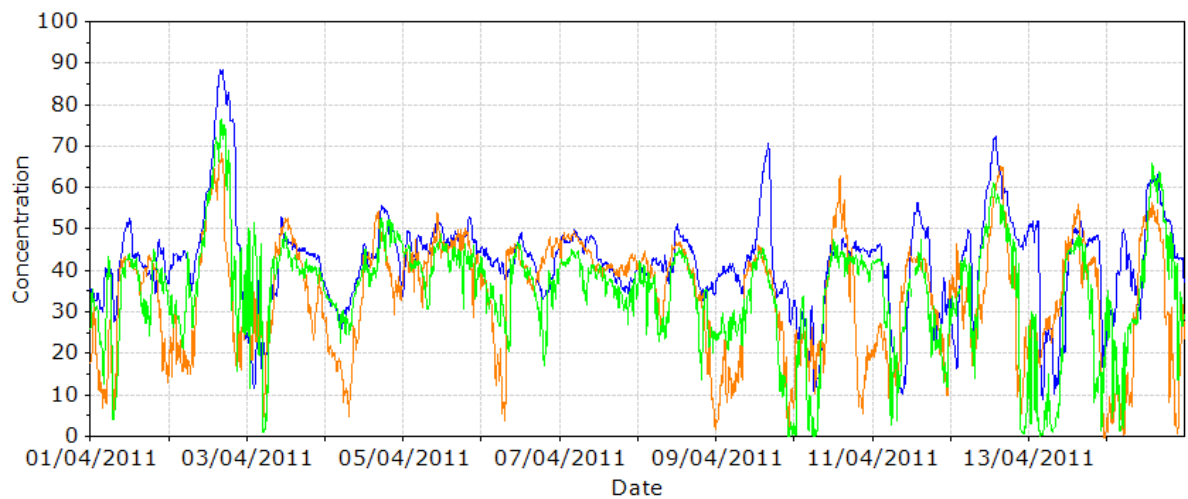
A number of customer specified options are available to present single or many data parameters. Customers can view data from single stations or across multiple stations. Various time scale options are also available. Examples follow.

Single Station Pollutant Comparison



Particulate Matter (PM-10) Particulate Matter (PM-2.5)

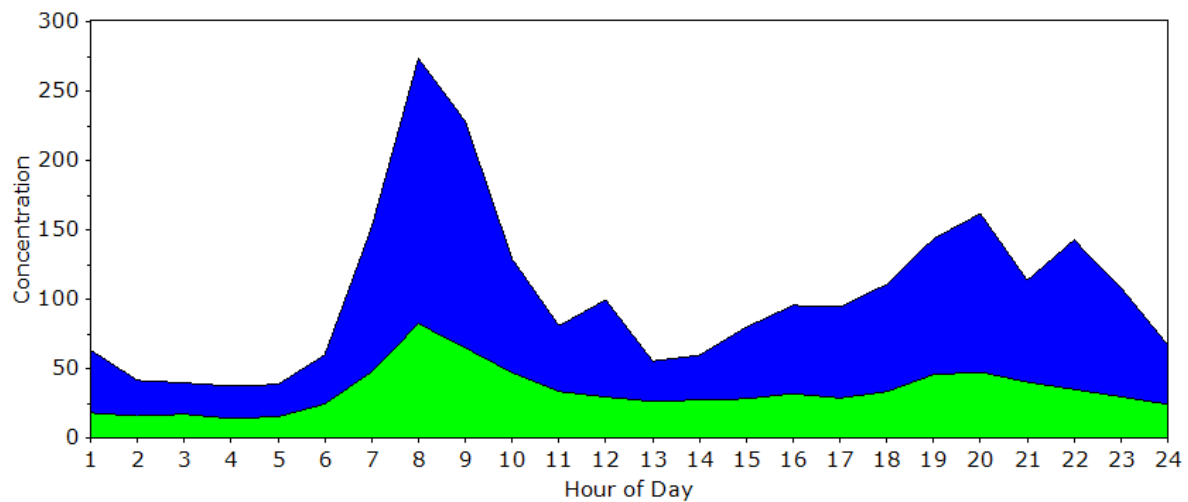
Multiple Station Pollutant Comparison



— Site 1 Ozone — Site 2 Ozone — Site 3 Ozone

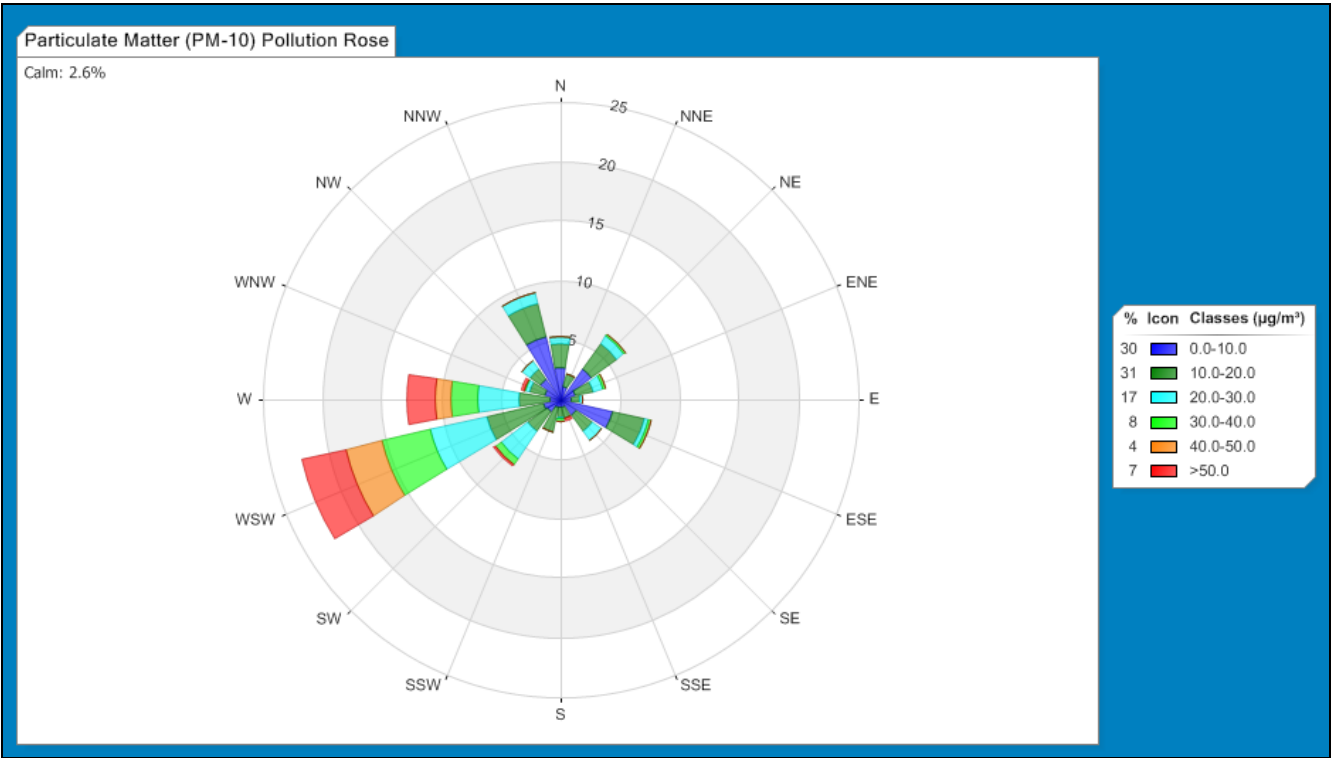
Analysis can be performed to determine the average value for the hour of the day, day of the month or month of the year for a given reporting period. This allows hourly, daily or monthly patterns to be seen in pollution concentrations.

Total Nitrogen Oxides Diurnal Pattern

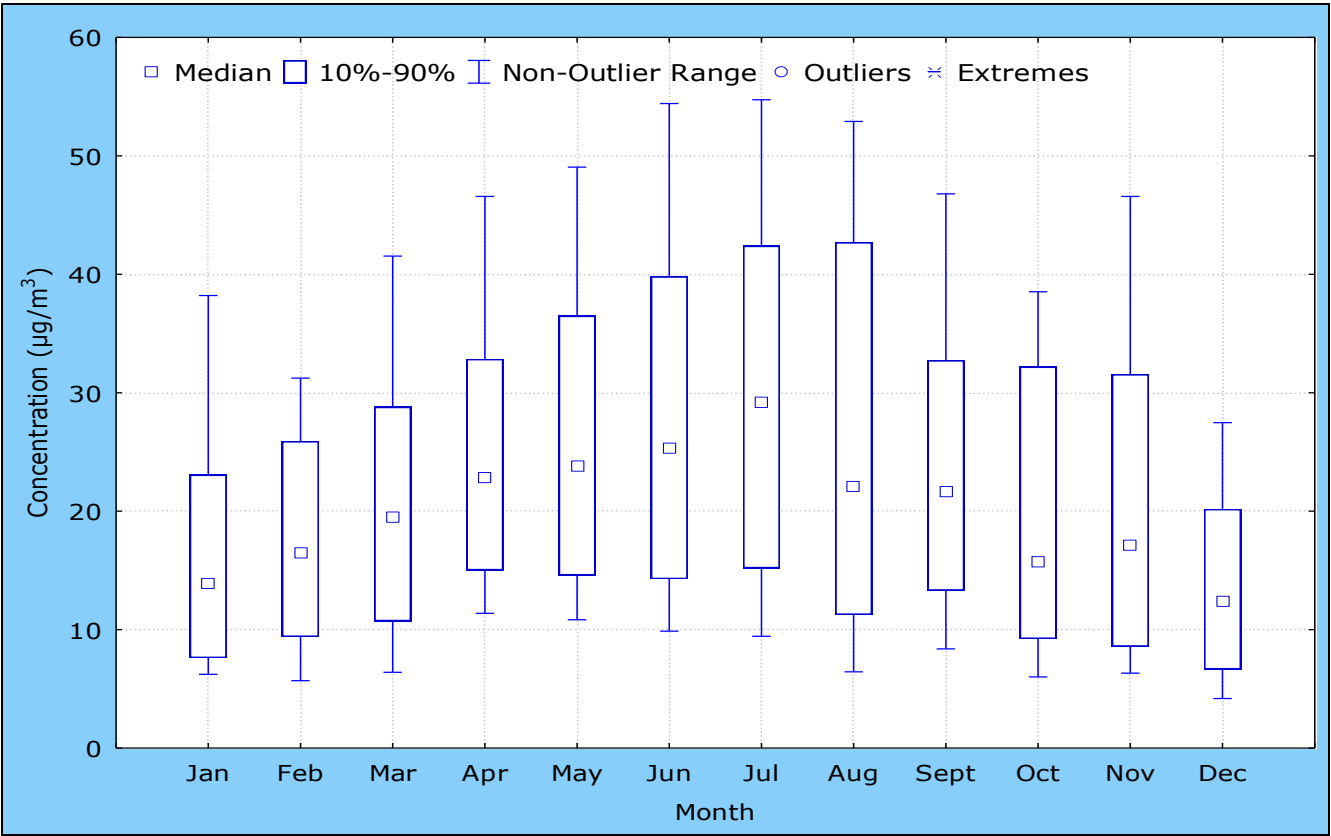


■ Maximum ■ Average

Wind and pollution rose plots are available. These graphs are effective tools in determining the possible sources of distribution of pollution. A wind rose displays the predominant wind direction and the strength of the wind. A pollution rose displays the direction and concentration of pollution.

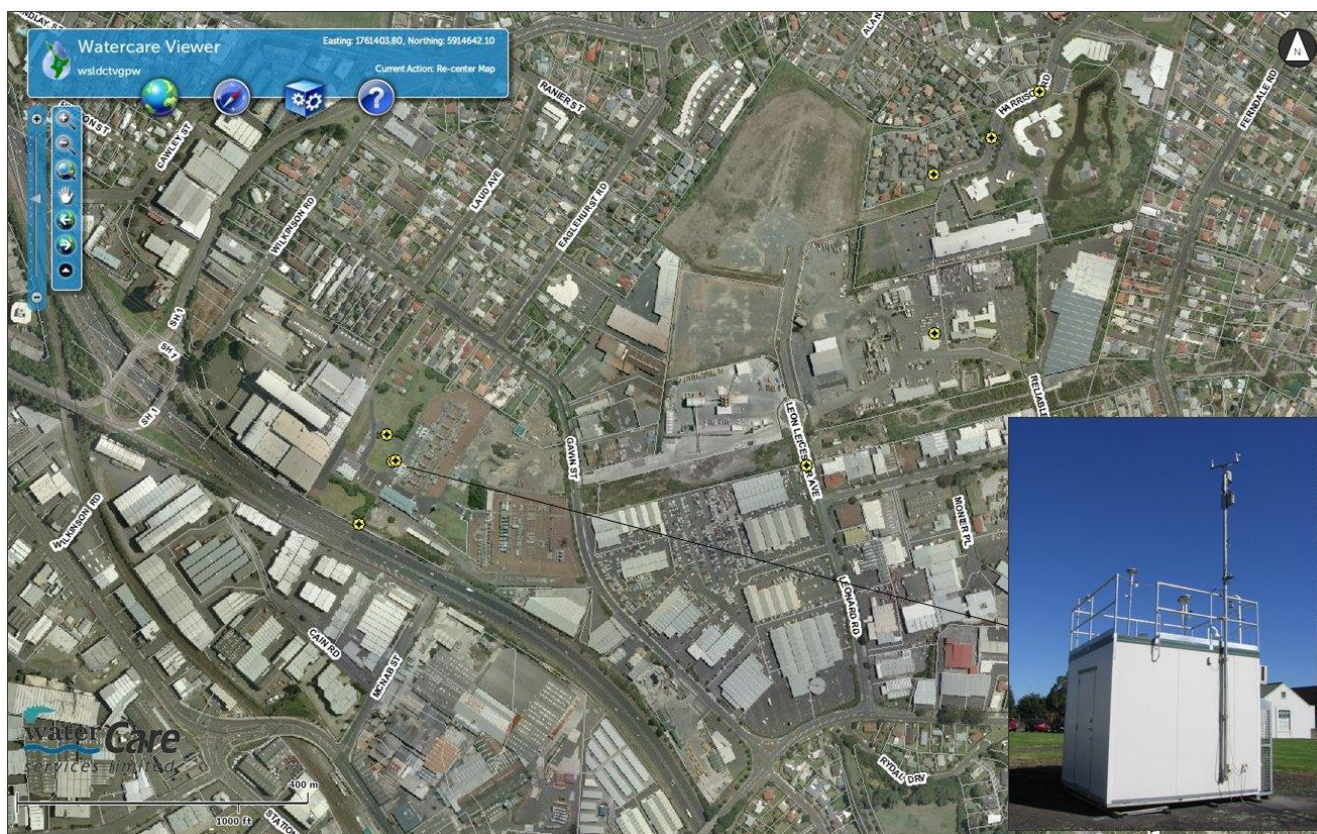


Analysis can be performed to determine the percentile value for the given reporting period and the information is able to be represented as box and whisker plots. Other options are available. This allows patterns to be seen in pollution concentrations which may vary hourly, daily or with any required period.

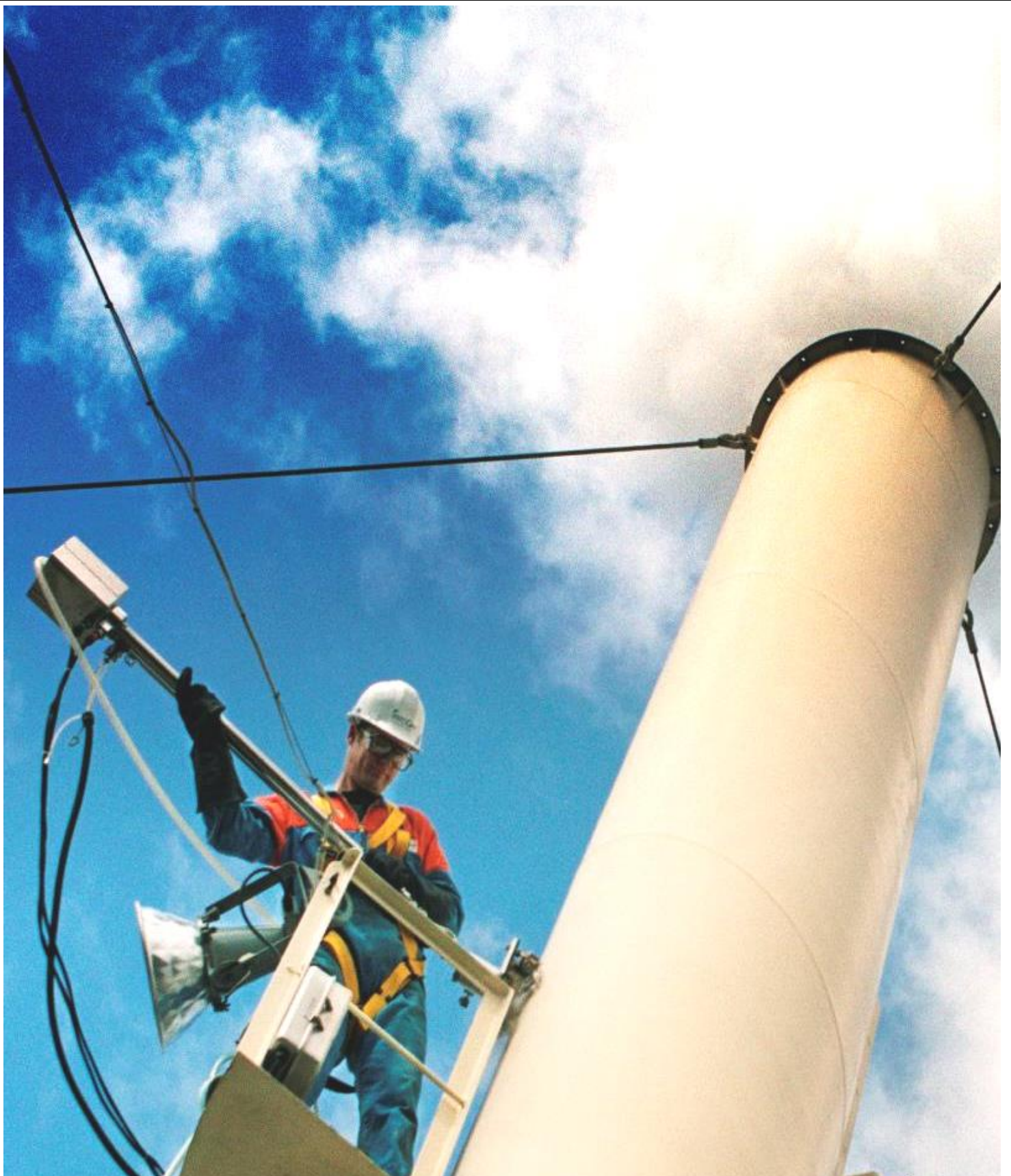


GIS Mapping for Monitoring Sites

Locations of monitoring sites are able to be represented in maps using Watercare GIS and TUMONZ mapping systems. These maps are effective tools in identifying monitoring network sites.



Stack, Odour and Workplace Monitoring



STACK, ODOUR AND WORKPLACE MONITORING

Stack, Odour and Workplace Monitoring

Jonathan Harland BSc

Stack, odour and workplace monitoring team leader

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(09) 539 7752

Stack emission monitoring

The stack team offers sampling of industrial discharge stacks using isokinetic sampling trains. The service extends to particulates (including Total Suspended Particulates (TSP), PM₁₀ and PM_{2.5}), metals, fluorides, Volatile Organic Compounds (VOCs) and sulfur and nitrogen compounds.

We are able to offer a specific package of services tailored to customer needs. Alternatively we can supply a full service which includes scheduling, monitoring, analysis, reporting and interpretive advice.

IANZ accredited methods include:

- Sample and velocity traverses from stationary sources.
- Stack gas velocity and volumetric flow rates.
- Gas analysis for determination of dry molecular weight.
- Moisture content in stationary sources.
- Particulate emissions from stationary sources.
- Sulfuric acid mist and sulfur dioxide emissions from stationary sources.
- Sampling of aldehydes and ketones from stationary sources.
- Determination of polychlorinated dibenzo-*p*-dioxins and polychlorinated dibenzofurans from stationary sources.
- Determination of hydrogen halides and halogen emissions from stationary sources.
- Determination of metal emissions from stationary sources.
- Collection and analysis of ammonia from stationary sources.
- Determination of PM₁₀ emissions (constant sampling rate procedure).
- Measurement of gaseous organic compound emissions (VOCs).

Services provided include:

- Site assessment including a health and safety assessment of sampling sites.
- Full and comprehensive reporting of results and methodology.
- Client liaison and project management and programme design.
- Competitive rates and discounted contract rates available
- Experienced and dedicated staff with KTP status.



Photos:

Top right: Particulate and gas sampling
Middle right: Odour sampling at an industrial site using odour barrel
Bottom right: Installed iso-kinetic sampling train

Odour assessment

Watercare Laboratory Services sensory evaluation unit based in Airport Oaks is the only IANZ accredited analytical odour laboratory in New Zealand.

Dedicated odour laboratory

The laboratory is environmentally controlled in order to provide a clean and odourless environment for our experienced odour panellists to undertake the olfactometry analysis. Other work undertaken on a regular basis includes offensiveness rating of odour samples, and odour analysis of drinking water samples (TON analysis). We also undertake flavour threshold analysis and flavour rating analysis on drinking water samples.

Accreditation

The majority of the analysis undertaken is in accordance with AS/NZ 4323.3:2001, for which we are IANZ accredited for both sampling and analysis.

Technical resource and experience

To maintain technical competence and ensure standards are maintained, all staff undergo extensive training. With on-going odour sampling projects being undertaken at treatment plants around New Zealand, we have one of the most experienced and knowledgeable teams in the country for odour work. This includes work in sampling and analysis, and projects including odour scout monitoring and field olfactometry assessments using a nasal ranger.

Watercare offers the following odour related services:

1. Sampling of odorous gas emissions from **point sources** (stacks), from solid surfaces (landfills, earth filters and **biofilters**) by biofilter hood and from liquid surfaces (ponds, clarifiers) by static flux chamber.
2. Assessment of odour samples for odour concentration using dynamic olfactometry, including a description of the odour. Watercare is IANZ accredited for this testing.
3. Assessment of the offensiveness of odour samples.
4. Assessment of odour in the field using a field scout according to German Method VDI 3940 "Determination of odorants in ambient air by field inspections".
5. Assessment of odour in the field using nasal ranger field olfactometry.
6. Nose calibrations.
7. Taste and odour of water samples (threshold odour number (TON)).
8. Experienced and dedicated staff with KTP status for sampling and analysis.



Photos:

- Top right: Dedicated and accredited odour laboratory
Middle right: Odour scout monitoring
Bottom right: Odour emissions from landfill

Workplace monitoring

The workplace exposure monitoring team monitors and reports on workplace environments. We are able to assess personal exposures using passive and instrumentation based sampling techniques. Our service offering includes a complete programme design, management and analysis.

Methods

The team can identify and assess potentially hazardous substances relevant to individual industries utilising various sampling techniques and methodologies. The methodology employed by our team is OSHA, NIOSH and USEPA method compliant.

This includes passive and ambient monitoring services, as well as direct sampling using occupational health sampling pumps.

Noise monitoring

Noise monitoring can also be undertaken using state of the art sound level meters. Data analysis and interpretation of results against guideline standards can also be undertaken.

General suite of services include:

- Programme design and project management.
- Assessment of workplace atmospheres for dust, gases, odours and other air pollutants by sampling onto filters and sorbent tubes, whole air sampling and direct assessment using portable instruments.
- In most cases, pollutants can be measured at trace or ultra trace levels.
- Assessment of physical parameters, such as noise, is performed with continuous monitoring and identification of specific events including actual noise.
- Equipment rental and calibration.
- Full and comprehensive reporting of results and methodology.

For further information contact Jonathan Harland on (09) 539 7752



Photos:

Top right: Site noise monitoring
Bottom right: Work place dust monitoring

Sample Logistics



SAMPLE LOGISTICS

Sample Logistics

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Head of Department – Sample Logistics

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Introduction

Professional and reliable sample collection (sampling) is an important component of any testing programme, as achieving accurate analytical results relies upon the collection of representative and contaminant-free samples. Commonly, sample collection is conducted for one or more of the following reasons:

1. **Compliance** – common examples of sampling are:
MoH compliance with the Drinking Water Standards NZ
Compliance with trade waste consents
Compliance with resource consents
Compliance with NZ Food Safety Authority regulations
2. **Process Monitoring** – to check that a treatment process is working.
3. **Charging** – most commonly this applies to trade waste sampling where clients are charged on the amount of waste they discharge and therefore the impact it has on the relevant treatment plant.
4. **Investigative** – to assess suitability for drinking, irrigation, swimming or other uses or to establish the nature and concentration of pollutants.
5. **Baseline** – to establish a picture of the ‘normal’ quality of water in a particular source to reference in the future. Often involves a reasonable period of sampling to counter the effect of seasonal, random or other variations.

We are one of only a few laboratories in New Zealand to be IANZ accredited for sample collection. The Watercare Sample Logistics department has a team of 10 dedicated samplers, trained in a range of sampling techniques which cover the following areas:

- Drinking water sampling compliance with DWSNZ 2005, (revised 2008), including (**IANZ Accredited**) field testing for FAC, total chlorine and chloramines.
- Wastewater sampling.
- Trade waste sampling including programming and collection of autosampler composite samples and consent self-monitoring requirements.
- Groundwater monitoring – piezometer reading and collection of samples from groundwater bores/monitoring wells.
- Environmental sampling – stream, lake and harbour water quality including field monitoring for parameters such as dissolved oxygen, temperature, salinity, pH, conductivity and ORP.
- Air Quality monitoring – filter changeover and data retrieval for a range of air quality monitoring devices.

Our experienced staff can also provide clients with sampling advice and assist with set up of sampling programmes. To discuss your requirements, please contact Alison McHugh (09) 539 7745 or Emma Anderson (021) 98 7762.

Sampling Charges

Sampling charges are calculated on a mileage plus labour basis, taking into account preparation for sampling, travel to and from site, time on site and time spent checking samples and submitting to Sample Reception.

Where sampling can be fitted in with existing programmes, sampling may be charged at a flat rate per site. This is, however, dependant on the location, type of samples to be collected and the time required. Most commonly this is applied for drinking water or swimming pool samples that can be collected as part of our daily drinking water sampling runs in the greater Auckland area.

* Specific conditions apply contact us for further details

Microbiological Sampling Fact Sheet

Bottles

Two types of sterile bottles are supplied for microbiological sampling depending on the volume of sample needed. They are supplied either with or without sodium thiosulfate (Na Thio) depending on whether the water to be sampled is chlorinated or not.

- Glass – These come in 250 mL, 500 mL, 1 Litre and 2 Litre sizes with or without sodium thiosulphate (indicated by Na Thio sticker on top of lid). NB: These bottles have a shelf life of only 6 weeks as indicated by the best before date sticker on the lid.
- Plastic – These come in 120 mL or 400 mL sizes. The 120 mL sizes come with or without a sodium thiosulphate tablet (blue lid – Na Thio, yellow lid – no Na Thio). The 400 mL bottles are only for non-chlorinated supplies. Sterile plastic bottles do not have an expiry date as long as they are stored in a clean, cool environment.

These bottles should be kept in a clean, cool environment away from dust and other potential contaminants. It is important to keep the outside of the bottles clean so contaminants can not be transferred to the inside of the bottle during sampling.

Bottles must be labelled with the following information as a minimum. NB: It is easier to write this on the sample bottles prior to sample collection.

Sample date – this is the date of sample collection not the date the sample was delivered to the laboratory.

Sample location – this should be the description you want to appear on the laboratory report.

Other information such as the time of sample collection and the name of the sampler do not need to be written on the bottle label but must be included on the paperwork which accompanies the sample.

Flushing

If the sample is to be collected from a line under pressure (i.e. a tap), it is important to flush the sample line prior to sampling, to ensure that the water sampled is representative of the water in the main system. When flushing, do so with the tap as fully open as possible and under most circumstances, a minute is sufficient time to flush the sample point. If after flushing the sample water remains discoloured, it may be necessary to flush it longer to determine if the discolouration disappears.

Sterilisation

Prior to sample collection for potable water samples, it is important to sterilise the sample tap or any sampling equipment used to collect the sample. Generally two types of sampling procedure are used to collect a sample and they require different sterilisation approaches:

Line under pressure – Flush the sample line as mentioned above. Sterilise either by:

- steam sterilisation – use a gas torch to heat the metal tap for 20 seconds with the flame concentrated around the end of the sample tap, or
- chemical disinfection – use alcohol/disinfectant wipes (e.g. Med wipes) to wipe the end of the sample tap ensuring that the alcohol/disinfectant is pushed into any grooves on the tap surface.
- For private household taps where you do not have access to the necessary equipment for the above two methods of sterilization, boiling water can be poured over the end of the sampling tap to sterilize it (NB: ensure the method of sterilization will not damage the tap).

After sterilising leave the sample tap for 1 minute to allow the alcohol/disinfectant to dry before proceeding further.

Dipped samples – If the sample is collected directly from a body of water, the device used to hold the sample bottle must be sterilised prior to being inserted into the water. If the bottle is to be collected by hand, either wear clean surgical gloves or use hand steriliser to disinfect your hands. Use a sterilised dipper to draw the sample if the sample point is more than an arm length away. NB: If using plastic bottles allow the flame sterilised gripper to cool before inserting the bottle.

Sample Collection

Two methods of sample collection can be employed depending on the nature of the sampling point. With either method it is extremely important to ensure aseptic technique is followed. The main points are outlined below:

Line under pressure – After sterilisation of the sample point, open the tap again. Flush for a further 30 seconds with the tap fully open. Close the tap partially to maintain a moderate flow. Minimise tap spraying. Remove the bottle lid and keep it in your hand with the opening facing down while collecting the sample. Fill the bottle up to the neck or above the fill line and replace the lid. Avoid overfilling.

Dipped samples – Hold the sample bottle towards the base in the hand or dipper. Remove the lid of the bottle and keep it in your hand with the opening facing down while collecting the sample. Place the bottle in the water with the base down and the neck pointing into the current if there is one. Fill the bottle up to the neck or above the fill line, with the mouth of the bottle just below the surface so as to avoid any surface scum. If there is no current then create one by pushing the bottle horizontally away from you while collecting the sample. Remove the bottle from the water and replace the lid.

NB: Do not rinse sterile sample bottles prior to sample collection.

Aseptic Technique

- Ensure hands and equipment that come into contact with the sample bottle or sample water are sterilised.
- Hold sample bottles towards the base and bottle lids towards the top. Avoid touching the bottle around the neck.
- Do not put the lid down while sampling as contact with other surfaces can contaminate the sample.
- Do not touch the inside of the bottle or lid while sampling.
- Keep the bottle open for the minimum amount of time possible to minimize contamination.
- Do not cough over an open container.
- Ensure other liquids do not drip or splash into the sample while collecting the sample.
- Ensure an air gap is left at the top of the bottle.
- If you have any concerns that the bottle or sample may have become contaminated, resample using a new bottle.

Sample Transportation

Ideally samples should be transported to the laboratory as soon as they are drawn and must be received no later than 24 hours following their collection. We would like to receive the samples at the laboratory by 4.00pm at the latest, unless prior arrangement has been made. This is to enable speedy processing and/or testing of time critical determinands. If there is more than an hour delay between sample collection and receiving of the sample by the laboratory, then samples must be chilled to below 10° Celsius and transported to the laboratory in a chilly bin with ice packs sufficient to maintain this requirement during transportation. If the sample is transported within an hour then it still must be kept cool and away from sunlight.

Trace Metals Sampling Fact Sheet

Field Filtration Kits

Kits are available for field filtering of trace metals samples. Each kit contains polyethylene gloves, a 60 mL syringe, a disposable filter and a trace-metal bottle containing ultraclean nitric acid preservative. The kits are cleanroom-prepared and double bagged to reduce the risk of sample contamination.

Please notify the laboratory in advance if you require these. Correct sampling technique is important to avoid sample contamination. Please ask for an instruction sheet or see instructions below.

General instructions for the use of field filtration kits for dissolved metal sampling

- Cleanliness is critical. Do not open bag until ready to sample. Do not set down bottle on any surface or allow to become dirty. Minimise the time that the cap is off the bottle and the bottle out of the bag.
- The bottle contains concentrated nitric acid as a preservative. Do not drain. Nitric acid is corrosive to skin, eyes and respiratory system. Avoid all contact.
- At sampling time, open outer bag. Remove and don't clean plastic gloves. (Do not substitute rubber or nitrile gloves)
- While wearing the gloves, open the bag containing the syringe, filter, and bagged bottle
- Rinse the syringe with sample and then refill
- If the filter has cover-plugs remove these from both of the longer barbed joints. Attach the filter to the full syringe with the printed side of the filter towards the syringe
- Depress the syringe to push sample through the filter. Discard the first 5-10 mL of sample
- Open the inner bag and remove the sample bottle. Uncap the bottle and filter the sample into it. Filter as much sample as possible, refilling the syringe when necessary, until the bottle is full
- If it is becoming difficult to depress the syringe, check that there are no air bubbles in the filter (air doesn't readily pass through the membrane). If there are no bubbles, it is probably a sign that the filter is beginning to clog. If the bottle is more than half full, stop filtering. Otherwise, attach a fresh filter to the syringe, filter and discard 5-10 mL of sample and then continue to fill the sample bottle
- Cap the bottle and reseal inside the bag
- Complete the label and return the sample to Watercare Laboratory Services for analysis
- Discard the syringe and filter after use. Under no circumstances use the same filter for a different sample

Bottle and Sampling Guide

Bottle guide and sample container information

Many tests require that the sample containers are prepared in a particular way. Note that while this sheet contains much of the information needed on preparation, it is meant as a basic guide, for detailed information and instruction please contact our sample reception at (09) 539 7614 or (09) 539 7615.

Analysis	Container Type	Preservation	Procedure for Sample Collection	Storage
Acid Herbicides	1 Litre amber glass with Teflon lined lid	No preservative required	Rinse bottle with sample water and then fill under gentle flow ensuring all air is removed from the sample bottle.	Refrigerate / dark
Algae	400mL / 1L Plastic	Add 0.5 mL Lugol's iodine / 100 mL	As this bottle contains preservative do not rinse prior to filling. Fill with sample water up to neck of bottle.	Dark brown bottle to be used if storing unpreserved samples
Chlorine residual & total	Plastic or glass	Sample must be analysed on site at time of sample collection	Rinse bottle with sample water prior to collection and analyse on site immediately	Analyse immediately
Cyanide	100 mL plastic	Add 2 mL 4M NaOH / 500 mL	As this bottle contains preservative do not rinse prior to filling. Fill with sample water up to neck of bottle.	Refrigerate / dark
Cyanogen Chloride	100 mL plastic	No preservative required. Mark bottle 'For Cyanogen Chloride analysis only'	Rinse sample bottle with sample water and then fill bottle leaving no headspace.	Analyse immediately on arrival at the laboratory
Cyanotoxins	100 mL or larger amber glass with Teflon lined lid	No preservative required	Rinse sample bottle with sample water and then fill bottle leaving a small headspace.	Refrigerate
DHAs	100mL Amber glass with Teflon lined lid	A few crystals of Ammonium Chloride are added as a preservative	Fill with sample water to top of bottle taking care not to overfill and ensuring all air is evacuated from bottle.	Refrigerate
Dioxins – subcontracted	1 Litre amber glass with Teflon lined lid	No preservative required.	Rinse the bottle and fill under gentle flow and leave approximately an inch of headspace at the top of the bottle.	Refrigerate / dark
Diquat & Thiabendazole – subcontracted	1 Litre amber glass with Teflon lined lid	No preservative required.	Rinse the bottle and fill under gentle flow and leave approximately an inch of headspace at the top of the bottle.	Refrigerate / dark
Dissolved Oxygen by Winkler	300 mL glass with ground glass tapered stopper	Add within 5 mins 2 mL MnSO ₄ sol. & 2 mL alkaline Iodide sol. to fix, after fixing titrate with 3 hrs. see method.	Rinse bottle and fill leaving one cm of headspace at top of bottle. Add preservatives and stopper bottle ensuring all air is evacuated. Shake to mix preservatives through sample.	Analyse immediately
DOC	100 mL amber glass with Teflon lined lid	No preservative required	Rinse bottle with sample water and then fill under gentle flow ensuring all air is removed from the sample bottle.	Refrigerate / dark
Formaldehyde	1 Litre amber glass with Teflon lined lid	No preservative required	Rinse bottle with sample water and then fill under gentle flow ensuring all air is removed from the sample bottle.	Refrigerate / dark
Giardia/ Cryptosporidium	Envirochek filter / Filtamax filter	See General Procedures Manual – Sample Logistics, Section 1.4.4 Special Sampling Techniques for instructions		Refrigerate
General Chemistry	100 mL, 250 mL, 500 mL, 1Litre or 2 Litre plastic	No preservative required	Rinse sample bottle with sample water and then fill bottle leaving a small headspace.	Refrigerate
Metals : Total Trace	100 mL plastic	Polyethylene bottles are soaked overnight in 1%v/v HNO ₃ prior to nitric acid preservative being added at 1 mL / 100 mL of sample.	As this bottle contains preservative do not rinse prior to filling. Fill with sample water up to neck of bottle.	Room Temperature
Metals : Soluble	250 mL plastic	These bottles are soaked with HNO ₃ and then rinsed twice with distilled water	Rinse once with sample water before filling up to neck of bottle.	Room Temperature
Metals : Ultra Trace	100 mL plastic	These bottles are specially prepared by in a trace metals cleanroom. Ultraclean acids are used. Bottles are double-bagged.	In order to achieve the ultra trace levels of detection, specific low level metals sampling procedures must be followed.	Room Temperature
Metals : Client Filtered	100 mL plastic	Polyethylene bottles are soaked overnight in 1%v/v HNO ₃ prior to nitric acid preservative being added at 1 mL / 100 mL of sample.	As this bottle contains preservative do not rinse prior to filling. Fill with sample water up to neck of bottle.	Room Temperature

Analysis	Container Type	Preservation	Procedure for Sample Collection	Storage
Metals: Acid Soluble	100 mL plastic	Polyethylene bottles are soaked overnight in 1% v/v HNO ₃ prior to nitric acid preservative being added at 0.25mL 50% per 100mL sample.	As this bottle contains preservative do not rinse prior to filling with sample water up to neck of bottle.	Room Temperature
Metals: Hexavalent Chromium	100 mL plastic	1 mL ammonium hydroxide ammonium sulphate buffer per 100mL sample	As this bottle contains preservative do not rinse prior to filling with sample water up to neck of bottle.	Room Temperature
Microbiology	250 mL, 500 mL or 1 Litre sterile glass or 120 mL, 250mL or 400mL sterile plastic	Bottles used for chlorinated samples contain Sodium Thiosulphate in the form of a tablet, liquid or crystals.	As these bottles are sterile do not rinse prior to filling. Ensure aseptic technique is used and leave a small head space at the top of the bottle (do not over fill).	Refrigerate and transport to laboratory under 10° C within 24 hours
Monochloramine	Plastic or glass	Sample must be analysed on site at time of sample collection. Potassium Iodide crystal added to sample prior to analysis (subtract free chlorine result to get Monochloramine).	Rinse bottle with sample water prior to collection and analyse on site immediately	Analyse immediately
Odour	2 Litre glass		Rinse and fill bottle leaving minimal headspace.	
Oil & Grease	1 Litre glass (preserving jar type)	1 mL conc. HCl preservative added in the lab	Rinse bottle with sample water and fill leaving as minimal headspace as possible. Preservative is added at Sample Preparation prior to analysis.	Refrigerate
Oxyhalides (Chlorate, Bromate, etc.)	100 mL plastic	Soak bottles and droppers in nanopure overnight prior to sample collection. Add 2 drops 5% v/v ethylenediamine /100 mL at time of sample collection	Empty nanopure from sample bottles and rinse with sample water. Fill with sample water up to neck of bottle and add 2 drops of preservative.	Refrigerate
Phenols	100 mL amber glass with Teflon lined lid	Bottles used for chlorinated samples contain Sodium Thiosulphate in the form of a tablet, liquid or crystals.	Fill under gentle flow ensuring all air is removed from the sample bottle.	Refrigerate / dark
Ammonia, Phosphorus, TKN, COD	100 mL plastic	Add 0.2 mL 50% H ₂ SO ₄	As this bottle contains preservative do not rinse prior to filling. Fill with sample water up to neck of bottle.	Refrigerate
Radiological Determinands (subcontracted)	2 x 1 Litre Plastic (must use H1 1 Litre cylindrical bottles)	No preservative required	Rinse sample bottles with sample water and then fill bottle leaving a small headspace.	
Sulphide	100 mL plastic	Add 4 drops 2N zinc acetate / 100 mL ; add 0.5 mL 4N NaOH / 100 mL	As this bottle contains preservative do not rinse prior to filling. Fill with sample water up to neck of bottle.	Refrigerate
SVOC	1 Litre amber glass with Teflon lined lid	No preservative required	Rinse and fill the bottle under gentle flow and leave approximately an inch of headspace at the top of the bottle.	Refrigerate / dark
Taste	2 Litre glass	No preservative required	Rinse and fill bottle leaving minimal headspace.	
Taste & Odour	250 mL amber glass with teflon lined lid	No preservative required	Rinse and fill bottle with sample water. Do not leave any headspace at the top of the bottle.	Analyse immediately
Temperature	Plastic	No preservative required	If possible take temperature directly from source. If not possible, collect a sample of at least 500 mL into a plastic container and take temperature immediately.	
THMs	40 mL Purge & Trap vial	Vials used for chlorinated samples contain Sodium Thiosulphate in the form of a tablet, liquid or crystals.	If the sample bottles contain preservative do not rinse, otherwise rinse bottle with sample water and then fill under gentle flow ensuring all air is removed from the sample bottle.	Refrigerate / dark
TOC	100 mL amber glass with Teflon lined lid	No preservative required	Rinse bottle with sample water and then fill under gentle flow ensuring all air is removed from the sample bottle.	Refrigerate / dark
TPH	1 Litre glass (preserving jar type)	No preservative required	Rinse bottle with sample water and fill leaving as minimal headspace as possible.	Refrigerate
Tributyl Tin (Subcontracted)	1 Litre glass preserving jar	No preservative required	Rinse bottle with sample water and fill leaving as minimal headspace as possible.	Refrigerate

Analysis	Container Type	Preservation	Procedure for Sample Collection	Storage
Enteric Viruses	1 Litre to 20 Litre Containers	No preservative required. Volume dependant on type of sample i.e. water, wastewater	Rinse sample bottle with sample water and then fill bottle leaving a small headspace.	Refrigerate
VOC	40 mL Purge & Trap vial	Vials used for chlorinated samples contain Sodium Thiosulphate in the form of a tablet, liquid or crystals.	If the sample bottles contain preservative do not rinse, otherwise rinse bottle with sample water and then fill under gentle flow ensuring all air is removed from the sample bottle.	Refrigerate / dark
1080 (Subcontracted)	250 mL Plastic	No preservative required but sample must be kept on ice / ice packs after collection and during transportation	Rinse sample bottle with sample water and then fill bottle leaving a small headspace.	Refrigerate

Soils				
Analysis	Container Type	Preservation	Procedure for Sample Collection	Storage
Metals	250 mL to 500mL Plastic	No preservative required	Use clean , non-metallic equipment for sample collection. Ensure the lid is correctly seated on the pottle and screw down firmly.	Room temperature
Mirobiological	400 mL to 1L Plastic	No preservative required	Use clean and preferably sterile equipment to transfer solid material into the pottle. Ensure the lid is correctly seated on the pottle and screw down firmly.	Refrigerate and transport to laboratory under 10 deg C within 24 hours.
Organic Testing	250 mL to 1L Glass	No preservative required	Ensure the lid is correctly seated on the bottle and screw down firmly.	Refrigerate / dark

General Chemistry



GENERAL CHEMISTRY

General Chemistry

Dr Steve Money PhD

Head of Department

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(09) 539 7768

Introduction

General Chemistry comprises a dynamic group of very experienced and qualified staff. A number of our staff members are IANZ and/or LAS signatories. We test samples over a wide range of matrices from drinking water to environmental solids and wastes. General Chemistry prides itself on producing a very high quality product in a timely manner at a competitive price.

We are also constantly striving to lower our turn around times on samples and detection limits. This is something that we are happy to discuss with customers to ensure that we can meet their needs.

The following tests are most commonly performed by the General Chemistry Department:

General Analysis

We are able to provide a wide variety of tests from simple gravimetric analysis through to complete nutrient and anion profiles. The laboratory has recently been undergoing a technology upgrade and now, where possible, utilises robotic procedures allowing for faster turnaround times on results. We test regularly for pH, BOD, COD, suspended solids, oil & grease and chlorophyll. Many other test types are available.

Nutrient Analysis

This includes all the tests required to determine nutrient level in the sample. Tests performed include ammoniacal nitrogen, dissolved reactive phosphorus and total phosphorous. These tests are run on our Aquakem Discrete Analysers which are capable of doing a very large number of samples very quickly.

Total Nitrogen, nitrate and nitrite analysis are conducted using a combination of discrete analysers, flow injection analyser and ion chromatography. The technology base allows our department to provide rapid turnaround times for urgent reporting needs. Customers have the option to test individual nutrients or select a nutrient suite.

Anion Analysis

General Chemistry is capable of doing the complete range of anions. With the addition of our state of art ion chromatograph we are now able to offer an extended range of anions at much lower detection limits.

For the complete range of tests offered in General Chemistry please refer to the following tables for further details. Also if you have some more specific requirements or tests that are not listed we would be happy to hear from you and see what we can offer to help out.

General Chemistry on Liquids

The table below lists routine General Chemistry tests on liquid samples. If a test you require is not included, please contact the marketing department on (09) 539 7785.

The tests have been arranged in alphabetical order for quick reference.

Note: some tests require specific sample preparation steps as denoted in the prep column. Each preparation step is only charged once per sample regardless of how many tests it is required for.

Description	MDL	Test Method	Prep
Acidity to pH 8.3	1 mg/L CaCO ₃	APHA (2005) 2310 B	
Alkalinity bicarbonate (requires total Alkalinity)	1 mg/L HCO ₃	APHA (2005) 2320 B	
Alkalinity carbonate (requires total Alkalinity)	1 mg/L CO ₃	APHA (2005) 2320 B	
Alkalinity Soluble by Autotitrator	1 mg/L CaCO ₃	APHA (2005) 2320 B	1
Alkalinity total by Autotitrator	1 mg/L CaCO ₃	APHA (2005) 2320 B	
Ammonia Nitrogen high level (NH ₃ + NH ₄)	0.4 mg/L N	MEWAM, HMSO 1981, ISBN 0117516139	
Ammonia Nitrogen low level (NH ₃ + NH ₄)	0.005 mg/L N	MEWAM, HMSO 1981, ISBN 0117516139	
Ammonia Nitrogen low level Soluble	0.005 mg/L N	MEWAM, HMSO 1981, ISBN 0117516139	1
Ammonia Nitrogen Soluble high level	0.4 mg/L N	MEWAM, HMSO 1981, ISBN 0117516139	1
Biochemical oxygen demand - Total (BOD ₅)	0.5 mg/L O	APHA (2005) 5210 B	
Biochemical oxygen demand (CBOD ₅)	0.5 mg/L O	APHA (2005) 5210 B	
Biochemical oxygen demand GFC filtered (CBOD ₅)	0.5 mg/L O	APHA (2005) 5210 B	2
Bromate by Ion Chromatography	0.005 mg/L	APHA (2005) 4110 B	
Bromide by Ion Chromatography	0.01 mg/L	APHA (2005) 4110 B	
Carbon dioxide by Calculation (Nomograph)	0.1 mg/L	APHA (2005) 4500-CO ₂ B	
Chemical oxygen demand (High Level)	30 mg/L O	APHA (2005) 5220 D	
Chemical oxygen demand (Low level/Titration)	1 mg/L O	APHA (2005) 5220 C	
Chemical Oxygen Demand (Membrane Filtered)	30 mg/L O	APHA (2005) 5520 D	1
Chemical oxygen demand flocculated & filtered	30 mg/L O	APHA (2005) 5220 D	2
Chemical oxygen demand GF/C filtered.	30 mg/L O	APHA (2005) 5220 D	2
Chlorate by Ion Chromatography	0.01 mg/L	APHA (2005) 4110B	
Chloride by Autotitrator (High Level)	200 mg/L	APHA (2005) 4500-Cl D	
Chloride by Ion Chromatography	0.02 mg/L	APHA (2005) 4110 B	
Chlorine residual	0.02 mg/L	APHA (2005) 4500-Cl G	
Chlorite by Ion Chromatography	0.005 mg/L	APHA (2005) 4110 B	
Chlorophyll "a"	0.0006 mg/L	APHA (2005) 10200 H	
Chlorophyll "b" (requires Chlorophyll "a")	mg/L	APHA (2005) 10200 H, modified	
Chlorophyll "c" (requires Chlorophyll "a")	mg/L	APHA (2005) 10200 H, modified	
Colour - Apparent	5 Hazen Units	APHA (2005) 2120 B	
Colour True - Membrane Filtered	5 Hazen Units	APHA (2005) 2120 B	1
Conductivity by Auto-titrator	0.5 mS/m 25oC	APHA (2005) 2510 B	
Cyanide Spot Test	0.08 mg/L	APHA (2005) 4500-CN K	
Cyanide total	0.01 mg/L	APHA (2005) 4500-CN E, modified	
Cyanogen Chloride	0.01 mg/L	APHA (2005) 4500-CN- J	
Fluoride by Ion Chromatography	0.02 mg/L	APHA (2005) 4110 B	
Fluoride by ISE	0.05 mg/L	APHA (2005) 4500-F C	
Iodide	0.001 mg/L	APHA (2005) 4500-I C	
Nitrate & Nitrite Nitrogen by Calculation (requires Nitrate and Nitrite)	0.004 mg/L N	Calculation	

Nitrate & Nitrite Nitrogen by FIA	0.002 mg/L N	APHA (2005) 4500-NO3 F	1
Nitrate Nitrogen (Calculation)	mg/L N	Calculation	
Nitrate Nitrogen by Ion Chromatography	0.002 mg/L N	APHA (2005) 4110 B	1
Nitrate Nitrogen on Effluent by IC	0.02 mg/L N	APHA (2005) 4110 B	1
Nitrite Nitrogen by Ion Chromatography	0.002 mg/L N	APHA (2005) 4110 B	1
Nitrite Nitrogen by FIA	0.002 mg/L N	APHA (2005) 4500-NO2 B	1
Nitrite Nitrogen on effluent by IC	0.02 mg/L N	APHA (2005) 4110 B	1
Nitrogen Dissolved Inorganic (requires Nitrate, Nitrite, Soluble Ammonia)	0.005 mg/L N	Calculation	
Nitrogen Dissolved Organic (requires Soluble Ammonia and Soluble TKN)	0.1 mg/L N	Calculation	
Nitrogen Total by Calculation (requires Nitrite, Nitrite, TKN)	0.1 mg/L N	Calculation	
Nitrogen Total by Persulphate Digestion/FIA	0.02 mg/L N	APHA (2005) 4500-P J, modified	
Nitrogen Total Dissolved	0.02 mg/L N	APHA (2005) 4500-N C, modified	1
Nitrogen Total Inorganic by Calculation (requires Ammonia, Nitrate, Nitrite)	mg/L N	Calculation	
Nitrogen Total Organic by Calculation (requires Ammonia, TKN)	mg/L N		
Oil & Grease - Free	20 mg/L	APHA (2005) 5520 D, modified	
Oil & Grease by ASE	20 mg/L	APHA (2005) 5520 D, modified	
Oil & Grease by partition	5 mg/L	APHA (2005) 5520 B	
pH (Autotitrator) at room temp(c.20°C)	0.1 pH Unit	APHA (2005) 4500-H B	
pH (Manual)	0.1 pH Units	APHA (2005) 4500-H B	
Pheophytin	0.004 mg/L	APHA (2005) PART 10200 H	
Phosphorus Soluble Reactive	0.005 mg/L P	APHA (2005) 4500-P F, modified	1
Phosphorus Total by Persulphate Digestion	0.01 mg/L P	APHA (2005) 4500-P B, F, modified	
Phosphorus Total Dissolved	0.01 mg/L P	APHA (2005) 4500-P B, F, modified	1
Rhodamine dye test	1 ug/L	Fluorimetry	
Salinity	0.1 ppt	YSI	
Settleable matter	1 ml/L	APHA (2005) 2540 F	
Sulfide (Methylene blue method)	0.1 mg/L	APHA (2005) 4500-S2-D	
Sulphate by Ion Chromatography	0.02 mg/L	APHA (2005) 4110 B	
Sulphite by Titration	0.1 mg/L	APHA (2005) 4500-SO3 B	
Suspended solids: High Level by 125 mm GF/C	1 mg/L	APHA (2005) 2540 D	
Suspended solids: Low Level by 47mm GF/C	0.2 mg/L	APHA (2005) 2540 D	
Tanin Index (DM Value)		In-house method	
Tannins	1 mg/L	APHA (2005) 5550 B	
Total dissolved solids	15 mg/L	APHA (2005) 2540 C, modified	2
Total Hydrocarbons	20 mg/L	APHA (2005) 5520 D, F, modified	
Total Kjeldahl Nitrogen (High Level)	0.1 mg/L N	USEPA 351.2	
Total Kjeldahl Nitrogen by Calculation (requires Total Nitrogen, Nitrate, Nitrite)	mg/L N	Calculation	
Total Kjeldahl Nitrogen GFC filtered	0.1 mg/L N	USEPA 351.2	2
Total solids	15 mg/L	APHA (2005) 2540 B	
Turbidity by Hach Meter	0.1 NTU	USEPA 180.1	
UV % transmittance at 254nm	%	APHA (2005) 5910 B	
UV % transmittance at 254nm m/f	%	APHA (2005) 5910 B	1
UV absorption 254nm	0.002 Abs	APHA (2005) 5910 B	
UV absorption m/f 254nm	0.002 Abs	APHA (2005) 5910 B	1
UV scan		UV Spectrophotometry	
UV Scan Membrane Filtered		UV Spectrophotometry	1
Volatile matter	1 mg/L	APHA (2005) 2540 E	2
Volume	mL	Volumetry	

Sample Preparation for General Chemistry Testing on Liquids

Prep	Description	Test Method
1	Membrane Filtration	Membrane Filter, 0.45µm
2	GF/C Filtration	Glass Fiber Filtration 1.2 um
3	Centrifuging	Centrifuging Pre-filtration

General Chemistry on Saline Samples

The table below lists routine General Chemistry tests on saline samples. If a test you require is not included, please contact the marketing department on (09) 539 7785

Note: some tests require specific sample preparation steps as denoted in the prep column. Each preparation step is only charged once per sample regardless of how many tests it is required for.

Description	MDL	Test Method
Alkalinity total by Autotitrator	1 mg/L CaCO ₃	APHA (2005) 2320 B
Alkalinity carbonate	1 mg/L CO ₃	APHA (2005) 2320 B
Alkalinity bicarbonate	1 mg/L HCO ₃	APHA (2005) 2320 B
pH at room temp (c.20°C)	0.1 pH Unit	APHA (2005) 4500-H B
Salinity	0.1 ppt	YSI
Suspended solids: High Level by 125 mm GF/C	1 mg/L	APHA (2005) 2540 D
Ammonia Nitrogen low level (NH ₃ + NH ₄)	0.01 mg/L N	APHA (2005) 4500-NH ₃ G
Nitrate & Nitrite Nitrogen by Cd Reduction/FIA	0.002 mg/L N	APHA (2005) 4500-NO ₃ F
Nitrite Nitrogen by FIA/Colorimetry	0.002 mg/L N	APHA (2005) 4500-NO ₂ B
Nitrate Nitrogen (Calculation)	mg/L N	CALCULATION
Soluble Reactive Phosphorus	0.005 mg/L P	APHA (2005) 4500-P F, modified
Total Phosphorus by Persulphate Digestion	0.01 mg/L P	APHA (2005) 4500-P B, F, modified
Total Kjeldahl Nitrogen by Calculation	mg/L N	
Total nitrogen by Persulphate Digestion/FIA	0.02 mg/L N	APHA (2005) 4500-P J, modified
Turbidity by Hach Meter	0.1 NTU	APHA (2005) 2130 B, modified
Volatile matter liquids	1 mg/L	APHA (2005) 2540 E

Sample Preparation for General Chemistry Testing on Saline Liquids

Prep	Description	Test Method
1	Membrane Filtration	Membrane Filter, 0.45µm
2	GF/C Filtration	Glass Fiber Filtration 1.2 um
3	Centrifuging	Centrifuging Pre-filtration

General Chemistry on Solids

The table below lists routine General Chemistry tests on solid samples. If a test you require is not included, please contact the marketing department on (09) 539 7785

Note: some tests require specific sample preparation steps as denoted in the prep column. Each preparation step is only charged once per sample regardless of how many tests it is required for.

Description	MDL	Test Method	Prep
Alkalinity Total dry weight	1 mg/kg CaCO ₃	Titrimetry; LOD	1, 3
Ammonia Nitrogen (solids) high level (NH ₃ + NH ₄)	4 mg/kg N	MEWAM, HMSO 1981, ISBN 0117516139	1, 2
Biochemical oxygen demand (Solids) (CBOD ₅)	mg/kg O	APHA (2005) 5210 B, modified	1
Chemical oxygen demand	mg/kg O	APHA (2005) 5220 D, modified	1
Chemical Oxygen demand dry weight	mg/kg O	APHA (2005) 5520 D, modified	1
Chloride as dry weight	1 mg/kg	APHA (2005) 4110 B	1, 3
Conductivity as Dry Weight	2.5 mS/m @ 25°C	Canadian Society of Soil Science (2008), Chap 18	1, 3
Cyanide total as dry weight	0.2 mg/kg drywt	APHA 4500-CN C & E, modified	1
Dry weight %	%w/w	APHA (2005) 2540 G	
Dry Weight % Solids Moisture Balance Method	%w/w	LOSS ON DRYING @ 103C	
Dry weight Solids	g	APHA (2005) 2540 G	
Nitrate Nitrogen extractable as dry weight (requires Total Oxidised Nitrogen and Nitrite)	1 mg/kg N	Canadian Society of Soil Science (2008)	
Nitrite Nitrogen extractable as dry weight	1 mg/kg N	Canadian Society of Soil Science (2008)	1, 2
Nitrogen Total as Drywt	50 mg/kg N	Canadian Society of Soil Science, USEPA 351.2	1
Nitrogen Total Oxidised extractable as dry weight	2 mg/kg N	Canadian Society of Soil Science (2008)	1, 2
Non volatile matter (requires Dry weight, Volatile matter)	% w/w	APHA (2005) 2540 G	1
Oil and Grease by ASE dry weight	20 mg/kg	APHA (2005) 5520 D, modified	1
pH on Solids/Sludges	0.1 pH Unit	APHA (2005) 4500-H B	3
Sulphate as dry weight by ion chromatography	1 mg/kg SO ₄	Calcium Chloride Extn, APHA (2005) 4110 B	1, 4
Total Kjeldahl Nitrogen as dry weight	10 mg/kg N	USEPA 351.2	1
Volatile matter	%w/w	APHA (2005) 2540 G	1

Sample Preparation for General Chemistry Testing on Solids

Prep	Description	Test Method
1	Dry weight % Sludge	APHA (2005) 2540 G
2	KCl extraction for NO ₃ , NO ₂ & NH ₃	Soil Sampling & Methods (1993) 4.2
3	Extraction for Alk, Cond, Cl (1:5 solid:water ratio)	Canadian Society of Soil Science (2008)
4	Extraction for SO ₄	Canadian Society of Soil Science (2008)

Miscellaneous General Chemistry Testing

Langelier Saturation Index

The Langelier Saturation Index is a means of evaluating water quality data to determine if the water has a tendency to be corrosive or scale forming. In order to use this index, the following laboratory analysis is needed: pH, conductivity, alkalinity, and total hardness. In manipulating the data, the actual pH of the water is compared to the theoretical pH (pHs) based on the chemical analysis. The Saturation Index is calculated:

$$SI = pH - pHs$$

The Saturation Index is typically either negative or positive and rarely 0. A Saturation Index of zero indicates that the water is “balanced” and is neither scale forming or corrosive.

A negative SI suggests that the water is corrosive. Corrosive water can react with plumbing and metal fixtures resulting in the deterioration of pipes and increased metal content of the water. This reaction could result in aesthetic problems, such as bitter water and stains around basins/sinks, and in some cases, elevated levels of toxic metals

A positive SI indicates that water may be scale forming. The scale, typically a carbonate residue, could clog or reduce the flow in pipes, cause build up on hot water heaters, impart an alkali taste to the water, reduce the efficiency of the water heaters, and cause other aesthetic problems.

Description	MDL	Test Method
Langelier saturation index		APHA (2005) 2330 B
Alkalinity total by Autotitrator	1mg/L CaCO ₃	APHA (2005) 2320 B
Alkalinity carbonate (requires total Alkalinity)	1mg/L CO ₃	APHA (2005) 2320 B
Alkalinity bicarbonate (requires total Alkalinity)	1mg/L HCO ₃	APHA (2005) 2320 B
Calcium: Total by ICPMS-Trace	0.01mg/L	USEPA 200.8, modified
Conductivity by Auto-titrator	0.5mS/m 25oC	APHA (2005) 2510 B
Minimum Charge: Total Trace Analyses		
Nitric/Hydrochloric Acid Digest (4:1 Ratio)		APHA (2005) 3030E, modified
pH(Autotitrator) at room temp(c.20°C)	0.1pH Unit	APHA (2005) 4500-H B

Ion Balance

An ion balance is used to check that the sums of all significant anions and cations in a sample are equal. (APHA 2005 Method 1030e) The result is expressed as a percentage. Tests required to perform an ion balance are listed below. Our report includes individual test results, conversion factors and percentages.

Description	MDL	Test Method
Ion balance Calculation		APHA (2005) 1030 E
Alkalinity total by Autotitrator	1mg/L CaCO ₃	APHA (2005) 2320 B
Calcium: Soluble by ICPMS-Trace	0.01mg/L	USEPA 200.8, modified
Chloride by Ion Chromatography	0.02mg/L	APHA (2005) 4110 B
Iron: Soluble by ICPMS-Trace	0.002mg/L	USEPA 200.8, modified
Potassium: Soluble by ICPMS-Trace	0.1mg/L	USEPA 200.8, modified
Membrane Filtration		Membrane Filter, 0.45um
Filtration for Soluble Metals		APHA (2005) 3030 B
Magnesium: Soluble by ICPMS-Trace	0.001mg/L	USEPA 200.8, modified
Sodium: Soluble by ICPMS-Trace	0.1mg/L	USEPA 200.8, modified
Ammonia Nitrogen low level Soluble	0.005mg/L N	MEWAM, HMSO 1981, ISBN 0117516139
Nitrate Nitrogen by Ion Chromatography	0.002mg/L N	APHA (2005) 4110 B
Sulphate by Ion Chromatography	0.02mg/L	APHA (2005) 4110 B

Dust Testing

We can supply a wide range of filter papers for dust testing.

Please note that initial and final weight test codes are charged, and the difference is not. If all the requirements for a calculation are satisfied the calculation is provided free of charge.

All filters are weighed in a dedicated room which is temperature and humidity controlled. All weights are taken in triplicate with the exception of Hi Volume filters. The price includes the cost of initial weighing, postage, final weights and reporting.

Description	Method	Weight (g/m ²)	Thickness (mm)	PoreSize (µm)	Dimensions (mm)
Glass Fibre Filter (47 mm): Weight Difference by Gravimetry	USEPA 7-1-95 Ed, Modified; AS/NZS 3580.9.3:2003, Modified	55	0.21	0.6	47
Glass Fibre Filter (90 mm): Weight Difference by Gravimetry	USEPA 7-1-95 Ed, Modified; AS/NZS 3580.9.3:2003, Modified	55	0.21	0.6	90
Glass Fibre Filter (110 mm): Weight Difference by Gravimetry	USEPA 7-1-95 Ed, Modified; AS/NZS 3580.9.3:2003, Modified	55	0.21	0.6	110
PTFE Filter (46.2 mm): Weight Difference by Gravimetry	USEPA 7-1-95 Ed, Modified; AS/NZS 3580.9.3:2003, Modified			2	46.2
PTFE Filter (46.2 mm): Visual Inspection	In-House Procedure				
Glass Fibre Filter (8" x 10"): Weight Difference by Gravimetry	USEPA 7-1-95 Ed, Modified; AS/NZS 3580.9.3:2003, Modified	85	0.45	2	203 x 254
Quartz Filter (47 mm): Visual Inspection	In-House Procedure	58	0.432	---	47
Glass Fibre/PTFE Filter (47 mm): Weight Difference by Gravimetry	USEPA 7-1-95 Ed, Modified; AS/NZS 3580.9.3:2003, Modified	50	0.178	---	47
Glass Fibre Filter (25 mm): Weight Difference by Gravimetry	USEPA 7-1-95 Ed, Modified; AS/NZS 3580.9.3:2003, Modified	53	0.26	1.6	25
Glass Fibre Filter (47 mm): Weight Difference by Gravimetry	USEPA 7-1-95 Ed, Modified; AS/NZS 3580.9.3:2003, Modified			1	45
Filter Weight Difference by Gravimetry	USEPA 7-1-95 Ed, Modified; AS/NZS 3580.9.3:2003, Modified				
Filter Weight Difference by Gravimetry	USEPA 7-1-95 Ed, Modified; AS/NZS 3580.9.3:2003, Modified				

Inorganic Chemistry



INORGANIC CHEMISTRY

Inorganic Chemistry

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Introduction

The Metals Department at Watercare Laboratory Services provides elemental analysis services to meet almost any need. A dedicated core of expert staff performs both routine and specialized custom analyses as required. Sample types that can be analysed include drinking waters, environmental waters, marine waters, wastewaters, trade wastes, soils, sludges, sediments, biosolids, solid wastes, dusts, filters, plants and shellfish. The majority of these analyses are currently ISO 17025 accredited.

Custom built facility

The department is housed within a custom-built laboratory complex that includes separate areas for sample preparation, instrumental analysis and office accommodation. To ensure optimum conditions for low level analysis, the metals complex also contains a positive-pressure cleanroom suite designed for contamination-free trace and ultra-trace level analyses. Entered through an airlock/gowning room, this area contains two separate cleanrooms; one for sample preparation and another for instrumental analysis. The actual instruments and all associated sample preparation are housed within the specialized cleanroom.

Instrumentation

Instrumentation available within the metals department includes two Agilent 7500ce series inductively-coupled plasma mass spectrometers (ICPMS); these can readily measure elemental concentrations down to the ppt (ng/L) level. Ancillary equipment available within the cleanroom suite includes data processing stations, precision balances, filtration stations and sample digestion apparatus, along with systems for producing ultrapure water and reagent acids.

For measuring higher elemental concentrations in samples such as trade wastes, the metals department has a Thermo iCAP6500 inductively coupled plasma optical emission spectrometer (ICPOES). This instrument is accommodated in a controlled environment outside of the cleanroom suite. In this area, the department also maintains a dedicated low level mercury analyzer and atomic absorption (AAS) instrumentation for clients who have specific regulatory requirements.

Sample preparation

The metals team uses specialised sample preparation technologies capable of homogenising and digesting anything from rocks and minerals through to shellfish and plant samples. Whatever your sample type, it is likely that the metals team will have what it takes to dissolve it and perform a comprehensive elemental analysis on it.

Quality Control

Quality control is a high priority and the metals team insists on meeting the most demanding specifications. All reference materials used are certified and directly traceable to the US National Institute of Standards. To ensure processes are accurate and fit-for-purpose, the laboratory participates in multiple inter-laboratory comparison schemes each year and regularly analyses standard reference samples of different sample types. Confidence is built in.

The following pages describe the tests routinely available in the metals department. However, many other "custom" tests are undertaken. If you don't see your sample type, the element you're interested in, or a detection limit low enough for your requirements, please contact the laboratory.

User notes

Sample-specific containers are available from the laboratory. These have been specially cleaned and, in many cases, contain preservative. Use of the correct containers is vital in assuring reliable results.

Please note that all samples require some form of preparation. Unless otherwise stipulated, the general preparation steps listed below apply.

Liquid samples:

For measuring total metals in liquids, the laboratory must perform an acid digestion prior to analysis. For measuring dissolved metals in liquids, a membrane filtration is required and this may be carried out on arrival at the laboratory or at the time of sampling using our specially prepared field-filter kits. This is best practice for ground water analysis.

Solid samples

For measuring total “recoverable” metals in solids, the samples must be dried and milled and then acid digested prior to analysis.

Sample quantity guideline

This table is a guideline only and the quantities detailed are for typical sample matrices. In many cases we can test smaller sample volumes. In these instances, specialist laboratory staff should be consulted.

Sample matrix	Type	Default Required Quantity	Minimum Required Quantity
Liquid	Water and wastewater	100 mL	See notes
	Saline waters	100 mL	See notes
	Miscellaneous	See notes	See notes
Solid	Sediments, Biosolids, Soils	500 g	50 g
	TCLP, SPLP	500 g	See notes
	Textiles	100 g	5 g
	Other	Please consult with technical expert on quantities required	
Shellfish / Biota	Cephalopods, crustacea, mussels, oysters,	20 g wet tissue weight (shucked)	See notes
	All bio matter including grasses, leaves, wood plus other	20 g wet tissue weight	See notes

Minimum sample quantities are required because:

- solid samples are rarely homogenous, enough material must be used to represent the sample site
- some test and preparation steps cannot be performed using lower quantities of sample
- a certain amount of sample is required to meet test detection limits
- in order to obtain results for all analytes, samples are frequently tested more than once

Field Filtration Kits

Kits are available for field filtering of trace metals samples. Each kit contains polyethylene gloves, a 60 mL syringe, a disposable filter and a trace-metal bottle containing ultraclean nitric acid preservative. The kits are cleanroom-prepared and double bagged to reduce the risk of sample contamination.

Please notify the laboratory in advance if you require these. Correct sampling technique is important to avoid sample contamination. Please ask for an instruction sheet or see instructions below.

General instructions for the use of field filtration kits for dissolved metal sampling

- Cleanliness is critical. Do not open bag until ready to sample. Do not set down bottle on any surface or allow to become dirty. Minimise the time that the cap is off the bottle and the bottle out of the bag.
- The bottle contains concentrated nitric acid as a preservative. Do not drain. Nitric acid is corrosive to skin, eyes and respiratory system. Avoid all contact.
- At sampling time, open outer bag. Remove and don the clean plastic gloves. (Do not substitute rubber or nitrile gloves)
- While wearing the gloves, open the bag containing the syringe, filter, and bagged bottle
- Rinse the syringe with sample and then refill
- If the filter has cover-plugs remove these from both of the longer barbed joints. Attach the filter to the full syringe with the printed side of the filter towards the syringe
- Depress the syringe to push sample through the filter. Discard the first 5-10 mL of sample
- Open the inner bag and remove the sample bottle. Uncap the bottle and filter the sample into it. Filter as much sample as possible, refilling the syringe when necessary, until the bottle is full
- If it is becoming difficult to depress the syringe, check that there are no air bubbles in the filter (air doesn't readily pass through the membrane). If there are no bubbles, it is probably a sign that the filter is beginning to clog. If the bottle is more than half full, stop filtering. Otherwise, attach a fresh filter to the syringe, filter and discard 5-10 mL of sample and then continue to fill the sample bottle
- Cap the bottle and reseal inside the bag
- Complete the label and return the sample to Watercare Laboratory Services for analysis
- Discard the syringe and filter after use. Under no circumstances use the same filter for a different sample

Water and Wastewater (IANZ Accredited)

The inorganic department offers a wide range of metals testing in a number of liquid matrices: clean drinking waters, wastewaters, process waters, ground waters, etc. Detection limits outlined below can be achieved for most sample matrices, however detection limits may be compromised for samples which contain high levels of certain analytes – please contact the laboratory if you have any concerns regarding this.

Method Description: ICPMS by US EPA Method 200.8 (modified)									
		Method Detection Limits (MDL)			Suites of Tests				
		Screen Level (mg/L)	Trace Level (mg/L)	Ultra-Trace Level (mg/L)	Heavy Metals	General	Leachate	Drinking Water	Comprehensive
Element	Symbol								
Aluminium	Al	0.06	0.005	0.0006		✓	✓	✓	✓
Antimony	Sb	0.005	0.001	0.00005				✓	✓
Arsenic	As	0.2	0.0001	0.00005	✓		✓	✓	✓
Barium	Ba	0.002	0.0002	0.00003				✓	✓
Beryllium	Be	0.002	0.00005	0.00002				✓	✓
Bismuth	Bi	0.002	0.00005	0.00001					✓
Boron	B	0.1	0.005	0.001		✓	✓	✓	✓
Cadmium	Cd	0.001	0.00005	0.000005	✓		✓	✓	✓
Caesium†	Cs	0.002	0.00005	0.00004					✓
Calcium	Ca	0.5	0.01	0.005		✓		✓	✓
Chromium (total)	Cr	0.01	0.0001	0.00001	✓		✓	✓	✓
Cobalt	Co	0.005	0.00003	0.000005			✓		✓
Copper	Cu	0.01	0.0002	0.00001	✓	✓	✓	✓	✓
Gold	Au	0.02	0.001	0.0005					✓
Iron	Fe	0.2	0.002	0.001		✓	✓	✓	✓
Lanthanum†	La	0.002	0.00001	0.00005					✓
Lead	Pb	0.002	0.0001	0.00005	✓	✓	✓	✓	✓
Lithium	Li	0.005	0.0001	0.00001				✓	✓
Magnesium	Mg	0.2	0.001	0.001		✓		✓	✓
Manganese	Mn	0.01	0.0005	0.00005		✓	✓	✓	✓
Mercury	Hg	0.001	0.00005	0.00005			✓	✓	✓
Molybdenum	Mo	0.005	0.0003	0.00005				✓	✓
Nickel	Ni	0.01	0.0001	0.0002	✓		✓	✓	✓
Phosphorus	P	0.2	0.01	0.01					✓
Potassium	K	0.5	0.1	0.04		✓		✓	✓
Rubidium†	Rb	0.002	0.00005	0.00002					✓
Selenium	Se	0.02	0.0005	0.0002			✓	✓	✓
Silicon (as Silica)	Si	2	0.1	0.05		✓			✓
Silver	Ag	0.002	0.00005	0.00003			✓	✓	✓
Sodium	Na	0.2	0.1	0.002		✓		✓	✓
Strontium†	Sr	0.01	0.00005	0.00001					✓
Sulfur* †	S	0.05	---	---					
Thallium	Tl	0.001	0.0005	0.0001					✓
Tin	Sn	0.01	0.0001	0.00005					✓
Titanium†	Ti	0.1	0.001	0.001					✓
Tungsten†	W	0.001	0.0001	0.0001					✓
Uranium	U	0.005	0.00001	0.00001				✓	✓
Vanadium	V	0.02	0.001	0.0005					✓
Zinc	Zn	0.02	0.001	0.0003	✓	✓	✓	✓	✓
Zirconium†	Zr	0.001	0.0005	0.0005					✓
Number of Elements in Suite					7	12	15	24	36
Preparation steps		Fraction			Description				
		Soluble metals			Membrane filtration for dissolved metals				
		Acid soluble metals			Membrane filtration for acid soluble metals				
		Total metals			Default Digestion for Total Metals				
NOTES:									
1. * = By ICPOES (Method APHA 3120B)									
2. † = Not IANZ Accredited									
3. If only one element is required, a minimum fee equal to the cost of a second element will be charged									
4. Ultratrace analysis is only suitable for very clean samples: samples MUST be received in the correct cleanroom-prepared bottles									

Water and Wastewater testing - Continued

Chromium testing

Chromium is present in the environment as two species – chromium 6+ and chromium 3+. Total chromium is the sum of these two species and is measured by ICPMS or ICPOES (see previous page). Chromium 6+ is a known carcinogen and is often specified in environmental regulations. It is measured using the specific methods listed below. Chromium 3+ is not measured directly but can be calculated as the difference between the total chromium and chromium 6+ concentrations. Please contact the laboratory if you are unsure which form of chromium test you require.

Analyte	Symbol	Method Description	MDL mg/L
Chromium 6+	Cr ⁶⁺	Colorimetric by Discrete Analyser (APHA 3500-Cr B). Not suitable for all sample types.* Contact the laboratory to discuss suitability.	0.005
Chromium 3+	Cr ³⁺	By calculation	
Chromium 6+	Cr ⁶⁺	Solvent Extraction/Digestion/ICPMS [Respective Methods: EPA 7197 / APHA3030a (modified)/EPA 200.8 (modified)]. Specialist method suitable for most sample types	enquire

*Note that turbid or highly coloured samples may cause interference using the discrete analyser method.

Summary of preparation steps for metals in liquids

Soluble and acid soluble metals

Description	Method Description
Membrane Filtration for dissolved metals	0.45 µm acid-washed filter, performed in cleanroom.
Membrane Filtration for Acid Soluble Metals	Adjust pH to .65-1.85, hold for 16 hours. Filter through 0.45 µm acid washed filter. Perform in cleanroom according to EPA Method 200.1
Field Filtration Kit for dissolved metals	Kit contains gloves, 0.45 µm filter cartridge, syringe and preserved bottle—all double bagged: cleanroom prepared.

Total metals and silver

Description	Method Description
Default Digestion for Total Metals	45 mL sample, 4mL HNO ₃ , 1 mL HCl, 95°C for 2 hours. Performed in cleanroom
Default Digestion for Silver ²	40 mL Sample, 5 mL HCl, 2 mL HNO ₃ , 95°C for 2 hours. Performed in cleanroom

Note:

1. The alternative digestion method is available to customers who have used the method historically or as a preference.
2. Samples containing high level silver include photographic process solutions and dentistry wastes.

Water and Wastewater Reference Limits

Reference Limits are for guideline purposes only. For regulatory purposes please ensure that the relevant standard is consulted in its entirety.

Reference Limits					
Element	Symbol	NZ Drinking Water Maximum allowable value	NZ Drinking Water Guideline Value	ANZECC Guideline. (99% Protection level)	ANZECC Guideline (95% Protection Level)
Aluminium	Al	—	0.1	0.027	0.055
Antimony	Sb	0.02	—	—	—
Arsenic	As	0.01	—	—	—
Barium	Ba	0.7	—	—	—
Beryllium	Be	0.004	—	—	—
Bismuth	Bi	—	—	—	—
Boron	B	1.4	—	0.09	0.37
Cadmium	Cd	0.004	—	0.00006	0.0002
Caesium	Cs	—	—	—	—
Calcium	Ca	—	100-300 Total Hardness as CaCO ₃	—	—
Chromium	Cr	0.05	—	—	—
Cobalt	Co	2	—	—	—
Copper	Cu	—	1	0.001	0.0014
Gold	Au	—	—	—	—
Iron	Fe	—	0.2	—	—
Lanthanum	La	—	—	—	—
Lead	Pb	0.01	—	0.001	0.0034
Lithium	Li	1	—	—	—
Magnesium	Mg	—	100-300 Total Hardness as CaCO ₃	1.2	1.9
Manganese	Mn	0.4	0.04	—	—
Mercury	Hg	—	—	—	—
Molybdenum	Mo	0.07	—	—	—
Nickel	Ni	0.02	—	0.008	0.011
Phosphorus	P	—	—	—	—
Potassium	K	—	—	—	—
Rubidium	Rb	—	—	—	—
Selenium	Se	0.01	—	0.005	0.011
Silicon	Si	—	—	—	—
Silver	Ag	0.1	—	0.00002	0.00005
Sodium	Na	—	200	—	—
Strontium	Sr	—	—	—	—
Sulfur		—	—	—	—
Thallium	Tl	—	—	—	—
Tin	Sn	—	—	—	—
Titanium	Ti	—	—	—	—
Tungsten	W	—	—	—	—
Uranium	U	0.02	—	—	—
Vanadium	V	—	—	—	—
Zinc	Zn	—	1.5	0.0024	0.008
Zirconium	Zr	—	—	—	—

Saline Waters

Testing for metals in saline waters is difficult due to the high salt content. Sample dilution is required to reduce the salt concentration, however please be aware that this can raise the detection limit for other analytes.

Element	Symbol	Relevant Environmental Standard Requirements		Watercare Method Detection Limits	Suites of Tests	
		ANZECC 99% Level	ANZECC 95% Level	Trace Level (ICP-MS)	Heavy Metals	Comprehensive
Aluminium	Al			0.05		✓
Antimony	Sb			0.01		✓
Arsenic	As			0.001	✓	✓
Barium	Ba			0.002		✓
Beryllium	Be			0.0005		✓
Bismuth	Bi			0.0005		✓
Boron	B			0.05		✓
Cadmium	Cd	0.0007	0.0055	0.0005	✓	✓
Caesium	Cs			0.0005		✓
Calcium	Ca			0.1		✓
Chromium	Cr	0.0077	0.0274	0.001	✓	✓
Cobalt	Co	0.000005	0.001	0.0003		✓
Copper	Cu	0.0003	0.0013	0.002	✓	✓
Gold	Au			0.01		✓
Iron	Fe			0.02		✓
Lanthanum	La			0.0001		✓
Lead	Pb	0.0022	0.0044	0.001	✓	✓
Lithium	Li			0.001		✓
Magnesium	Mg			0.01		✓
Manganese	Mn			0.005		✓
Mercury	Hg	0.0001	0.0004	0.0005		✓
Molybdenum	Mo			0.003		✓
Nickel	Ni	0.007	0.07	0.001	✓	✓
Phosphorus	P			0.1		✓
Potassium	K			1		✓
Rubidium	Rb			0.0005		✓
Selenium	Se			0.005		✓
Silicon (as Silica)	Si			1		✓
Silver	Ag	0.0008	0.0014	0.0005		✓
Sodium	Na			1		✓
Strontium	Sr			0.0005		✓
Thallium	Tl			0.005		✓
Tin	Sn			0.001		✓
Titanium	Ti			0.01		✓
Tungsten	W			0.001		✓
Uranium	U			0.0001		✓
Vanadium	V			0.01		✓
Zinc	Zn	0.007	0.015	0.01	✓	✓
Zirconium	Zr			0.005		✓

Tests for metals in saline waters are not IANZ accredited.

NOTES:

1. If only one element is required, a minimum fee equal to the cost of a second element will be charged
2. Ultratrace detection limits are available by request. Please contact the laboratory.

Summary of digestion steps for metals in saline water

Description	Method Description
Membrane Filtration (for soluble or acid-soluble metals)	0.45 µm acid-washed filter, performed in cleanroom.
Default Digestion for Total Metals	45 mL sample, 4mL HNO ₃ , 1 mL HCl, 95°C for 2 hours. Performed in cleanroom

Solids (IANZ Accredited)

The department can handle a wide variety of solid sample types including but not limited to: soils, biosolids, textiles, sediments.

Solids Analysis by ICPMS: US EPA Method 200.8 (modified)							
		Total Recoverable Metals		TCLP extraction (US EPA 1311)			
		MDL (mg/kg)		MDL (mg/L)	Suites of Tests		
	Symbol	Screen Level	Trace Level	Screen Level Only**	Heavy	General	Comprehensive
Aluminium	Al	20	2	0.06			✓
Antimony	Sb	0.5	0.05	0.005		✓	✓
Arsenic	As	0.2	0.02	0.2	✓	✓	✓
Barium	Ba	0.2	0.02	0.002			✓
Beryllium	Be	0.1	0.01	0.002			✓
Bismuth	Bi	0.1	0.01	0.002			✓
Boron	B	5	0.5	0.1		✓	✓
Cadmium	Cd	0.1	0.01	0.001	✓	✓	✓
Caesium	Cs	0.1	0.01	0.002			✓
Calcium	Ca	50	5	0.5		✓	✓
Chromium (total)	Cr	0.2	0.02	0.01	✓	✓	✓
Cobalt	Co	0.05	0.005	0.005		✓	✓
Copper	Cu	0.5	0.05	0.01	✓	✓	✓
Gold	Au	0.5	0.05	0.02			✓
Iron	Fe	3	0.3	0.2			✓
Lanthanum	La	0.02	0.002	0.002			✓
Lead	Pb	0.04	0.03	0.002	✓	✓	✓
Lithium	Li	0.5	0.075	0.005			✓
Magnesium	Mg	50	5	0.2		✓	✓
Manganese	Mn	0.5	0.05	0.01			✓
Mercury	Hg	0.05	0.005	0.001			✓
Molybdenum	Mo	0.5	0.05	0.005		✓	✓
Nickel	Ni	0.3	0.05	0.01	✓	✓	✓
Phosphorus	P	10	1	0.2			✓
Potassium	K	100	20	0.5		✓	✓
Rubidium	Rb	0.05	0.005	0.002			✓
Selenium	Se	0.2	0.02	0.02			✓
Silicon (as Silica)	Si	100	10	2			✓
Silver	Ag	0.5	0.05	0.002			✓
Sodium	Na	100	20	---			✓
Strontium	Sr	0.2	0.02	0.01			✓
Sulphur*†	S	5	---	0.05			✓
Thallium	Tl	2	0.2	0.001			✓
Tin	Sn	0.75	0.075	0.01		✓	✓
Titanium†	Ti	2	0.1	0.1			✓
Tungsten†	W	2	0.01	0.001			✓
Uranium	U	0.2	0.02	0.005			✓
Vanadium	V	0.5	0.05	0.02			✓
Zinc	Zn	7.5	0.75	0.02	✓	✓	✓
Zirconium†	Zr	2	0.05	0.001			✓
Number of Elements in Suite					7	15	39

* By ICPOES (Method APHA 3120B)

† Not IANZ Accredited

** Lower detection limits not available due to high levels of sodium in leachate; IANZ accredited for all metals except sulphur. IANZ accredited for hexavalent chromium analysis in TCLP extracts

Summary of digestion steps for solids	
Description	Method Description
Preparation for Digestion	Dry at 60°C. Grind to fine powder.
Default Digestion for Recoverable Metals	0.5 g sample, 1mL HCl, 1 mL HNO ₃ , 4 mL H ₂ O, 30 min at 95°C. (According to EPA Method 200.8)

Solids Reference Limits

Reference Values								
		Total Recoverable Metals (mg/kg)					TCLP Extraction (mg/L)	
	Symbol	NZ Biosolids Guidelines	NZS 9201 (Trade Waste Limits)	Class A Landfill	Class B Landfill	National Environmental Standard - Residential (Proposed)	Class A Landfill	Class B Landfill
Aluminium	Al	—	—	800	80	—	40	4
Antimony	Sb	—	10	12	1.2	—	0.6	0.06
Arsenic	As	20	5	100	10	20	5	0.5
Barium	Ba	—	10	2000	200	—	100	10
Beryllium	Be	—	0.005	200	20	—	10	1
Bismuth	Bi	—	—	—	—	—	—	—
Boron	B	—	—	400	40	34000	20	2
Cadmium	Cd	1	0.5	20	2	5*	1	0.1
Caesium	Cs	—	—	—	—	—	—	—
Calcium	Ca	—	—	—	—	—	—	—
Chromium (total)	Cr	600	5	—	—	—	—	—
Cobalt	Co	—	10	—	—	—	—	—
Copper	Cu	100	10	100	10	32000	5	0.5
Gold	Au	—	—	—	—	—	—	—
Iron	Fe	—	—	—	—	—	—	—
Lanthanum	La	—	—	—	—	—	—	—
Lead	Pb	300	10	100	10	730	5	0.5
Lithium	Li	—	—	400	40	—	20	2
Magnesium	Mg	—	—	—	—	—	—	—
Manganese	Mn	—	20	—	—	—	—	—
Mercury	Hg	—	0.005	4	0.4	380	0.2	0.02
Molybdenum	Mo	—	10	200	20	—	10	1
Nickel	Ni	60	10	200	20	—	10	1
Phosphorus	P	—	—	—	—	—	—	—
Potassium	K	—	—	—	—	—	—	—
Rubidium	Rb	—	—	—	—	—	—	—
Selenium	Se	—	10	200	20	—	1	0.11
Silicon (as Silica)	Si	—	—	—	—	—	—	—
Silver	Ag	—	2	200	20	—	5	0.5
Sodium	Na	—	—	—	—	—	—	—
Strontium	Sr	—	—	—	—	—	—	—
Sulphur	S	—	—	—	—	—	—	—
Thallium	Tl	—	10	—	—	—	—	—
Tin	Sn	—	20	20000	2000	—	1000	100
Titanium	Ti	—	—	—	—	—	—	—
Tungsten	W	—	—	—	—	—	—	—
Uranium	U	—	—	—	—	—	—	—
Vanadium	V	—	—	40	4	—	2	0.2
Zinc	Zn	300	10	200	20	—	10	1
Zirconium	Zr	—	—	—	—	—	—	—
* Cadmium in soil with pH 5								

Shellfish/Biota

The department regularly tests a wide variety of samples including shellfish and other biological materials. The department is IANZ accredited for shellfish and crustaceans. We have significant experience in this area so please call to discuss your requirements whatever your sample type.

Element	Symbol	MDL (mg/kg dry weight)	Heavy Metals Suite	Comprehensive Suite
		(by ICP-MS)		
Aluminium	Al	2		✓
Antimony	Sb	0.1		✓
Arsenic	As	0.04	✓	✓
Barium	Ba	0.09		✓
Beryllium	Be	0.005		✓
Bismuth	Bi	0.005		✓
Boron	B	0.3		✓
Cadmium	Cd	0.006	✓	✓
Calcium	Ca	10		✓
Caesium	Cs	0.01		✓
Chromium	Cr	0.04	✓	✓
Cobalt	Co	0.01		✓
Copper	Cu	2	✓	✓
Gold	Au	0.1		✓
Iron	Fe	20		✓
Lanthanum	La	0.01		✓
Lead	Pb	0.02	✓	✓
Lithium	Li	0.03		✓
Magnesium	Mg	20		✓
Manganese	Mn	0.1		✓
Mercury	Hg	0.008		✓
Molybdenum	Mo	0.05		✓
Nickel	Ni	0.1	✓	✓
Phosphorus	P	30		✓
Potassium	K	30		✓
Rubidium	Rb	0.02		✓
Selenium	Se	0.05		✓
Silicon (as Silica)	Si	40		✓
Silver	Ag	0.07		✓
Sodium	Na	150		✓
Strontium	Sr	0.2		✓
Thallium	Tl	0.05		✓
Tin	Sn	0.03		✓
Titanium [†]	Ti	0.4		✓
Tungsten [†]	W	0.3		✓
Uranium	U	0.002		✓
Vanadium	V	0.1		✓
Zinc	Zn	5	✓	✓
Zirconium [†]	Zr	0.3		✓
Number of Elements in Suite			7	39

NOTES:

1. Shellfish require shucking (unless this is done by the client) and must then be homogenised and digested.
2. In order to report results as mg/kg dry weight of sample (default), the moisture content must also be determined.
3. If only one element is required, a minimum fee equal to the cost of a second element will be charged

Summary of digestion steps for shellfish / biota

Description	Method Description
Shucking (once per sample)	Sufficient shellfish to provide 20 g wet tissue
Sample Homogenising	Crush/chop/blend/pulverise as required
Biological Materials Digestion	0.5g sample (dry weight) 8 mL HNO ₃ , 1 mL HCl, 95°C 1 hour, 2 mL H ₂ O ₂ , 85°C 1 hour
Percent solids	Dry at 60 deg C overnight, then dry at 105 deg C overnight

Inorganic Analysis on Dust Filters (IANZ Accredited)

The department can test for a wide range of metals on filters. Because detection limits depend on baseline levels of metals within filters, at least one blank filter from each batch should be supplied along with samples for analysis.

Element	Symbol	MDL (µg) (by ICP-MS)
Aluminium	Al	0.025
Antimony	Sb	0.5
Arsenic	As	0.01
Barium	Ba	0.05
Beryllium	Be	0.01
Bismuth	Bi	0.005
Boron	B	0.005
Cadmium	Cd	0.5
Caesium	Cs	0.0025
Calcium	Ca	2.5
Chromium	Cr	0.0025
Cobalt	Co	0.005
Copper	Cu	0.005
Gold	Au	0.025
Iron	Fe	0.25
Lanthanum	La	0.01
Lead	Pb	5
Lithium	Li	0.005
Magnesium	Mg	0.025
Manganese	Mn	0.25
Mercury	Hg	0.025
Molybdenum	Mo	0.025
Nickel	Ni	10
Phosphorus	P	0.025
Potassium	K	0.015
Rubidium	Rb	0.5
Selenium	Se	0.01
Silicon (as Silica)	Si	0.1
Silver	Ag	0.015
Sodium	Na	5
Strontium	Sr	0.01
Thallium	Tl	0.025
Tin	Sn	0.1
Titanium†	Ti	0.001
Tungsten†	W	0.0001
Uranium	U	0.0025
Vanadium	V	0.01
Zinc	Zn	0.1
Zirconium†	Zr	0.0005

† Not IANZ Accredited

NOTES:

1. If only one element is required, a minimum fee equal to the cost of a second element will be charged
2. Each filter will require a digestion (DIG3030).
3. Because detection limits depend of baseline levels of metals within filters, at least one blank filter from each batch should be supplied along with samples for analysis

Digestion step for total metals on filters

Description	Method Description
Default Digestion for Total Metals	45 mL sample, 4mL HNO ₃ , 1 mL HCl, 95°C for 2 hours. Performed in cleanroom

Miscellaneous Inorganic Testing

Ryznar Index

Description	MDL	Units	Accredited	Test Method
Alkalinity total by Autotitrator	1	mg/L CaCO ₃	IANZ	APHA (2005) 2320 B
Calcium Total by ICP	0.02	mg/L	IANZ	APHA (2005) 3120 B; USEPA 6010
Minimum Charge: Total ICP-OES Analyses				0
Total dissolved solids	1	mg/L		APHA (2005) 2540 C (Modified)
Ryznar Index				By Calculation
Default digestion for Total Metals				APHA (2005) 3030E (Modified)

Sodium Adsorption Ratio – (Soil samples only)

Description	MDL	Units	Accredited	Test Method
Calcium Trace by ICPMS	0.01	mg/L	IANZ	USEPA 200.8 (Modified)
Nitric/Hydrochloric Acid Digest (5:1 Ratio)				APHA (2005) 3030E (Modified)
Magnesium Trace by ICPMS	0.005	mg/L	IANZ	USEPA 200.8 (Modified)
Sodium Adsorption Ratio				By Calculation
Fixed Ratio (1:5) Aqueous Soil Extraction				Rhoades 1982
Sodium Trace by ICPMS	0.1	mg/L	IANZ	USEPA 200.8 (Modified)

Hardness

Description	MDL	Units	Accredited	Test Method
Calcium Trace by ICPMS	0.01	mg/L	IANZ	USEPA 200.8 (Modified)
Magnesium Trace by ICPMS	0.005	mg/L	IANZ	USEPA 200.8 (Modified)
Default Digestion for Total Metals		m/L		APHA(2005) 303E
Total Hardness		mg/L CaCO ₃	IANZ	By calculation

*Hardness is also available as dissolved hardness

TCLP Extraction

Description	Test Method
*TCLP extraction	USEPA 1311
Default Digestion for Total Metals	APHA (2005) 3030E (Modified)

SPLP Extraction

Description	Test Method
*SPLP extraction	USEPA 1312

Elutriation Extraction

Description	Test Method
*Elutriation Extraction	Four parts water to one part sediment, 60 min agitation

* not IANZ Accredited

Organic Chemistry



ORGANIC CHEMISTRY

Organic Chemistry

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Introduction

The Organic Chemistry department is primarily involved with the analysis of carbon containing compounds in soil, water and air samples. The department is led by Dr Peter Boniface who has over 10 years experience dealing with the analysis and interpretation of environmental samples.

Organic chemicals are widely used worldwide and some of them are very persistent and do not break down easily in the environment. Organic compounds also appear in the environment from the use and manufacture of pesticides and herbicides, solvents and also as by products from the chlorination of water for drinking purposes. Many of these compounds are deleterious to human health if consumed regularly. For these reasons the analysis of organic compounds is very commonly carried out.

Instrumentation

Equipment within the department includes two dedicated GC/MS with purge and trap for the analysis of volatiles in soil and waters, four GC/MS setup for the analysis of phenols and semi volatiles in soil and waters, two LC/MS/MS for the analysis of herbicides, pesticides, cyanotoxins as well as endocrine disruptors. Other instruments include two GC/MS/MS triple quad for the analysis of herbicides and pesticides at trace levels in various matrices, GC with FID and ECD detectors for the analysis of total petroleum hydrocarbons and trace level chlorinated compounds respectively, two TOC instruments for the analysis of organic carbon in solids and waters and two automated extractors for extraction of semi volatile analytes of interest in soils.

Drinking water

The department is very experienced in the analysis of drinking water, carrying out all organic analysis of Auckland drinking water, such as disinfection by-products. Chlorination of water is carried out routinely to kill bacteria and viruses. The chlorine reacts with organic compounds to form disinfection by-products. These compounds have limits set by the Ministry of Health and the organic department can monitor all these compounds to very low levels of detection.

Trade waste analysis

Another important analytical service is the monitoring of trade waste for resource consent. Companies producing manufactured goods often have consents based on how much of the by-products of manufacture can be discharged to the sewer. The organic chemistry department routinely assists in analysing the level of contamination and if this meets set consent limits.

Petroleum products

The use of petroleum products is ubiquitous in today's environment. These compounds cause pollution in streams, rivers soils, etc. The organic chemistry department can analyse these compounds and give the client a report which can suggest what the source of contamination is i.e. petrol, diesel, etc.

Soils and solids

The department has considerable experience in soil analysis. Most analyses that are carried out are accredited by IANZ, an internationally recognised accreditation body. Both Accelerated Solvent Extraction (ASE) and Sonication extraction methods are used for the extraction of organic contaminants in these matrices.

Summary of liquid suites available

The following suites are available from our organic chemistry department. Most suites are available with both screen and trace levels of detection. Refer to detailed suite information for the compounds covered and preparation steps.

Description	MDL	Test Method
Acid Herbicides (AH) Liquids Trace Profile	0.0001 mg/L	SPE, LC MS/MS
Alcohol Profile	1 mg/L	SPME GC-FID
Aldehyde Liquids Profile	0.01 mg/L	USEPA 8315A, modified
BTEX Liquids Trace Profile	0.0001 mg/L	APHA(2005) 6200B purge and trap GCMS
BTEX Liquid Screen Profile	0.001 mg/L	APHA(2005) 6200B purge and trap GCMS
Cyanotoxins Liquid Trace Profile	0.5 ug/L	LC MS/MS
Cyanotoxins Liquid Screen Profile	1 ug/L	LC MS/MS
Dihaloacetoneitriles (DHA/DBP) Liquids Trace Profile	0.00002 mg/L	USEPA 551.1 modified
Dissolved organic carbon	0.1 mg/L	USEPA 551.1 modified
GCMS qualitative scan		Dichloromethane extraction, GCMS
Haloacetic Acid (HAA) Liquids Trace Profile	0.001 mg/L	APHA (2005) 6251 B, modified
Organochlorine Pesticides (OCP) Liquids Screen Profile	0.0001-0.0003 mg/L	APHA (2005) 6630 B, modified SPE GC-ECD/MS/MS
Organochlorine Pesticides (OCP) Liquids Trace Profile	0.00004 mg/L	APHA (2005) 6630 B, modified SPE GC-ECD/MS/MS
Organonitrogen OrganoPhosphorus Pesticides – ONOP Trace	0.03 – 0.1 ug/L	Instrumental Techniques by GC/MS 2.70
Poly Aromatic Hydrocarbons (PAH) Liquids Trace Profile	0.0001 mg/L	APHA (2005) 6410 B, modified, GCMS or GC/MS/MS
Poly Aromatic Hydrocarbons (PAH) Liquids Screen Profile	0.001 mg/L	APHA (2005) 6410 B, modified, GCMS or GC/MS/MS
Polychlorinated Biphenyls (PCB) Liquids Trace Profile	1 ng/L	USEPA 1668, modified, GC-ECD or GCMS
Phenols (PHN) Liquids Screen Profile	0.01 mg/L	SPME, GCMS
Phenols (PHN) Liquids Trace Profile	0.001-0.004 mg/L	SPME, GCMS
Siloxanes Liquid Trace Profile	1 mg/L	In-house GCMS
SVOC Liquids Screen Profile	0.001-0.03 mg/L	APHA (2005) 6410 B, modified
SVOC Liquids Trace Profile	0.0001-0.003 mg/L	APHA (2005) 6410 B, modified
Taste & Odour Liquids Profile	1 ng/L	APHA (2005) 6410 B, modified
Total organic carbon	0.1 mg/L	APHA (2005) 5310 B
Total Petroleum Hydrocarbons (C7-C36) Liquids Trace Profile	0.3 mg/L	Extraction GC-FID
Trihalo Methanes (THM) Liquids Trace Profile	0.0001 mg/l	APHA (2005) 6200 B purge and trap GCMS
VOC Liquids Trace Profile	0.0001 mg/L	APHA (2005) 6200 B purge and trap GCMS
VOC Liquids Screen Profile	0.001 mg/L	APHA (2005) 6200 B purge and trap GCMS
Volatile acids (total) by GC	10 mg/L	GC-FID

*The SVOC Suite includes: PAH, OCP, and other miscellaneous compounds (see page 77 for full breakdown)

**Minimum sample quantities apply

Summary of solid suites available – (includes shellfish and biota)

The following suites are available from our organic chemistry department. Most suites are available with both screen and trace levels of detection. Refer to detailed suite information for the compounds covered and preparation steps.

Description	MDL	Test Method
Acid Herbicides (AH) Solids Trace Profile	0.01 mg/kg	SPE, LC MS/MS
BTEX Solids Screen Profile	1 mg/kg	USEPA 8260, modified
BTEX Solids Trace Profile	0.1 mg/kg	USEPA 8260, modified
Organochlorine Pesticides (OCP) Solids Screen Profile	0.01-0.04 mg/kg	USEPA 8270
Organochlorine Pesticides (OCP) Solids Trace Profile	0.001-0.004 mg/kg	USEPA 8270
Organonitrogen OrganoPhosphorus Pesticides - ONOP	0.02 – 0.09 mg/kg	Instrumental Techniques by GC/MS 2.70
Phenols (PHN) Solids Screen Profile	1 mg/kg	USEPA 8270
Phenols (PHN) Solids Trace Profile	0.1 mg/kg	USEPA 8270
Poly Aromatic Hydrocarbons (PAH) Solids Screen Profile	0.1 mg/kg	USEPA 8270,GC/MS/MS
Poly Aromatic Hydrocarbons (PAH) Solids Trace Profile	0.001 mg/kg	USEPA 8270,GC/MS/MS
Polychlorinated Biphenyls (PCB) Solids Trace Profile	0.002 mg/kg	USEPA 1668, modified, GCMS/MS
Siloxanes Dry Weight Trace Profile	1 mg/kg	In-house GCMS
SVOC Solids Screen Level Profile	1-5 mg/kg	USEPA 8270
SVOC Solids Trace Profile	0.1 mg/kg	USEPA 8270
Total Petroleum Hydrocarbons (C7-C36) Solids Trace Profile	30 mg/kg	Extraction GC-FID
Total Organic Carbon Dry Weight	% w/w	APHA (2005) 5310 B
VOC Solids Screen Profile	0.1 mg/kg	USEPA 8260B, modified
Volatile Organic Compounds (VOC) Solids Trace Profile	0.001 0.005 mg/kg	USEPA 5035, modified

*ASE is the primary extraction method used. Please advise the laboratory if sonication is required.

** Detection limits may vary from those published for shellfish and biota sample matrices

*** Prices listed above are for analysis only. Additional costs may apply for preparation steps necessary.

Summary of drinking water suites available

The organics laboratory regularly tests raw water and drinking water for a range of compounds. Detailed compound lists and any relevant preparation steps are shown in subsequent sections of the book.

Description	MDL	Test Method
Cyanotoxins Liquid Trace Profile	0.5 ug/L	LC MS/MS
Dihaloacetonitriles (DHA/DBP) Liquids Trace Profile	0.00002 mg/L	USEPA 551.1
Epichlorohydrin	0.01 mg/L	USEPA 8260, modified
Haloacetic Acid (HAA) Liquids Trace Profile	0.001 mg/L	APHA (2005) 6251 B, modified
Taste & Odour Liquids Profile	1 ng/L	APHA (2005) 6410 B, modified
Trihalo Methanes (THM) Liquids Trace Profile	0.0001 mg/l	APHA (2005) 6200 B purge and trap GCMS
VOC Liquids Trace Profile	0.0001 mg/L	APHA (2005) 6200 B purge and trap GCMS
SVOC Liquids Trace Profile	0.0001-0.003 mg/L	APHA (2005) 6410 B, modified

Summary of air quality suites available

The laboratory is able to test for various air borne compounds. We can accept and test samples from Tedlar bags, ATD tubes, passive collectors and other. Please contact the laboratory if you have any questions.

Description	MDL	Test Method
IMPINGER		
Aldehyde on Air Profile	0.5 ug	USEPA 8315A, modified
Total VOC as Toluene	0.02 ug	USEPA TO17, Calculation
Formaldehyde	0.01 mg/L	USEPA 8315A Modified
TUBES		
TD PHN Trace Profile	0.1-4 ug	ORBO Tube
TD SVOC Trace Profile	0.1-4 ug	ORBO Tube
Thermal Desorb Volatile Organic Compounds	0.02 ug	USEPA TO17
Organophosphate Profile on XAD Tubes	1 ng	OSHA Method 62
BAGS		
Methane	mg/L	GC-FID
Thermal Desorb Volatile Organic Compounds	0.02 ug	USEPA TO17

Acid Herbicides - AH

Acid herbicides are used to control weeds and are water soluble. As a consequence they may find their way into source water used for drinking. Many of these compounds have limits in the NZ drinking water regulations.

Our laboratory is able to perform AH testing on both soils and liquids.

The detection limits quoted are those determined for clean samples (e.g. drinking waters). Many samples contain substances that can interfere with particular tests. In such instances, the detection limits are likely to be different to those listed. Please contact the laboratory for further advice.

Note, for the analysis of solid samples a dry weight preparation step is required.

Acidic herbicides		
Accreditation	IANZ	IANZ
Description	Liquids	Solids
	Trace	Trace
	MDL	
	mg/L	mg/kg
2-(2,4,5-trichlorophenoxy)propionic acid (fenoprop)	0.0001	0.01
2,4,5-trichlorophenoxyacetic acid	0.0001	0.01
2,4-Dichlorophenoxyacetic acid (2,4-D)	0.0001	0.01
3,5-Dichlorobenzoic Acid	0.0001	0.01
4-(2,4-dichlorophenoxy) butanoic acid (2,4-DB)	0.0001	0.01
Acifluorfen	0.0001	0.01
Bentazone	0.0001	0.01
Chloramben	0.0001	0.01
Clopyralid	0.0001	0.01
Dicamba	0.0001	0.01
Dichlorprop	0.0001	0.01
Dinoseb	0.0001	0.01
MCPA	0.0001	0.01
Mecoprop (MCP)	0.0001	0.01
Picloram	0.0001	0.01
Tetrachloroterephthalic Acid	0.0001	0.01
Triclopyr	0.0001	0.01
2,4-Dichlorophenoxyacetic acid (2,4-D)	0.0001	0.01
MCPB	0.0001	0.01

Alcohols - ALC

Our laboratory is able to perform alcohol testing on liquids. The detection limits quoted are those determined for clean samples (e.g. drinking waters). Many samples contain substances that can interfere with particular tests. In such instances, the detection limits are likely to be different to those listed. Please contact the laboratory for further advice.

Alcohols	
Accreditation	Pending
Description	Liquids
	Trace
	MDL
	mg/L
Methanol	1
Ethanol	1
Isopropanol	1

Aldehydes-ALD

(Including Formaldehyde)

Our laboratory is able to perform Aldehyde testing on both Air and liquids.

The detection limits quoted are those determined for clean samples (e.g. drinking waters). Many samples contain substances that can interfere with particular tests. In such instances, the detection limits are likely to be different to those listed. Please contact the laboratory for further advice.

Aldehydes		
Accreditation	IANZ	
Description	Liquids	
	Trace	
	MDL	
	mg/L	µg
Acetaldehyde	0.01	0.5
Butanal	0.01	0.5
Crotonaldehyde	0.01	0.5
Cyclohexanone	0.01	0.5
Decanal	0.01	0.5
Formaldehyde	0.01	0.5
Heptanal	0.01	0.5
Hexanal	0.01	0.5
Nonanal	0.01	0.5
Octanal	0.01	0.5
Pentanal	0.01	0.5
Propanal	0.01	0.5

BTEX

BTEX stands for benzene, ethylbenzene, ethyl benzene and xylenes. They are commonly found as components of petrol. Xylenes are also used as solvents. If a sample is suspected to contain petrol then BTEX is the best test as TPH is not specific for these compounds.

Our laboratory is able to perform BTEX testing on both soils and liquids.

The detection limits quoted are those determined for clean samples (e.g. drinking waters). Many samples contain substances that can interfere with particular tests. In such instances, the detection limits are likely to be different to those listed. Please contact the laboratory for further advice.

BTEX				
Accreditation	IANZ			
Description	Liquids		Solids	
	Screen	Trace	Screen	Trace
	MDL			
	mg/L		mg/kg	
1,2,4-trimethylbenzene	0.001	0.0001	1	0.1
1,3,5-trimethylbenzene	0.001	0.0001	1	0.1
benzene	0.001	0.0001	1	0.1
ethylbenzene	0.001	0.0001	1	0.1
iso-propylbenzene	0.001	0.0001	1	0.1
m- & p-xylene	0.001	0.0001	1	0.1
n-butylbenzene	0.001	0.0001	1	0.1
n-propylbenzene	0.001	0.0001	1	0.1
o-xylene	0.001	0.0001	1	0.1
p-isopropyl toluene	0.001	0.0001	1	0.1
sec-butylbenzene	0.001	0.0001	1	0.1
tert-butyl benzene	0.001	0.0001	1	0.1
toluene	0.001	0.0001	1	0.1

Screen-level analyses can be performed on some samples. Please contact the laboratory to discuss. Note, for the analysis of solid samples a dry weight preparation step is required.

Cyanotoxins - CYN

Our laboratory is able to analyse samples for Cyanotoxins in liquid samples using our LC/MS/MS.

The detection limits quoted are those determined for clean samples (e.g. drinking waters). Many samples contain substances that can interfere with particular tests. In such instances, the detection limits are likely to be different to those listed. Please contact the laboratory for further advice.

We are also able to handle marine and shellfish samples. Please contact the laboratory to discuss requirements.

Cyanotoxins		
Accreditation	IANZ	IANZ
Description	Liquids	
	Screen	Trace
	MDL	
	mg/L	mg/L
Microcystin-LR	0.001	0.0005
Microcystin-RR	0.001	0.0005
Microcystin-YR	0.001	0.0005
Microcystin-Total	0.001	0.0005
Nodularin	0.001	0.0005
Anatoxin	0.001	0.0005
Cylindrospermopsin	0.001	0.0005

Dihaloacetonitriles - DHA or Disinfection by-products - DBP

These compounds are all disinfection by-products i.e. they are formed from the reaction of chlorine with carbon species in the source water. They are common in drinking water and the levels are regulated in the drinking water regulations.

Our laboratory is able to perform DHA (DBP) testing on liquids.

The detection limits quoted are those determined for clean samples (e.g. drinking waters). Many samples contain substances that can interfere with particular tests. In such instances, the detection limits are likely to be different to those listed. Please contact the laboratory for further advice.

Dihaloacetonitriles - DHA	
Disinfection by-products - DBP	
Accreditation	IANZ
Description	Liquids
	Trace
	MDL
	mg/L
1,1,1-trichloro-2-propanone	0.00002
1,1-dichloro-2-propanone	0.00002
Bromochloroacetonitrile	0.00002
Chloral hydrate	0.00002
Chloropicrin	0.00002
dibromoacetonitrile	0.00002
dichloroacetonitrile	0.00002
trichloroacetonitrile	0.00002

Endocrine Disruptors – END

These compounds originate from humans. They are associated with the contraceptive pill.

They are harmful to the environment in that they have been shown to cause feminisation of aquatic organisms such as fish resulting in lower birth rates and threatening survival of the species.

Endocrine Disruptors (Estrogen compounds)	
Sample Matrix	Solids
Description	MDL
alpha-Estradiol	20µg/kg
beta-Estradiol	20µg/kg
Estriol	20µg/kg
Estrone	20µg/kg
Ethinylestradiol	20µg/kg

Endocrine disruptors are commonly found in sludges from wastewater treatment plants.

Haloacetic Acids – HAA

HAA's are also disinfection by products. Our laboratory is able to perform HAA testing on liquids. The detection limits quoted are those determined for clean samples (e.g. drinking waters). Many samples contain substances that can interfere with particular tests. In such instances, the detection limits are likely to be different to those listed. Please contact the laboratory for further advice.

Screen detection limits are not available as HAA testing is required for Drinking Water Standards; hence the lowest detection possible is necessary.

Haloacetic Acids - HAA	
Accreditation	IANZ
Description	Liquids
	Trace
	MDL
	mg/L
Bromoacetic Acid	0.001
Bromochloroacetic Acid	0.001
Chloroacetic Acid	0.001
Dichloroacetic Acid	0.001
Dibromoacetic Acid	0.001
Trichloroacetic Acid	0.001

Organochlorine Pesticides – OCP

These compounds are persistent pollutants and were heavily used in New Zealand for a number of decades.

Although they have not been used for twenty years there are many sites which are contaminated due to heavy use in the past.

Our laboratory is able to perform trace and screen level OCP testing on both solids and liquids.

The detection limits quoted are those determined for clean samples (e.g. drinking waters). Many samples contain substances that can interfere with particular tests. In such instances, the detection limits are likely to be different to those listed. Please contact the laboratory for further advice.

Screen-level analyses can be performed on some samples. Please contact the laboratory to discuss.

Note, for the analysis of solid samples a dry weight preparation step is required.

Organochlorine Pesticides - OCP				
Accreditation	IANZ		IANZ	
Description	Liquids		Solids	
	Screen	Trace	Screen	Trace
	MDL			
	mg/L		mg/kg	
4,4'-DDD	0.0002	0.00004	0.01	0.001
4,4'-DDE	0.0002	0.00004	0.01	0.001
4,4'-DDT	0.0002	0.00004	0.01	0.001
Aldrin	0.0001	0.00004	0.01	0.001
Alpha-Chlordane	0.0002	0.00004	0.01	0.001
BHC alpha	0.0001	0.00004	0.01	0.001
BHC beta	0.0001	0.00004	0.01	0.001
BHC delta	0.0001	0.00004	0.01	0.001
cis-permethrin	0.0002	0.00004	0.1	0.01
Dieldrin	0.0002	0.00004	0.01	0.001
Endosulfan I	0.0002	0.00004	0.01	0.001
Endosulfan II	0.0002	0.00004	0.01	0.001
Endosulfan sulfate	0.0002	0.00004	0.02	0.002
Endrin	0.0002	0.00004	0.02	0.002
Endrin aldehyde	0.0003	0.00004	0.04	0.004
Gamma-Chlordane	0.0002	0.00004	0.01	0.001
Heptachlor	0.0001	0.00004	0.01	0.001
Heptachlor epoxide	0.0001	0.00004	0.04	0.004
Lindane (BHC gamma)	0.0001	0.00004	0.01	0.001
Methoxychlor	0.0002	0.00004	0.01	0.001
trans-permethrin	0.0002	0.00004	0.1	0.01

Organonitrogen Organophosphorus Pesticides – ONOP

These compounds are persistent pollutants and were heavily used in New Zealand for a number of decades. Our laboratory is able to perform trace level analyses on liquids and screen level analyses on solids.

The detection limits quoted are those determined for clean samples (e.g. drinking waters). Many samples contain substances that can interfere with particular tests. In such instances, the detection limits are likely to be different to those listed. Please contact the laboratory for further advice.

Note: for the analysis of solid samples a dry weight preparation step is required.

Organonitrogen Organophosphorus Pesticides - ONOP			
Sample Matrix	Liquids Trace	Liquids Screen	Solids Screen
Description	MDL		
	µg/L	µg/L	mg/kg
Acetochlor	0.03	0.1	0.05
Alachlor	0.03	0.1	0.05
Atrazine	0.03	0.1	0.05
Atrazine desethyl	0.03	0.1	0.05
Atrazine desisopropyl	0.05	0.1	0.09
Azaconazole	0.01	0.5	0.02
Azinphos methyl	0.05	0.5	0.09
Benalaxyl	0.01	0.1	0.02
Bitertanol	0.05	0.1	0.09
Bromacil	0.03	0.1	0.05
Bromopropylate	0.03	0.5	0.05
Butachlor	0.03	0.1	0.05
Captan	0.05	0.1	0.09
Carbaryl	0.03	0.1	0.05
Carbofuran	0.03	0.1	0.05
Chlorfluazuron	0.03	0.1	0.05
Chlorpyrifos	0.03	0.1	0.05

Organonitrogen OrganoPhosphorus Pesticides - ONOP			
Sample Matrix	Liquids Trace	Liquids Screen	Solids Screen
Description	MDL		
	µg/L	µg/L	mg/kg
Chlorothalonil	0.03	0.1	0.05
Chlorpyrifos methyl	0.03	0.1	0.05
Chlortoluron	0.05	0.1	0.09
Cyanazine	0.03	0.1	0.05
Cyfluthrin	0.03	0.1	0.05
Cyhalothrin lambda	0.03	0.1	0.05
Cypermethrin	0.05	0.5	0.09
Deltamethrin	0.03	0.1	0.05
Diazinon	0.01	0.1	0.02
Dichlofluanid	0.03	0.5	0.05
Dichloran	0.1	1	0.2
Dichlorvos	0.05	0.1	0.09
Difenoconazole	0.05	0.2	0.09
Dimethoate	0.05	0.5	0.09
Diphenylamine	0.05	0.1	0.09
Diuron	0.03	0.1	0.05
Fenpropimorph	0.03	0.1	0.05
Fluazifop butyl	0.03	0.1	0.05
Fluometuron	0.03	0.5	0.05
Flusilazole	0.03	0.1	0.05
Fluvalinate tau	0.03	0.1	0.05
Furalaxyl	0.03	0.1	0.05
Haloxyfop methyl	0.03	0.1	0.05
Hexaconazole	0.03	0.1	0.05
Hexazinone	0.03	0.1	0.05
IPBC	0.03	1	0.05
Iprodione	0.03	0.5	0.05
Kresoxim methyl	0.01	0.1	0.02
Linuron	0.03	0.1	0.05
Malathion	0.03	0.1	0.05
Metalaxyl	0.03	0.1	0.05
Methamidaphos		0.1	0.2
Metolachlor	0.03	0.1	0.05
Metribuzin	0.03	0.1	0.05
Molinate	0.03	0.1	0.09
Myclobutanil	0.03	0.1	0.05
Naled	0.1	1	0.2
Norflurazon	0.05	0.5	0.09
Oxadiazon	0.03	0.1	0.05
Oxyfluorfen	0.01	0.1	0.02
Paclobutrazol	0.03	0.1	0.05
Parathion Ethyl	0.03	0.1	0.05
Parathion Methyl	0.03	0.1	0.05
Pendimethalin	0.03	0.5	0.05
Permethrin	0.01	0.1	0.02
Pirimicarb	0.03	0.1	0.05
Pirimiphos methyl	0.03	0.1	0.05
Prochloraz	0.1	0.5	0.2
Procymidone	0.03	0.1	0.05
Prometryne	0.01	0.1	0.02
Propachlor	0.03	0.1	0.05
Propanil	0.1	0.5	0.2
Propazine	0.01	0.1	0.02
Propioconazole	0.03	0.1	0.05
Pyriproxifen	0.03	0.1	0.05
Quizalofop ethyl	0.03	0.1	0.05
Simazine	0.05	0.1	0.05
Simetryn	0.03	0.1	0.05
Sulfentrazone	0.03	0.5	0.2
TCMTB	0.05	0.1	0.09
Tebuconazol	0.03	0.1	0.05
Terbacil	0.03	0.1	0.05
Terbufos	0.03	0.1	0.05
Terbumeton	0.03	0.1	0.05

Organonitrogen OrganoPhosphorus Pesticides - ONOP			
Sample Matrix	Liquids Trace	Liquids Screen	Solids Screen
Description	MDL		
	µg/L	µg/L	mg/kg
Terbutylazine	0.01	0.1	0.02
Terbutylazine desethyl	0.03	0.1	0.05
Terbutryn	0.03	0.1	0.05
Thiabendazole	0.1	1	0.2
Thiobencarb	0.03	0.1	0.05
Tolylfluanide	0.01	0.2	0.2
Triazophos	0.03	0.1	0.05
Trifluralin	0.03	0.1	0.05
Vinclozolin	0.03	0.1	0.05

Phenols - PHN

Phenols are commonly used as disinfectants in e.g., toilet cleaners and are common in industrial waste. Our laboratory is able to perform trace and screen level phenol testing on both soils and liquids. Total phenols is also available.

The detection limits quoted are those determined for clean samples (e.g. drinking waters). Many samples contain substances that can interfere with particular tests. In such instances, the detection limits are likely to be different to those listed. Please contact the laboratory for further advice.

Screen-level analyses can be performed on some samples. Please contact the laboratory to discuss.

Note, for the analysis of solid samples a dry weight analysis step is required.

Phenols				
Accreditation	IANZ		IANZ	
Description	Liquids		Solids	
	Screen	Trace	Screen	Trace
	MDL			
	mg/L		mg/kg	
2,3,4,6-tetrachlorophenol	0.01	0.001	1	0.1
2,4,5-trichlorophenol	0.01	0.001	1	0.1
2,4,6-trichlorophenol	0.04	0.004	1	0.1
2,4-dichlorophenol	0.01	0.001	1	0.1
2,4-dimethylphenol	0.01	0.001	1	0.1
2,6-dichlorophenol	0.01	0.001	1	0.1
2-chlorophenol	0.01	0.001	1	0.1
2-methyl 4,6-dinitrophenol	0.01	0.001	1	0.1
2-methylphenol	0.01	0.001	1	0.1
2-nitrophenol	0.02	0.002	1	0.1
4-chloro-3-methylphenol	0.01	0.001	1	0.1
4-methylphenol	0.01	0.001	1	0.1
pentachlorophenol	0.01	0.001	1	0.1
phenol	0.02	0.002	1	0.1

Phenols - Total

Total phenols on liquids and solids are also available. For solid samples please discuss with the laboratory.

Note, for the analysis of solid samples a dry weight analysis step is required.

Phenols- Total		
Accreditation		Pending
Description	Test method	MDL
Phenols Total	APHA 5530	0.2 mg/L

Polychlorinated Biphenyls – PCB

Polychlorinated biphenyls were used as insulators many years ago and although banned they are very persistent pollutants. They were usually in mixes known as aroclors. Our laboratory is able to perform PCB testing on both soils and liquids.

The detection limits quoted are those determined for clean samples (e.g. drinking waters). Many samples contain substances that can interfere with particular tests. In such instances, the detection limits are likely to be different to those listed. Please contact the laboratory for further advice.

Polychlorinated Biphenyls - PCB		
Accreditation	IANZ	IANZ
Description	Liquids	Solids
	Trace	Trace
	MDL	
	mg/L	mg/kg
2,4,4'- Trichlorobiphenyl	0.000001	0.002
2,4,5-Trichlorobiphenyl	0.000001	0.002
2,2',3,5'-Tetrachlorobiphenyl	0.000001	0.002
2,2',4,5'-Tetrachlorobiphenyl	0.000001	0.002
2,2',5,5'-Tetrachlorobiphenyl	0.000001	0.002
2,3,4,4'-Tetrachlorobiphenyl	0.000001	0.002
3,3',4,4'-Tetrachlorobiphenyl	0.000001	0.002
3,4,4',5-Tetrachlorobiphenyl	0.000001	0.002
2,2',3,4,5-Pentachlorobiphenyl	0.000001	0.002
2,2',4,5,5'-Pentachlorobiphenyl	0.000001	0.002
2,3,3',4,4'-Pentachlorobiphenyl	0.000001	0.002
2,3,3',4',6-Pentachlorobiphenyl	0.000001	0.002
2,3',4,4',5'-Pentachlorobiphenyl	0.000001	0.002
2,3,4,4',5-Pentachlorobiphenyl	0.000001	0.002
2,3',4,4',5-Pentachlorobiphenyl	0.000001	0.002
2,3',4,5',6-Pentachlorobiphenyl	0.000001	0.002
3,3',4,4',5-Pentachlorobiphenyl	0.000001	0.002
2,2',3,3',4,4'-Hexachlorobiphenyl	0.000001	0.002
2,2',3,4,4',5'-Hexachlorobiphenyl	0.000001	0.002
2,2',3,4,5,5'-Hexachlorobiphenyl	0.000001	0.002
2,2',3,4',5,6-Hexachlorobiphenyl	0.000001	0.002
2,2',3,5,5',6-Hexachlorobiphenyl	0.000001	0.002
2,2',4,4',5,5'-Hexachlorobiphenyl	0.000001	0.002
2,3,3',4,4',5'-Hexachlorobiphenyl	0.000001	0.002
2,3,3',4,4',5-Hexachlorobiphenyl	0.000001	0.002
2,3,3',4,5,5'-Hexachlorobiphenyl	0.000001	0.002
2,3',4,4',5,5'-Hexachlorobiphenyl	0.000001	0.002
3,3',4,4',5,5'-Hexachlorobiphenyl	0.000001	0.002
2,2',3,3',4,4',5-Heptachlorobiphenyl	0.000001	0.002
2,2',3,4,4',5,5'-Heptachlorobiphenyl	0.000001	0.002
2,3,3',4,4',5,5'-Heptachlorobiphenyl	0.000001	0.002
2,2',3,3',4,4',5,5'-Octachlorobiphenyl	0.000001	0.002
2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl	0.000001	0.002
Decachlorobiphenyl	0.000001	0.002

Polycyclic Aromatic Hydrocarbons – PAH

Many PAH compounds are known carcinogens. They are common in old gaswork sites and when any fossil fuels have been burned. They are persistent and not very soluble in water and thus tend to be found in solid samples.

Our laboratory is able to perform PAH testing on both solids and liquids.

The detection limits quoted are those determined for clean samples (e.g. drinking waters). Many samples contain substances that can interfere with particular tests. In such instances, the detection limits are likely to be different to those listed. Please contact the laboratory for further advice.

Screen-level analyses can be performed on some samples. Please contact the laboratory to discuss. Benzo(a)pyrene equivalent calculations are available upon request.

Note, for the analysis of solid samples a dry weight analysis step is required.

Polycyclic Aromatic Hydrocarbons - PAH profile				
Accreditation	IANZ		IANZ	
Description	Liquids		Solids	
	Screen	Trace	Screen	Trace
	MDL			
	mg/L		mg/kg	
acenaphthene	0.001	0.0001	0.1	0.001
acenaphthylene	0.001	0.0001	0.1	0.001
anthracene	0.001	0.0001	0.1	0.001
benzo(a)anthracene	0.001	0.0001	0.1	0.001
benzo(a)pyrene	0.001	0.0001	0.1	0.001
benzo(b)fluoranthene	0.001	0.0001	0.1	0.001
benzo(ghi)perylene	0.001	0.0001	0.1	0.001
benzo(k)fluoranthene	0.001	0.0001	0.1	0.001
chrysene	0.001	0.0001	0.1	0.001
dibenzo(ah)anthracene	0.001	0.0001	0.1	0.001
fluoranthene	0.001	0.0001	0.1	0.001
fluorene	0.001	0.0001	0.1	0.001
indeno(1,2,3,c,d)pyrene	0.001	0.0001	0.1	0.001
Naphthalene	0.001	0.0001	0.1	0.001
phenanthrene	0.001	0.0001	0.1	0.001
Pyrene	0.001	0.0001	0.1	0.001

Semi Volatile Organic Compounds - SVOC

Semi volatile (SVOC) analysis includes a number of compounds which are persistent and toxic in the environment. The suite is commonly used to monitor landfill sites and to monitor samples from old contaminated sites. The semi volatile suite includes a wide range of compounds including polyaromatic hydrocarbons, organochlorine pesticides, plasticisers and other compounds. They do not break down easily in the environment.

Our laboratory is able to perform SVOC testing on both solids and liquids. The detection limits quoted below are those determined for clean samples (e.g. drinking waters). Many samples contain substances that can interfere with particular tests. In such instances, the detection limits are likely to be different to those listed. Please contact the laboratory for further advice. Screen-level analyses can be performed on some samples. Please contact the laboratory to discuss.

Semi Volatile Organic Compounds				
SVOC profile (SVM, PHL, PHN, PAH, OCP)				
Accreditation	IANZ		IANZ	
Description	Liquids		Solids	
	Screen	Trace	Screen	Trace
	MDL			
	mg/L		mg/kg	
1,2,4-trichlorobenzene	0.005	0.0005	1	0.1
1,2-dichlorobenzene	0.005	0.0005	1	0.1
1,3-dichlorobenzene	0.005	0.0005	1	0.1
1,4-dichlorobenzene	0.005	0.0005	1	0.1
2,3,4,6-tetrachlorophenol	0.01	0.001	1	0.1
2,4,5-trichlorophenol	0.01	0.001	1	0.1
2,4,6-trichlorophenol	0.04	0.004	1	0.1
2,4-dichlorophenol	0.01	0.001	1	0.1
2,4-dimethylphenol	0.01	0.001	1	0.1
2,4-dinitrotoluene	0.005	0.0005	1	0.1
2,6-dichlorophenol	0.01	0.001	1	0.1
2,6-dinitrotoluene	0.015	0.0015	1	0.1
2-chloronaphthalene	0.002	0.0002	1	0.1

2-chlorophenol	0.01	0.001	1	0.1
Semi Volatile Organic Compounds				
SVOC profile (SVM, PHL, PHN, PAH, OCP)				
Accreditation	IANZ		IANZ	
Description	Liquids		Solids	
	Screen	Trace	Screen	Trace
	MDL			
	mg/L		mg/kg	
2-methyl 4,6-dinitrophenol	0.01	0.001	1	0.1
2-methylnaphthalene	0.002	0.0002	1	0.1
2-methylphenol	0.01	0.001	1	0.1
2-nitrophenol	0.01	0.001	1	0.1
4,4'-DDD	0.002	0.0002	0.6	0.06
4,4'-DDE	0.001	0.0001	0.5	0.05
4,4'-DDT	0.002	0.0002	0.5	0.05
4-bromophenylphenylether	0.01	0.001	1	0.1
4-chloro-3-methylphenol	0.01	0.001	1	0.1
4-chlorophenylphenyl ether	0.01	0.001	1	0.1
4-methylphenol	0.01	0.001	1	0.1
acenaphthene	0.001	0.0001	0.1	0.01
acenaphthylene	0.001	0.0001	0.1	0.01
Aldrin	0.001	0.0001	0.1	0.01
Alpha-Chlordane	0.002	0.0002	0.1	0.01
anthracene	0.002	0.0002	0.1	0.01
benzo(a)anthracene	0.002	0.0002	0.1	0.01
benzo(a)pyrene	0.001	0.0001	0.1	0.01
benzo(b)fluoranthene	0.002	0.0002	0.1	0.01
benzo(ghi)perylene	0.001	0.0001	0.1	0.01
benzo(k)fluoranthene	0.002	0.0002	0.1	0.01
BHC alpha	0.002	0.0002	0.1	0.01
BHC beta	0.002	0.0002	0.6	0.06
BHC delta	0.002	0.0002	0.1	0.01
bis(2-chlorisopropyl)ether	0.015	0.0015	1	0.1
bis(2-chloroethoxy)methane	0.01	0.001	1	0.1
bis(2-chloroethyl)ether	0.015	0.0015	1	0.1
bis(2-ethylhexyl)adipate	0.02	0.002	1	0.1
bis(2-ethylhexyl)phthalate	0.02	0.002	1	0.1
butylbenzyl phthalate	0.02	0.002	1	0.1
chrysene	0.002	0.0002	0.1	0.01
cis-permethrin	0.005	0.0005	0.2	0.02
dibenzo(ah)anthracene	0.001	0.0001	0.1	0.01
dibenzofuran	0.005	0.0005	1	0.1
Dieldrin	0.001	0.0001	0.5	0.05
diethyl phthalate	0.02	0.002	1	0.1
dimethyl phthalate	0.02	0.002	1	0.1
di-n-butyl phthalate	0.02	0.002	1	0.1
di-n-octyl phthalate	0.02	0.002	1	0.1
Diphenylhydrazine	0.01	0.001	1	0.1
Endosulfan I	0.001	0.0001	0.2	0.02
Endosulfan II	0.001	0.0001	0.3	0.03
Endosulfan sulfate	0.002	0.0002	0.5	0.05
Endrin	0.002	0.0002	0.4	0.04
Endrin aldehyde	0.04	0.004	0.5	0.05
fluoranthene	0.002	0.0002	0.1	0.01
fluorene	0.001	0.0001	0.1	0.01
Gamma-Chlordane	0.002	0.0002	0.1	0.01
Heptachlor	0.002	0.0002	0.2	0.02
Heptachlor epoxide	0.002	0.0002	0.2	0.02
hexachlorobenzene	0.005	0.0005	1	0.1
hexachlorobutadiene	0.005	0.0005	1	0.1
hexachlorocyclopentadiene	0.005	0.0005	1	0.1
hexachloroethane	0.005	0.0005	1	0.1

indeno(1,2,3,c,d)pyrene	0.001	0.0001	0.1	0.01
Semi Volatile Organic Compounds				
SVOC profile (SVM, PHL, PHN, PAH, OCP)				
Accreditation	IANZ		IANZ	
Description	Liquids		Solids	
	Screen	Trace	Screen	Trace
	MDL			
	mg/L		mg/kg	
isophorone	0.005	0.0005	1	0.1
Lindane (BHC gamma)	0.002	0.0002	0.2	0.02
Methoxychlor	0.002	0.0002	0.1	0.01
Naphthalene	0.005	0.0005		
nitrobenzene	0.01	0.001	1	0.1
<i>n</i> -nitrosodi- <i>n</i> -propylamine	0.015	0.0015	1	0.1
<i>n</i> -nitrosodiphenylamine	0.005	0.0005	1	0.1
pentachlorophenol	0.01	0.001	1	0.1
phenanthrene	0.002	0.0002	0.1	0.01
phenol	0.02	0.002	1	0.1
pyrene	0.002	0.0002	0.1	0.01
<i>trans</i> -permethrin	0.005	0.0005	0.2	0.02

Note: for the analysis of solid samples a dry weight preparation step is required.

Siloxanes –SIL

These compounds are widely used in cosmetics, deodorants, water repellent coatings, food additives and some soaps. They are found in biogas which is the common name for the gas derived from landfills.

Biogas is often used to fuel engines to generate power but in this process the siloxanes are oxidised to silicon dioxide (sand) which is extremely abrasive to the engine causing failure. Siloxanes are thus commonly monitored to check which ones and how much is present in the gas pre and post filtration.

Siloxanes		
Sample Matrix	Liquids	Solids
Description	MDL	MDL
Decamethylcyclopentasiloxane	1mg/L	1mg/kg
Dodecamethylcyclohexasiloxane	1mg/L	1mg/kg
Hexamethyldisiloxane	1mg/L	1mg/kg
Octamethylcyclotetrasiloxane	1mg/L	1mg/kg
Octamethyltrisiloxane	1mg/L	1mg/kg

Taste and Odour - T&O

These compounds are formed by algae and other organisms such as achnomycetes (filamentous bacteria), present in raw water. They give rise to objectionable taste and odour characteristics in drinking water and are not completely removed by standard water treatment processes.

Humans can detect these compounds at very low levels e.g., parts per trillion.

Our laboratory is able to perform T&O testing on liquids.

Taste and Odour	
Accreditation	IANZ
Description	Liquids
	Trace
	MDL
	ng/L
2,4,6-trichloroanisole	1
2-isobutyl-3-methoxypyrazine	1
2-isopropyl-3-methoxypyrazine	1
2-methylisoborneol	1
geosmin	1

The detection limits quoted are those determined for clean samples (e.g. drinking waters). Many samples contain substances that can interfere with particular tests. In such instances, the detection limits are likely to be different to those listed. Please contact the laboratory for further advice .

Total Petroleum Hydrocarbons -TPH

TPH (total petroleum hydrocarbons) is a test measuring contamination of the sample by petroleum related compounds e.g., petrol, diesel, kerosene, jet fuel oil, etc. These compounds are often present in water and soil where there has been a spill. They can enter the environment either naturally, from spills, by leakage from storage facilities or from deliberate application e.g., diesel as a solvent for herbicide application.

Our laboratory is able to perform TPH testing on both solids and liquids. The detection limits quoted are those determined for clean samples (e.g., drinking waters). Many samples contain substances that can interfere with particular tests. In such instances, the detection limits are likely to be different to those listed. Please contact the laboratory for further advice. Chromatograms are available for samples showing positive results upon request.

Note, for the analysis of solid samples a dry weight analysis step is required.

Total Petroleum Hydrocarbons – TPH profile		
Accreditation	IANZ	IANZ
Description	Liquids	Solids
	Trace	Trace
	MDL	
	mg/L	mg/kg
Total Petroleum Hydrocarbons (C7-C36)	0.3	60
TPH Band C10-C14	0.1	20
TPH Band C15-C36	0.1	20
TPH Band C7-C9	0.1	20
*Note that Hexane is covered in the BTEX suite		

Trihalomethanes - THM

THM's are also disinfection by-products. Our laboratory is able to perform THM testing on liquids. The detection limits quoted are those determined for clean samples (e.g. drinking waters). Many samples contain substances that can interfere with particular tests. In such instances, the detection limits are likely to be different to those listed. Please contact the laboratory for further advice .

Screen detection limits are not available as THM testing is required for Drinking Water Standards, hence the lowest detection possible is necessary.

Trihalomethanes - THM	
Accreditation	IANZ
Description	Liquids
	Trace
	MDL
	mg/L
bromodichloromethane	0.0001
bromoform	0.0001
chloroform	0.0001
dibromochloromethane	0.0001

Volatile Organic Compounds – VOC

This suite contains many solvents commonly used and includes monoaromatic hydrocarbons. VOC compounds are commonly used industrially and are also found in petroleum products e.g., petrol. Our laboratory is able to perform VOC testing on both soils and liquids.

The detection limits quoted are those determined for clean samples (e.g. drinking waters). Many samples contain substances that can interfere with particular tests. In such instances, the detection limits are likely to be different to those listed. Please contact the laboratory for further advice. Screen-level analyses can be performed on some samples. Please contact the laboratory to discuss. Note, for the analysis of solid samples a dry weight analysis step is required.

Volatile Organic Compounds – VOC (includes) BTEX					
Accreditation	IANZ				
Description	Liquids		Solids		Air - Tedlar Bag/ ATD Tubes
	Screen	Trace	Screen	Trace	Trace
	MDL				
	mg/L		mg/kg		mg
1,1,1,2-tetrachloroethane	0.001	0.0001	0.1	0.001	0.00002
1,1,1-trichloroethane	0.001	0.0001	0.1	0.001	0.00002
1,1,2,2-tetrachloroethane	0.001	0.0001	0.1	0.001	0.00002
1,1,2-trichloroethane	0.001	0.0001	0.1	0.001	0.00002
1,1-dichloroethane	0.001	0.0001	0.1	0.001	0.00002
1,1-dichloroethene	0.001	0.0001	0.1	0.001	0.00002
1,1-dichloropropene	0.001	0.0001	0.1	0.001	0.00002
1,2,3-trichlorobenzene	0.001	0.0001	0.1	0.001	0.00002
1,2,3-trichloropropane	0.001	0.0001	0.1	0.001	0.00002
1,2,4-trichlorobenzene	0.001	0.0001	0.1	0.001	0.00002
1,2,4-trimethylbenzene	0.001	0.0001	0.1	0.001	0.00002

Volatile Organic Compounds - VOC					
Accreditation	IANZ		IANZ		Pending
Description	Liquids		Solids		Air - Tedlar Bag/ ATD Tubes
	Screen	Trace	Screen	Trace	Trace
	MDL				
	mg/L		mg/kg		mg
1,2-dibromo-3-chloropropane	0.001	0.0001	0.1	0.001	0.00002
1,2-dibromoethane	0.001	0.0001	0.1	0.001	0.00002
1,2-dichlorobenzene	0.001	0.0001	0.1	0.001	0.00002
1,2-dichloroethane	0.001	0.0001	0.1	0.001	0.00002
1,2-dichloropropane	0.001	0.0001	0.1	0.001	0.00002
1,3,5-trimethylbenzene	0.001	0.0001	0.1	0.001	0.00002
1,3-dichlorobenzene	0.001	0.0001	0.1	0.001	0.00002
1,3-dichloropropane	0.001	0.0001	0.1	0.001	0.00002
1,4-dichlorobenzene	0.001	0.0001	0.1	0.001	0.00002
2,2-dichloropropane	0.001	0.0001	0.1	0.001	0.00002
2-chlorotoluene	0.001	0.0001	0.1	0.001	0.00002
4-chlorotoluene	0.001	0.0001	0.1	0.001	0.00002
benzene	0.001	0.0001	0.1	0.001	0.00002
bromobenzene	0.001	0.0001	0.1	0.001	0.00002
bromodichloromethane	0.001	0.0001	0.1	0.001	0.00002
bromoform	0.001	0.0001	0.1	0.001	0.00002
bromomethane	0.005	0.0005	0.5	0.005	0.00002
carbon disulphide			0.1	0.001	0.00002
carbon tetrachloride	0.001	0.0001	0.1	0.001	0.00002
chlorobenzene	0.001	0.0001	0.1	0.001	0.00002
chloroform	0.001	0.0001	0.1	0.001	0.00002
chloromethane	0.005	0.0005	0.1	0.001	0.00002
cis-1,2-dichloroethylene	0.001	0.0001	0.1	0.001	0.00002
cis-1,3-dichloropropene	0.001	0.0001	0.1	0.001	0.00002
Dibromochloromethane	0.001	0.0001	0.1	0.001	0.00002
dibromomethane	0.001	0.0001	0.1	0.001	0.00002
dichlorodifluoromethane	0.005	0.0005	0.1	0.001	0.00002
ethylbenzene	0.001	0.0001	0.1	0.001	0.00002
ethylchloride	0.005	0.0005	0.1	0.001	0.00002
fluorotrichloromethane	0.001	0.0001	0.1	0.001	0.00002
hexachlorobutadiene	0.001	0.0001	0.1	0.001	0.00002
iso-propylbenzene	0.001	0.0001	0.1	0.001	0.00002
m- & p-xylene	0.001	0.0001	0.1	0.001	0.00002
methylene chloride	0.001	0.0001	0.1	0.001	0.00002
Naphthalene	0.001	0.0001	0.1	0.001	0.00002
n-butylbenzene	0.001	0.0001	0.1	0.001	0.00002
n-propylbenzene	0.001	0.0001	0.1	0.001	0.00002
o-xylene	0.001	0.0001	0.1	0.001	0.00002
p-isopropyl toluene	0.001	0.0001	0.1	0.001	0.00002
sec-butylbenzene	0.001	0.0001	0.1	0.001	0.00002
styrene	0.001	0.0001	0.1	0.001	0.00002
tert-butyl benzene	0.001	0.0001	0.1	0.001	0.00002
tetrachloroethylene	0.001	0.0001	0.1	0.001	0.00002
toluene	0.001	0.0001	0.1	0.001	0.00002
trans-1,2-dichloroethene	0.001	0.0001	0.1	0.001	0.00002
trans-1,3-dichloropropene	0.001	0.0001	0.1	0.001	0.00002
trichloroethylene	0.001	0.0001	0.1	0.001	0.00002
vinyl chloride	0.001	0.0001	0.1	0.001	0.00002

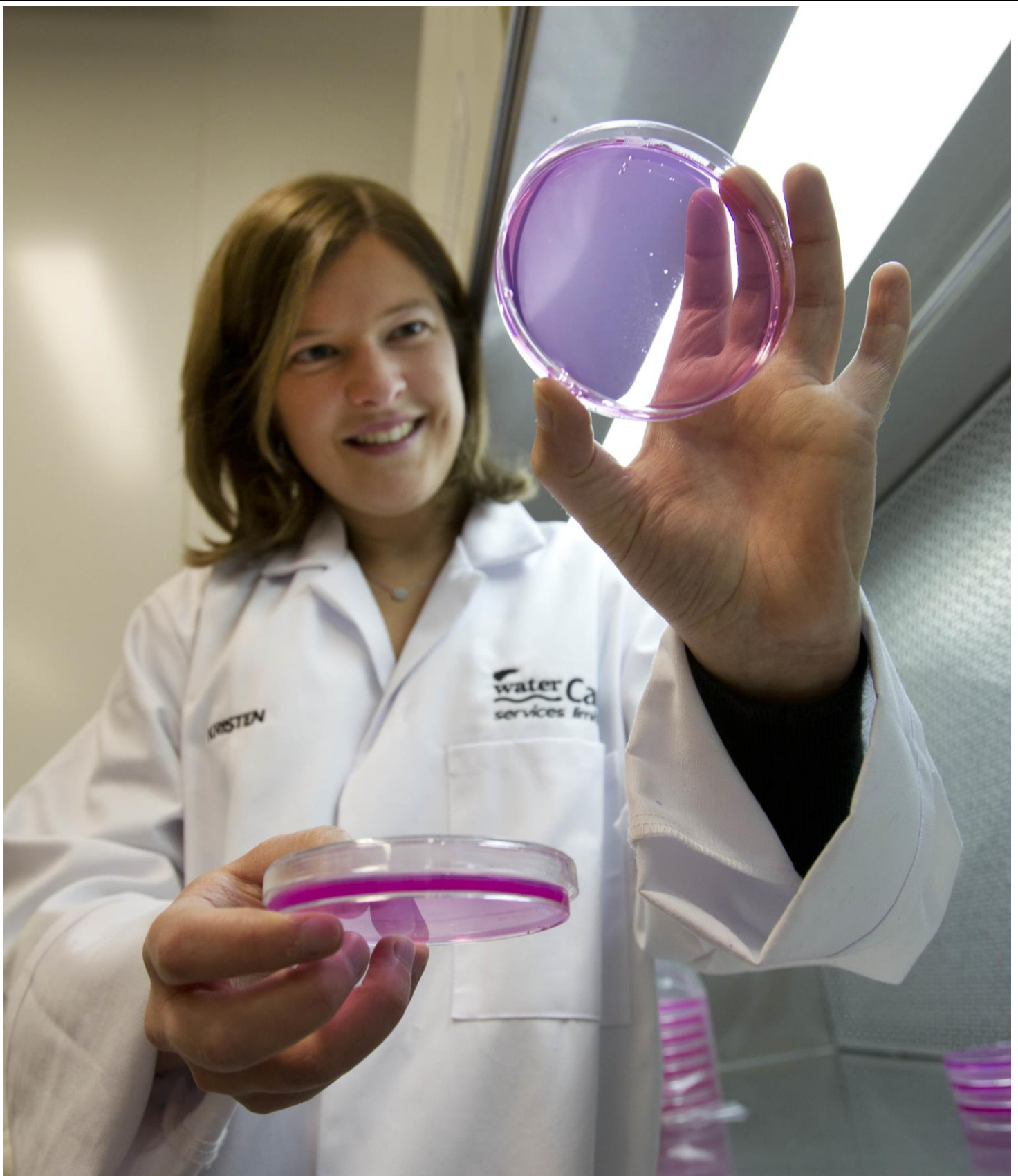
Volatile Fatty Acids – VFA

These are commonly analysed to check the performance of sludge digesters in waste water treatment plants.

When the levels of the acids rise, longer chain acids are in greater abundance, it is a good sign the digester is not working well or is being overloaded.

Volatile Fatty Acids	
Sample Matrix	Liquids
Description	MDL
Total Volatile Fatty Acids	10mg/L
Acetic acid	2mg/L
i-Butyric acid	2mg/L
n-Butyric acid	2mg/L
Propionic acid	2mg/L

Microbiology



MICROBIOLOGY

Microbiology

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Introduction

The microbiology department is comprised of ten qualified, trained and highly dedicated staff working in various sections viz. Microbiology, Parasitology, Virology, and Algae. The testing is IANZ accredited, and our key staff are LAS and KTP signatories.

Our analyses are done to APHA, MIMMs, EPA standards and the NZ Biosolid Guidelines. We strive to meet customer requests for other international standards. Our QA/QC procedures are well-documented and continuous checks are in place to ensure that the results meet the clients' requirements, and technician precision is maintained throughout the process.

We are capable of testing various matrices/materials – drinking water, environmental samples (treated, raw, effluent, lakes, seawater), leachates, biosolids and shellfish. We offer specific testing for swimming pools (New Zealand Standard NZS 5826) and bathing beaches for all council areas.

We cover the following test groups:

Microbiology

- Heterotrophic plate count (35°C, 37°C and 22°C), Total coliforms, faecal coliforms and *Escherichia coli* (bacterial indicator of faecal contamination), enterococci, faecal streptococci, *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Salmonella* species, *Campylobacter* species, *Legionella* species, *Clostridium perfringens* and *E. coli* O157. Both pour plates, MPN and membrane filter techniques are carried out.
- Tests for sulphate reducing bacteria, sulphite reducing *Clostridium*, iron bacteria and filamentous bacteria

Parasitology

- *Giardia* and *Cryptosporidium* by Envirochek and Filta Max methods.
- Helminth ova (viable and culturable)
- Nematode counts

Virology

- Culturable viruses: entero (poliovirus-2) and adeno (type 1) viruses (and the associated cell culture)
- Sample preparation for the testing of hepatic virus and norovirus.
- F-specific RNA Bacteriophage

Algae

- Phytoplankton up to species level count including cyanobacteria.
- Algae Biovolumes
- Zooplankton testing
- Particle size and counts

Aquatic biology

- Routine enumeration and identification of macroinvertebrates including MCI assessments.
- Filamentous bacteria
- Iron and sulphur bacteria

Transitional facility

- The microbiology department also oversees a MAF registered transitional facility for supervising the importation of microbiological and chemical samples.

User notes

Sample specific containers and guidelines are available from the laboratory. More detailed information regards microbiological sampling is available in the sample logistics section of this price book. As a quick reference tool we have provided a basic sampling volume table shown below. This is a guideline only and we do and can accept samples with lower volumes. For further information regards sample volume please contact the laboratory.

General sampling volume guideline

Description	Units	Potable water	Environmental Water	Wastewater
Algae	Cells/mL	1L	400mL	400mL
Bacteria species		100mL	100mL	100mL
Biological/microscopical examination report	Speciation	>10mL. Analysis can be carried out on less sample.		
Biosolids / Soilds	Analysis dependent. Please note that for the analysis of samples to meet the Biosolid Guidelines we require 1kg of sample			
<i>Campylobacter</i>	MPN/L	1L	1L	1L
<i>E.coli</i> O157 MPN	MPN/L	1L	1L	1L
Filamentous Bacteria - Abundance		400mL	400mL	400mL
<i>Giardia</i> & <i>Cryptosporidium</i>	/100L	100L – 1000L	20L	20L
Helminths Enumeration	/100L	100L	20L	20L
<i>Legionella</i>	cfu/ml	100ml	100ml	100ml
Nematode Count	Total	1L	400mL	400mL
Particle size by microscopic examination	Total	1L	400mL	400mL
Macroinvertebrates	/L	Dependent on protocol being followed.		
<i>Salmonella</i>	/L	1L	1L	1L
Shellfish		200g of shucked shellfish or 20-30 * environmental samples 10-20 * commercial samples *For smaller shellfish species larger numbers are required		
Virus - Phage F specific	pfu/L	1L	250mL	100mL
Virus - Presumptive Culturable Adenoviruses	MPN/100L	100L	20L	20L
Virus - Presumptive Culturable Enteroviruses	pfu/100L	100L	20L	20L

Algae testing

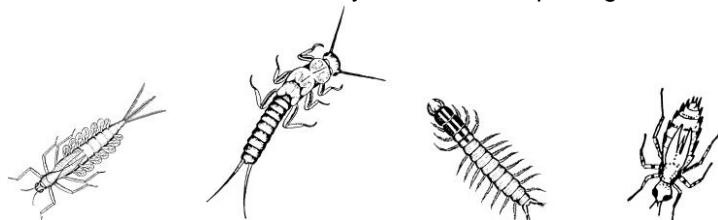
We offer a comprehensive algae testing range that includes cell count, species identification and biovolume. Species identification is down to genus level.

Description	MDL	Units	Test Method
Algae (cell & colony count)	100	Cells/mL	APHA (2005) 10200 C,E,F, modified
Algae Biovolume		um3/mL	APHA (2005) 10200 C,E,F, modified
Algae identification to genus level / Periphyton			APHA (2005) 10300
Algae Membrane Filtration (cell & colony count)		Cells/mL	APHA (2005) 10200 C,E,F, modified

Macroinvertebrates

Assessment of the ecological health of streams, rivers, and lakes is often determined using the composition of the aquatic macroinvertebrate communities. Such assessments rely on quality laboratory processing of field collected macroinvertebrate samples, through recognised sorting and identification methods.

We are able to supply services for the routine enumeration and identification of macroinvertebrates. We cover over 190 species of macroinvertebrates. Each macroinvertebrate sample collected is analysed in terms of its community diversity (number of taxa) and sensitivity (MCI - Macroinvertebrate Community Index and QMCI - Quantitative Macroinvertebrate Community Index). An optional service includes Semi-Quantitative Macroinvertebrate Community Index. Our reporting includes summary data calculations and taxa scores.



Description	MDL	Units	Test Method	Prep
Macroinvertebrates	1	/L	APHA (2005) 10500 B,C,D	

Guideline for selecting test methods

The following table may assist customers to select the correct method for the sample type being examined. The table covers the methods available to customers to measure Total coliforms, Faecal coliforms and *E.coli* across a number of sample types. Customers should consider the reported units and the detection limit they require.

Tcode	Test Description	D-Limt	Potable Water	Environmental Water	Solids	Soils	Wastewater	Meat & Poultry potable water	Seafood process water	Shellfish (uncooked)	Seawater
eert18pa	Colilert- <i>E. coli</i> 18 hrs presence/absence	Present/100mL	✓					✓			
tert18pa	Colilert-Total coliforms 18hrs presence/absence	Present/100 mL	✓					✓			
eert18mp	<i>Escherichia coli</i> -18 hours	1 MPN/100mL	✓	✓				✓	✓		
tert18mp	Colilert - Total coliforms 18 hrs MPN	1 MPN/100mL	✓	✓				✓	✓		
ecolmtc	<i>E.coli</i> by m-TEC	2 cfu/100mL		✓			✓				✓
mpn-ec	<i>E.coli</i> MPN (MUG Method)	2 MPN/100mL		✓							
mpn-ec-x	<i>E.coli</i> by MPN (MUG Method, as dry wt basis)	depends on dry weight			✓	✓					
mpn-faex	Faecal coliforms /g by MPN (as dry wt basis)	depends on dry weight			✓	✓					
mpn-ec-s	<i>E.coli</i> by MPN (MUG Method) Shellfish (as wet wt basis)	18 MPN/100g								✓	
fc-shell	Faecal coliforms MPN (as wet wt basis)	18 MPN/100g								✓	
fcoll-mfc	Faecal coliforms in Potable Water	1 cfu/100mL	✓								
fcollmfc	Faecal coliforms mFC Non Potable water	2 cfu/100mL		✓			✓				✓
Mpn-faec	Faecal coliforms by MPN	MPN/100mL		✓			✓				✓

Microbiology on Liquids

The table below lists routine Microbiology tests on liquid samples. If a test you require is not included, please contact the marketing department on (09) 539 7785

Note: some tests require specific sample preparation steps as denoted in the prep column. Each preparation step is only charged once per sample regardless of how many tests it is required for.

Description	MDL	Test Method	Prep
Aerobic spores	1 cfu/mL	BS (2005) 4285: Part 3	
<i>Aeromonas</i>	2 cfu/100mL	AEM (1996) 62:3544	
Algae (cell & colony count)	100 Cells/mL	APHA (2005) 10200 C,E,F, modified	
Algae Biovolume	um ³ /mL	APHA (2005) 10200 C,E,F, modified	
API-Bacteria Identification	Speciation	API KIT METHOD	
Biological/microscopical examination report	Speciation	Microscopic Examination	
<i>Campylobacter</i> species by MPN	1 MPN/L	MIMM (2004) 13.1	
<i>Campylobacter</i> species presence/absence	/L	MIMM (2004), 13.1	
<i>Clostridium perfringens</i> spores	2 cfu/100mL	MIMM (2005), ISO6461/2 (1986)	
<i>Clostridium perfringens</i> LAS	1 cfu/100mL	MIMM (2005) 11.A3	
<i>E.coli</i> 18 hrs Colilert presence/absence	/100mL	APHA(2005) 9223, MIMM (2004) 12.4	
Total Coliforms 18hrs Colilert presence/absence	/100 mL	APHA (2005) 9223, MIMM (2004) 12.4	
<i>E.coli</i> 18 hours Colilert MPN	1 MPN/100mL	APHA(2005) 9223, MIMM (2004) 11.A1.1	
Total Coliforms 18 hrs Colilert MPN	1 MPN/100mL	APHA (2005) 9223, MIMM (2004) 11.A1.1	
<i>E.coli</i> by m-TEC	2 cfu/100mL	USEPA 1603	
<i>E.coli</i> by multiple tube MPN MUG method	2 MPN/100mL	APHA (2005) 9221 F	
<i>Enterococci</i> by Enterolert 96	10 MPN/100mL	MIMM (2004) 12.4, IDEXX 2000 Method	
<i>Enterococci</i> Species by CFU	2 cfu/100mL	APHA (2005) 9230 C	
<i>Enterococci</i> Species by MPN	2 MPN/100mL	APHA (2005) 9230 B	
<i>Enterococci</i> Species LAS Accredited	1 cfu/100mL	MIMM (2007) 11.7	
Faecal Coliforms by MPN	2 MPN/100mL	APHA (2005) 9221 E	
Faecal Coliforms in Potable Water	1 cfu/100mL	APHA (2005) 9222 D	
Faecal Coliforms mFC Agar (LAS)	1 cfu/100mL	MIMM (2005) 11.4	
Faecal Coliforms mFC Non Potable water	2 cfu/100mL	APHA (2005) 9222 D	
<i>Faecal streptococci</i>	2 cfu/100mL	MIMM (2007) 11.7	
Filamentous Bacteria - Abundance		Microscopy	
Giardia & Cryptosporidium on Potable Water	1 /100L	USEPA 1623, modified	5
Giardia & Cryptosporidium on Raw water	5 /100L	USEPA 1623, modified	4
Helminths Enumeration	5 /100L	Filtration, Concentration and Microscopic	
HPC at 22°C	1 cfu/1mL	APHA (2005) 9215 B	
HPC at 35°C	1 cfu/mL	APHA (2005) 9215 B	
HPC at 37°C	1 cfu/1mL	APHA (2005) 9215 B	
Iron Bacteria	Speciation	APHA (2005) 9240	
<i>Legionella pneumophila</i>	10 cfu/mL	AS/NZS (2008) 3896	
<i>Legionella pneumophila</i> Presumptive	10 /0.1 mL	AS/NZS (2008) 3896	
<i>Legionella pneumophila</i> Confirmation Count	10 cfu/mL	AS/NZS (2008) 3896	
Macroinvertebrates	1 /L	APHA (2005) 10500 B,C,D	
Nematode Count	Total	APHA (2005) 10200 C,E,F,G	
<i>Pseudomonas aeruginosa</i>	1 cfu/100mL	APHA (2005) 9213 E	
<i>Pseudomonas spp</i>	1 cfu/100mL	APHA (2005) 9213 E	

<i>Salmonella</i> MPN	1 MPN/L	APHA (2005) 9260 B, MIMM (2004) 13.2, modified	
<i>Salmonella</i> species presence/absence	/L	APHA (2005) 9260 B, MIMM (2005) 13.2, modified	
<i>Staphylococcus aureus</i>	2 cfu/100mL	APHA (2005) 9213 B	
Sulfate Reducing Bacteria	2 /100mL	APHA (2005) 9240E	
Sulfide Producing Clostridia Spores Count	2 spores/100mL	MIMM (2004) 11.8	
Total coliforms (100 ml)	1 cfu/100ml	APHA (2005) 9222 B	
Total Coliforms mEndo 100ml LAS	1 cfu/100ml	MIMM (2005) 11.3 LAS	
Total Plate Count SPC at 22°C	1 cfu/100mL	MIMM(2001) 11.6 LAS	
Total Plate Count SPC at 37°C	1 cfu/100mL	MIMM(2001) 11.6 LAS	
Virus - Phage F specific	10 pfu/L	ISO (1995) 10705-1	
Virus - Presumptive Culturable Adenoviruses (liquid matrices)	1 MPN/100L	APHA (2005) 9510, modified	1, 2, or 3
Virus - Presumptive Culturable Enteroviruses (water and effluent)	5 pfu/100L	APHA (2005) 9510, modified	1 or 2
Virus - Presumptive Culturable Enteroviruses (raw sewage)	100 pfu/L	APHA (2005) 9510, modified	2
Yeasts & Moulds	2 cfu/100mL	APHA (2005) 9610 B	

*Note: In turbid samples Giardia and Cryptosporidium testing may require additional Pellets.

Microbiology on saline samples

Description	MDL	Test Method	Prep
<i>E.coli</i> by m-TEC	2 cfu/100mL	USEPA 1603	
Enterococci by Enterolert 96	10 MPN/100mL	MIMM (2004) 12.4, IDEXX 2000 Method	
Faecal coliforms by MPN	2 MPN/100mL	APHA (2005) 9221 E	
Faecal coliforms mFC Non Potable water	2 cfu/100mL	APHA (2005) 9222 D	
Presumptive Culturable Enteroviruses	5 pfu/100L	APHA (2005) 9510, modified	1
Presumptive Culturable Adenoviruses	1 MPN/100L	APHA (2005) 9510, modified	1

Note:

When selecting the appropriate Faecal Coliform test method consider the following:

Faecal coliforms by MPN (mpn-faec) – best method where bacterial counts are expected to be medium to low and the sample is highly turbid.

Faecal coliforms by Membrane Filtration (fcolmfce) – best method where bacterial counts are moderate to high and turbidity is moderate.

Sample Preparation for Microbiology Parameters

Prep	Description	Accredited	Test Method
1	Virus preparation on water samples	IANZ	APHA (2005) 9510 Modified
2	Virus preparation on raw sewage	IANZ	APHA (2005) 9510 Modified
3	Virus preparation on treated effluent	IANZ	APHA (2005) 9510 Modified
4	Filtration step- we require 20 litres of raw water for Giardia Cryptosporidium testing		
5	Filtration step- we require 100 litres of raw water for Giardia Cryptosporidium testing		
6	Please note that we require time to order media for <i>Legionella</i> testing		

Microbiology on Solids

The table below lists routine Microbiology tests that are carried out on solids. If a test you require is not included, please contact the marketing department on (09) 539 7785

Note: some tests require specific sample preparation steps as denoted in the prep column. Each preparation step is only charged once per sample regardless of how many tests it is required for.

Description	MDL	Test Method	Prep
<i>Campylobacter</i> on Solids by MPN	1MPN/g	MIMM (2004), 13.1	5
<i>Clostridium perfringens</i> spores on Solids	1cfu/g	MIMM (2005), ISO6461/2 (1986)	5
<i>E.coli</i> by on Solids by MPN	2MPN/g	APHA (2005) 9221 F	5
Enterococci on Solids by MPN	2MPN/g	APHA (2005) 9230 B	5
Faecal coliforms on Solids by MPN	2MPN/g	APHA (2005) 9221	5
<i>Giardia</i> and <i>Cryptosporidium</i> on Solids	1 /g	USEPA 1623, modified	
Helminths Cultured on Solids	1/4g	AFNOR PR XP 33-031 Enumeration of Viable Heminth Eggs	5
Helminths Enumeration on Solids	1/4g	Elution, Concentration & Microscopic Examination	5
<i>Salmonella</i> on Solids	1MPN/g	APHA (2005) 9260 B, MIMM (2005) 13.2, modified	5
Virus - Phage F specific on Solids	10pfu/g	ISO (1995) 10705-1	5
Virus - Presumptive Culturable Adenoviruses on Solids	5pfu/4g	APHA (2005) 9510, modified	4, 5
Virus - Presumptive Culturable Enteroviruses in Solids	5pfu/4g	APHA (2005) 9510, modified	4, 5

Sample Preparation for Microbiology Parameters

Prep	Description	Accredited	Test Method
4	Virus Preparation On Sediments	IANZ	APHA (2005) 9510 MODIFIED
5	Dry weight %	IANZ	APHA (2005) 2540 G

Microbiology on Shellfish

The table below lists routine Microbiology tests that are carried out on shellfish. If a test you require is not included, please contact the marketing department on (09) 539 7785

Note: some tests require specific sample preparation steps as denoted in the prep column. Each preparation step is only charged once per sample regardless of how many tests it is required for.

Description	MDL	Test Method	Prep
<i>Campylobacter</i> as wet weight on Shellfish by MPN	1 MPN/100g	MIMM (2004), 13.1	1, 2
<i>Clostridium perfringens</i> as wet weight on Shellfish	2 cfu/100g	MIMM (2005), ISO6461/2 (1986)	1, 2
<i>E.coli</i> as wet weight on Shellfish by MPN	2 MPN/100g	APHA (2005) 9221 F	1, 2
Enterococci as wet weight on Shellfish by MPN	2 MPN/100g	APHA (2005) 9230 B	1, 2
Faecal coliforms as wet weight on Shellfish by MPN	2 MPN/100g	APHA (2005) 9221 B,E	1, 2
<i>Salmonella</i> as wet weight on Shellfish by MPN	1 MPN/100g	APHA (2005) 9260 B, MIMM (2005) 13.2, modified	1, 2
Virus - Phage F specific as wet weight on Shellfish	10 pfu/100g	ISO (1995)10705-1	1, 2
Virus - Presumptive Culturable Adenoviruses on Shellfish	5 MPN/100g	APHA (2005) 9510, modified	1, 2, 3
Virus - Presumptive Culturable Enteroviruses on Shellfish	5 pfu/100g	APHA (2005) 9510, modified	1, 2, 3

Sample Preparation for Microbiology Parameters

Prep	Description	Test Method
1	Shellfish Shucking	Manual Shucking
2	Shellfish Blending	BLEND, APHA (2005) 3030
3	Virus Preparation On Shellfish	APHA (2005) 9510, modified
4	Virus preparation on sediment	APHA (2005) 9510, modified
5	Dry wt % Sludge	APHA (2005) 2540 G