



Environmental Laboratory Services

Testing the Waters



Landfill Analysis

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## Introduction

Environmental Laboratory Services is one of New Zealand's leading experts in the areas of:

- Air quality monitoring
- Boiler water
- Environmental water
- Landfills
- Meat industry services
- Potable water for councils
- Sample Integrity
- Swimming pools
- Biological fluids
- Ceramicware and metal food containers
- Food and Dairy Products
- Legionella
- Metals
- Potable water for small communities
- Sewage and effluent
- Trade waste

The company has its origin as part of the Hutt City Council Laboratory and became a private enterprise in 1994. In 1998 the laboratory acquired the Wellington City Council Laboratory. In September 2001, ELS further expanded with the purchase of the Inorganic Chemistry section of AgriQuality New Zealand. This section was previously part of ESR, which before that was the DSIR.

We are based in a purpose built facility of 1450 m<sup>2</sup> at 85 Port Road, Lower Hutt. ELS is comprised of four separate laboratory areas – Instrumental Chemistry, General Chemistry, Biological Fluids, and Microbiology. The latter is further split into three separate rooms with clean, cleaner and ultra clean capabilities. The ultra clean lab is used for pathogenic bacteria determinations.

ELS is privately owned by scientific people committed to the science industry in New Zealand. We continue to be one of the few major laboratories in the country with such a broad microbiological and chemical analysis capability. We provide high quality, fast turnaround analyses at competitive prices.

## Who should read this brochure?

This brochure has been developed for the operators and administrators of landfill consents in New Zealand. This includes council contractors and environmental engineers.

The brochure details the capability that ELS possesses to make sampling and analyses of landfill groundwater, surface water, and leachate a simple process.

Complementing this brochure are our sample integrity, and metals analyses brochures which are available on request.

## Analytical Capability

ELS has invested heavily in recent years and now boasts one of the countries most extensive and newest range of inorganic instrumentation. This includes:

- Two ICP-MS instruments for low level metals determination
- ICP-OES for alkali metals and specialist matrices
- Two Ion Chromatography instruments for anion analyses
- Dedicated Carbon analyser
- Two Flow Injection Autoanalysers for low level nutrients analyses

## Landfill analyses

An increased public awareness of environmental contamination has resulted in recent legislative changes to the way councils operate and plan the disposal of solid and liquid waste.

These changes have resulted in a greater emphasis on waste minimisation needs as well as for the need to closely monitor the environmental impact of current and closed landfills.

The management of solid waste disposal is a high priority for councils and environmental engineers around the world, and ELS is ideally placed to provide the analytical needs of these systems. Through our own laboratory and our partners we offer the a comprehensive range of surface, groundwater and leachate analyses including:

- Full microbiological suite
- Low level metals analysis by ICP-MS
- Low level nutrient analysis
- Full Organic analyses

Often these samples provide a special challenge to our analysts because of the different matrix interferences that may be present. Experience with these samples is a prerequisite to ensure that the correct results are being identified.

Landfill analyses is based on Ministry for the Environment criteria and vary between locations. ELS operates a wide range of equipment and test methodology, capable of meeting all the required parameters.

The following table details the range of tests that are available to our clients.

As well as our extensive microbiological capability, ELS offers the following tests for landfill leachate, ground, and surface waters.

Instrumental Chemistry Parameters	General Chemistry Parameters
Aluminium	Absorbance at 254 nm
Ammonia Nitrogen	Absorbance at 270 nm
Antimony	Absorbance at 440 nm
Arsenic	Acidity to pH 8.3
Barium	Aerated pH
Beryllium	Alkalinity (Total)
Bismuth	Alkalinity to 4.5
Boron	Alkalinity to 8.3
Bromide	Ammonia - unionised
Cadmium	Apparent Colour
Calcium	Ash Content
Chromium	Bicarbonate Alkalinity
Chromium - Hexavalent	BOD - Carbonaceous
Cobalt	BOD - Soluble
Copper	BOD - Soluble Carbonaceous
Dissolved Organic Carbon	BOD - Total
Dissolved Organic Nitrogen	Carbonate Alkalinity
Dissolved Reactive Phosphorus	Chemical Oxygen Demand
Germanium	Chloride
Gold	COD - Soluble
Iron	Colour (from Absorbance 270nm)
Lead	Conductivity
Lithium	Cyanide
Magnesium	Detergent
Manganese	Dissolved Oxygen
Mercury	Floating Oil and Grease
Molybdenum	Fluoride
Nickel	Hydroxide Alkalinity
Nitrite Nitrate Nitrogen	Ion Balance Calculation
Nitrite-Nitrogen	Nitrate - Nitrogen
Phosphorus	Odour
Potassium	Oil/Grease @104C
Scandium	pH
Selenium	Phenol
Silver	Salinity
Sodium	Saturation Index
Strontium	Settleable Solids
Sulphate	Sulphide
Sulphur	Sulphite
Thallium	Suspended Solids
Tin	Temperature
Titanium	Total Dissolved Solids
Total Hardness	Total Kjeldahl Nitrogen
Total Nitrogen	Total Solids
Total Organic Carbon	Transmissivity @ 253.7nm
Total Phosphorus	Turbidity
Tungsten	Volatile Solids
Zinc	Volatile Suspended Solids

## Closed Landfills

Recent landfills have been designed with built-in liners and leachate collection systems. Dangerous and toxic waste has been diverted to other processes so that most new landfills are kinder on the environment than their predecessors.

Older landfills are causing problems around New Zealand and their analytical approach is often treated quite differently from current or newer ones. The Ministry for the Environment has prepared a report specifically targeting the management of closed landfills and this includes a detailed approach to the laboratory testing requirements.

Testing is based on a number of factors including topography, groundwater velocity and landfill contents, and the testing program may target certain analytes directly. The objective of the program is to identify potential problems before they arise.

## Leaching Procedures

Several leaching procedures are available to evaluate metals mobility. Two of the more frequently used procedures require that solid waste be mixed with the appropriate extraction fluid and tumbled for 18 hours in a rotary agitator. The liquid is filtered and then analysed for metals.

Please refer to our metals brochure for more details on this technique.

### **Toxicity Characteristic Leaching Procedure**

The most commonly used EPA Method 1311, Toxicity Characteristic Leaching Procedure (TCLP), evaluates metal mobility in a landfill. The extraction simulates a worst case scenario where the waste is co-disposed with municipal solid waste.

### **Synthetic Precipitation Leaching Procedure**

EPA Method 1312, the Synthetic Precipitation Leaching Procedure (SPLP) is used to evaluate the potential for leaching metals into ground and surface waters. This method provides a more realistic assessment of metal mobility under actual field conditions, i.e. what happens when it rains (or snows). The extraction fluid is intended to simulate precipitation.

The SPLP is a method of choice when evaluating fate and transport of metals in a properly engineered wasteland disposal facility from which municipal solid waste is excluded.

## Bottle Service

Please contact us with your sample program and we will send out the sample bottles and filtration equipment you need.

## Sampling Landfills

The following is an excerpt from our sample integrity brochure.

### **Surface water**

Many water bodies (rivers, streams, ditches etc) are shallow and well mixed and surface (0-1m) water sampling is all that is required. For this purpose, immersion of a sample bottle by hand to just below the surface (typically 0.25-0.5m) is satisfactory. Ideally the sampler should be wearing a plastic disposable glove and be standing downstream of where the sample is being collected. Always sample upstream of any other action in the water that may result in stirring up sediment (eg. landfill activity or other monitoring work).

### **Ground Water Samples**

Groundwater occurs in aquifers at various depths below the ground. Recharge may be by direct infiltration of rainfall, by seepage from rivers or other bodies of surface water, or by transfer from one aquifer to another. The area of recharge may be at the sampling site or many hundreds of kilometres away. The water may have been resident in the aquifer for a few days or millions of years.

Monitoring of the quality of groundwaters involves techniques different from those used for surface water quality investigations because groundwater, by its very nature, cannot be sampled without some disturbance from the construction of a bore or other access hole and the effects of sampling devices and procedures.

Sampling staff must take extreme care to ensure that samples are representative of the water in the aquifer. To retrieve a representative sample the following principles should be considered:

- The sampling equipment should not change the water quality in any way and particular effort should be made to avoid cross-contamination between bores and sampling equipment.
- Sufficient water should be removed to ensure the sample derived from the aquifer itself rather than from water that has sat in the bore.

The aim of sampling water from a well is to obtain a sample representative of the water in the aquifer outside the well. All wells should be purged for a period of time before sampling to flush out non-representative water from the well and any connected pumping system. Stagnant water in the well may give results unrepresentative of conditions in the aquifer, because physical parameters such as temperature and contact with well construction materials may differ from those conditions in the aquifer. Also note that some parameters will unavoidably change through contact with air. Iron is particularly affected, and often a clear sample can turn brown within a few minutes.

## Contact Details

Please feel free to contact ELS by any one of the methods shown below.

### TELEPHONE

Main lines to Central Services

Main Telephone	(04) 576-5016
Facsimile	(04) 576-5017
Free Phone	(0800) 576-5016

Direct Lines

Joanne	Accounts	(04) 568-1205
Rob Deacon	General Manager	(04) 568-1203
Sue Meiklen	Occupation Health	(04) 568-1207
Sunita Raju	Microbiology	(04) 568-1206
Terry Manning	Managing Director	(04) 568-1204
Tracy Morrison	Instrumental Chemistry	(04) 568-1200
Jacinta Hira	General Chemistry	(04) 568-1209

Email can be directed to staff using "first initial last name"@els.co.nz

### COURIER

85 Port Road, Seaview, Lower Hutt, New Zealand.

### MAIL

P.O. Box 36-105, Moera, Lower Hutt, New Zealand.

### EMAIL

General Information: solutions@els.co.nz

### WEB

www.els.co.nz



NZFSA Laboratory Approval Scheme  
Accreditation Number 905

IANZ Accreditation Numbers:  
Biological 639, Drinking Water 787,  
Chemistry 414, Dairy L1921