



Environmental Laboratory Services

Testing the Waters

Boiler 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 m² 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?

In the draft "Code of practice for the design, safe operation, maintenance and servicing of boilers", a requirement is made for regular water-quality monitoring of both limited-attendance boilers and unattended boilers.

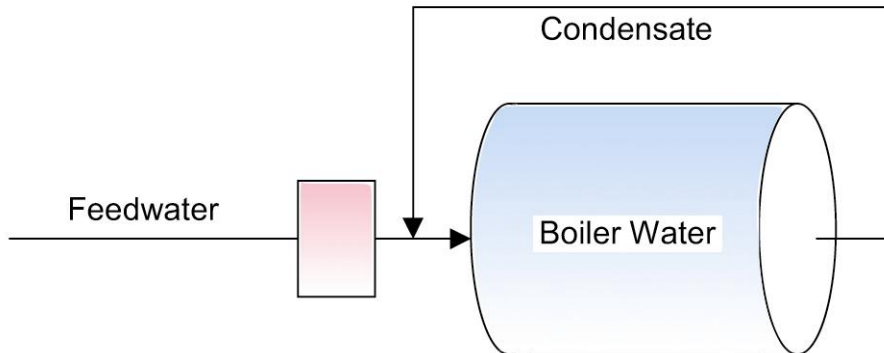
OSH require monthly tests for these boiler types and stipulate that the testing be conducted by an IANZ accredited laboratory.

If you supervise a limited-attendance or unattended boiler then ELS can assist you with your water testing requirements.

Boiler water tests available

The specific method of chemical treatment used varies with the type of boiler and the specific properties of the water from which the boiler feed is derived. This is very site specific but ELS has the testing capability to cover all your requirements.

A boiler requires testing of three different water types as shown below:



Feedwater

Not all feed-water is created equally.

Boiler feedwater is sourced from many different places. Some supplies come from industry owned bores and treatment plants, while others come directly from a council supply, however all feedwater should be analysed in order to correctly determine dose rates of treatment chemicals.

Water quality can change as it passes through a delivery or reticulation system, so it is important to check for various parameters at point of use - ie where it enters the boiler or pre-treatment system.

Boiler feedwater is usually a combination of returned condensate plus pre-treated makeup water from a softener, reverse osmosis, or other purification system. Typical tests used for boiler feedwater include:

- Chloride or salinity
- Conductivity
- Dissolved Oxygen
- Hardness
- Iron and Manganese
- pH
- Silica
- Sulphide
- Suspended Solids
- Total Dissolved Solids
- Turbidity

Not all water supplies will require all the tests shown here, and if the supply is constant the tests will not need to be repeated very often.

Boiler Water

The boiler water itself must be dosed in order for the boiler to run efficiently and safely. A chemical imbalance can lead to corrosion and damage to the system and this damage can ultimately lead to boiler failure and injury.

Boiler water analyses are basically aimed at keeping the parameters within established limits.

Please remember that OSH require monthly tests for limited-attendance boilers and unattended boilers and stipulate that the testing be conducted by an IANZ accredited laboratory.

Alkalinity

One standard measurement is alkalinity, which can be determined and expressed in three ways, essentially identifying hydroxide, carbonate, and total alkaline components. ELS reports alkalinity in several different ways following the British Standard method BS 1427: 1993.

- Hydroxide P2 Alkalinity
- Phenolphthalein P1 Alkalinity
- Total Alkalinity

pH

pH must be maintained at an alkaline state in order to reduce corrosion due to acidity.

Total Dissolved Solids

Total Dissolved Solids are controlled by blowdown. If boiler water gets too high in total dissolved solids, then it becomes inefficient and expensive to operate.

Sulphite

Sulphite is added to remove oxygen from within the boiler. Even at low concentrations, oxygen will become corrosive in a high pressure/temperature boiler.

ELS can report Sulphite in three ways.

- Sulphite
- Metabisulphite
- Sulphite as Na_2SO_3

Silica

Silica causes scale that is very hard and very difficult to remove. ELS uses ICP-OES techniques to analyse this parameter.

Phosphate

Additives such as phosphate must be regularly monitored to ensure adequate levels are maintained. While simple colorimetry kits are available, ELS uses IANZ accredited instrumental techniques in order to ensure accuracy.

Nitrate

Nitrates appear in boiler feedwater due to the oxidation of ammonium ions resulting from bacterial and organic surface contamination of pipelines. While simple colorimetry kits are available, ELS uses IANZ accredited instrumental techniques in order to ensure accuracy.

Condensate

Good condensate is the best quality, least expensive water most systems can generate. You do not want to lose it, or contaminate it unnecessarily.

Steam condensate analysis should include

- pH
- conductivity
- iron
- copper
- ammonia

Condensate analysis can indicate several possible problems. Iron and copper of course indicate corrosion, and the levels are an indication of the rate. If more than a few parts per billion of metals are found in a sample, it may indicate corrosion is occurring within the boiler.

Ammonia, especially in the presence of oxygen, can produce extreme copper corrosion.

How to arrange everything

After you have read this brochure and decided which suite you require, please give us a ring to arrange the delivery of bottles to you. Alternatively you could visit our website and order through there.

You will receive the bottles within a few days. Please fill them up following the instructions and then send back to ELS. Please include your cheque as payment. We will process the samples and deliver a report within a few days.

How to collect the samples

We will provide you with colour-coded bottles and clear instructions to make sampling easier. Each bottle corresponds to a particular preservative type and ensures the parameters under examination remain as constant as possible. Alternatively, we can collect the samples if you are nearby.

How to return the samples to ELS

All samples should be delivered to the laboratory as soon as possible but within 24 hours. Please follow the instructions we include. ELS operates 365 days a year and accepts samples from Monday to Saturday. Please remember that if you send samples on a Friday your courier may require a Saturday delivery ticket.

Cost of Analysis

ELS offers suites of tests that cover any chemistry analysis required. These suites cover all the common tests required.

Standard Boiler Suite \$69 + GST

- pH
- Total Dissolved Solids
- Total Reactive Phosphorus
- Sulphite

Please note that ELS performs TDS by gravimetric technique, silica by ICP-OES, and phosphorus by automated Flow Injection Autoanalyser. We realise cheaper tests are available, but insist on using the best techniques to ensure accuracy.

Additional Tests Available

Total, P1 and P2 Alkalinities	\$30
Silica, Iron, and Manganese	\$30
Nitrate by Ion Chromatography	\$20
Ammonia	\$22
Chloride	\$11

Many other tests are available. Please don't hesitate to contact us for more information, and remember that we offer good discounts for volume work.

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