FITZ SCIENTIFIC
MONITORING & TESTING

The following are basic guidelines on how to understand and read your Certificate of Analysis

The columns listed on the Certificate that are relevant to you are those listed **Test Parameter** and **Result.**

If any of the parameters are **highlighted in grey** then this means that the sample has failed to comply with standards for this particular test and the water is not suitable for drinking.

The next step is to contact a water treatment company for advice on treatment.

Please note that there is no standard for hardness so a treatment company will also advise you on how hard your water is and will treat it accordingly.

After installation of the treatment system by an appropriate company you will require a retest of the drinking water supply to ensure that the problem has been solved. Not all of the parameters will require a retest just the ones you failed on. Contact us again at this stage and we will provide a price for individual parameters and arrange for bottles to be supplied to you.

Wording used on Cert	Explanation
Test Parameter	The chemical, metal or bacteria we analysed for in the Water sample
SOP	Standard Operating Procedure – this is the method we follow in the lab
Analytical Technique	The instrument or technique used
PVL	Parametric Value Limit acceptable for potable water
Result	Your result
Units	The units relating to the result
Acc	If we have Accreditation for the test

Please see below a list of the parameters which were tested on your drinking water sample, their common causes, Parametric Value Limits PVL (the maximum allowable limit), our laboratory Limit of Quantification (LoQ) ie how low we can detect to, and the effect on the water from a human consumption point of view.

Aluminium – (PVL – 200 ug/l, LoQ= 9 ug/L) is a significant element in the earth's crust and is therefore widespread in the natural environment. A level greater than 200 ug/l can cause turbid and discoloured water. There is no conclusive evidence on the health effects although it is known to have a tendency to accumulate in the brain and bones. (This test is accredited to ISO 17025:2017)

Ammonia – (PVL - 0.3 mg/l as NH_4 , LoQ=0.04 mg/L as NH_4) is found naturally in groundwater however generally it is in low concentrations as it absorbs to soil particles and clays and is not easily leached. Ammonia may have public health connotation associated with it. Ammonia is an indicator of recent contamination, typically septic tank discharges, and agricultural waste. (This test is accredited to ISO 17025:2017)

Coliforms (Total) – (PVL – 0 no/100ml, LoQ= None Detected) this is a measure of the presence of bacteria which may be harmful to humans and as such bacteria from this group should not be present in drinking water. Their presence is due to sources of contamination, usually septic tanks in close proximity to the well, or run off from farming activity or storage/spreading of silage effluent or slurry. Coliforms can cause serious health risks. (This test is accredited to ISO 17025:2017)

Colour (Apparent) – (PVL – Acceptable to consumers and no abnormal change, LoQ= 11 PtCo units) Colour in water may result from the presence of neutral metallic ions (iron and manganese), humus and peat materials, plankton, weeds and industrial wastes. Colour is removed to make water suitable for domestic and industrial applications. (This test is accredited to ISO 17025:2017)

Conductivity – (PVL – 2500uScm-1@20C, LoQ= 7.4 uScm-1@20C) is a measure of the total amount of ions in a particular water supply and is also a measure of the waters ability to carry an electrical current. The conductivity of potable waters ranges generally from 50 – 1650uScm-1 and samples which exceed this higher value indicate some form of contamination. (This test is accredited to ISO 17025:2017)

E Coli – (PVL – 0 no/100ml, LoQ= None Detected) E Coli belongs to the faecal coliform group of bacteria. Potable water systems can become polluted with coliform bacteria from normal, diseased or carrier human and animal excrements. This can occur by gross connections between a water main and a sewer or from the entry of sewage water through leaks in damaged pipes. (This test is accredited to ISO 17025:2017)

Iron (Total) – (PVL – 200 ug/l, LoQ= 14 ug/L) is found naturally in groundwater and has no major health connotations but is of concern as a nuisance parameter causing problems with staining of laundry and tableware. (This test is accredited to ISO 17025:2017)

Nitrite – (PVL – 0.5 mg/l as NO_2, LoQ= 0.099 mg/L as NO_2) Nitrite has health connotations with it and is the actual etiological agent of methemoglobinemia (or more commonly known as blue baby syndrome). Nitrite is an indicator or recent contamination. (This test is accredited to ISO 17025:2017)

pH – (PVL – 6.5-9.5, LoQ= 4 pH units) pH below 7 is acidic in nature while pH above 7 is basic. Most natural waters in Ireland are slightly basic in nature due to the presence of carbonates and bicarbonates of the alkali and alkaline earth metals. pH has no real health connotations associated with it except in extreme cases. (This test is accredited to ISO 17025:2017)

Hardness (Total) – (PVL – Not Specified, LoQ = 6 mg/L $CaCO_3$) Total hardness is defined as the sum of the calcium and magnesium concentrations. Hardness may range from zero to hundreds of mg/l depending on the source of the treatment to which the water has been subjected. Hardness can be treated with a filtration system. (This test is accredited to ISO 17025:2017)

Turbidity – (PVL – Acceptable to Consumers and no abnormal change, LoQ=0.1 NTU) Clarity of water is important in producing products destined for human consumption and in many manufacturing operations. The clarity of a natural body of water is on important determinant of its condition and productivity. Suspended and colloidal matter such as clay, silt, microscopic organisms etc. cause turbidity in water. (This test is accredited to ISO 17025:2017)

TBC @ 22˚C – (PVL No abnormal change, LoQ = None Detected) This is where a count is made of bacteria after they have been incubated in water heated to 22°C for a fixed period. This bacteria is aerobic and is not related to faecal contamination. The objective of water treatment systems should be to ensure that bacteriological colonies are kept as low as possible. (This test is accredited to ISO 17025:2017)

Manganese – (PVL 50ug/l, LoQ=3 ug/L) This is widely found in soils and ground waters. Manganese, like iron, is of concern as a nuisance parameter causing problems with staining but with this metal the problems can be more severe hence the more stringent limit. The presence of manganese much above the limit can also cause an unacceptable taste. (This test is accredited to ISO 17025:2017)

Lead – (PVL – 10 ug/L, LoQ = 1 ug/L) Lead is one of the most commonly determined heavy metals because it accumulates in body tissue. It follows that strict limits on its presence in raw and finished drinking waters must be imposed. Particular attention is paid to this element as in many older houses extensive use is made of lead piping and there is a danger of lead being brought into solution ("plumbosolvency"). Levels may be quite marked in samples taken first thing in the morning when the initial yield will be of water which has been standing in such pipes for perhaps twelve hours. Hence the recommendation that drinking water pipes be flushed briefly in the morning before the water is consumed. (This test is accredited to ISO 17025:2017)

Copper – (PVL – 2 mg/L, LoQ = 0.003 mg/L) Copper is not particularly toxic to humans (indeed, it is an essential dietary requirement) and medicinal doses up to 20 mg/l are not unknown. However, astringent tastes in water can be caused by levels above 1 mg/l Cu. Background Information: This element is present naturally in metalliferous areas but more often its presence in waters is due to attack on copper piping. Rarely, its occurrence may be due to its use as an algicide. Unless used with great care for algal control there is a grave risk of fish kills. (This test is accredited to ISO 17025:2017)

Nitrate – (PVL – 50 mg/L as N, LoQ = 3.99 mg/L as N) Hazard to infants above 11 mg/l N [50 mg/l NO3]. Relatively little of the nitrate found in natural waters is of mineral origin, most coming from organic and inorganic sources, the former including waste discharges and the latter comprising chiefly artificial fertilisers. However, bacterial oxidation and fixing of nitrogen by plants can both produce nitrate. Interest is centred on nitrate concentrations for various reasons. Most importantly, high nitrate levels in waters to be used for drinking will render them hazardous to infants as they induce the "blue baby" syndrome (methemoglobinemia). The nitrate itself is not a direct toxicant but is a health hazard because of its conversion to nitrite which reacts with blood haemoglobin to cause methemoglobinemia. (This test is accredited to ISO 17025:2017)

Fluoride – (PVL – 0.8 ug/L for mains water or 1.5 mg/L for a natural supply (well water or bore hole), LoQ = 0.08 ug/L) Fluoride in water is almost exclusively from the fluoridation processing of public water supplies and from industrial discharges, although it occurs naturally in quite rare instances. Studies have shown that the addition of fluoride to at levels above 0.6mg/l F leads to a reduction in tooth decay in growing children however, in light of international and Irish research showing an increased occurrence of dental fluorosis, the lowering of the fluoride levels in drinking water to a range of 0.6 to 0.8 mg/l. (This test is accredited to ISO 17025:2017)

Sodium [Na] PVL - 200 mg/litre LoQ = 4.9 mg/l. Sodium is an elementary chemical that is common in rocks and soils. Considerable amounts of sodium are excreted by humans and it is a common constituent of domestic sewage. Given its abundance in the environment, some sodium will be present in nearly all water supplies. The problem is likely to be higher in coastal areas, where sea spray can contribute to sodium levels. Apart from contamination by salt water and from natural leaching of rocks and soils, sewage effluent can contribute to sodium levels in drinking water sources. Where source values are normally low, excessive sodium might indicate pollution of the source by wastewater treatment systems. Sodium is an essential dietary requirement, but it causes hypertension when taken in excess.

Arsenic [As] PVL - 10 μg/litre LoQ = 2 ug/l

Arsenic is a naturally-occurring element, widely distributed in the Earth's crust. It can be introduced into water as the minerals and ores in rocks dissolve, or from industrial effluent, atmospheric deposition (through the burning of fossil fuels and waste incineration), drainage from old gold mines, or the use of some types of sheep dip. Natural sources can make a significant contribution to the arsenic concentration in drinking water. The concentration of arsenic in groundwater is often highly dependent on the depth to which a borewell is sunk. Arsenic exceedances in drinking water tell us either that the source has naturally high concentrations, or that chemical pollution is occurring. Consumption of elevated levels of arsenic through drinking-water is related to the development of cancer of the skin, bladder and lung.

Nickel [Ni] Max. allowed: 20 μg/litre LoQ =2 ug/l

Nickel is a silvery-white metallic chemical element that takes on a high polish. There will be a trace element of nickel in most supplies, depending on the concentration of nickel in local rock formations etc. Raw water can be contaminated by diffuse nickel emissions from power plants, waste incinerators and metal industries, while discharge to surface waters from various industries can also be problematic. Nickel exceedances in drinking water most likely point to a supply that has been in prolonged contact with nickel plated plumbing fittings, rather than to a problem at source. Long-term exposure may result in toxic effects to the kidney. Nickel is known to be a common skin allergen and can cause dermatitis, particularly in younger women.

Selenium [Se] Max. allowed: 10 μg/litre LoQ = 3 ug/l

Selenium is a non-metallic element, Selenium is released from natural and human-made sources, with the main source being the burning of coal. Selenium compounds are used in some insecticides, in hair shampoos and as a nutritional feed additive for poultry and livestock. Cereal and grain products contribute most to intake, while fish and liver contain the highest selenium concentrations. The presence of selenium in drinking water tells us that the source has been contaminated, either naturally or through an industrial effluent spill. Other features of excessive selenium intake include symptoms such as gastrointestinal disturbances and dermatitis.

Thank you for choosing Fitz Scientific as your service provider.

It is advisable to have your Drinking Water analysed on a regular basis.

Kits for sampling and delivering to our accredited laboratory can be ordered on line at www.fitzsci.ie