

Lead – Guidance for Local Authorities



Photo: Irish Times

Description and Background

Lead is a soft, dense, silvery metal which rapidly tarnishes to a dull grey on exposure to the air. It has been used in plumbing since roman times, but once its toxic properties became apparent, its use in plumbing was discontinued.

Lead can be found in pipework and tanks in older properties, but it may also be present as a component of some brass or alloy fittings and solder. Solubility of lead is more likely to be a problem for soft, low pH waters, high in natural organic acids such as those often found in Scotland and Northern Ireland.

Sources of industrial pollution are less likely, but include lead smelting, heavy metal processing, paints, batteries, and in some countries, fuels.

Lead can occur naturally in waters, however it is unusual for this to be at concentrations in excess of the regulatory standard.

The risk of lead in drinking water is enhanced on private water supplies due to the poor control of plumbing materials and the tendency for pH control to be poor or absent. (Low pH water will be corrosive to any lead pipes – public water supplies are fully pH corrected and often dosed with phosphate to inhibit corrosion).

Health Significance

Lead has no known use in the human body. It is a cumulative general poison, with both acute and chronic effects. Children under 6 and unborn babies are most at risk but it can also result in illness in adults. Health effects can be wide ranging, but the impact on neurodevelopment in children is especially well documented.

No safe lower threshold for lead concentration has been identified. Consequently, WHO guideline values have progressively reduced and may potentially be lowered further in future years. Consequently, their guidance is that lead is removed from the drinking water supply route. The current guideline value is 10 microgrammes per litre, and this is also the regulatory standard. Lead may impart a slightly sweet taste to waters.



Photo: WRAS

Risk Assessment and Monitoring

It is possible for lead to be present naturally in a source, but unlikely. The presence of mines or known mineral deposits, even for other metals such as silver, copper, tin and zinc with which lead can be associated, increase the potential. Industrial waste, especially old lead acid batteries can cause lead to be present in a source.

By far the most likely source of lead, and the one which should be considered first, is the existence of lead piping in the system. Given the varied range of materials often found in PWS, this could be located anywhere in the system, although it is more likely to be present in buildings, collecting chambers or storage tanks especially if they were constructed prior to about 1970. Very small quantities of lead piping can cause failures of the 10mg/l standard. Lead solder (illegal but still used), and some brass fittings (which contain quantities of lead) can also be significant sources and cause failures. Less commonly, some early PVC pipes were made with lead stabiliser – this is no longer the case and most lead will probably have leached away, however it may be worth considering as a possible source.

This document from the Water Regulations Advisory Scheme (WRAS) contains useful information on lead, including a photo of lead piping. Note the dull grey colour and distinctive bulbous joints.



Developers Briefing -
Lead and drinking water

When undertaking a risk assessment on a PWS it should be assumed that lead is a risk where:

- a) There are properties older than 1970
 - or b) There is positive confirmation that there is no lead piping anywhere in the system
- Even where these conditions are satisfied, lead may still be present.

Sampling for lead is fairly straightforward – most accredited water laboratories will undertake it fairly cheaply as part of a suite of analysis for other metals. Although sampling requires no special bottles, thought needs to be given to the time the sampled water has been in contact with any lead piping. Generally speaking, when lead piping is present in a property, the worst case result will be obtained from the un-flushed first draw sample. Flushing will tend to reduce the concentration of lead in most cases.

What if it fails?

Lead failures can occur on PWS – it is worth remembering that the lead result will vary from tap to tap (depending on the amount of lead piping present) and the circumstances of the sample (flushed samples or those drawn after a lot of water has been used in the house will usually contain more lead than those drawn first thing in the morning with no flushing of the tap).

Check the following:

- Resample from several points and properties in the supply to eliminate the source and try to identify the properties containing lead. Alternatively a first draw / 30 minute stagnation sample could be taken as well as a flushed sample from the same property to see how lead concentrations vary.
- Is there any visible lead piping in the property (look under the sink or in the loft space)?
- Could lead solder have been used illegally?
- Are any water fittings WRAS approved / certified lead free?
- If there is evidence that the lead may be in the water supplied to the property, try to pinpoint the source via sampling upstream and / or investigation, looking for the risk factors ?

Options for resolving at source

It is unlikely that any lead is present in the source, but if this is thought to be the case, the remediation of any point source contamination could be attempted. If the lead is naturally occurring, it is probably far cheaper and simpler to locate an alternative source than to attempt to remove the lead via treatment.

Treatment

Complete removal of any lead piping / lead solder / lead fittings in the system is by far the preferable option and should be the starting point for any discussions with supply owners / users.

Treatment options that remove lead could include ion exchange, reverse osmosis or GAC filters. The latter is probably simplest, but unreliable and needs very careful monitoring as the GAC will exhaust over time and lead removal will cease.

Proper conditioning of the water to reduce its corrosivity will minimise the amount of lead (and other plumbing metals) being dissolved into the water but will not reliably ensure the standard is met. Some phosphate compounds are available for dosing into the water to form a protective coating on any lead piping, but, again, failures can still occur with these systems in place.

Newly developed technologies for lining lead piping are coming on the market, and are beginning to be used on some public supply service pipes, but they do not resolve the issue of any lead piping within the building itself and do not carry the certainty of complete removal.

Fact Sheet for Owners and Users

The Scottish Water leaflet on lead, although it is primarily aimed at those on a public water supply, contains relevant information and is available here:

<http://www.scottishwater.co.uk/assets/domestic/files/you%20and%20your%20home/water%20quality/swfactsheet7lead.pdf>



Photo: Structuretech



Photo: Gumtree