Private Water Supplies

Mercury – Guidance for Local Authorities

Description and Background

Mercury is a metal, liquid at ambient temperatures. It occurs as both organic and inorganic compounds, with some natural processes creating methyl mercury. Inorganic mercury is commonly found in two oxidation states, I and II, with II being the most common state in nature. High concentrations of naturally occurring mercury are rare, but do occur and have been documented in the USA and Japan[1]. Occurrence will commonly be with other metals or in volcanic area and mercury may also be associated with coal deposits. Mercury deposits of commercial significance have been found in Spain, USA, Kyrgyzstan, Italy and Slovenia. The most significant producer or mercury is now China.

Affected Areas

Contamination Sources

Contamination of water from industrial activities is possible – mercury is used in electrical products, especially batteries and fluorescent light bulbs, including those commonly used to generate UV light to disinfect small water supplies.

Health Significance

Mercury is a well-known toxin. Health effects are primarily neurological and in the kidney[1]. Acute exposure to high concentrations can cause severe damage to the heart and stomach. Organic forms of mercury are more toxic to humans and difficult to remove from drinking waters.

The WHO has set 6μg/l as the health based guideline value. The EU Drinking Water Directive sets a limit of 1μg/l.

Risk Assessment and Monitoring

The Private Water Supply regulations require regular monitoring for mercury where it is present at more than 75% of the PCV.

Mercury is primarily a risk where it is naturally occurring in local mineral deposits. Studies by the British Geological Survey (BGS) into metal concentrations in stream sediments may be helpful in determining the risk from mercury in a particular area[2].

What if it fails?

If a water sample fails for mercury it would be prudent to gather additional samples to verify the failure and determine the variability of the concentration of arsenic in

water. If there are multiple sources, it would be worth sampling each one to determine whether one source has greater levels of contamination than the others.

Check the following:

- Is it likely that mercury is naturally occurring, based on other sample data from supplies in the area and BGS data?
- Is there any history of industrial processes that could have used mercury (paints, pesticides, timber preservation), or large accumulations of products that could have been treated with these products?
- If multiple sources, are concentrations of mercury consistent across these?
- If the source is a groundwater, how much is known about the construction of the borehole or spring? Is it known at what depth water is being drawn off?

Options for resolving at source

Where mercury is likely to be naturally occurring, such as in volcanic areas, near metalliferous mineral deposits, or coal measures, it maybe advisable to seek an alternative water source could be sought.

Unless widespread industrial pollution is suspected, man-made contamination could well be from point sources, such as buried batteries or electrical equipment and this option is probably the most productive one to be investigated initially.

Treatment

If the source of the mercury cannot be located, GAC filters or ion exchange technologies are likely to be the most cost-effective methods for removal of mercury at source. GAC is most likely to be effective for organic forms of mercury. Mercury selective ion exchange resins are commercially available. Reverse osmosis membranes should also be effective.

There is some evidence that lime softening may be effective, by precipitating the mercury as a hydroxide.

Point of use treatment is likely to be feasible, based on the technologies above. GAC filtration may be simplest, however a service contract or close monitoring to ensure timely media replacement would be advisable. The spent media may contain high levels of contaminant and need special disposal measures. Point of use ion exchange and reverse osmosis units are also available.

References / Further reading

[1] WHO 2005. *Mercury in Drinking-water. Background document for development of WHO Guidelines for Drinking-water Quality.* WHO/SDE/WSH/05.08/10

[2]Shand, P, Edmunds, W M, Lawrence, A R, Smedley, P L, and Burke, S. 2007.
The natural (baseline) quality of groundwater in England and Wales.
British Geological Survey & Environment Agency, RR/07/06 & NC/99/74/24

FAQ Fact Sheet for Owners and Users
To be developed if necessary