Bacteriological Contamination of Drinking Water – Advice Sheet

Private Water Supplies can become contaminated by bacteria or viruses which can cause illnesses, such as gastro-enteritis and dysentery. Hence, it is normal to test water for indicator bacteria called Escherichia coli (E.coli). This bacterium, from the coliform family, is found in the faeces of humans, warm blooded animals and birds. It is rarely found from any other source. The water is also tested for total coliform bacteria. These bacteria may be from an animal source, but can also be found in soil, rotting plant matter and on rusty surfaces, such as well lids.

A satisfactory result under The Private Water Supplies (England) Regulations 2016 (as amended):

Total Coliforms	0 per 100 ml
E.coli	0 per 100 ml

If coliform bacteria and especially E.coli are found in a supply it indicates the presence of harmful organisms from a human or animal source. As a short term measure it is advisable to boil all water before consuming it. A longer term method is to provide permanent treatment to your private water supply.

The Drinking Water Inspectorate recommend a multi-barrier approach to the protection of water supplies: This includes physical methods to protect the supply and disinfection.

(1) **Structural Improvement Works**

Contamination may be the results of incorrect construction of a well, borehole or other source and you are advised to make the following improvements where appropriate:

a)   The spring, well or borehole or well should be protected by a fence at least 4 metres from the source where there is livestock in the immediate vicinity to prevent physical damage and protect the water supply to keep out grazing animals and chickens.

b)   The access points to all sources and water storage chambers should be raised 150mm above ground level and diversion ditches or barriers installed where appropriate to prevent the ingress of surface water.

c)   All cracks and gaps in chambers should be repaired. Essential openings such as overflows should be protected with a fine mesh to keep out birds, animals and insects. Coarse filtration may be advised at suitable intervals along the supply pipework.

d)   Plants, whose roots could cause structural damage, should be removed and if they have broken through brickwork, this should be made good.

e)   Overflow pipes should not be linked to other drainage pipes as this may result in back siphonage or contamination if drains are blocked. All animal water drinking troughs on the supply must have non-return valves or equivalent to prevent the risk of back siphonage in the event of ballcock failure.

f)   Rusty components such as lids and pipes may make an existing problem worse by encouraging the growth and survival of bacteria. Where practical rusted ironwork should be replaced. In some cases components can be treated with rust proof coatings.

h)   Indoor storage tanks should also be protected from contamination by mice, bats and other animals, through the application of an air tight lid.

(2)   **Disinfection of Water**

It is unlikely that a wholesome water supply can be ensured by structural improvements alone. Filtration, and on occasion fine filtration followed by a disinfection treatment is recommended.

Ultra Violet Treatment: The recommended option for point of use of small supplies

Ultra violet is a powerful disinfectant. The light passes through the water leaving no residue to affect the taste or odour of the supply. The unit should be installed inside a building as it is prone to frost damage. Hence this method is more appropriate to smaller supplies. The unit should be installed such that it covers all the taps used for drinking, food preparation and for cleaning teeth and washing hands. It is also preferable to site the unit after any storage tanks which could be contaminated.

A 5 micron pre-filter is usually required to filter out fine particles that could impact on the efficiency of the unit. If the water contains suspended solids, these will act as a shield to protect the bacteria from ultra violet light. If the water supply has a history of being discoloured or turbid, a further coarse filter and also a 1 micron filter may be required. Certain organic chemicals which give the water a yellow colour can also absorb ultra violet light. This will reduce the effective dose of the unit. This problem may be dealt with by the installation of an activated carbon filter and further advice should be sought.

Chlorination

This is a chemical disinfectant which leaves a residue to continue to kill bacteria up to the tap. There are various methods available to add chlorine to a water supply.

Electric dosing systems are used to add chlorine in the form of sodium or calcium hypochlorite to a water supply in a controlled manner. In order to achieve effective disinfection, a concentration of 0.2 to 0.5 mg chlorine per litre of water is recommended by the World Health Organisation. This is also the level of chlorine found in mains water. A minimum contact time of 30 minutes is required for the chlorine to be effective; hence the dosing unit should be installed as near to the source as possible in a purpose built housing. The dosing unit is ideal for shared supplies as only one unit need be installed. Some pre-treatment may also be required, e.g. for removal of suspended sediment or organic chemicals.

If the source is in a location where the quality of its water could be affected by livestock, chlorination on its own will be not address the risk of cryptosporidium and points of use systems such as pre-filter and UV are advised at individual properties.

3) Management

All private water supplies require proactive maintenance and management. Sources, distribution and storage arrangements should be checked at intervals and equipment checked and maintained in accordance with the manufacture's instructions.

Drinking Water Inspectorate
There is a wealth of information available on the Inspectorate's website in relation to private water supplies: http://www.dwi.defra.gov.uk/private-water-supply/index.htm

Also a technical manual for small water treatment supplies at:
http://www.dwi.defra.gov.uk/private-water-supply/installations/updated-manual-on-treatment-for-small-supplies.pdf

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