

Protecting your private water supplies

The possible causes of contamination and their remediation to prevent this risk.

Contamination from a variety of sources can occur potentially at any point throughout a water supply system if it is not robust and adequately protected. This document provides an outline of some of the key measures that can be undertaken to prevent and remediate the main forms of contamination that pose a risk to a private water supply.

For convenience this document is divided up into the three main parts of the supply system;

- source (well, borehole, stream, spring etc.)
- treatment systems
- distribution network – pipes, valves, storage tanks, etc.

The Source

- a) Microbiological contamination by faecal material can lead to illness. Some of the following improvements at the source can be effective in preventing their ingress to the water supply:
- Maintenance of septic tank or cess pools as per manufacturer's instructions.
 - Check if there is an existing septic tank is within 50 m of a source, appropriate treatment to remove or inactivate harmful microorganisms, including cryptosporidium oocysts will probably be required.
 - Fence off the source of the supply from grazing animals;
 - Eliminate the spreading or storage of manure within 50 metres of the source;
 - Restrict livestock within 50 metres of the source' where appropriate, particularly for vulnerable surface water supplies or ground water supplies susceptible to ingress from fissures, sink hole or boggy ground surrounding the source.
 - Eliminate or relocate storm water overflows away from the source;
 - For a spring source, barriers to prevent ingress of surface flows may reduce the risk of microbiological contamination including embankments, walls or diversion ditches.

- Design and construct the well head or borehole headworks to prevent surface water or spillages of contaminated material getting into the source.
- Construct storage lagoons or tanks for raw water to allow settlement of sediment and organic matter.
- Design and construct any tanks, storage chambers and borehole head works to prevent access from animals and insects.
- Check for caves, swallow holes, abandoned wells, boreholes or other geological features which may permit surface water or runoff to contaminate the aquifer'
- Cover and seal any abandoned boreholes or wells to prevent surface water affecting the ground water.
- For a surface water supply, limit or control recreational use of the source water near the intake point
- Locate the intake for surface water sources at a point, which is at least exposed to possible contamination from up-stream activities, run-off, discharge points, sediment from river beds or lake/pond floors.
- For rainwater harvesting systems remove or avoid the use of roof-mounted aerals or overhanging trees in the collection area.

b) Chemical contamination

- Contact the Environmental Health Department of your local authority to find out if there are any discharges from licensed facilities, such as industrial premises in the catchment area.
- Limit or control recreational use of the source water.
- Limit or control the use of pesticides and fertilisers within the catchment.
- Construct storage lagoons or tanks for raw water to enable intakes to be shut-off if surface water is contaminated.
- Create a run to waste facility for borehole or spring chambers to allow contaminated water to be discharged (Guidance from the EA should be sort prior to discharging contaminated water)
- Locate the intake for surface water sources at a point which is least exposed to possible contamination from up-stream activities, run-off, discharge points
- Stored fuel or oil in the catchment or on-site is adequately bunded and any oil pipes are protected from accidental damage and clearly identified.

c) Physical contamination

- For rainwater harvesting systems installation of screens or filters; protection of inlets and the setting up of a cleaning regime for the gutters will all help prevent/reduce ingress of organic matter into the system.
- Construct storage lagoons or tanks for raw water.
- Replace cartridge filters according to manufacturer's instructions.
- Ensure screens are installed on raw water storage tanks.
- Fit appropriate covers on tanks etc. where relevant
- Carry out regular checks and cleaning of storage tanks at suitable intervals to reduce sludge or sediment build-up
- Using valves, ball-valves, or level sensors ensure that the frequency of turnover of water is appropriate (prevention of stagnation).

Treatment and treatment plant operation risks

Where the hazard is natural or persistent it may not be possible to eliminate the risk of contamination. In these situations appropriate treatment will be required (see Treatment section). Treatment should be verified by monitoring, to ensure that it is effective. If this is not possible the following risk mitigation measures should be considered and applied where appropriate:

- Optimisation of the chemical dosing regime;
- Optimisation of treatment practices and procedures (e.g. coagulation/clarification conditions, filter operation and backwashing frequency, disinfection),
- Replacement of filter media according to manufacturer's instructions,
- Replacement of cartridge filters according to manufacturer's instructions,
- Additional treatment processes or modification of existing processes,
- Installation of continuous monitoring and alarms for chlorine and turbidity,
- Improve the maintenance of the treatment plant,
- Increase the monitoring frequency of the treated water, (which can mean increased sampling frequent and/or additional determinands)

Ensure that any new treatment system is designed specifically for the nature of your supply .

N.B. Disinfection treatment plants should be operated in accordance with the following guidance:

- Install appropriate treatment depending on the hazard (cryptosporidium, micro biological hazards);and the risk this presents;
- Consider a multi-barrier approach for risk of microbiological contamination;
- Protect or remove any existing treatment stage by installing by-passes, to ensure they cannot be used in error or compromise treatment;
- Manage the flows through the works to stabilise the treatment and to ensure that the works is operated within the required design capacity;
- Ensure that chlorine disinfection fail-safe systems are adequate (duty/standby arrangements or alarms, or auto shutdown on loss of dose);
- Ensure that water is subjected to sufficient preliminary treatment to achieve turbidity readings of <1NTU before disinfection;
- Ensure that treatment stages are maintained as per manufacturer's specification;

Where ultraviolet disinfection is used, additionally:

- Ensure that the availability and continuity of the supply of spare parts for key water treatment equipment e.g. UV bulbs is maintained;
- Install an Ultra Violet transmittance (UVT) monitor to ensure that the UV is operating within its validated range at all times (Note the effectiveness of treatment can be compromised by dissolved matter as well as visible particles. The measure for this us UV transmittance (UVT).
- Ensure the UV plant cannot be bypassed or shutdown without alarming.
- Ensure UV systems are validated to an appropriate European or international standard.

Where treatment processes are in place, the following control measures are recommended to ensure they are adequately operated and maintained:

- Ensure that there is an adequately trained person responsible for the maintenance of the supply available at all times.
- Ensure sufficient stock of treatment chemicals , i.e there is no risk of running out of key treatment chemicals at any time.

Action to deal with hazards and risks in the distribution network

a) Microbiological hazards:

- Replacement/refurbishment of corroded/leaking pipe work;
- Maintenance of service reservoirs;
- Ensure there is a robust procedure available for the installation of new mains and fittings, and the repair of existing mains and fittings to ensure the prevention of contamination. Develop and implement a system to prevent water/soil/ingress into the distribution system during occurrences of low pressure;
- Ensure backflow protection is in place at points of risk, such as animal watering systems, and industrial installations, etc.;
- Ensure all material and chemicals conform to WRAS, Regulation 5 and relevant BS (www.DWI.gov.uk)
- Ensure that treated water tanks are designed, installed and maintained to prevent ingress; and
- Follow best hygiene practices when in contact with the water (e.g. hand washing and avoiding contamination from the use of tools previously used in unsanitary areas, such as cow pens, etc.).

b) Chemical contamination:

- Replace pipe work that poses an obvious contamination risk (e.g. lead service mains);
- Ensure backflow protection is in place at points of risk, such as animal watering systems, and industrial installations, etc.;
- Ensure all material and chemicals conform to Regulation 5
- Ensure that treated water tanks are designed, installed and maintained in such a way as to prevent ingress;
- Ensure that any personnel who have close contact with the water supply have awareness of best hygiene practices (e.g. hand washing and avoiding contamination from the use of tools previously used in unsanitary areas, such as cow pens, etc.).
- Ensure that fuel or oil stored on-site is adequately banded;
- Replace mains and other pipework with barrier pipe in land that is known to be contaminated or at risk of being contaminated, or in areas where there is a risk of oil or solvent spillage.

c) Physical contamination

- Flush/scour the mains;
- Replace/refurbish corroded/leaking pipe work;
- Maintain the physical structure of service reservoirs at a suitable frequency to ensure it is robust at all times:
- Ensure backflow protection is in place at points of risk, such as animal watering systems, industrial installations, etc.;
- Ensure that treated water tanks are designed, installed and maintained in such a way as to prevent ingress.
- Implement a flushing regime at a suitable frequency for distribution network with low flows;
- Using valves, ball-valves, or level sensors ensure that water within tanks is adequately turned over at all times (prevention of stagnation).
- Ensure that inlets and outlets to tanks are sited at opposite ends to reduce the possibility of stagnant areas of water.

Where a supply originates from a public water supply and a risk of back-siphonage has been identified from that supply (i.e. no backflow protection), it is recommended that you liaise with the local water company to arrange a water fittings inspection if one has not been recently undertaken.

Action to deal with radiological hazards and risks

Where radiological contamination is identified as a hazard, the following control measures should be considered. You should also contact your Environmental Health department for more information:

- Ensure that radon removal treatment is installed. This must be before the water enters a building. Aeration is the preferred treatment technique for this.
- Uranium removal is installed through point of use systems.

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