

Chapter 3 Water Supply

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3. Introduction

Water can be a potential source of microbiological and chemical hazards. Micro-organisms that cause food poisoning can survive for days or even months in water. Procedures are needed to minimise the risk of such hazards causing contamination and therefore illness to consumers.

Examples demonstrating the importance of monitoring the water supply:

Problem	Effect	Possible outcome
Contaminated water supply (biological contaminants)	Water supplies can become polluted with human sewage or agricultural waste containing faecal contamination from animals	A source of microbiological contamination
Contaminated water supply (chemical contaminants)	Water supplies can be a source of chemical contaminants, such as heavy metals, pesticides, nitrates, and industrial pollutants, which can be transferred from water used in processing or cleaning onto food	A source of chemical contamination
Water distribution system not kept clean, adequately maintained or infrequently used water storage tanks and pipes	Bacteria can, in specific circumstances, multiply in water distribution systems which can be spread to other parts of the food production system and transferred to food	A source of microbiological contamination

3.1. Private water supplies

Water that does not originate from public mains is described as a **private water supply** and is likely to be from ground waters (for example, boreholes, wells and springs) although some private water supplies are surface waters (for example, streams, rivers, lakes and lochs). Regulation of private water supplies is the responsibility of the Local Authority in whose area the private water supply arises.

Private water supplies are more likely to be contaminated with micro-organisms or chemicals than public water supplies, unless properly protected and treated. Contamination may not be smelt, tasted or seen.

Examples of the types of potential contaminants and their sources, and suggested counter-measures to address the source of the contamination:

Contaminant / hazard	Source of contamination	Counter-measures
Chemicals: heavy metals such as cadmium, copper, molybdenum, arsenic and lead, as well as pesticides and nitrates	Chemicals used in farming, forestry, industry, commercial premises or workshops	A risk assessment of the supply should be carried out to assess the potential for contamination which will inform the level of testing required
Micro-organisms: animal faeces	Private water supplies drawn from land where animals graze or where manure is spread. Heavy rainfall or warm weather increases this risk	If a hazard is identified or if a test contains micro-organisms or chemicals above prescribed standards, there must be an investigation into the cause and appropriate remedial action taken to reduce / remove the risk
Micro-organisms: cess pits or septic tanks	Discharge from cess pits or septic tanks	
Micro-organisms: ground water	The spring from which the ground water emerges or where it collects in the borehole or well	Wells need to be protected (cased to prevent contamination leaking through the side walls) Spring water reaching ground level needs to be cased from its point of exit from the ground all the way to its point of use (or into a storage tank) Collection chambers / tanks: <ul style="list-style-type: none"> • should have watertight and vermin-proof walls and lids • the tops of chambers or tanks should be above ground level to prevent water from surrounding land from flowing into them • any tanks, overflow pipes or vents in chambers should be designed to

		<p>stop animals and debris from entering them or mesh cover installed</p> <ul style="list-style-type: none"> the collection chamber should not be close to any soakaway or drain
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Advice on provision of water treatment can be provided by a number of organisations such as:

Water UK at: www.water.org.uk.

British Water at: www.britishwater.co.uk.

In Northern Ireland contact the Drinking Water Inspectorate at: <https://www.daera-ni.gov.uk/topics/water/drinking-water> or the Environmental Health department of your local council.

3.2. Potable water

'Potable water' means water meeting the minimum requirements laid down in Directive 98/83/EC on the quality of water intended for human consumption (the Drinking Water Directive) 852/2004 Article 2 Definitions: point 1(g).

3.3. Water Supply (Water Quality) Regulations

Directive 98/83/EC is applicable for all water supplies in the UK and all meat processing facilities must adhere to the relevant regulations.

Arrangements in England

Regulation	Supply type
The Water Supply (Water Quality) Regulations 2000 as amended in 2007 and 2010 http://www.legislation.gov.uk/uksi/2000/3184/contents/made	Public water supplies
The Private Water Supplies Regulations 2009 http://www.legislation.gov.uk/uksi/2009/3101/contents/made	Private water supplies

Arrangements in Wales

Regulation	Supply type
The Water Supply (Water Quality) Regulations 2010 (Wales) http://www.legislation.gov.uk/wsi/2010/994/contents/made	Public water supplies
The Private Water Supplies (Wales) Regulations 2010 http://www.legislation.gov.uk/wsi/2010/66/contents/made as amended by The Private Water Supplies (Wales) (Amendment)(No. 2) Regulations 2010 http://www.legislation.gov.uk/wsi/2010/1384/signature/made	Private water supplies

Information on the Drinking Water Inspectorate (for England and Wales) can be found at: www.dwi.gov.uk.

Arrangements in Scotland

Regulation	Supply type
The Water Supply (Water Quality) (Scotland) Regulations 2001 (as amended) (SI 2001/207) http://www.legislation.gov.uk/ssi/2001/207/contents/made	Public water supplies
The Private Water Supplies (Scotland) Regulations 2006 (SI2006/209) http://www.legislation.gov.uk/ssi/2006/209/contents/made	Private water supplies

Information on the Drinking Water Quality Regulator for Scotland can be found at: www.dwqr.org.uk.

Arrangements in Northern Ireland

Regulation	Supply type
The Water Supply (Water Quality) Regulations (Northern Ireland) 2007 (SR 147) http://www.legislation.gov.uk/nisr/2007/147/contents/made as amended in 2009 and 2010	Public water supplies
Private Water Supplies Regulations (Northern Ireland) 2009 (SR 413) http://www.legislation.gov.uk/nisr/2009/413/contents/made as amended in 2010	Private water supplies

Information on the Northern Ireland Drinking Water Inspectorate can be found at: <https://www.daera-ni.gov.uk/topics/water/drinking-water>.

3.4. Water Fittings Regulations

Water Supply (Water Fittings) Regulations 1999 and the Water Supply (Water Fittings) (Scotland) (Byelaws) 2014 set out national requirements for the design, installation and maintenance of plumbing systems, water fittings and water-using appliances. They are important to prevent contamination of water supplies within a building or premises.

Technical information on water fittings regulations can be found at: www.wras.co.uk.

3.5. British Standards for chemicals used for treatment of water

Many chemicals used in the treatment of water are subject to comprehensive test requirements and purity checks to ensure that there are no detrimental effects on the safety and quality of water for public supply. These chemicals are considered to conform to specific British Standards. If any chemicals for use in contact with water do not have a British Standard, they can only be used in

the UK if approved under regulation 31 of the Water Supply (Water Quality) Regulations (see sections 3.3).

A list of approved products for use in public water supply in the UK is published at: www.dwi.defra.gov.uk/drinking-water-products/approved-products/soslistcurrent.pdf.

3.6. Legal requirements for water supply

The following sections set out the water supply requirements of the regulations that apply to slaughter, dressing and further processing of meat.

A. Water supply

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Legal requirement

852/2004 Annex II Water Supply: Chapter VII point 1(a)

A1. There is to be an adequate supply of potable water, which is to be used whenever necessary to ensure that foodstuffs are not contaminated.

852/2004 Annex II Food premises: Chapter I points 2(c), 1 & 4

A2. The design and construction ... of food premises are to permit good food hygiene practices, including protection against contamination.

A1. and A2. Compliance regarding supply of potable water

- Provide an adequate and reliable supply of potable water for food processing and cleaning.
- Make sure that the design and construction of the premises permits good food hygiene practices.

A1. and A2. Good practice

Potable water must meet the minimum requirements of Directive 98/83/EC. It may be drawn from the public mains supply network operated by a water company, or from a private supply, such as a borehole. See relevant topics below.

Supply – take account of the need for adequate water supplies for food processing, cleaning and other requirements in the design and construction of premises or when buildings are rebuilt, altered or refurbished. See chapter 2 on ‘Design and facilities’, Sections ‘A2. Provision of toilets’, ‘A3. Provision of washbasins and facilities’, ‘D9. Handwashing facilities’, ‘H4. Handwashing facilities’, ‘A11. Drainage’, ‘B3. Facilities for food washing’, ‘D8. Facilities for disinfecting tools’, ‘H5. Disinfecting tools’, ‘E5. Facilities for cleaning livestock vehicles’ and ‘F2. Cleaning poultry transport vehicles and poultry crates’.

Private supplies – where water is drawn from a private supply it may require disinfection treatment (for example, filtration, ultra-violet light chlorination). Consult a water treatment specialist to help identify the most effective method.

Capacity – make sure that the water distribution system has sufficient capacity to meet demand at peak times (for example, during cleaning).

Water storage tanks – should be made of inert material to avoid chemical contamination of water and corrosion. Keep tanks covered and secured to prevent contamination.

Plans – water distribution systems can be complex, especially in larger premises. Detailed plans will help to identify any redundant pipe work that could act as a reservoir of microbiological contamination and to define an area to be isolated if contamination occurs. Keep an accurate and dated plan of the potable and any non-potable system, including pipe work, point of entry of water into the premises and numbered outlets (see '3.8. Compliance regarding operator responsibilities for water'). Update the plan if alterations are made. Plans should be submitted with applications for approval of new premises.



Legal requirement

852/2004 Annex II Food premises: Chapter I point 4

A3. Washbasins for cleaning hands are to be provided with hot and cold running water.

A3. Compliance regarding water temperature

- Provide hand washbasins with hot and cold running water.

A3. Good practice

Supply tap water at suitable temperatures for effective hand washing without risk of scalding. See chapter 2 on 'Design and Facilities' and section 'A3. Provision of washbasins and facilities'.



Legal requirement

852/2004 Annex II Food premises: Chapter I point 1

A4. Food premises are to be kept clean and maintained in good repair.

A4. Compliance regarding cleaning and maintenance

- Keep food premises clean and maintained in good repair.

A4. Good practice

Cleaning – clean tanks regularly to prevent any build-up of organic or mineral material that could act as a source of microbial growth and contamination. Even well maintained water distribution systems may suffer from a build-up of organic matter, so it is good practice to schedule the draining and cleaning of the entire system at a frequency that prevents this from affecting water quality.

Maintenance – keep water distribution systems in good condition and maintained so that water does not become contaminated. Carry out regular inspections of the water distribution systems for signs of damage, corrosion and leaks. The frequency of inspection will depend on the likelihood of a problem being found (once a month may be sufficient for well-designed premises that are kept in good order). Keep an accurate, dated account (for example, in a maintenance notebook) of the date and result of each inspection and of any corrective action taken.

Disinfection systems – if used, treat filtration and other disinfection systems with ultra-violet light. They require maintenance, for example, filter systems need to be cleaned and / or changed regularly to maintain performance. Have the system checked periodically to confirm it is functioning correctly.

Chlorine – if added to disinfect private supplies seek specialist advice.

Water softening – in hard water areas water softening may be applied to prevent the build-up of scale and reduce the use of detergents. If used, keep water softeners in good condition so that they do not become sources of contamination.

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Use of recycled water - recycled water can be used in certain situations such as cleaning the floors, surfaces, for hosing down lairages, crate washing.

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Legal requirement

852/2004 Annex II Training: Chapter XII point 1

A5. Food business operators ensure that food handlers are supervised and instructed and / or trained in food hygiene matters commensurate with their work activity.

A5. Compliance regarding training, instruction and supervision

- Make sure that food handlers are supervised and instructed and / or trained in food hygiene matters commensurate with their work activity.

A5. Good practice

Instruct staff (and any contract cleaners) about the need to use potable water (including ice and steam if appropriate), to use only water from the correct outlets and report problems promptly. Staff who take or test water samples need to be adequately trained so that results are reliable. Supervise as appropriate and issue reminders if lapses occur. See chapter 7 on 'Training' at section 'A1.'

Keep accurate, dated records to show what instruction / training individuals have received.



Legal requirement

852/2004 Annex II Water Supply: Chapter VII point 2

A6. Where non-potable water is used, for example, for fire control, steam production, refrigeration and other similar purposes, it is to circulate in a separate, duly identified system. Non-potable water is not to connect with, or allow reflux into, potable water systems.

A6. Compliance regarding use of non-potable water

Make sure that:

- where supplies of non-potable water are used, they are carried in completely separate and clearly identified distribution systems
- non-potable water does not connect with, or allow reflux into, potable water systems

A6. Good practice

Non-potable water may be used in food premises for certain purposes, for example, for fire control, non-food contact steam generation, or refrigeration.

Clearly identify potable and non-potable water systems and particularly water outlets to avoid misuse of non-potable water. See section on 'Plans' at 'A1. And A2. Compliance regarding supply of potable water'.

Make sure there are no opportunities for non-potable water to enter the potable distribution system, for example, through siphoning back from a drain or from any cross-connections of pipework.



Legal requirement

852/2004 Annex II Water Supply: Chapter VII point 3

A7. Recycled water used in processing or as an ingredient is not to present a risk of contamination. It is to be of the same standard as potable water, unless the competent authority is satisfied that the quality of the water cannot affect the wholesomeness of the foodstuff in its finished form.

A7. Compliance regarding recycled water

- Where water is recycled for use in processing or as an ingredient, make sure that it is the same standard as potable water, unless the competent authority is satisfied that the quality of the water cannot affect the wholesomeness of the foodstuff in its finished form.

A7. Good practice

Standards for potable water are set out in the EC Directive. See section '3.2. Potable water'.

If recycled or re-circulated water is used, carry out daily tests to check its quality, keeping a record of the results. Take appropriate action if quality standards are not being met.

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Legal requirement

852/2004 Annex II Water Supply: Chapter VII points 4 & 5

A8. Ice which comes into contact with food or which may contaminate food is to be made from potable water ... It is to be made, handled and stored under conditions that protect it from contamination.

A8. Compliance regarding the use of ice

- Make sure ice that comes into contact with food or may contaminate food, is from potable water, and make sure it is made, handled and stored under conditions that protect it from contamination.

A8. Good practice

Keep ice storage containers covered. Clean and periodically disinfect them to be sure that they do not become contaminated.

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Legal requirement

852/2004 Annex II Water Supply: Chapter VII points 4 & 5

A9. Steam used directly in contact with food is not to contain any substance that presents a hazard to health or is likely to contaminate the food.

A9. Compliance regarding the use of steam

- Generate steam used for direct contact with meat, from potable water.

A9. Good practice

Include the potable water outlet used to feed the steam supply in the sampling programme.

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Legal requirement

852/2004 Annex II Water Supply: Chapter VII point 6

A10. Where heat treatment is applied to foodstuffs in hermetically sealed containers, it is to be ensured that water to cool the containers after heat treatment is not a source of contamination for the foodstuff.

A10. Compliance regarding the cooling of containers after heat treatment

- Make sure that water used to cool hermetically sealed containers after heat treatment does not contaminate the product.

A10. Good practice

Include the water used to cool hermetically sealed containers in the sampling programme. Check on containers after cooling to establish whether the seals are secure.

B. Water for disinfecting tools in meat plants

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Legal requirement

853/2004 Annex III: Slaughterhouses: Section 1 Chapter II point 3 & Section II Chapter II: point 3 / Cutting: Section I Chapter III point 5 & Section II Chapter III point 1e / Farmed Game: Section III points 1 & 2; / Production Establishments: Section V Chapter I point 5 / Meat Products: Section VI point 2

B1. (Meat plant) Operators must have facilities for disinfecting tools with hot water supplied at not less than 82°C, or an alternative system having an equivalent effect.

B1. Compliance regarding water for disinfecting tools

- Water used for disinfecting tools has a minimum temperature of 82°C.

B1. Good practice

Facilities for disinfecting tools / approval of alternatives – see chapter 2 on 'Design and facilities' and section 'D8. Facilities for disinfecting tools'.

C. Removal of surface contamination

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Legal requirement

853/2004 Article 3 point 2

C1. Food business operators shall not use any substance other than potable water - ... - to remove surface contamination from products of animal origin, unless the substance's use has been approved ...

C1. Compliance regarding the removal of surface contamination

- Only potable water or EU approved substances may be used for the removal of surface contamination from meat or other products of animal origin.

C1. Good practice

See chapter 12 on 'Dressing of carcasses' at 'A15. Removal of contamination', 'C36. Removal of surface contamination' and 'D13. Washing of poultry / lagomorphs'.

3.7. Official control requirements

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Legal requirement

854/2004 Article 4 point 4g

Audits by officials of good hygiene practices shall verify that meat plant operators' water quality procedures are applied continuously and properly.

3.8. Water testing

I. Water supply

Mains supply

Mains supply – water suppliers are required to monitor the microbiological and physio-chemical quality of mains water entering the premises to demonstrate that it meets the standards in Directive 98/83/EC. A copy of their test results can be obtained but consider carrying out your own independent verification tests.

Mains supply with intermediate storage tanks – if mains water is stored in tanks before use and / or if the water distribution system is complex and / or the system is old, the water can become contaminated after entering the premises.

Regular testing of water samples from cold or mixed hot / cold water outlets where the water could come into direct contact with food, food processing equipment, or food handlers, will indicate whether contamination is occurring on site or whether the water is potable. See 'Water testing parameters' in this section.

Private supply

Local authorities do sometimes monitor the quality of private supplies, but the regulations require a greater focus on risk assessment. An FBO can request a copy of the risk assessment where a private water supply feeds a food business. Any microbiological or physical-chemical analysis will only indicate the quality of the water at the time of those tests and the quality of the water may change at different times.

Testing samples – regularly will provide an indication whether there is microbiological contamination or whether the private water supply is potable, whether it is used for drinking, cleaning or as water or ice in food products. Further investigation may be required to determine whether contamination is occurring at point of supply or on site. See 'Water testing parameters' in this section.

II. Water supply parameters

Microbiological parameters

- Aerobic colony count (ACC) at 22°C after 72 hours
- Aerobic colony count (ACC) at 37°C after 48 hours

- Coliform bacteria (total coliforms)
- E.coli
- Enterococci
- Clostridium perfringens (including spores) - if water originates from, or is influenced by, surface water

Private supplies or mains supplies with intermediate storage – in these cases microbiological parameters should be monitored to check that the water being used is of potable quality and that contamination is not occurring after the water enters the premises.

Testing frequency – ACC and Coliforms should be measured monthly and used to indicate when further investigation is required. All microbiological parameters should be checked at least annually and as part of any follow-up investigation when the ACC and / or Coliform levels exceed the guidelines.

Physical-chemical parameters

Mains water suppliers should provide annual summary of the physical-chemical analysis of the water. A copy of these results can be obtained from the supplier for the previous year.

Private water supplies should be tested for residues of pesticides that may come from crop spray run off after heavy rain and heavy metals that may be present in the rock strata where the water originates.

British Standard for chemicals used for treatment of water – please see the ‘Introduction’ section in this chapter.

III. Water sample procedures and facilities

Taking water samples

Water samples need to be taken carefully so that no contamination is introduced when the sample is taken. Staff should receive training to ensure that the results will be accurate. Take care to label all samples with the correct sample point as inaccurate labelling will prevent the source of any contaminated samples from being readily identified.

Chlorine – if the water has been chlorinated, the sample bottle should contain sodium thiosulphate to neutralise the effect of any remaining chlorine.

For further information on sampling procedures see ‘The Microbiology of Drinking Water (2002) – Part 2 – Practices and procedures for sampling’ obtainable at:

www.gov.uk/government/publications/standing-committee-of-analysts-sca-blue-books.

Laboratories

Ideally use laboratories that are accredited by a recognised body for the relevant test methods in water samples such as UKAS or at least participate in proficiency testing schemes.

All tests for samples of water taken for regulatory purposes in relation to water law and all tests of water taken by water suppliers and by local authorities for private water supplies must be carried out by an accredited laboratory (UKAS).

Further information can be found at:

- UKAS holds a list of accredited bodies at: www.ukas.com
- Laboratory Environmental Analysis Proficiency Scheme (LEAP) at: <https://fapas.com/shop/browse/1/group/14?producttypes=1>
- Public Health England – ‘Proficiency testing for food and water microbiology’ at: www.gov.uk/government/collections/external-quality-assessment-eqa-and-proficiency-testing-pt-for-food-water-and-environmental-microbiology

Interpretation of results

Aerobic colony count (ACC) – the results of ACC tests can be used to assess the water quality around the plant.

Guideline figures for acceptable ACC values are:

- ACC at 22 °C after 72h – up to 100 per ml
- ACC at 37 °C after 48h – up to 20 per ml

Regular samples from the same points on the system can indicate a developing contamination problem. Any increase in counts above these guideline figures should be classified as a low level positive.

Coliform bacteria (total coliforms) – expected levels are less than 1 per 100ml. Presence should be considered as a low level positive and must be re-sampled – see ‘Follow up actions – Low level positives’ in this section. If coliform bacteria are found at levels above 3 per 100 ml of water, in two consecutive samples, or in more than 5% of samples taken within a year, this may indicate contamination in the water distribution system, and urgent action must be taken – see ‘Follow up action - High level positives’ in this section.

E.coli – if E.coli is detected in water, this is evidence of contamination by animal or human faeces. This is a serious food safety risk and urgent action must be taken – see ‘Follow up actions – High level positives’ below.

Enterococci and Clostridium perfringens – are also an indication of faecal contamination and urgent action must be taken – see ‘Follow up actions – High level positives’ in this section.

Chlorine – British Standards 12671: 2000 Chlorine dioxide – the combined concentration of chlorine dioxide, chlorite and chlorate should not exceed 0.5mg litre as chlorine dioxide in the water entering supply – see the ‘Introduction’ section in this chapter.

IV. Follow up actions

Follow up actions – Low level positives

Re-sample and test for all faecal indicators. If a further low level positive result is obtained, but there is no evidence of faecal contamination, investigate the source of the problem.

Follow up actions – High level positives

Do not use the water outlet or tank from which the sample was taken (and associated outlets if

necessary) until the contamination has been investigated and eliminated and satisfactory microbiological results have been obtained from further samples taken at the point of entry, the outlet from which the contaminated sample was taken and any other associated outlets.

Take the appropriate corrective action.

V. Corrective action

Corrective action – Water supply entering premises

If the water supply entering the premises becomes contaminated, it is the water supplier's or local authority's responsibility to restore potable water quality. Follow their directions concerning water use and product safety.

Corrective action – Contamination within premises

If the water supply becomes contaminated after entering the premises or non-potable water comes into contact with food, take urgent corrective action to ensure food safety.

Corrective action may include:

- isolating appropriate water outlets / tanks until satisfactory microbiological test results are obtained (see 'Follow up actions' in this section)
- stopping production where no potable supply can be provided
- dealing with any product that has been contaminated, including removing it from the market if necessary
- establishing the underlying cause and what needs to be done to prevent similar contamination incidents in the future, such as the installation of either a water filtration and chlorination system or a water filter and ultra-violet sterilisation system
- reviewing sampling and testing procedures
- improving staff instructions and training