



PUBLIC HEALTH ADVICE IN RELATION TO FLOODING

This advice is supplementary to the HPA's public facing information and addresses specific issues being considered between Monday 23rd and Wednesday 25th July.

The national Scientific & Technical Advisory Cell chaired by the Health Protection Agency has produced this document with input from and the support of the Drinking Water Inspectorate (DWI), Food Standards Agency (FSA), Environment Agency (EA) and Severn Trent Water. The document will be updated as the situation develops.

Public water supplies during flooding:

- 1 People whose water comes through a mains supply should follow the advice of the local water company regarding the safety of their water supply.
- 2 Water from the hot tap is not suitable for drinking whether in flood circumstances or not.
- 3 If you notice a change in water quality, such as the water becoming discoloured or there is a change in taste or smell, or if you are unsure, ring your local water company. Whilst waiting for an answer, and if water is urgently required, boil all water intended for drinking (however, see guidance on 'water for infants during flooding') or use bottled water.
- 4 If you have been advised to boil your water, then all water should be brought to the boil and then allowed to cool before using.
- 5 Only boiled water, bowser water or bottled water should be used for drinking, brushing teeth, washing food, cooking and making ice, or use bottled water for these purposes if it is available.
- 6 If there is no gas or electricity available to householders to boil water then bowser or bottled water should be used in all these circumstances.

Water for infants during flooding:

- 7 Where the drinking water supply is either interrupted or contaminated, it is important to take precautions for formula-fed infants.
- 8 In these circumstances there are three options for the use of water to make infant formula milk:
 - a. The preferred option is to use bowser or bottled water brought to the boil then allowed to cool for no more than thirty (30) minutes in a clean covered container. Afterwards, follow the manufacturer's instructions

on making up the feed.

OR

- b. Commercially ready made formula milk may be used as an alternative to powdered feeds made up with bowser water.

OR

- c. If neither option a or b are possible because there is no electricity or gas to allow boiling, bottled water (table, spring or mineral water) can be used unboiled to prepare baby feeds, but the prepared feed should then be used immediately. Unboiled bowser water should not be used.

Note that the bottled water supplied to the public by the water company during flooding incidents is suitable for making up infant formula.

Parents with infants that are unwell with diarrhoea and vomiting should seek medical advice.

- 9 If the water company has advised that the domestic supply is unsafe for drinking it is inadvisable to use this for bathing infants. In this situation bowser water, or bottled water, are safe alternatives. A safe alternative to bathing is to use baby wipes for hand cleansing and washing infants.

Flushing toilets

- 10 With restrictions in drinking water supply there can be problems with water for flushing toilets.
- 11 Where emergency water conservation is essential it is useful to use water that has been used for washing and bathing, or taken from garden water butts for flushing toilets. In these circumstances, toilets need not be flushed after urination but only after defecation. If other sources of water are unavailable floodwater can be used for flushing but care should be exercised in collecting this and hands should be washed with soap and water afterwards and containers should be considered contaminated.

Private water supplies during flooding

- 12 Water supplies can be domestic and commercial and range in size from those used by single domestic premises to large boreholes that supply a significant population or a large commercial organisation or institution. Private supplies are either from boreholes, springs, or wells. The microbiological and chemical quality of water can be influenced by surface waters, and contamination can follow heavy rainfall. Normally boreholes have a secure wellhead thereby minimising the risk of surface water incursion into the groundwater. Local Authority Environmental Health Department are responsible for overseeing the quality of private supplies and are provided with technical advice by the DWI.
- 13 Private supplies are commonly located in rural locations where there are

agricultural animals in proximity to the catchment area of the supply. There are risks of animal and human waste contaminating these supplies where there is flooding.

- 14 If a private well or spring has been covered by floodwater, or if you notice a change in water quality, such as the water becoming discoloured or there is a change in taste or smell, or if you are unsure, ring your local authority. Whilst waiting for an answer, assume the water is unsafe to drink unless boiled, or source an alternative supply.
- 15 Continue to use boiled water for drinking and bathing until the supply has been tested and shown to be safe. Boiling water kills pathogenic bacteria, viruses and parasites that may be present in water. Bring the water to the boil and then allow it to cool before drinking. It can be stored in a clean jug covered by a saucer in a cool place (preferably a working fridge). Ice should be made from water prepared for drinking.

Information on disinfecting water

- 16 Only use water that has been properly disinfected for drinking, cooking, making any prepared drink or for brushing teeth
- 17 Only disinfect water if a safe source of water (a piped supply or water from a bowser or in bottles) is not available. Water from a bowser should be disinfected if you are unsure about the cleanliness of the container used for collection.
- 18 Untreated water affected by flooding may contain disease causing bacteria and viruses even if it looks clean. Rain water is a useful source of water for drinking in emergency situations but requires disinfecting as it may be contaminated by bird droppings.
- 19 If the water is cloudy or turbid in appearance, try and filter it before disinfection. Ideally a paper coffee filter or clean tights can be used but even a tea towel is better than nothing.
- 20 The best way to disinfect water at home is by boiling. Water should be brought to the boil (when it bubbles and steams) in a kettle or saucepan. That is sufficient; it does not have to boil for a period of time. Obviously, cool the water before use. Once boiled the water may be kept for at least 24 hours in a clean container such as a glass jug covered by a saucer.
- 21 If electricity, gas or even camping equipment is not available for boiling then CHLORINE DISINFECTION must be used. Some chemist shops may be able to supply chlorine tablets, for which the manufacturer's instructions should be followed; otherwise you will need MILTON or unscented household bleach.
- 22 In either case you will need a clean container of known volume or a clean measuring jug. A normal sized bucket holds two gallons (16 pints) or nine litres of water. A pint is approximately half a litre (500 millilitres), large

plastic fizzy drink or water bottles normally contain one litre or one and a half litres, a normal wine bottle is 750 millilitres. The volume is usually shown on the label.

- 23 Milton fluid for babies' bottles contains about 1% chlorine, bleach between 5% and 10% but check what is says on the label.
- 24 For each ONE litre or TWO PINTS of water to be disinfected add:

Milton (1% chlorine)	10 DROPS
Household Bleach (5% chlorine)	2 DROPS
Household bleach (10% chlorine)	1 DROP

(10 drops is about 1/8 of a teaspoon)
- 25 If you are unsure of the strength of the chlorine solution, use 10 drops per litre. Double the dose if the water is cloudy or coloured.
- 26 Mix the treated water thoroughly and allow it to stand, preferably covered, for 30 minutes. The water should have a slight chlorine odour. If not, repeat the dosage and allow the water to stand for an additional 15 minutes. If the treated water has too strong a chlorine taste, allow the water to stand exposed to the air for a few hours or pour it from one clean container to another several times.

General hygiene advice for flooded properties

- 27 Flood water can contaminate items within the household. The following precautions should reduce the risk of gastrointestinal infections.
- 28 Use a dilute bleach solution or sterilising tablets to rinse containers, pans and utensils used in cooking or food preparation before reusing them after flooding.
- 29 Domestic water taps may be contaminated by flood water and should be cleaned and disinfected inside and out using dilute bleach solution before using them for the first time. Flush water through taps for a few minutes before use.

Other Questions

Health Implications of Flooding of Cemeteries

- 30 Flooding of burial grounds is clearly going to cause distress and concern the general public, and particularly relatives of the deceased.
- 31 Because of the depth at which coffins are buried (usually several feet) this is unlikely to present a problem. Microbiological contaminants will not be

Contact lenses

- 32 Tap water or bowser water should never be used for cleaning or storing contact lenses since this may cause a rare but serious eye infection, *Acanthamoeba keratitis*.

Rats and Leptospirosis

- 33 Rats can move into homes following flooding, but are generally wary of humans. Avoid approaching or cornering rats and encourage them to leave. If you are bitten seek medical advice.
- 34 Rats can carry leptospirosis (Weil's disease) and have been associated with human outbreaks of leptospirosis (Weil's disease) following flooding in developing countries. Such outbreaks have not occurred during previous floods in the UK or other developed countries, however. Leptospirosis (Weil's disease) is rare in the UK.

Health Implications of Flooding of Petrol Stations

- 35 Petroleum, Diesel and Biofuel storage tanks at Service stations should be vapour tight and therefore should not allow the ingress of water. Each tank should be properly sealed at the point of filling, and should have an interceptor to prevent the loss of small volumes of petroleum products. Therefore, large scale release of petroleum products is not expected during the flood. However, if the interceptors have not been properly installed or well maintained there is the possibility that small volumes of petroleum products could be released during flooding. If this occurs, dilution with flood water is expected to greatly minimise any risk to the public. Similarly any release of petrol from flooded cars is also unlikely to present a significant risk to the general public.

Carbon monoxide risks

- 36 Portable generators, grills, camp stoves, or other gasoline, propane or natural gas devices should not be used indoors for heating houses or, ideally, boiling water. Use of these devices indoors can lead to carbon monoxide poisoning, which can be fatal. If you have to use these devices to boil water this should be done outdoors. If you cannot use these devices outdoors and there are no other alternatives available, then they should only be used to boil water for as short a period as possible in well ventilated rooms. They should never be used to heat or dry out rooms. If you experience dizziness, headaches or disorientation, the appliance should be switched off and medical advice sought.

Health Implications of Flooding of Playing Fields, Kitchens, Gardens and Allotments

- 37 For play areas, visual inspection is important to ensure that no dangerous debris has been deposited by the flood waters and that any visible collections of sludge should be physically removed. Paved or patio areas should be cleaned. Exposure to sun and soil will make grassed surfaces safe from infection after a week or so.
- 38 Discard any food that may have come into contact with flood water. Do not eat any food from kitchen gardens or allotments that has come into contact with flood water.

PROFESSIONAL ADVICE

Advice for clinicians

- 39 Only safe high quality water should be used for intensive care units, dialysis patients and other healthcare purposes including dental surgery. Dental surgeons will need to be aware of the status of the water supply and to follow guidance from their water company regarding compliance with flushing requirements

Health Implications of Flooding of Rendering Plants

- 40 Most renderers would not normally allow carcasses to build up in storage, unless the flooding occurred midway during a loading process, or there had been a breakdown at the plant just prior to or during a loading process; even then the carcasses that might be washed out are more likely to be an aesthetic problem than a health problem provided that they are removed in reasonable time;
- 41 The process is for the most part sealed and so the risk of materials in process becoming part of the contaminated waters is low; some material could conceivably be washed out of the loading augers, but it would be in very small volume;
- 42 There will be a massive dilution effect such that if any unprocessed materials were to enter the flood waters it is highly unlikely that any zoonotic pathogens are going to be present in quantities that could give rise to human infection.
- 43 Heating to high temperature occurs early in the process so any processed, or even part processed, materials are not going to be biologically hazardous.

Diseases Associated with Flooding

- Acute health problems associated with flooding include drowning, car accidents, electrocution, heart attacks and accidental injuries.
- Much of the illness in developed countries following flooding results from the physical and psychological stress.
- Flooding can contribute to outbreaks of infectious disease in developing countries. These include cholera, typhoid, dysentery, other diarrhoeal diseases, hepatitis A & E, as well as vector borne diseases such as malaria when mosquito populations increase. These diseases are uncommon following floods in developed countries.

- Prevention of infectious diseases is attributed to public health systems such as effective sewage disposal, drinking water supply and good housing.
- There is no evidence that mass immunisation is appropriate
- A surveillance system and accurate information on the situation are essential
- Drinking water supplies can be compromised if they or their pumping stations become flooded, and floodwaters can cause faecal contamination of runoff as it mixes with the contents of latrines, septic tanks, and sewers
- There is evidence of an increase in cases of acanthamoeba keratitis following flooding. This can result from people using tap water for washing contact lenses (this should not be done under normal conditions).
- There can be problems associated with building dampness in the months following a flood and moulds may contribute to respiratory symptoms.
- Outbreaks of leptospirosis associated with large rodent populations are reported following flooding in developing countries. These have not been important in developed countries.
- There is evidence for the risk of gastrointestinal infection being associated with the depth of flooding in a study following floods in Lewes, Sussex in 2000. This also identified ear infections associated with the floods

Sanitation and alternatives (advice to SW)

With restrictions in drinking water supply there can be problems with water for flushing toilets.

Where emergency water conservation is essential it is useful to use water that has been used for washing and bathing, or taken from garden water butts for flushing toilets. In these circumstances, toilets need not be flushed after urination but only after defecation. If other sources of water are unavailable floodwater can be used for flushing but care should be exercised in collecting this and hands should be washed with soap and water afterwards and containers should be considered contaminated. If there is a simple blockage without backflow contamination normal means of unblocking can be attempted.

Households in flood affected areas may be experiencing problems with blockages and backflow. Such problems can result in sewage flowing back into rooms and properties. This is particularly exacerbated when there is standing water which will serve to quickly disperse this material.

Non flooded households

In a non-flooded property do not use the rooms affected by sewage waste and faecal matter overspill (backflow). Contamination of rooms with sewage may provide a source of infection from the organisms present, either through flies, or from children being in contact with it. Close the door to prevent access to the room and ensure that the toilets are not used or attempts made to unblock them. Current public health advice on hand washing, food preparation, drinking water, and general hygiene for flooded properties will further reduce any risks to health.

Flooded households

In a flooded property where sewage from a backflow has spread outside the room, simply restricting access may be less effective. Until the water recedes do not attempt to use or unblock a non-functioning toilet.

The following options may be available to householders whose toilets cannot be used:

1. It may be possible and practicable to use the facilities of unaffected neighbours, public toilets, rest centres, local shops, supermarkets and hotels.
2. Chemical toilets (“portaloos”) may be provided in your area.
3. You may be provided with portable a “bag in bag” system (see below).
4. Where these options are not available and there has been contamination of the property with sewage waste, householders should consider whether relocating, e.g. to friends or relatives outside of the affected areas, may be useful option.

Where households are already affected by possible gastrointestinal infection options 3 or 4 are preferred.

Portable “bag in bag” products (e.g. “brief relief”, “wag bag”)

There are a number of products available based on a bag in bag design for solid and urine waste. It is single use system containing chemical polymers and enzymes that change the composition of the waste.

These products do not contain hazardous chemicals and use a mostly enzyme / bacterial complex. The chemicals will not present a risk. If you get it on your skin, your skin will only feel dry.

The bags are chemically suitable for disposal to landfill.

There are issues of provision (to individual premises, to collection points, use in holding/rest centres) and effective collection. Defra have indicated to the companies producing these products that the waste bags from such systems are comparable to nappies and household sanitary waste in terms of disposal to landfill.

If their use is planned, careful consideration is needed as to the effective distribution and collection of waste from these systems. If large numbers of these waste bags are generated or if local collections are going to be delayed, then the setting up of a central collection system should be considered.

As people will be unfamiliar with these products, there will be a potential for contamination with faecal matter on the outside of the bag/pouch and of the plastic bucket frame (if supplied). To reduce the risk additional tie top plastic bags could be supplied with instructions on double bagging of the entire pouch before disposal. Providing hand wipes with these products should also be considered.

Public health advice following flooding - chemical hazards

The recent flooding in central parts of England has affected domestic, industrial and agricultural premises. It is therefore inevitable that some chemicals may have been released into the floodwater. The advice given so far by the Health Protection Agency on avoiding possible infections from sewage in floodwater is generally applicable to chemical pollution.

The sheer volume of water will dilute chemical pollution but there could be local problems and precautions should be taken when cleaning up after flooding.

- Portable generators, grills, camp stoves, or other gasoline, propane or natural gas devices should not be used indoors for heating or, ideally, boiling water. Use of these devices indoors can lead to carbon monoxide poisoning, which can be fatal. If you have to use these devices to boil water this should be done outdoors.

If you cannot use these devices outdoors and there are no other alternatives available, then they should only be used to boil water for as short a period as possible in well ventilated rooms.

They should never be used to heat or dry out rooms.

If using dehumidifiers and pressure washers always ensure you have adequate ventilation.

If you experience dizziness, headaches or disorientation, the appliance should be switched off and medical advice sought.

- Be aware that flood waters may have soaked into containers of chemicals, solvents and other industrial items or moved them from their normal storage place. However the risk of chemical exposure is likely to be limited as the volume of flood water has been so significant that there is likely to be considerable dilution of any chemical hazard that may have been released. In general avoid contact with flood water and wear protective clothing and waterproof gloves.
- Special care should be taken when opening cupboards that may contain household or garden chemicals that have become wet, especially those in bags or cardboard packaging. In general avoid contact with these products if wet and wear protective clothing and waterproof gloves whilst cleaning up. DO NOT try to utilise any products which are flood damaged.
- Petrol or oil films may be seen floating on the flood waters both inside buildings and in surrounding areas. It is recommended that these petrol films should not be disturbed. Flood waters should be allowed to subside and on contact with the ground the petrol allowed to evaporate. Avoid exposure to petrol films if possible. As is normal practice, people are reminded not to smoke or have fire sources such as matches in the vicinity of petrol films.
- Avoid enclosed areas that may be chemically contaminated, such as garages and cellars where hazardous fumes may build up. Ensure such confined areas

are adequately ventilated before entering and are not accessible to children and animals.

- Chemical pollution may have occurred due to materials stored in garages and garden sheds. Special care should be taken during any clean up. For example car batteries in flooded premises should only be handled with rubber gloves for electrical and chemical safety reasons because acid from the batteries could have leaked out.
- If you believe your home has become contaminated with chemicals, you must not return home without specialist advice from your Local Authority.
- Water and mud may enter gas systems during a flood. Even if appliances appear to be working normally, the flue or ventilation systems may be affected. For safety reasons it is most important to have appliances inspected by a CORGI registered engineer.
- It is recommended that you only fully reoccupy your home once it has been thoroughly cleaned and disinfected and allowed to dry out. This will also reduce any risk from any chemical hazard.

Precautions during clean-up

Although any chemicals in floodwater will have been very diluted and present a low risk, as with sewage contamination, you should always:

- Wear protective clothing-waterproof boots, apron, gloves and, where possible, protective eyewear while cleaning up. Cover any open cuts with waterproof plasters
- Wash your hands with soap and water after being in contact with floodwater or items that have been contaminated
- Thoroughly clean all hard surfaces (including walls, appliances, floors, furniture etc) with a solution made up with hot water and an ordinary detergent based household cleaning agent
- Remove and discard items that are clearly contaminated or that you suspect may have been contaminated. If items are likely to be the subject of insurance claims, speak to insurers and find out what evidence claims will require. In the interim, we recommend that affected items are moved and stored in areas away from those which are used for day to day living. Contaminated items should be discarded at the earliest opportunity.
- We recommend you wash all other soft fabric items (bedding, linen, clothing, soft furnishings, children's toys etc) on a hot soapy wash – 60 °C (or recommended temperature on detergent manufacturer's instructions). Items that cannot be put in a washing machine should be dry cleaned.
- Wash all clothes worn during clean up activities in hot water and detergent and wash them separately from uncontaminated clothes and linens. If the clothes are seriously contaminated you should consider discarding them

Version 10

Further general health advice in relation to flooding is available on the Health Protection Agency's website or contact NHS Direct on 0845 4647 or visit their website <http://www.nhsdirect.nhs.uk>.