



# **Private Water Supplies Sampling Procedures Manual**

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## **Legislative background**

Regulation 7 of The Private Water Supplies Regulations 2016 (2010 in Wales) requires that all local Authorities in England and Wales must monitor (sample and analyse) all private water supplies in accordance with this part when carrying out its duties under section 77 (1) of the Water industry Act 1991. These regulations implement the 1998 Drinking Water Directive in England and Wales (98/83/EC). Regulatory monitoring is carried out to satisfy the requirements of the Water Act 1989.

Schedule 3 of The Private Water Supplies Regulations 2016 (2010 in Wales) requires that local authorities must ensure that each sample it takes is:

- a) Taken by a competent person.
- b) Representative of the water at the sampling point at the time of sampling.
- c) Not contaminated in the course of being taken, stored or transported.

Following the procedures to the manner prescribed in this manual ensures that regulatory monitoring requirements are met by way of standard best practice.

## Introduction and scope

The procedures contained within this manual prescribe the standard sampling arrangements and methods to which local authorities and their contracted representatives should follow for the purposes of regulatory and investigational monitoring of private water supplies. Sampling forms part of the wider risk based requirements of The Private Water Supplies Regulations 2016 (2010 in Wales). It is recognised that there may be variation in some chemistry methods, as this can be dependent on the sample bottle type supplied. Local procedures should therefore be amended accordingly.

The word “sampler” is used in this manual as a generic term, which applies to any person employed by a local authority employed to collect water samples for the purpose of fulfilling regulatory duties under The Private Water Supplies Regulations 2016 (2010 in Wales): for example; Environmental Health Officers, Technical Officers and persons contracted exclusively for sampling.

Local adaptations of the manual by local authorities should be made in the following ways:

### 1. Sample bottles.

It is recognised that bottle types may vary according to suppliers. Accordingly each local authority shall include within their local version of the manual a comprehensive photographic list of all bottle types used by the authority, which must be appended to the manual.

### 2. Sampling methods

Each local authority should amend/replace any methods for the taking of samples in section 6 of this manual, to reflect the required methods necessary for the bottle types, in accordance with its laboratory/supplier instructions.

### 3. A list of all local equipment, including all test equipment should be appended to the local version of the manual.

### 4. Localised versions of the following records – template examples are provided in the template in the appendices of this document.

- Chain of custody form
- Sampler authorisation record
- Vehicle fridge/coolbox daily record
- Storage fridge temperature record

Local authorities should incorporate into their manual any local health and safety requirements according to local policies and procedures, as they see fit.

## **Section 1 – Maintaining sample integrity**

Cross contamination between samples must be avoided at all times during sample collection, transportation and storage through the strict adherence to the procedures.

Ensure any liquid chlorine and other chemicals are segregated to prevent cross contamination when being stored, carried in holders or in transit. Ensure that all chemical containers are at all times labelled with the content name and concentration (where relevant) and the date after which it should no longer be used (expiry date).

Samples, sampling equipment and on site kit shall be stored on vehicles in a hygienic, safe and tidy manner to avoid accidents and sample contamination of any kind. Each local authority should append to its local version of the scheme manual a list of its sampling equipment. This should include the make and model of all on site testing and calibration equipment.

Samplers must remain vigilant at all times to conditions that pose a risk to the water quality integrity of a sample by inadvertent contamination, particularly when exposed to adverse weather or other unfavourable external environmental influences (e.g. unhygienic food preparation areas). Issues that impact on sample integrity shall be noted, and recorded in local records, and later considered in the interpretation of any sample failure where relevant.

When sampling raw and treated water in a single site visit, always take the treated water sample first to minimise the risk of cross contamination. Raw and treated water samples must be segregated during transportation and when stored awaiting collection to the laboratory.

Whilst being manually transported, samples (before and after filling) shall be carried in a suitably robust and hygienic holder, in a way that ensures the bottles are maintained permanently in an upright position and that all sampling equipment and on-site test kit is securely stowed in the vehicle at all times.

Cool boxes and/or vehicle refrigerated units shall be maintained in a clean and hygienic manner at all times and cleaned no less than the day before sampling, using an appropriate disinfectant spray. Surfaces should be wiped dry with paper tissues afterwards.

Samples requiring refrigeration during transportation must be refrigerated AT ALL TIMES. These include all microbiological samples and any chemistry samples where this is a requirement to ensure the sample remains representative whilst in transit and storage – as directed by the analytical service provider. These shall be transported in an upright position in a container within a temperature range of 2-8 °C

in either a cool box or refrigerated unit on the vehicle. See section 8 for further details.

Samplers shall always wear appropriate personal protective equipment (PPE) to meet the relevant health and safety risks at the time of sampling. Furthermore, each sampling activity shall be subject to the application of all health and safety requirements laid down by the local authority.

Samplers are prohibited from eating, smoking or drinking whilst sampling.



## Section 2 - Sample types

Samples from private water supplies are taken for one of two reasons shown below, and they are normally coded as such (these are usually known as “reason codes” or “purpose codes”).

- (a) **Samples taken for regulatory purposes** – These samples are taken to demonstrate compliance with The Regulations and are taken at a sampling point where the water is representative of that where it is intended to be used for human consumption (as defined in Regulation 3 of the regulations). The sample parameters, collection frequencies and points of collection are prescribed by The Regulations.
- (b) **Samples taken for investigational purposes** – These samples are taken for operational purposes to assist with determining the quality of a supply. They may be taken from the designated regulatory sample point (the point of consumption) or from other assets in a supply system. Investigational samples are usually taken to understand the cause and extent of a water quality failure that has been highlighted by a failed sample. They are also taken to verify that subsequent remedial action to mitigate a public health risk (potential or actual) that has been identified through an investigation, has been effective.

In addition to their purpose/ reason, sample types are designated according to where in a prescribed sequence they are collected (pre-flush, post flush etc). This sequence, “the order of sampling,” is an essential element of sampling procedures. There are 4 sample types in this respect:

- (a) **Overnight stagnation samples** – This is a measure of the worst possible conditions for the dissolution of metals or microbiological growth within plumbing systems, after an overnight period in which the water has remained static in pipework. This sample type must be taken prior to any consumer use on any given day, and before any preparative flushing, cleansing or disinfection of the tap. The sample bottle must not be rinsed beforehand.
- (b) **Pre-flush samples** – This sample type is taken prior to any flushing, cleansing or disinfection of the tap at a random point in any 24 hour period. Samples of this type may be accompanied by a swab if the sample is being taken for investigative purposes to determine biofilm, growth within fittings. In these instances the swab must be taken before cleaning/cleansing the tap and the taking of any other samples. Samples for chemical analysis must be taken next followed by microbiological samples during which water loss must be kept to an absolute minimum. Pre-flush samples would include those taken

for plumbing metals, such as lead, copper and zinc. The results of which can be compared with post flush samples for the same parameters.

- (c) **Post flush samples** – Samples of this type are taken after a tap has been prepared in the manner described in section 6.2 of this manual. Most chemical and microbiological samples for regulatory purposes are of this sample type.
- (d) **Lead stagnation samples** – samples of this type are collected for investigative purposes to measure the lead content in water after it has been static in lead pipework for a defined period. The stagnation period follows a period of flushing and the collection of any after flush samples (see section 6.1 for procedure).

### **Section 3 – Sample vessels (bottle types)**

The analytical test requirements for any given sample will determine the bottle type that the sample shall be collected in. Sample vessels, (usually termed generically as bottles) vary in shape, size, volume and the material they are made from, the level of their transparency, how they are pre-prepared (in some cases additives/preservatives are added), whether or not they are reusable, and in their cap type and colour. The vessel used must be of the appropriate type for the intended tests. It is important to recognise that the bottle type required for a particular test or set of tests influences the method and sampling technique to be applied.

**NB. Bottles used for the sampling and analysis of private water supplies must, be strictly only those supplied by the laboratory service provider. Analysis of samples must be carried out in accordance with the Drinking Water Test Specification and accredited to BS17025 by UKAS.**

A photographic list and its description of all bottle types used by a local authority for the sampling of private water supplies should be appended to the local manual and referenced where relevant in relation to its use.

Where relevant, each bottle shall be labelled with an expiry date (use-by) and if necessary with appropriate hazard labels, where it contains preservatives. Technical Managers must assign individuals to the responsibility of the management of sampling equipment, including sample bottles and their hygienic and secure storage, ensuring relevant health and safety measures are applied. Bottles must be stored in a clean dry environment and locally stored stocks must be managed such that out of date bottles are not inadvertently used. Any out of date sample bottles must be returned to the appropriate bottle provider. No sample bottle must be used if that date has been exceeded.

## **Section 4.0 - Preparation of chlorine solutions for tap disinfection**

### **4.1 Introduction**

Hypochlorite solutions are commonly used as an effective method of disinfecting sample taps, as well as for equipment, clothing, water mains/pipes and fittings. Appropriate health and safety procedures need to be employed when using hypochlorite (or chlorine) solutions (see relevant H&S guidance notes, risk assessments and COSHH data sheets as necessary. Reference should be made to manufacturers' hazard and data sheets or COSHH sheets). It is recommended that local authorities undertake a risk assessment for using these chemicals. Even in low concentrations chlorinated water can kill fish and cause environmental pollution, if discharged to watercourses. It is therefore essential to plan how best to dispose of chlorinated solutions to the environment.

- a) Commercial hypochlorite (sodium) solution is a caustic solution containing between 10% and 15% available chlorine when new.
- b) 'Rapid release' chlorine tablets are rapidly dissolving and provide a simple and effective means of preparing chlorine solutions of known strength, for disinfection purposes approved for use with wholesome water. They are best used for making up small quantities of solution.

**When using 'rapid release' chlorine tablets it is necessary to consider the different size of tablet and the strength of solution that will be produced and to refer to the manufacturer's instructions/guidance notes.**

The chlorine solution must be prepared to the concentration of 10,000mg/l at the start of the sampling day. All solutions made from tablets need to be used on the day of preparation. The date, description and concentration of the solution must be clearly displayed on the container together with any hazard labels. Disposal of small amounts of excess hypochlorite solution must be to foul sewer via a sink and flushed with copious amounts of clean water. These solutions cannot be allowed to enter watercourses or surface water drains. All local and manufacturers' health and safety precautions must be applied during the preparation of the solution.

### **4.2 Personal protective equipment (PPE)**

Goggles, nitrile gloves, and appropriate work-wear i.e. coveralls work trousers and long sleeved top need to be worn at all times when mixing and applying the chlorine disinfectant solution. At NO time is bare skin to be exposed to the chlorine disinfectant solution/spray.

This PPE is in addition to any other PPE specified in local arrangements. All other applicable local health and safety measures must be observed.

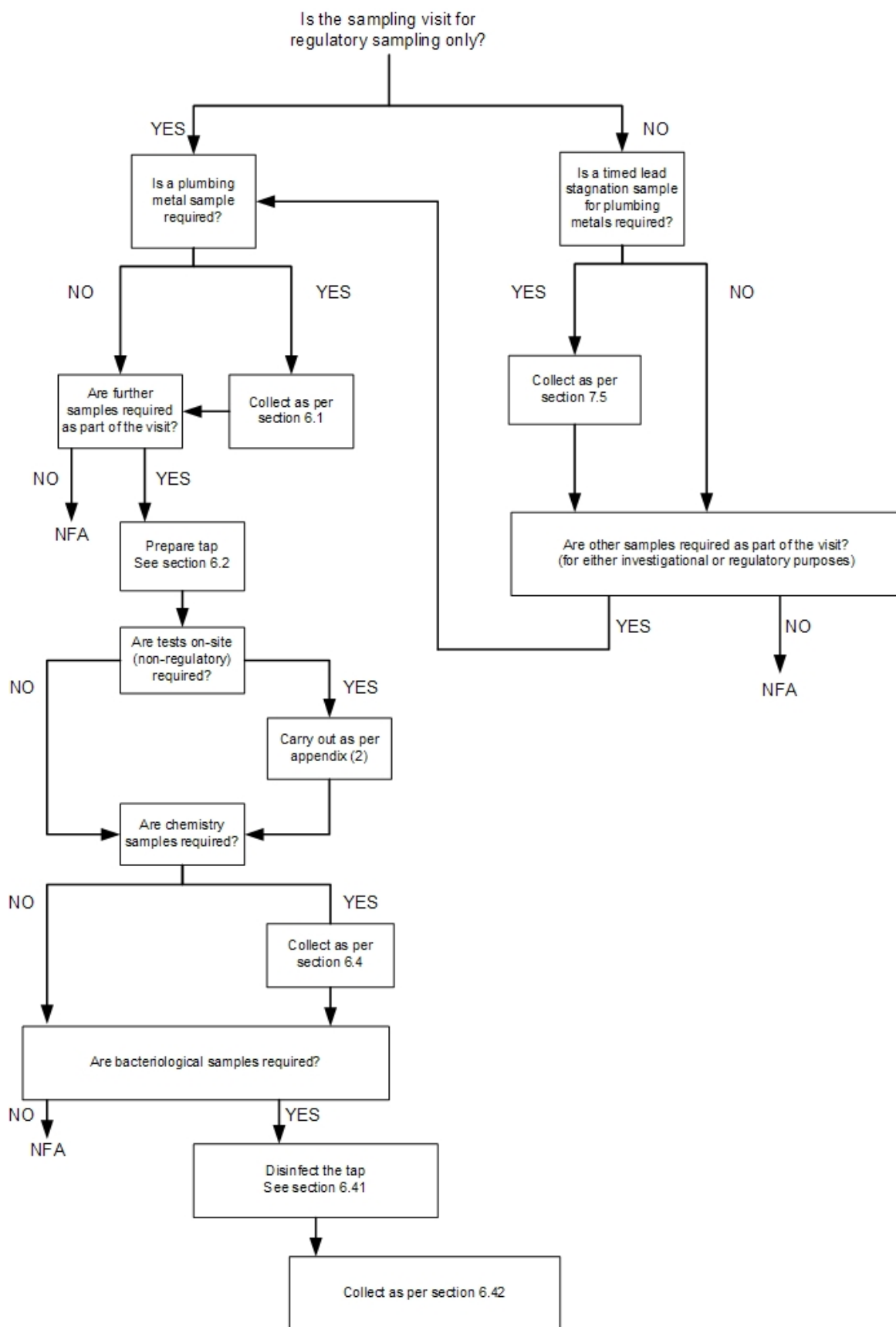
## **Section 5– Order of sampling**

Sampling in the correct order is an essential and integral part of sampling methodology and ensures that samples are representative of their source. The first bottle to be filled within this sequence shall be determined by the analytical requirements of the sample (which can comprise a collection of different sample bottle types for a range of analysis) and shall be collected in accordance with the methods shown in section 6. In most cases the procedure would commence at point 3 in the order of sampling, which is shown below.

All sample vessels shall be labelled in advance of the following steps to avoid inadvertent mislabelling and sample mix ups prior to analysis.

1. Plumbing metals, or other pre-flush samples, including swabs for investigational purposes as required
2. Plumbing metals (regulatory)
3. Preparation of the tap, including flushing
4. On site tests
5. After flush chemistry samples
6. Disinfection of the tap
7. Bacteriological samples

Flow diagram showing order of sampling



## **Section 6.0 - Sampling methods**

The sampling methods in this section are described in the order sample types are required to be taken. Failure to adhere to these methods could result in sample results being inaccurate, requiring further sampling and investigation at unnecessary expense to the consumer.

N.B. where timed actions are required, time should be measured using a suitable digital instrument. Time durations must not be estimated.

All personnel required to take samples of private water suppliers must be trained and authorised to sample (a suggested “authorisation to sample” proforma is appended to this manual).

### **6.1 Plumbing metals (lead, copper, zinc, nickel)**

The method of collection of a sample for plumbing metals shall be determined in the first instance by its purpose (i.e. whether regulatory or investigational). This in turn will determine where in the order of sampling it is taken.

If a timed investigational stagnation sample for plumbing metals is required, it must be taken prior to any other sample type.

If this is not required, the regulatory sample shall be collected first and as follows:

- Fill the bottle *before any cleaning or flushing of the tap*. Do not rinse the bottle first.

### **6.2 Tap preparation and on site measurements**

Ensure that the tap type and condition is likely to provide a sample that is representative of the supply:

- Record any observations where its representativeness might be compromised, e.g. unhygienic surroundings, attachments/anti-splash devices in use.
- Check for any on line filters, point of use devices or softeners
- Remove anti-splash devices or rubber hoses etc.
- Clean the outside of the tap with 70% isopropyl alcohol wipe to remove any debris, grease or other potential sample contaminants.
- Turn the tap on and adjust the flow to a steady stream, ensuring that the water flows directly into the bottle, without it over-spilling the rim of the vessel. Run for a minimum of 3 minutes.

- Run further until the temperature stabilizes.
- Take any on site test measurements (see appendices (2) for methods), including chlorine residual where the supply has been chlorinated.

### 6.3 Chemistry

The method for taking a sample for a particular chemistry parameter or group of parameters selected for that supply will largely be determined by the sample bottle type used (for the reasons shown in section 3). Container cap colours and types will also vary according to the laboratory supplier. The scope of vessels used by a local authority for taking private water supply samples must be appended locally to its version of this manual.

**NB.** The following procedures prescribe the methods for using a stated sample bottle type for a particular parameter or set of parameters. Where an alternative bottle type and/or method are used locally by a local authority the procedure shall be amended by The Technical Manager and the bottle type list appended accordingly.

#### 6.31 Metals other than mercury and plumbing metals.

If using a 125ml HPDE metals bottle:

- Rinse out the bottle and the cap twice and fill the bottle to the brim of the container.
- Replace the lid
- Place the sample in the bottle carrier and transport to vehicle

#### 6.32 Pesticide samples

If using a 1 litre amber glass PTFE lined screw cap bottle fill the bottle to the bottom of the thread and replace the cap. Do not rinse first. These are usually used for organics GCMS analysis.

If using a 2 litre glass bottle, rinse the bottle and cap twice with water from the tap, then fill the bottle to the bottom of the thread and replace the cap.

If using a, 1 litre plastic bottle with additive, fill the bottle to the bottom of the thread and replace the cap WITHOUT RINSING the bottle first.

Place the sample in the bottle carrier and transport to vehicle.



### 6.33 Trihalomehtanes (THM's) samples

If using a 100ml amber glass bottle with glass stopper, DO NOT RINSE THE BOTTLE PRIOR TO USE.

- Set the tap to a gentle flow
- Run the water from the tap down the inside of the bottle, avoiding any entrapment of air bubbles.
- Fill the bottle completely so that there remains no air gap when the bottle stopper is replaced. Top the bottle up if necessary.
- Replace the stopper.
- Place the sample in the bottle carrier and transport to vehicle

Transport the bottle in a refrigerated unit to ensure the sample is kept chilled and not exposed to sunlight.

### 6.34 Polyaromatic hydrocarbons (PAH) samples

If using a 500ml amber glass container DO NOT RINSE THE BOTTLE PRIOR TO USE [N.B. it may contains isopropanol]

- Fill the bottle until it is about a third full and replace the cap
- Invert the bottle gently twice to mix in the additive.
- Loosen the cap and leave the bottle to stand until bubbles of gas stop rising.
- Completely fill the bottle and leave it to stand until bubbles of gas stop rising.
- Ensure there is no air space (top up the bottle if necessary) at the top of the sample, replace the cap.
- Place the sample in the bottle carrier and transport to vehicle.

### 6.35 Mercury and alpha and beta samples

If using a 1L clear plastic bottle DO NOT RINSE THE BOTTLE PRIOR TO USE

- Fill the bottle to the bottom of the thread and replace the cap.
- Place the sample in the bottle carrier and transport to vehicle.

### 6.36 Sulphide samples

If using a 25ml clear glass bottle DO NOT RINSE THE BOTTLE PRIOR TO USE

- Using bottle type X, fill from the tap to the brim of the bottle.
- Replace the cap.
- Shake the bottle to mix
- Place the sample in the bottle carrier and transport to vehicle.

### 6.37 General chemistry samples

These samples include those for pH, colour, conductivity, and turbidity. If using a 1L clear plastic bottle type:

Fill the bottle to the bottom of the thread

- Replace the cap
- Place the sample in the bottle carrier and transport it to the vehicle.

**For total organic carbon (TOC), cyanide, phenol, hydrocarbons and “dionex” (for the separation, of components of chemical mixtures and compounds) and laboratory taste and odour (see section 6.39), the sample bottle must be filled completely.**

### 6.38 Radon sampling

Radon occurs in water as a dissolved gas and any agitation of the sample may cause losses to atmosphere. It is therefore important that samples are taken directly into the bottle supplied.

- Open the tap to obtain a slow, continuous flow. Allow the tap to run for a minute before taking the sample but avoid turbulence at the outlet of the tap and on the bottle walls.
- Take and note the temperature of the flowing water
- Take the sample carefully, allowing the stream of water to flow gently down the wall of sample bottle.
- Fill the bottle completely (leaving no air gap) in order to avoid the presence of air in the sample but do not allow the container to overflow with turbulence.
- Close the container ensuring the bottle cap is fixed tightly.

- Transfer the samples to a cool box or fridge and ensure the temperature during transit and storage is below the water temperature at the time of sampling until analysed. This is because the solubility of radon varies greatly with temperature”
- Ensure that the sample container is sealed to prevent it being opened during transport and dispatch to the testing laboratory immediately. Analysis must commence within 48 hours of sampling.

### **6.39 taste and odour sampling**

Collect the sample in a taste and odour bottle (usually a 1litre glass bottle). Fill the bottle completely so as to exclude head space and avoid exposure to sunlight during transportation to the laboratory.

## **6.4 Microbiological sampling**

Following tap preparation and all relevant chemistry samples, carry out the following procedures:

### **6.41 Disinfection of tap**

NB. For purposes of best practise this method employs a double disinfection procedure:

- Inject or spray a pre-prepared chlorine solution over and into the tap nozzle using a suitable vessel/container (the make shall be named in the equipment list appended in this manual). Leave the solution for a contact time of 1 minute. (N.B. the make and model of the vessel or container used must be listed in the equipment list provided in the appendix of this document and added to the local version of this manual).
- Turn on the tap and adjust the flow to a steady stream.
- Run for 1 minute.
- Re-apply the disinfectant and leave for 1 minute
- Turn on the tap and adjust flow to steady stream
- Run the tap for a minimum of 2 minutes.
- Where the supply has been treated with a chlorine disinfectant, take a free chlorine residual reading to ensure they match the readings obtained taken at the stage shown in section 6.2. If the reading is higher flush the tap for a

further 2 minutes and repeat the test. If no match is obtained, carry out an investigation to find the cause or likely cause before proceeding to 6.42

#### **6.42 Bacteriological sampling procedure:**

Usually a pre-prepared **500ml sterilised clear plastic bottle** with added sodium thiosulphate):

- Using the bacterial bottle type shown in the appendix of this manual, hold it near its base and unscrew cap.
- Do not put the cap down. Hold it open end downwards.
- Do NOT rinse the bottle.
- Fill the bottle by holding it under the water stream a slight angle ensuring the top of the bottle does not come into contact with the tap.
- Avoid splashing and fill to the line where the cap meets the bottle so as to leave an air space to allow for expansion during transportation.
- Replace the cap taking care not to touch the inside of the cap or it to come into contact with anything.
- Tighten the cap and invert.
- Transfer to and transport in a refrigerated unit or cool box.

## **Section 7.0 – Investigational sampling**

This section includes the methods for the collection of samples that are not required for regulatory purposes, but are required to gain additional information to determine the extent and cause of risks or sample failures. Some investigational samples may be taken from regulatory sample points (point of use), whilst others may be taken from other points such as hydrants, tanks or open raw water.

### **7.1 Procedure for sampling from hydrants**

Observing the requirements of relevant local health and safety arrangements:

- Lift the hydrant cover with a suitable levering tool.
- If the pit is flooded such that the outlet is immersed, then bail out the pit until the water level is below the outlet by 2.5cm or more and all debris removed.
- Carefully open the hydrant valve using a key and crow-bar and allow water to enter the pit, but not flood it.
- Shut the valve and bail out or pump out the pit if necessary to ensure the water level is below the outlet.
- Attach a swan neck to the hydrant outlet and turn on the valve.
- Flush the water until it runs visually clear, avoiding the risk this might present to bystanders or property.
- Check for clarity using a clear plastic sample bottle.
- When the water is clear reduce the flow to facilitate sampling.
- Measure the residual chlorine to determine the base line reading.
- Take any chemistry samples from the swan neck
- Turn off valve and safely remove swan neck.

If microbiological samples are required, continue as follows:

- If the hydrant pit has become flooded, bail out or pump out the water to at least 2.5cm below the hydrant outlet.
- Pour approximately 250ml of a 10,000mg/l chlorine solution into the hydrant outlet and 250ml of the same solution into an inverted standpipe.
- Swiftly connect the standpipe to the hydrant outlet.

- Open slightly the hydrant valve to ensure the standpipe is fully charged with water and then open the tap on the standpipe to discharge the chlorinated water. Do not flush, but once water is flowing turn off the standpipe tap, and allow the water to stand in the standpipe for at least 5 minutes under positive pressure.
- Run the water to waste for at least 2 minutes
- Test the chlorine residual to ensure that it is back to the base line reading. If it is not, continue flushing until it does.
- Take microbiological sample using procedure described in section 6.42.
- Take any on site readings, such as temperature, taste, odour and appearance if required.
- Remove the standpipe and replace the hydrant lid.

N.B. if the hydrant pit cannot be bailed out or pumped out for any reason, it is therefore not possible to disinfect the outlet by pouring in a chlorine solution. However, the same procedure can be used except that 500ml of the 10,000mg/l chlorine solution should be poured into the inverted standpipe prior to the collection of any required microbiological samples using the procedure described in section 6.42.

## **7.2 Procedure for sampling raw water from an open water source:**

This procedure is applicable for taking investigational samples from any open water facility. This includes from rivers and streams, chambers, channels and storage reservoirs (and tanks) where sampling can only be achieved by standing over open water from height. This method is not appropriate for bacteriological sampling as it poses contamination risks and health and safety hazards.

When sampling from height, all appropriate local health and safety procedures must be adhered to. Disposable gloves must be worn when taking microbiological samples (e.g. large volume samples). Where a risk of falling into open water is a risk always wear a life jacket.

Raw water is defined as water that has not been treated for human consumption and other domestic purposes and includes any point that is prior to the regulatory sampling point.

- When working from height, direct filling of sample bottles, other than samples for pathogens and viruses is not to be used. It requires the use of a dipping jug – a jug on a chain or rope.

- First find a suitably safe place to take the sample without causing risk of injury. This may be a bridge, platform or jetty.
- Check that the jug is clean and dry. Disinfection of the jug at this stage shall be considered where appropriate. Methods of disinfection should observe all necessary health and safety procedures
- Throw the jug out and allow it to sink well below the surface. Do not allow the jug to hit the bottom of the tank, channel etc.
- Draw the jug back using the attached rope.
- Fill sample bottles by pouring from the jug, observing any specific requirements of the bottle type.

### **7.3 Procedure for pathogens and viruses by direct dipping of raw water**

Samples shall be collected in the appropriate bottle shown in the appendix of this manual. The volume required for pathogen and virus samples will usually be 5 or 10 litres. Either way samples should be collected in in the relevant container. N.B. disposable gloves should be worn for the collection of these samples

- Lower the container carefully into the water, observing all health and safety precautions and procedures. If the water is flowing then ensure that the opening of the container faces downstream.
- Allow the container to fill.
- Retrieve the container and replace the cap
- Dry the container and avoid exposure to sunlight as much as possible.
- Dispose of gloves in a suitable receptacle in the vehicle or back at base and wash hands
- Transfer to and transport in a refrigerated unit or cool box ensuring the samples are separated from all clean and treated water samples.

#### **7.4 Procedure for large volume sampling procedure for treated water (e.g. regulatory sample points)**

Samples should be taken by directly filling the container from the tap. If this is not feasible due to the size of the container, then water should be transferred from the tap to the container using a 1L jug.

#### **7.5 Procedure for lead stagnation sampling**

Lead stagnation samples represent the concentration of lead in the sample after the water has been left in contact with pipes for a specified duration (e.g. 30 minutes). This is to assist with determining the level of risk posed by the lead pipes.

These samples must be collected at point 2 in the order of sampling shown in section 5.

- The tap must be first flushed for a minimum of 2 minutes and the temperature checked throughout flushing.
- When the temperature has stabilised turn off the tap
- Do not turn on the tap for 30 minutes
- Fill the bottle (\*bottle type shown in appendix) to the brim and screw on the cap
- Transfer to and transport in a refrigerated unit or cool box.

### **Section 8 – Storage and transportation of samples**

Samples for microbiological analysis (bacti) and unpreserved chemistry samples must be transferred to a fridge or cool box, which must be maintained between 2 and 8 °C after being taken, until delivery to the laboratory. Where cool boxes are used, a sufficient number of frozen ice packs must be placed within the storage compartment during the transportation of samples to ensure the temperature remains within the required temperature range.

NB. For radon samples the temperature during transit and storage must remain below the water temperature at the time of sampling until analysed. This is because the solubility of radon varies greatly with temperature.



Complete one chain of custody sheet (using the proforma shown in the appendix of this manual) for each crate of sample bottles to be transferred to the laboratory and place it into the crate.

Crates should then be sealed, to prevent any tampering of samples during transit (using cable ties, for example).

The samples must be transferred to the laboratory as soon as practicable on the day of collection, for analysis to commence promptly on arrival, whilst taking into account parameter stability times – ideally within 24 hours. In exceptional circumstances, if there is a delay, store the samples at 2-8°C in the dark for analysis within 8 hours the next day. Samples that do not meet these requirements may not be processed. Samples must remain upright at all times whilst in transit.

All other unrefrigerated samples should be transferred to the laboratory as soon as practicable on the day of collection, for analysis to commence promptly or appropriate preservation. If samples are unable to be received by the laboratory on the day of sampling, they must be stored securely and transported to the laboratory the following morning.

Fridges and cool boxes used for transporting samples must have the temperature checked with a calibrated thermometer. The thermometer should be placed into the cool box and the temperature recorded once a stabilised reading is displayed. Where available a data logger is preferred and data should be downloaded on a daily basis and checked to ensure the temperature has been maintained between 2 and 8°C. Cool boxes should be cleaned using a suitable commercial disinfectant product prior to the sampling visit, either on the day or evening before.

Short-lived exceedances of the temperature band are to be expected as the fridge/cool box is opened. Exceedances lasting over one hour should be recorded on the record sheet.

When using a fridge thermometer, the temperature must be recorded approximately mid-way during a sampling/collection round (allowing about 20mins from when the fridge was last opened, so that the temperature has had a chance to recover). The temperature must be noted on the sampler's daily record sheet. Any recordings outside of the range 2-8°C should be notified to the Quality Control Manager, so that corrective action can be taken.

Where the samples are transported to the laboratory by a courier the temperature should be recorded on the tracking sheet at the time of collection. Arrangements must be made for the courier to deliver the samples to the laboratory, as soon as is practicable.

It should be noted that it is a requirement under ISO 5667 part 3 that accredited laboratories inform Local Authorities about the storage and transportation requirements of samples.

Further details can be found in section 1 – Maintaining sample integrity.

## Appendices

### 1. Proformas

The following proformas are examples that may be adapted locally, and where they are they should contain the same information. Local versions should be appended to the appendices of the local manual, along with a bottle type image and description list and details of local on-site equipment and their instructions for use.

- [Authorisation to carry out sampling](#)
- [Chain of custody form](#)
- [Sample storage fridge temperature and cleaning record](#)
- [Vehicle and fridge daily checks](#)

### 2. On site testing

After preparing the tap (see section 6.2), carry out the following procedures as required:

#### Temperature readings

Water temperature readings should be taken using a suitable thermometer, according to the manufacturers' instructions. These may vary according to the make and model. The thermometer should have a range between -50 °C and 150°C and measure within 0.1°C.

All digital thermometers should be calibrated on receipt before they are used. Thereafter they should be calibrated every 3 months.

- Take any pre-flush temperature readings for any investigational sampling required.
- Flush the tap for a minimum of 3 minutes.
- Place a beaker under the tap and run water into it until it overflows
- Turn on the thermometer and immerse the probe into the water in the beaker. Do not immerse above the probe.
- Allow the temperature to stabilise then record the thermometer reading as shown on the unit.
- If the temperature recorded appears abnormally high or low, then repeat the check and record the temperature once it has stabilised.

- Where the temperature remains abnormally high, an investigation should be carried out to determine the cause and extent as part of a risk assessment. Following this the local authority will need to ensure that the relevant persons (as defined in Section 80 of The Water Industry Act 1991) put appropriate mitigation in place to prevent a recurrence and verify completion in a timely manner.

### **Chlorine residual measurements**

The measurement of chlorine residual is only applicable where the supply is known or suspected to be disinfected or pre-treated with a chlorine disinfectant, such as sodium hypochlorite.

Methods will vary according to the instructions of the device and manufacturer's model. The manufacturer's instructions must be followed in all cases.

### **NN-Diethyl-p-phenylenediamine (DPD) reagents (DPD)**

DPD measures chlorine that is not bound chemically to other compounds ("free" chlorine). The addition of DPD to chlorinated water forms a pink/red colour, which is measurable.

To measure "total" chlorine (i.e. free chlorine and chlorine which has become chemically bound to other components, known as "combined" chlorine), the DPD is used with iodide, which reacts with DPD to give a measurable pink/red colour, proportional to the total chlorine concentration.

N.B. Liquid DPD has a shelf life of twelve months whilst unopened and one month when opened. The expiry date of one month from the date of opening must be written on every bottle where it is used, once it has been opened. Discard any liquid DPD bottles which are outside this date. Check that the DPD reagents in use have a legible batch number and expiry date by the manufacturer. Discard any bottles where the batch number or expiry date is illegible.

### **Procedure for visual appearance**

N.B. vessel types for this test may vary and the method should be checked by the laboratory supplier. The procedure should be amended locally as required.

- Take an untreated 1 litre taste and odour bottle and rinse the bottle and stopper under the tap twice.
- By holding under a running tap half fill the taste and odour bottle and replace the stopper
- Invert the bottle and shake vigorously
- Hold the bottle up to the light and inspect the contents for any particulates, turbidity/cloudiness or colour.
- Note the appearance of the water.
- Record the results of your observations.

### **Procedure for odour test**

- After completing the visual test remove the stopper immediately and smell the sample.
- Note and record any abnormal odour.
- Discard the sample unless carrying out a taste test

### **Procedure for taste test (optional)**

- Pour a small portion of the original odour sample into a beaker and rinse.
- Discard the water in the beaker
- Pour approximately 125ml of the original odour sample into the beaker. Taste the sample.
- Note and record any abnormal taste.