



# Private Water Supplies Sampling Manual

## A Field Guide



## Foreword

This sampling manual details standard procedures for the collection, storage and transportation of samples from private water supplies in accordance with current guidance aimed at maintaining the integrity of the water samples.

This second version of the manual, produced in May 2015, updates the routine sampling protocol to include the new requirement to take a chlorine reading before and after chlorine disinfection and the procedure for radioactivity sampling. It also includes a new section which highlights the importance of health and safety and good hygiene practices for sampling staff.

As before the basic step-by-step sampling process is supported by appendices some of which are designed for the inclusion of specific details on the bottle types supplied by the testing laboratory; sampling records; and manufacturers' instructions and validation records for on-site meters.

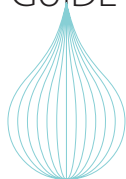
This field guide is published by the Drinking Water Inspectorate for Northern Ireland specifically for use by Environmental Health staff in Northern Ireland engaged in taking water quality samples from private water supplies. It is designed to be printed in an A5 format.

Drinking Water Inspectorate for Northern Ireland

(ISBN 978-1-84807-712-6)

# Private Water Supplies Sampling Manual

## A FIELD GUIDE



### Contents

1. General Sampling Procedures	1
2. Tap Sterilisation - Flaming	4
3. Tap Sterilisation - Chlorine Solution	5
4. Preparation of 1% (w/v) Chlorine Solution	7
5. On-site Determination of Free and Total Chlorine	8
6. On-site Determination of Chlorine Dioxide	9
7. Sample Storage and Transportation	10
8. Health and Safety	11
9. References	12
<b>Appendix A – (a) Sampling and (b) Tap Sterilisation Flow Charts</b>	<b>14</b>
<b>Appendix B – Sample Bottle Types and Descriptions</b>	<b>17</b>
<b>Appendix C – Sample Kit</b>	<b>19</b>
<b>Appendix D – Example of Sampling Records</b>	<b>21</b>
<b>Appendix E – Instructions for use of Chlorine Meter</b>	<b>22</b>
<b>Appendix F – Validation of Chlorine Meter</b>	<b>23</b>
<b>Appendix G – Instructions for use of Chlorine Dioxide Meter</b>	<b>24</b>
<b>Appendix H – Validation of Chlorine Dioxide Meter</b>	<b>25</b>
<b>Appendix I – Material Safety Data Sheets</b>	<b>26</b>

# 1. General Sampling Procedures

The order of sampling is presented in a flow chart in [Appendix A \(a\)](#).

## Sample Point

- 1.1 A sample point should be a cold water tap after any treatment and representative of the water at point of use within the premises.

[**Note:** All sample points should be predetermined at the time of registration or risk assessment of a private supply].

- 1.2 Remove any attachments to the tap (e.g. hoses), or plastic inserts where fitted, which could contaminate the sample. Mixer taps may not provide a representative sample of the cold water supply.
- 1.3 Any issues with the sample point which may affect the sterilisation of the tap or the sample results should be noted on the field sheet as shown in [Appendix D](#).

## Chemical Sampling

- 1.4 If a sample is to be taken for **first draw metal analysis** (lead, copper and nickel) this sample bottle must be filled before the flushing step below (i.e. first issuance). If required it will be noted on the field sheet and bottle label. With the first draw sample bottle in position, gently turn on tap, adjust the flow to a gentle and steady stream of water and fill the bottle.
- 1.5 The tap must then be flushed at a uniform flow rate for several minutes or longer to remove any debris, sediment and/or biofilm contained within the tap or pipe work before subsequent samples are taken. It may be helpful to measure the temperature of the water until a stable value is obtained.
- 1.6 Fill the **chemical sample bottles**, following closely any bottle fill instructions in [Appendix B](#), or on the labels of the bottles, and observing any expiry dates.

## **Radioactivity Sampling**

- 1.7 If no chemical samples are required, the tap must be flushed (at a uniform flow) for several minutes or longer. It may be helpful to measure the temperature of the water until a stable value is obtained.
- 1.8 Fill the **general radioactivity sample bottles** (tritium and total indicative dose), following closely any bottle fill instructions in **Appendix B**, or on the labels of the bottles, and observing any expiry dates.
- 1.9 For **radon samples**, reduce the flow rate from the tap to minimize the occurrence of air bubbles. Fill the sample bottle directly from the tap with as little disturbance of the water as possible until a positive meniscus appears above the brim of the bottle. Immediately cap the bottle tightly ensuring no air is trapped. If air bubbles are present when the bottle is inverted the water sample should be discarded and the procedure restarted.

## **Microbiological Sampling**

- 1.10 If no chemical or radioactivity samples are required, the tap must be flushed (at a uniform flow) for several minutes or longer. It may be helpful to measure the temperature of the water until a stable value is obtained.
- 1.11 Where there is disinfection by chlorination or chlorine dioxide or blending with mains water is practised then residual disinfectant readings should be measured (see **Section 5** or **6**). On-site readings should be recorded on the field sheet as shown in **Appendix D**.
- 1.12 The tap must then be sterilised by either flaming (see **Section 2**) or by the use of a chlorine solution (see **Section 3**).  
**[Note:** Where sterilisation using a chlorine solution is to be used, a free chlorine reading must be taken **before and after** the sterilisation process to ensure the sample being collected is representative and does not contain excess disinfectant solution.]
- 1.13 After sterilisation, **microbiological samples** should be taken in sterile bottles. Checks should be made that the expiry date is satisfactory and that the sterile seal has not been broken.
- 1.14 Care should be taken to avoid contamination of the sample: remove the top and hold with the open end downwards; the top should not be placed down on any surface.

- 1.15 Place the bottle into a steady stream of water, ensuring it does not touch the tap, and fill to the base of the neck. The bottle should **not** be rinsed out or be allowed to overflow. A small air gap must be left at the top of the bottle.
- 1.16 The bottle should be sealed immediately by replacing the cap again taking care not to touch the top or neck of the bottle. When sealed the sample should be mixed by inverting.
- 1.17 If during sampling it is suspected the sample has been contaminated or if the bottle or lid is damaged, the sample and the bottle should be discarded and the procedure restarted. Any replacement bottles used should be properly labeled (see **Step 1.21**).

## **Sampling Records**

- 1.18 All scheduled samples should have pre-printed bottle labels: the date and time of sampling should be added to the bottle label and initialed by the sampler.
- 1.19 Field sheets should be completed with sampler name, date and time of sampling, disinfection method used and record any on-site measurements taken, as shown in **Appendix D**.
- 1.20 If necessary record on field sheet any changes from routine sampling procedures – e.g. atypical sample appearance or odour, extreme weather conditions, change to sample point used, reason for sample not being lifted, residual disinfectant outside expected range or any other unusual situation encountered.
- 1.21 For any samples taken with no pre-printed bottle label, the information contained on the field sheet should be recorded on the bottle label: site code; site name; sample date and time; analysis required and initialed by the sampler.

## 2. Tap Sterilisation – Flaming

The procedure for tap sterilisation by flaming is presented in a flow chart in **Appendix A (b)**.

- 2.1 Sterilisation of sample taps by flaming should only be carried out where it is deemed to be safe to do so, the tap is metal and there is no plastic insert. Generally, in domestic situations, flaming is not recommended. Do **not** use gloves when handling a blowtorch.
- 2.2 Clean the outside of the tap, to remove any deposits of grease or dirt, with an iso-propyl alcohol wipe or paper towel soaked in 1% (w/v) chlorine solution.
- 2.3 Using a gas blowtorch, thoroughly flame around the mouth of the tap using a tight blue flame and work up the spout to the body of the tap until the water held in the spout boils. Care should be taken to ensure that hot water which may spurt out of the tap during flaming does not cause damage or injury.
- 2.4 After flaming, care should be taken when turning on the tap. Run the water to waste (at a uniform flow) for several minutes or longer. It may be helpful to measure the temperature of the water until a stable value is obtained. Adjust to a steady flow to avoid splashing and take the microbiological sample (refer to **Step 1.13**).

### 3. Tap Sterilisation – Chlorine Solution

The procedure for tap sterilisation by using a chlorine solution is presented in a flow chart in **Appendix A (b)**.

- 3.1 Disinfection of taps using chlorine solution (1% (w/v) available chlorine) can be carried out on taps where flaming is not appropriate. This method is suitable for both plastic and metal taps. A fresh chlorine solution should be prepared each sampling day it is required (see **Section 4**).

**WARNING:** The chlorine solution used in this procedure is highly corrosive, should be handled with care and stored appropriately when transporting. Both gloves and eye protection should be worn when handling this solution. If the solution comes into contact with skin or clothing, the area should be immediately washed with copious amounts of water. If the solution comes into contact with eyes, rinse immediately with plenty of water and seek medical advice.

- 3.2 If no residual chlorine readings have been recorded at **Step 1.11** then measure free chlorine reading **before** sterilisation of the tap with chlorine solution (see **Section 5** or **6**).
- 3.3 Clean the outside of the tap, to remove any deposits of grease or dirt, with an iso-propyl alcohol wipe or paper towel soaked in 1% (w/v) chlorine solution.
- 3.4 Using the wash bottle containing chlorine solution of 1% (w/v) available chlorine, spray the outside of the tap and inject into the inside of the tap spout, as far up as possible until the solution runs out of the tap. Care should be taken to ensure the chlorine solution does not spray out from tap and cause damage or injury.
- 3.5 Leave for **a minimum of 2 minutes** to allow the chlorine to disinfect the tap. Turn tap on gently, taking care not to touch the outside of the spout. Allow water to run to waste at a uniform flow rate for several minutes or longer to remove excess chlorine.
- 3.6 In certain circumstances, particularly if the sample tap is fitted with anti-splash devices that cannot be removed, it may be beneficial to repeat the disinfection and flushing process.



- 3.7 Measure free chlorine reading **after** flushing to ensure the level has returned to that determined prior to disinfection (refer to **Step 3.2**). If the chlorine levels are elevated then repeat the flushing and testing of free chlorine.
- 3.8 When tap has been adequately flushed to remove excess chlorine from the disinfection process, adjust to a steady flow to avoid splashing and take the microbiological sample (refer to **Step 1.13**).

## 4. Preparation of 1% (w/v) Chlorine Solution

- 4.1 A chlorine solution, of 1% (w/v) available chlorine, must be prepared fresh each sampling day it is required.
- 4.2 Put on safety glasses and gloves and fill a 250 ml wash bottle to approximately 1/3 full with distilled water; if not available, then tap water may be used.
- 4.3 Slowly add two Presept tablets (2.5 grams), one at a time, into the wash bottle. Swirl the wash bottle until both tablets have dissolved. This should be carried out in a well ventilated area. As the tablets dissolve, gases will be given off; you should avoid inhaling these gases.
- 4.4 Make up to the 250ml mark on the wash bottle with distilled or tap water. Place the lid on the bottle and gently invert the bottle over a sink to mix the solution. Any spillages should be washed away with copious amounts of water.
- 4.5 The bottle must be labelled 'Chlorine Solution - 1% (w/v) available chlorine' along with the date prepared and an appropriate hazard label.

**WARNING:** The chlorine solution used in this procedure is highly corrosive, should be handled with care and stored appropriately when transporting. Both gloves and eye protection should be worn when handling this solution. If the solution comes into contact with skin or clothing, the area should be immediately washed with copious amounts of water. If the solution comes into contact with eyes, rinse immediately with plenty of water and seek medical advice.

- 4.6 At the end of each sampling day dispose of unused solution by flushing down a drain or sink with copious amounts of water.
- 4.7 Consult relevant **Material Data Safety Sheet (Appendix I)** for precautions required in the handling of Presept tablets.

## 5. On-site Determination of Free and Total Chlorine

- 5.1 Where treatment of the water at a site is by chlorination or blending with mains water is practised, the amount of free and total chlorine in the water should be determined. On-site readings should be recorded on the field sheet as shown in **Appendix D**.

[**Note:** If chlorine residual readings differ significantly from the range expected at a site, this should be recorded in the 'Comments' section of the field sheet and the person responsible for the private water supply informed.]

- 5.2 Where sterilisation using a chlorine solution is to be used, a free chlorine reading must be taken **before and after** the sterilisation process to ensure the sample being collected is representative and does not contain excess disinfectant solution.
- 5.3 Commercial hand-held meters are available for the determination of free and total chlorine levels. These will give a measure of the chlorine in mg/l.
- 5.4 A copy of the manufacturer's instructions for the chlorine meter being used should be placed in **Appendix E** and these instructions should be followed in the measurement of free and total chlorine and for the maintenance and validation of the meter.
- 5.5 Chlorine meters are calibrated by the manufacturer but check standards are available as a means to validate the calibration.
- 5.6 The meter should be validated annually by arrangement with the Inspectorate and records of the validation kept in **Appendix F**.
- 5.7 Consult relevant **Material Data Safety Sheet Appendix I** for precautions required in handling any reagents for use with chlorine meters.

## 6. On-site Determination of Chlorine Dioxide

- 6.1 Where treatment of the water at a site is by the addition of chlorine dioxide, the amount of chlorine dioxide in the water should be determined. On-site readings should be recorded on the field sheet as shown in **Appendix D**.

[**Note:** If chlorine dioxide readings differ significantly from the range expected at a site, this should be recorded in the 'Comments' section of the field sheet and the person responsible for the private water supply informed.]

- 6.2 Where sterilisation using a chlorine solution is to be used, a free chlorine (**not** chlorine dioxide) reading must also be taken **before and after** the sterilisation process to ensure the sample being collected is representative and does not contain excess disinfectant solution. If the chlorine dioxide meter available is not capable of measuring chlorine then a chlorine meter should be used (see **Section 5**).
- 6.3 Commercial hand-held meters are available for the determination of chlorine dioxide levels. Some of these meters can also be used for the measurement of chlorite, where this option is available a chlorite reading should also be taken. The meter will give a measure of the chlorine dioxide/chlorite in mg/l.
- 6.4 The manufacturer's instructions for the chlorine dioxide meter being used should be placed in **Appendix G** and these instructions should be followed in the measurement of chlorine dioxide and for the maintenance and validation of the meter.
- 6.5 All chlorine dioxide meters are calibrated by the manufacturer but check standards are available as a means to validate the calibration.
- 6.6 The meter should be validated annually by arrangement with the Inspectorate and records of the validation kept in **Appendix H**.
- 6.7 Consult relevant **Material Data Safety Sheet Appendix I** for precautions required in handling any reagents for use with chlorine dioxide meters.

## 7. Sample Storage and Transportation

7.1 After the samples have been taken the bottles must be stored and transported correctly.

7.2 Microbiological samples should be stored upright in the dark, in a cool box containing appropriate ice packs to retain a temperature, during transportation and storage, of between 2 and 8°C.

**[Note:** Cool boxes used should be exclusively for drinking water samples. The inside of cool boxes should be cleaned down with a paper towel soaked in 1% (w/v) chlorine solution prior to use. Care should be taken as detailed in **Section 4.**]

7.3 Chemical/radioactivity samples should be replaced in any protective wrapping, provided with the bottles, and placed back into the sample crate.

7.4 The samples should be returned as soon as possible to the collection point (normally the Council Offices) in time for collection by the appointed contractor.

7.5 The samples should be stored in a secure area out of direct sunlight and away from any sources of heat or contamination. If there is to be any significant delay in collection, the samples should be stored in a suitable fridge and a note made within the 'Comments' section of the field sheet. For microbiological samples, analysis should commence within 24 hours of the sample being taken.

7.6 Insulated cool boxes, small refrigerators or refrigerated vehicles are suitable for storing and transporting samples to the laboratory. Storage and transport conditions should be clean and dry and regularly disinfected. Where practicable, the storage temperature should be monitored and recorded.

**[Note:** Samples which have not been stored correctly may not be suitable for analysis.]

## 8. Health & Safety

- 8.1 Staff involved in the sampling of private water supplies should have an appropriate risk assessment in place to ensure their safety while undertaking the duties associated with the sampling process. The risk assessment should cover all the hazards which may be encountered, including but not exclusively:
- Lone working;
  - Working in confined spaces;
  - Entry into potentially noisy environments;
  - Handling of chemicals and equipment required for sampling.
- 8.2 Many of the risks relating to water sampling are likely to already be incorporated as part of other activities carried out by the sampling staff. It would however be good practice to review the relevant risk assessments in light of the contents of this manual.
- 8.3 Any new or specific hazards identified on an initial visit to a private water supply site should be incorporated into the relevant health and safety risk assessment.
- 8.4 To safeguard the private water supply from possible contamination sampling staff should ensure appropriate good hygiene practices, similar to those applied to food premises, are followed. Further information is available in the 'Principles of Water Supply Hygiene' (see **Section 9**).

## 9. References

- 9.1 The Microbiology of Drinking Water (2010) – Part 2  
– Practices and procedures for sampling.  
[www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/316769/MoDW-2-232.pdf](http://www.gov.uk/government/uploads/system/uploads/attachment_data/file/316769/MoDW-2-232.pdf)
- 9.2 Private Water Supplies Technical Manual – Published by the Scottish Executive, June 2006 (ISBN 0-7559-5151-4).  
[www.privatewatersupplies.gov.uk/private\\_water/files/Full%20Doc.pdf](http://www.privatewatersupplies.gov.uk/private_water/files/Full%20Doc.pdf)
- 9.3 Methods for the Examination of Waters and Associated Materials – Chemical disinfecting Agents in waters and effluents (2008). [www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/316790/chlorine218\\_1985298.pdf](http://www.gov.uk/government/uploads/system/uploads/attachment_data/file/316790/chlorine218_1985298.pdf)
- 9.4 Royal Society of Public Health - Principles of Water Supply Hygiene (2010). [www.water.org.uk/publications/reports/principles-water-supply-hygiene](http://www.water.org.uk/publications/reports/principles-water-supply-hygiene)

## Appendices

Appendix A – (a) Sampling and (b) Tap Sterilisation Flow Charts

Appendix B – Sample Bottle Types and Descriptions

Appendix C – Sample Kit

Appendix D – Example of Sampling Records

Appendix E – Instructions for use of Chlorine Meter

Appendix F – Validation of Chlorine Meter

Appendix G – Instructions for use of Chlorine Dioxide Meter

Appendix H – Validation of Chlorine Dioxide Meter

Appendix I – Material Safety Data Sheets

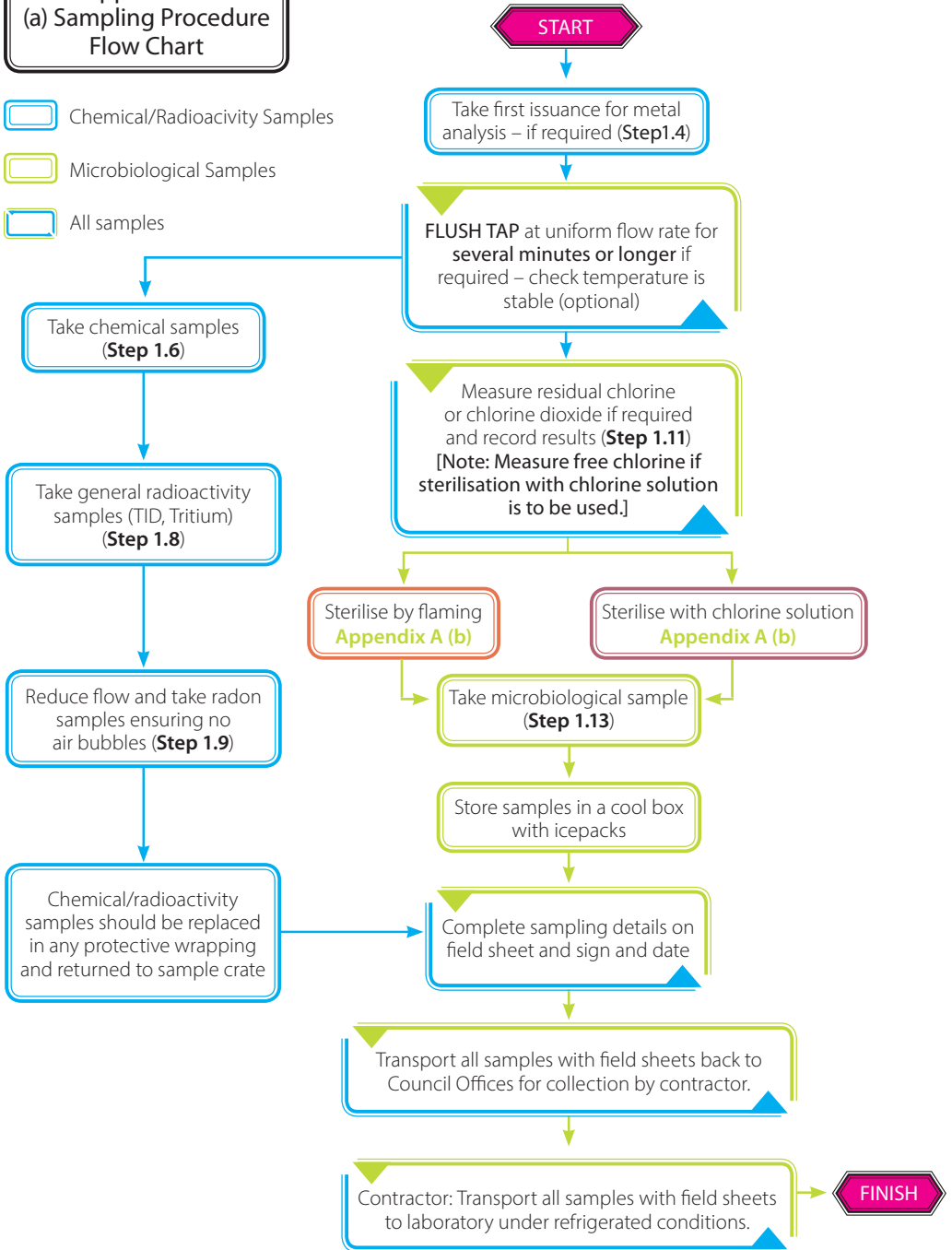


Appendix A – (a) Sampling and (b) Tap Sterilisation Flow Charts

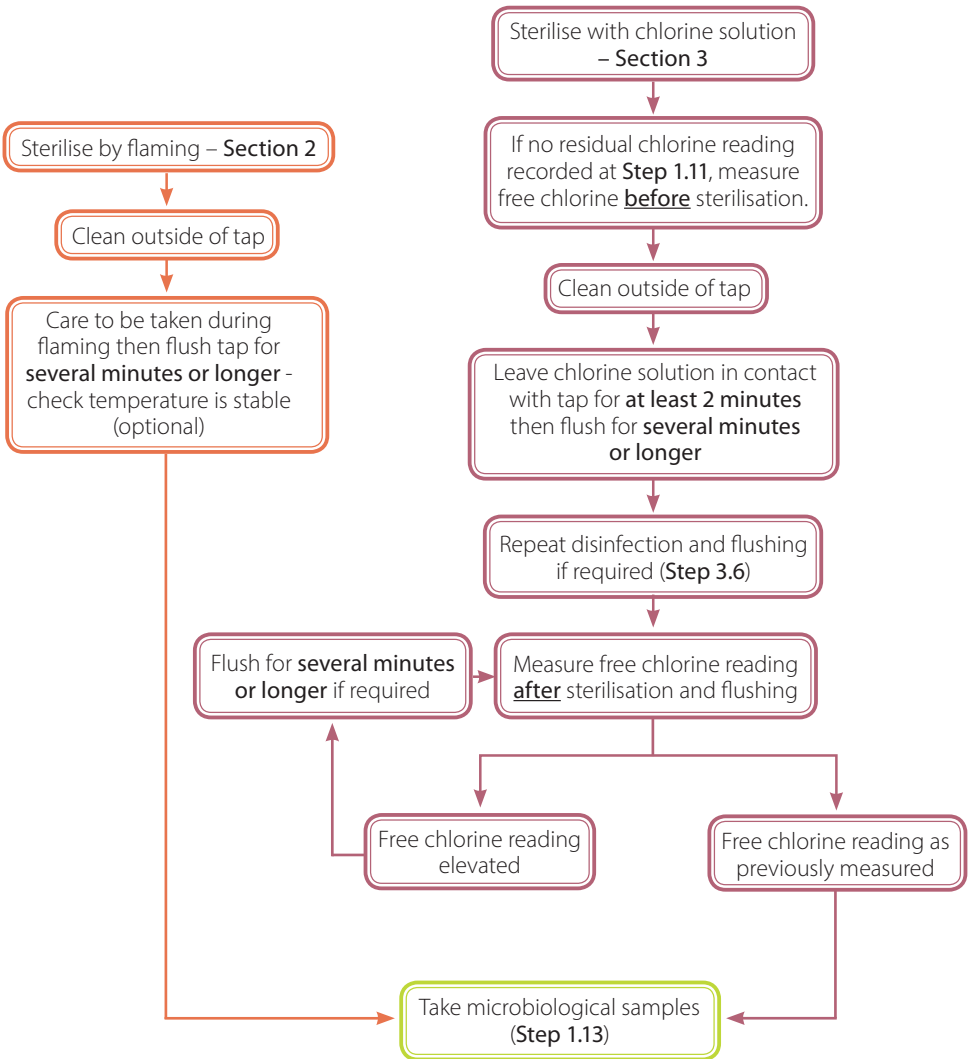


# Appendix A (a) Sampling Procedure Flow Chart

- Chemical/Radioactivity Samples
- Microbiological Samples
- All samples



Appendix A  
(b) Tap Sterilisation  
Procedure Flow Chart



## Appendix B – Sample Bottle Types and Descriptions



## Appendix B – Sample Bottle Types and Descriptions

- Bottle types may vary depending on the laboratory used for the sample analysis. The current list of bottle types, descriptions, fill and storage instructions will be available from the laboratory and should be inserted in this section.
- Any specific bottle fill or storage and transportation instructions provided by the testing laboratory should be closely followed.

[Note: Samples which have not been taken, stored or transported correctly may not be suitable for analysis.]

- Sample bottles provided for scheduled samples should have pre-printed labels with details of site code, site name, sampling date and analysis required. Any sample bottles without pre-printed labels will require these details to be recorded on the label.
- Sample bottles for each sampling site should be well organized and stored in a clean, dry and secure location and not exposed to extremes of temperature to prevent damage or contamination prior to use.
- Any sample bottles which are dirty, damaged, or outside of their expiry date should not be used. Any unused bottles should be returned to the laboratory or contractor.

[Note: Glass containers should not be used on food manufacturing or similar premises where there is a potential hazard if broken. In these instances the site should provide an appropriate sample point outside of the production area that is representative of the water supply at point of use.]

Appendix C – Sample Kit



Private Water Supplies Sampling Manual

## APPENDIX C – SAMPLE KIT

- Warrant card for sampling
- Protective gloves
- Safety glasses
- Alcohol wipes (70% isopropyl alcohol)
- 1% (w/v) chlorine solution in labelled 250ml wash bottle for tap sterilisation (Section 3)
- Gas blowtorch and lighter
- Chlorine meter with reagents/sensors (if required)
- Chlorine dioxide meter with reagents/sensors (if required)
- Timer or watch with second hand
- Field sheets
- Waterproof pen
- Sample bottles and crate
- Cool box and ice packs
- Paper towels
- Thermometer (optional)

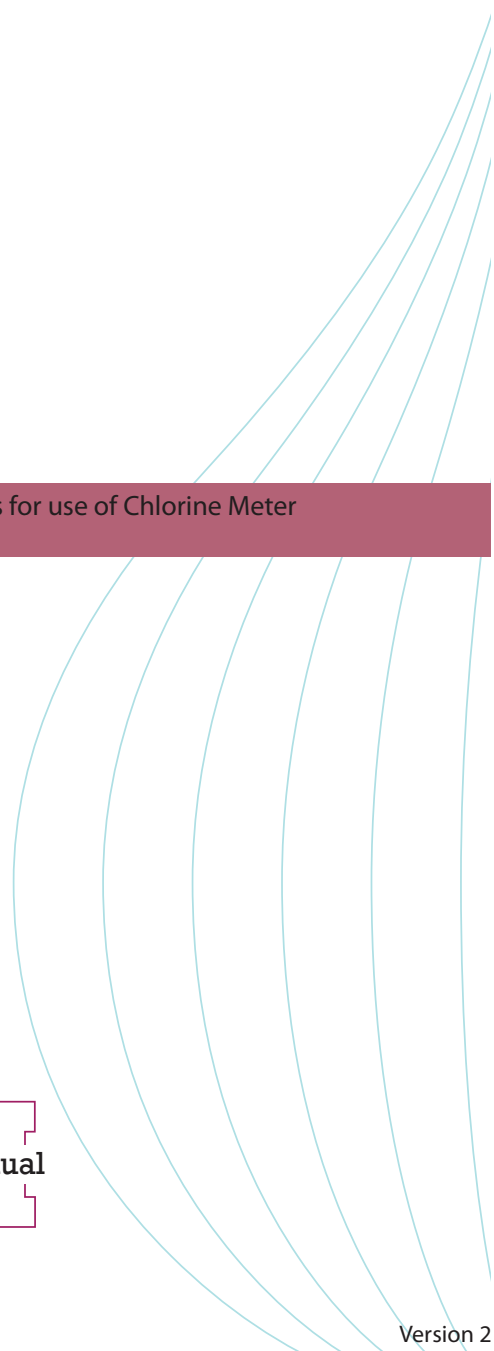
[**Note:** On-site meters should be stored in their own case/bag away from chlorine tablets/solution.]

Appendix D – Example of Sampling Records

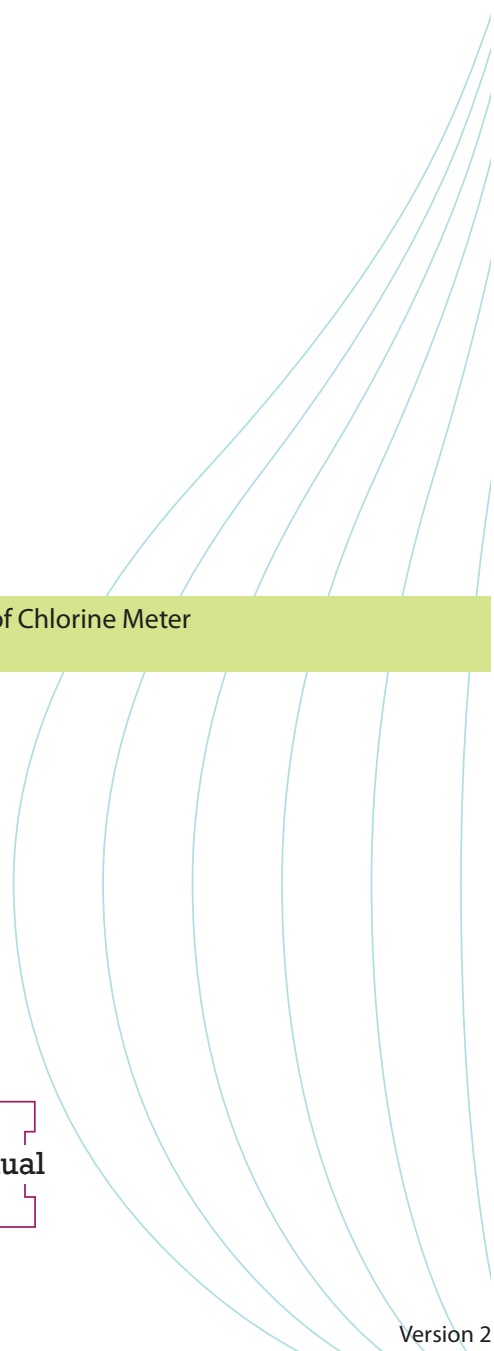


Private Water Supplies Sampling Manual





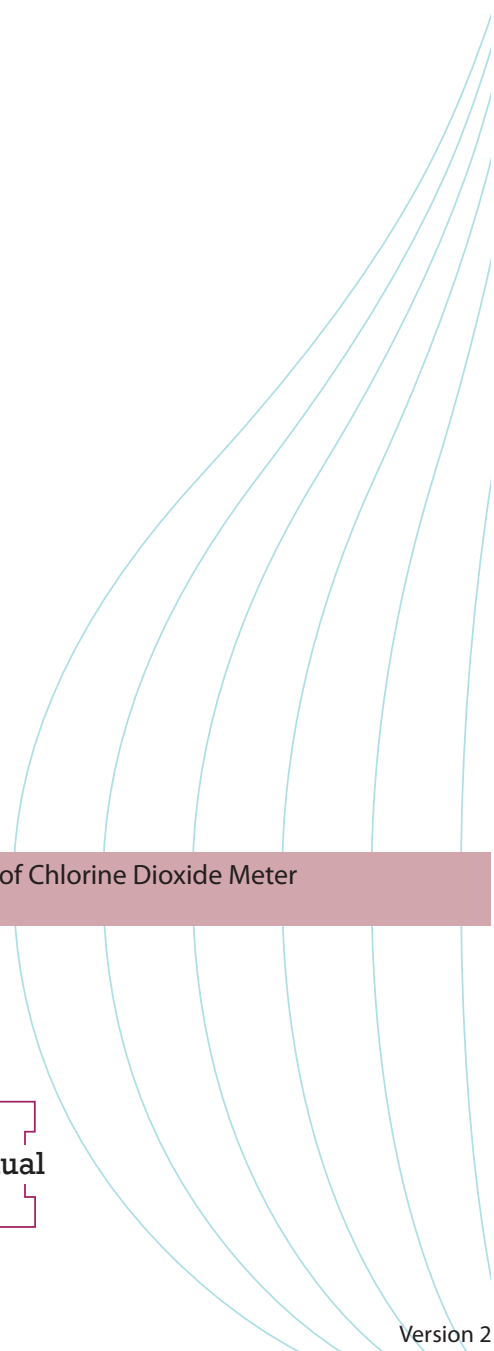
Appendix E – Instructions for use of Chlorine Meter



Appendix F – Validation of Chlorine Meter

Appendix G - Instructions for use of Chlorine Dioxide Meter





Appendix H – Validation of Chlorine Dioxide Meter



Appendix I – Material Safety Data Sheets



**Private Water Supplies Sampling Manual**

ISBN: 978-1-84807-712-6



An Agency within the Department of  
**Agriculture, Environment  
and Rural Affairs**  
[www.daera-ni.gov.uk](http://www.daera-ni.gov.uk)



**INVESTORS  
IN PEOPLE**

Version 2

DMS 16.17.195a