Information note on Monitoring of Private Water Supplies

Background

Monitoring provides crucial information necessary to determine the status of a supply at a moment in time – the time the sample was taken.

Monitoring is used to identify supplies that do not meet water quality standards and for the evaluation or verification of control measures introduced to supply systems to ensure compliance.

The requirements for the monitoring of The Private Water Supplies Regulations 2016 (as amended) are found in Schedule 2 to the amended Regulations and are explained further below.

Local authorities must monitor all private water supplies according to the supply type (Regulation 8, 9 or 10 supply). Sampling and transportation of samples must be undertaken in accordance with ISO 17024, and samplers must be certified by companies accredited to deliver this scheme under ISO 17024 and certify individuals. Compliance with this standard is required by 11 July 2020. A list of organisations participating in the scheme will be made available at www.dwi.gov.uk

All monitoring for microbiological parameters in the distribution network and at a consumer's tap must be taken in accordance with European standard EN IS0 19458 ("Water Quality – Sampling for microbiological analysis") using sample procedure A in the distribution network and sampling procedure B at a consumer's tap. Samples for chemical parameters in the distribution network must be taken in accordance with international standard ISO 5667-5 ("Water quality. Sampling. Guidance on treatment of drinking water from treatment works and piped distribution systems"). The Inspectorate has reviewed these standards and confirmed that in all cases the requirements are captured in the DWI sampling procedures manual published at www.dwi.gov.uk. Therefore it is not necessary for Local authorities to purchase these standards if they are following those procedures.

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Types of Supply

Regulation 8 supplies

For those supplies categorised as Regulation 8 supplies, both parameters chosen and frequency of monitoring must be carried out on the basis of the risk assessment – see Information Note on Regulation 8.

Regulation 9 supplies

The local authority must carry out Group A monitoring and Group B monitoring (in accordance with Schedule 2) and carry out any additional monitoring that the risk assessment shows to be necessary. For further details, see Information Note on Regulation 9.

Regulation 9 requires local authorities to carry out Group A and Group B monitoring at specified frequencies according to the volume of water being consumed for domestic purposes. Where this volume is unknown, the local authority should estimate the volume by multiplying the number of people supplied by an assumed water consumption of 0.2m^3/day (200 litres/day).

Water fountains

When a private water supply (PWS) supplies a single drinking water fountain and no other premises, the local authority is required to monitor the supply at the fountain in accordance with Regulation 9. When the PWS supplies a drinking water fountain and other premises, the local authority should select a representative premises for sampling from all those supplied, including the fountain. However, as the fountain is likely to represent the highest risk, it should be sampled at least once per year and, when it is sampled, the local authority should take a sample at the same time for microbiological parameters only (coliforms, *E.coli* and colony counts) from one of the other premises supplied by the supply.

Group A and B monitoring of Regulation 9 supplies:

The purpose of Group A monitoring is to establish levels of specified microbiological, chemical and organoleptic parameters for determining compliance with drinking water quality standards and the effectiveness of existing control measures and those introduced following risk assessment are working satisfactorily.

The Group A monitoring parameters are shown in Table 2 of this document. Some parameters are mandatory, whereas others need only to be monitored if the circumstances specified in the table exist.

If a Group A parameter is required to be monitored because the circumstances in the Schedule A table apply, and that parameter is also listed in the Group B table, there

is no need to monitor the same parameter as part of the Group B monitoring requirements.

Part 2A (5) (1) of Schedule 2 of the Regulations allows a local authority to **reduce** the frequency of Group A and B monitoring for all parameters except *Escherichia coli*, to 50% of the original frequency provided that all the following conditions are met. The inspectorate notes that it not always straightforward to measure 50% of the PCV for certain parameters[1]. Where the local authority reduces the frequency of sampling in these cases, it should record the justification for doing so

(a) the results from samples taken in respect of that parameter collected at regular intervals over a period of at least three years[2] are all at less than 60% of the parametric value;

(b) the results of a risk assessment described in regulation 6(l) are considered, and that risk assessment indicates that no factor can be reasonably anticipated to be likely to cause deterioration of the quality of the water;

(c) any available relevant data is into account; and

(d) at least one sample is taken per year.

A local authority may **cease** to monitor for a Group A or Group B parameter other than *E. coli* provided that—

(a) the results from samples taken in respect of that parameter collected at regular intervals over a period of at least three years are all at less than 30% of the parametric value;

(b) the results of a risk assessment described in regulation 6(1) are considered, and that risk assessment indicates that no factor can be reasonably anticipated to be likely to cause deterioration of the quality of the water; and

(c) data collected in the course of discharging its monitoring obligations under this Part are taken into account.

A local authority may increase the frequency of monitoring for a particular parameter if it considers it appropriate from the results of the risk assessment, e.g. because the

[1] These parameters include: Enterococci, Taste, Odour, Clostridium perfringens (including spores), Coliform bacteria, Colony counts, Hydrogen ion (pH),Total organic carbon (TOC)

[2] Any 3 years provided no other results during or subsequent that indicate a risk

risk assessment shows that the concentration or value of the parameter is likely to vary considerably. A local authority may also include any other parameter or substance if it considers it appropriate from the results of the risk assessment. For example, styrene may be included in the monitoring suite if the risk assessment indicates that it may be present.

Note that results of monitoring taken under the Water Framework Directive for raw water should be gathered from the local water company or Environment Agency and used to inform the risk assessment required under Regulation 6.

Note that this does not apply to radioactive parameters. Also note that some parameters do not have parametric values and therefore cannot be reduced. These are:

If any subsequent sample results are >60% of the parametric value (PCV) then sampling should be returned to the full frequency for a further three year period either until there is three more year's of data <60% or <30%, or something has changed to reduce the risk e.g. source protection, etc. In addition, if the risk changes even in the absence of sample results then sampling should be resumed at full frequency.

For parameters on a reduced sampling frequency, a minimum of one sample per year must be taken for those parameters. For parameters that have ceased monitoring altogether, there is no minimum specified frequency i.e. sampling can cease totally.

Regulation 10 supplies

All Regulation 10 supplies with the exception of Regulation 10(3) supplies (so called Single Domestic Dwellings) require monitoring for five specified parameters once every five years as a minimum: conductivity; Enterococci; *Escherichia coli* (*E.coli*); hydrogen ion concentration; and turbidity. They are not subject to Group A and B monitoring and hence sampling cannot cease or be reduced.

Additional parameters may be monitored where a risk assessment has determined a risk of not complying with any other prescribed water quality standard or where there is a potential danger to human health. The frequency of monitoring may be increased where the supply risk assessment justifies it.

Single domestic dwellings will not ordinarily require monitoring unless requested by the owner or occupier. Where the local authority believe there to be a risk to health then they should investigate as per Regulation 16, and it is recommended that sampling is undertaken as part of this.

Monitoring of supplies used only for toilet flushing

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A private water supply to a premises used only for toilet flushing falls under the definition of domestic purposes under the Water Industry Act 1991 (section 218), on the basis that it is a sanitary purpose

A risk assessment for the supply should be carried out to determine any health risks associated with that use, if there are any aesthetic issues which may affect its acceptability, or if there is a risk of contaminating any wholesome supplies. The Inspectorate has developed a risk assessment tool specifically for toilet flushing, which is available on the DWI website. If the risk assessment confirms that there are no significant risks to health, routine monitoring is not required.

Parameters to be Monitored

Group A and Group B parameters are listed in the Appendix to this information note.

Inclusion of additional parameters

For each type of supply the Regulations permit the monitoring of any parameter, whether listed in the Regulations or not where a local authority considers it appropriate from the results of the risk assessment.

Where *Cryptosporidium* is deemed a risk as identified by the risk assessment, the presence or absence of oocysts on any particular sampling occasion is unlikely to be informative. Therefore the only time that testing is relevant is an outbreak or when confirmed cases of cryptosporidiosis are being investigated.

Unacceptable taste and odours often arise because the drinking water source itself may have become contaminated following historical industrial contamination, or there has been a fuel, heating oil or solvent spill affecting the supply system.

Fuels and solvents are complex mixtures of chemicals with extremely low taste and odour thresholds meaning that they are detectable in the water at concentrations well below those of concern for health, hence it is not appropriate to set a health-based standard. Because of this, if a fuel taste or odour is detected it is not necessary to undertake extensive testing and analysis for exotic organic compounds – the water will be unwholesome by virtue of the taste and odour present in it.

Exclusion of certain parameters

There are certain parameters which are controlled through the use of approved products under Regulation 5, and for which monitoring is therefore not informative. These are:

- Acrylamide
- Epichlorohydrin

- Vinyl chloride

Where products containing these parameters are not part of the supply system, then there is no need to monitor for these parameters. Unapproved products identified in the supply system during risk assessment may require monitoring for parameters otherwise controlled through Regulation 5 and the product approval process – see Regulation 5 Information Note.

Indicator parameters

Detection of indicator parameters above the specification or value require an investigation to determine the cause. The appropriate action is determined by the cause. For some parameters which are found to be naturally occurring, Public Health England can advise whether it is safe to use at the level found. If the cause is contamination of the supply, the source of the contamination should be determined and mitigated. Indicator parameters are listed in Table 4 of the appendix and Schedule 1, Part 2, Table C to the Regulations.

Repeat testing

Where a sample exceeds a standard for a particular parameter(s), the local authority must carry out an investigation under Regulation 16 of The Private Water Supplies (England) Regulations 2016 (as amended). Additional repeat testing may be required to help determine the cause and extent of the failure, as part of the investigation (i.e. a risk-based site inspection). Local authorities should not rely on repeat sampling alone to determine whether a supply is wholesome and/or a potential danger to health or not. Local authorities are not permitted to charge for any sample taken and analysed solely to confirm or clarify the results of the analysis of a previous sample.

Once the cause has been established the local authority must serve a Notice in accordance with Regulation 16 or 18, as required to mitigate the risks identified by the investigation.

Monitoring for Radioactive Parameters

When a parametric value for a radioactive substance is exceeded it must be investigated as follows:

a) Review the results of other private supplies from the supplying aquifer (including any information from the incumbent water undertaker if they abstract from the same aquifer) as to whether this is unusual for the aquifer.

b) If the results for the sample provided are shown to be similar to the aquifer and providing that previous investigations into indicative dose value have been found not to exceed 0.1mSv/year, then no further investigation will be required unless there is an upward trend in the value of the failing parameter.

c) If the indicative dose exceeds 0.1 mSv/year an investigation into the cause should be undertaken. If the supply has not exceeded the PCV before, then an investigation into cause and indicative dose levels will be required. Resamples should be taken from the original private water supply as well as from other private supplies from the same aquifer. The risk assessment should be updated with any changes within the local area, for example: if this is a new supply, if there is a local historical environmental cause, etc. If the resamples confirm the levels of the initial result then indicative dose assessment will be required.

d) Arrangements should be made with a suitably qualified laboratory to carry out analysis and calculation of indicative dose. If the indicative dose exceeds 0.1mSv/year then Public Health England (PHE) should be contacted for additional support. A useful document is *UK Recovery Handbooks for Radiation Incidents 2015 Drinking Water Supplies Handbook* (https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/433689/PHE-CRCE-018_Drinking_Water_Supplies_Handbook_2015.pdf). See also the Information Note for Radon.

Note that the local authority can exclude the indicative dose parameter from monitoring, or reduce the frequency of that monitoring of that parameter, provided that the parameter is naturally occurring and stable.

Monitoring Programmes

Regulation 7(2) permits the local authority to use measurements recorded by a continuous monitoring process as part of the requirement for monitoring. If the local authority wishes to do this, it is recommended that they approach the Inspectorate for guidance. As a general guide, if continuous monitoring is to be used, this should be supported by periodic submission of data to the local authority, regular reviews of data by the local authority, instrumentation being fit for purpose and regular calibration of instruments

Regulation 7(3) allows local authorities to add inspections of equipment and/or inspections of the whole catchment to tap system to the monitoring programme for a supply. Please note that this is in addition to regulatory requirements under Regulation 7(1) and 7(2).

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Appendix

Table 1: likely causes of a parameter arising in a private water supply

Parameter	Circumstances in which likely to be present
Aluminium	Where aluminium compounds are used as coagulants in treatment. Occurs naturally in some surface and ground-waters.
Antimony	It can be derived from domestic plumbing fittings and is used as a compound in a wide variety of alloys, especially with lead in batteries plates and the manufacture of flame-proofing compounds, paint, semiconductor devices and ceramic products. It is also reportedly replacing lead in tin solder.
Arsenic	Arsenic can be present naturally in some ground waters, but it can also be introduced into water from industrial effluent, drainage from old gold mines, or the use of some types of sheep dips.
Benzene	Contamination of raw waters from petrol/diesel etc. Permeation of plastic distribution and domestic plumbing pipes.
Benzo(a)pyrene	Leaching from internal coal tar lining of some distribution pipes.
Boron	Contamination of surface waters with detergents mainly from sewage effluents.
Bromate	Present in sodium hypochlorite used to disinfect water, including electrolytically generated hypochlorite. Formed if ozone used and water contains bromide. Can occasionally be found as contamination from industrial activities.
Cadmium	Leaching from galvanised pipes and some domestic plumbing fittings (e.g. plated taps).It can also be released to the environment in wastewater from a variety of industrial processes.
Chloride	Indicator of saline intrusion, so relevant in coastal areas. Also relevant if water softener installed. May indicate sewage pollution of surface water.
Chromium	Leaching from some domestic plumbing fittings (e.g. chrome-plated plastic taps). Can also occur as contamination from industrial activities.
Clostridium perfringens (including spores)	Contamination of raw waters from sewage, sewage effluents and animal waste.
Copper	Leaching from pipes and plumbing fittings. Low pH and low or high alkalinity increases copper leaching.
Cyanide	Possible contamination of raw waters from industry (e.g. metal finishing, wood preservatives).

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Parameter	Circumstances in which likely to be present
1,2 dichloroethane	Volatile solvent used in manufacture of vinyl chloride and other processes including dry cleaning. Can contaminate and persist in groundwater.
Enterococci	Contamination of raw waters from sewage, sewage effluents and animal waste.
Fluoride	May be present in some groundwaters.
Iron	Use of iron compounds as coagulants. Occurs naturally in some surface water and groundwaters. Corrosion of iron distribution pipes.
Lead	Leaching from lead pipes in distribution and domestic plumbing or from lead soldered copper pipes. Low pH and low or high alkalinity increases lead leaching. Present naturally in some groundwaters.
Manganese	Present in some greensand filtration materials. Occurs in some surface water and groundwaters.
Mercury	Contamination from mercury thermometers, broken UV lamps and float valves.
Nickel	Leaching from some domestic plumbing fittings (e.g. plated taps).
Nitrate	Contamination of surface and groundwaters from fertilisers, animal wastes or sewage effluents.
Nitrite	Contamination of raw waters. Use of chloramination as a residual disinfectant or use of chlorine as disinfectant when ammonium ions present.
Pesticides	Contamination of raw waters from use in agriculture, forestry, roads, railways etc.
Pesticides – total	This means the sum of the concentrations of the individual pesticides detected and quantified in the monitoring procedure.
Polycyclic aromatic hydrocarbons (PAH)	Leaching from internal coal tar lining of some distribution pipes. Sum of four individual PAH compounds.
Selenium	May occur naturally in some raw waters.
Sodium	Present in raw waters but usually below standard. Can be introduced by water softeners and treatment chemicals (e.g. sodium hypochlorite for disinfection) or through saline intrusion of groundwaters in coastal areas.
Sulphate	Occurs in some raw waters, but usually below the standard.
Tetrachloroethene and Trichloroethene	Contamination of some groundwaters from use of these volatile solvents in dry cleaning and metal finishing. Standard is sum of two compounds.
Tetrachloromethane	Contamination of some groundwaters from use of this volatile solvent in metal finishing and other industries.

Parameter	Circumstances in which likely to be present
Trihalomethanes – total	Formed by reaction of organic matter in raw water with chlorine compounds used as disinfectants. Standard is sum of four compounds.
Acrylamide[3]	Use of polyacrylamides as coagulant aids. Use of polyacrylamide grouts for borehole/well linings.
Epichlorohydrin[2]	Use of polyamines as coagulant aids. Use of epoxy resins (e.g. to line pipes and tanks). Use to make some ion exchange resins.
Vinyl chloride[2]	Used for making PVC. Leaching from unplasticised PVC pipes used in distribution or domestic plumbing.
Radioactive substances	
Radon	May be present in groundwaters where the underlying geology contains elevated levels of radon.
Total indicative dose (for radioactivity)	Contamination of raw waters from natural or manmade radioactive compounds.
Tritium	Cosmic production in upper atmosphere. Byproduct of nuclear explosions and nuclear industry.

[3] These are normally controlled by use of approved products and do not usually require monitoring

Table 2: Monitoring for Group A parameters (Regulation 9 supplies)

Circumstances	Parameters
When used as flocculant or where the water originates from, or is influenced by, surface waters	Aluminium Iron
Where the water originates from, or is influenced by, surface waters	Manganese
In all supplies	Coliform bacteria Colony counts Colour Conductivity *Escherichia coli* (*E.coli*) Hydrogen ion concentration (pH) Odour Taste Turbidity
When chloramination is practised[4]	Ammonium Nitrite Nitrate
Only in the case of water in bottles or containers[5]	*Pseudomonas aeruginosa*

[4] The Regulations do not require residual chlorine disinfectant to be monitored but it is strongly recommended that local authorities monitor this at the Group A monitoring frequency. The same applies for the monitoring of any other approved chemical disinfection process where chlorite and chlorate must be controlled.

[5] Where the water is offered for free. If it is for sale, then it will be covered by the Natural Mineral Water, Spring Water and Bottled Drinking Water (England) Regulations 2018/2007.

Table 3: Group B parameters (Regulation 9 supplies)

Acrylamide	Selenium
Antimony	Tetrachloroethene and Trichloroethene
Arsenic	Trihalomethanes: Total
Benzene	Vinyl chloride
Benzo(a)pyrene	Aluminium
Boron	Colour
Bromate	Iron
Cadmium	Manganese
Chromium	Odour
Copper	Sodium
Cyanide	Taste
1, 2 dichloroethane	Tetrachloromethane
Enterococci	Turbidity
Epichlorohydrin	Ammonium
Fluoride	Chloride
Lead	*Clostridium perfringens* (including spores)
Mercury	Coliform bacteria
Nickel	Colony counts
Nitrate	Conductivity
Nitrite	Hydrogen ion
Pesticides	Sulphate
Aldrin	Total organic carbon (TOC)
Dieldrin	Turbidity
Heptachlor	
Heptachlor epoxide	
Other pesticides	
Pesticides total	
Polycyclic aromatic hydrocarbons	

Table 4: Indicator parameters (including radioactive substances)

Ammonium	Chloride
Clostridium perfringens (including spores)	Coliform bacteria
Colony counts	Conductivity
Hydrogen ion (pH)	Sulphate
Total organic carbon (TOC)	Turbidity
Indicative dose	Gross alpha
Gross beta	Radon
Tritium	