Information note on Regulation 7 (Wales)

Background

Monitoring provides crucial information necessary to determine the quality 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 2017 are found in Schedule 2 of the Regulations and are explained further below.
Local authorities must monitor all private water supplies according to the supply type (Regulation 8, 9, 10 or 11 supply).

Local authorities must monitor all private water supplies according to the supply type (Regulation 8, 9 or 10 supply). Samplers must be certified by companies accredited to deliver this scheme under ISO 17024.

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.

Regulation 8 supplies

For those supplies categorised as Regulation 8 supplies, the 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 monitoring and Group B monitoring at specified frequencies according to the volume of drinking water being consumed for domestic purposes. It is therefore necessary to know the daily average volume of water used for human consumption only for each supply. Where this 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 per day) – see Table 4: Estimating volumes using population.

Water fountains

When a private water supply 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 private water supply 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 represents 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.

a) Group A 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 specified Group A monitoring parameters are shown in Table 1. 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.

Table 1: Monitoring for Group A parameters

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**	Ammonium Nitrite Nitrate
Only in the case of water in bottles or containers***	*Pseudomonas aeruginosa*

** 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, for example. Note that there is no residual disinfectant where water is disinfected using irradiation with ultraviolet (UV) light. Hence the importance of ensuring a suitable unit is used.

*** 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 2007.

Table 2: Sampling Frequency for Group A Parameters

Volume supplied (m^3/day)	**Group A monitoring frequency (Number of samples per year)**	**Volume supplied (m^3/day)**	**Group A monitoring frequency (Number of samples per year)**
≤ 10	1	> 5,000 ≤ 6,000	22
> 10 ≤ 100	2	> 6,000 ≤ 7,000	25
> 100 ≤ 1,000	4	> 7,000 ≤ 8,000	28
> 1,000 ≤ 2,000	10	> 8,000 ≤ 9,000	31
> 2,000 ≤ 3,000	13	> 9,000 ≤ 10,000	34
> 3,000 ≤ 4,000	16	11,000*	37 [4 + (3 x 11)]
> 4,000 ≤ 5,000	19	12,000*	40 [4 + (3 x 12)]
		* For volumes greater than 10,000 the formula 4 + (3 x n) is used to calculate Group A monitoring	4 + (3 x n) Where n = the number of 1,000m^3/day rounded up to the nearest multiple of 1,000m^3/day.

frequency:	

Part 4 (5) 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*, provided that:

(a) the results from samples taken in respect of that parameter collected at regular intervals over the preceding three years area all at less than 60% of the PCV;

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

For any parameter collected at regular intervals over the preceding three years, if results are less than 30% of the PCV then the local authority may cease to monitor any parameter other than *E.coli* provided that—

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

A local authority may set a higher frequency for any parameter if it considers it appropriate, taking into account the findings of any risk assessment.

Each local authority is required to carry out a risk assessment of each private water supply. 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, for example, because the risk assessment shows that the concentration or value of the parameter is likely to vary considerably. A local authority may include any other parameter or any other substance if it considers it appropriate from the results of the risk assessment. For example, arsenic may be included in the monitoring suite if the natural geology indicates that it may be present.

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

Group B monitoring frequency (as shown in part 2 (4) of Schedule 2)

Table 3: Group B monitoring frequencies

Volume supplied (m^3/day)	Group B monitoring frequency (Number of samples per year)	
≤ 10	1	
> 10 - ≤ 3,300	2	
> 3,300 - ≤ 6,600	3	
> 6,600 - ≤ 10,000	4	
20,000*	5 [3 + (1 x 2)]	* For volumes greater than 10,000 the formula 3 + (1 x n) is used to calculate Group B monitoring frequency: 3 + (1 x n) Where n = the number of 10,000m^3/day rounded up to the nearest multiple of 10,000m^3/day.
30,000*	6 [3 + (1 x 3)]	
> 10,000 - ≤ 100,000*	3 + 1 for each 10,000 m^3/day of the totalvolume (rounding up to the nearest multiple of 10,000 m^3/day)	
125,000**	15 [10 + (1 x 5)]	** For volumes greater than 100,000 the formula 10 + (1 x n) is used to calculate Group B monitoring frequency: 10 + (1 x n) Where n = the number of 25,000m^3/day rounded up to the nearest multiple of 25,000m^3/day.
> 100,000**	10 + 1 for each 25,000 m^3/day of the total volume (rounding up to the nearest multiple of 25,000 m^3/day)	

Regulation 10 supplies

Regulation 10 supplies do not require a local authority to carry out regular monitoring and/or risk assessment at frequencies defined in the regulations, but a local authority may monitor in accordance with regulation 11(1) if it wishes to do so. However, sampling and analysis, and/or risk assessment must be carried out by the local authority (or a body deemed competent by the local authority) when it is requested to

do so by the dwelling owner or occupier. See Information Note 10 for more information on Regulation 10 supplies.

Regulation 11 supplies

Local authorities are required to monitor regulation 11 supplies at least every five years and more frequently if the risk assessment shows this to be necessary, for the following parameters:

- Conductivity;
- Enterococci;
- Escherichia coli (E. coli);
- Hydrogen ion (pH value);and
- Turbidity
- Any parameter in part 1 of Schedule 1 identified in the risk assessment as being at risk of not complying with the concentrations or values in those Parts of that Schedule
- Anything else identified in the risk assessment as a potential danger to human health.

Monitoring of supplies used only for toilet flushing

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.

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. For example, it could include silver, if silver or silver compounds are incorporated in any filtration system used to treat private water supplies (the World Health Organisation (WHO) guidelines suggest that silver levels up to 0.1mg/l can be tolerated without risk to human health) or zinc if galvanised pipework has been used in distribution or domestic plumbing

(the WHO guidelines suggest that zinc levels over 3.0mg/l may be regarded as unacceptable by consumers). Likewise, chloride may indicate some types of groundwater contamination (saline intrusion).

Where *Cryptosporidium* is deemed a risk as identified by the risk assessment, the presence or absence of oocysts on any particular sampling occasion will not 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.

Hydrocarbon-related ground contamination is particularly problematic where plastic pipes have been laid, since these chemicals can migrate through the plastic water pipes and contaminate the supply. Where this has occurred, the solution is normally to replace the contaminated pipes with barrier piping.

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.

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 Wales can advise whether it is safe to use at the level found. If the cause is contamination the source of the contamination should be determined and mitigated.

Repeat testing

Where a sample exceeds a standard for a particular parameter(s), the local authority must carry out an investigation under Regulation 18 of the Private Water Supplies Regulations 2017. Additional repeat testing will 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 18 or 20, as required to mitigate the risks identified by the investigation.

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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 then providing previous investigations into indicative dose value has 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 Wales (PHW) 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.

Estimating volumes using Population

Where information on volumes of water used is not available, an estimate can be made where the population supplied is known. Table 4 gives examples, based on an assumption of 200 litres consumption per person per day

Table 4: Estimating volumes using population

Volume supplied (m^3/day)	Number of people supplied	Group A monitoring frequency (Number of samples per year)
≤ 10	≤ 50	1
> 10 ≤ 100	> 50 ≤ 500	2
> 100 ≤ 1,000	> 500 ≤ 5,000	4
> 1,000 ≤ 2,000	> 5,000 ≤ 10,000	10
> 2,000 ≤ 3,000	> 10,000 ≤ 15,000	13
> 3,000 ≤ 4,000	> 15,000 ≤ 20,000	16
> 4,000 ≤ 5,000	> 20,000 ≤ 25,000	19
> 5,000 ≤ 6,000	> 25,000 ≤ 30,000	22
> 6,000 ≤ 7,000	> 30,000 ≤ 35,000	25
> 7,000 ≤ 8,000	> 35,000 ≤ 40,000	28
> 8,000 ≤ 9,000	> 40,000 ≤ 45,000	31
> 9,000 ≤ 10,000	> 45,000 ≤ 50,000	34
> 10,000	> 50,000	4 + 3 for each 1,000m^3/day of the total volume (rounding up to the nearest multiple of 1,000m^3/day)*

Any water used for rearing livestock or irrigation can be excluded from the total volume of water used.

Worked example:

For volumes greater than 10,000m^3/day the formula 4 + (3 x n) is used to calculate Group A monitoring frequency:

For example:

A volume of 10,162m^3/day is rounded up to 11,000m^3/day and then using the formula 4 + (3 x n) where n = the number of 1,000m^3/day rounded up to the nearest multiple of 1,000m^3/day.

$$4 + \left(3\,x\,\frac{11{,}000}{1000}\right)$$

$$4 + (3\,x\,11)$$

$$4 + (33)$$

37 samples per year. These should be taken at regular intervals throughout the year.

Table 5: 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 groundwaters.
Antimony	It can be derived from domestic plumbing fittings.
Arsenic	It can be present naturally in some groundwaters.
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).
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.

Parameter	Circumstances in which likely to be present
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).
1,2 dichloroethane	Volatile solvent used in manufacture of vinyl chloride and other processes. 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 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.

Parameter	Circumstances in which likely to be present
Polycyclic aromatic hydrocarbons (PAH)	Leaching from internal coal tar lining of some distribution pipes. Sum of four individual PAH.
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.
Trihalomethanes – total	Formed by reaction of organic matter in raw water with chlorine compounds used as disinfectants. Standard is sum of four compounds.
Radioactive substances Radon Total indicative dose (for radioactivity) Tritium	May be present in groundwaters where the underlying geology contains elevated levels of radon. Contamination of raw waters from natural or manmade radioactive compounds. Cosmic production in upper atmosphere. Byproduct of nuclear explosions and nuclear industry.
Acrylamide	Use of polyacrylamides as coagulant aids. Use of polyacrylamide grouts for borehole/well linings.
Epichlorohydrin	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	Used for making PVC. Leaching from unplasticised PVC pipes used in distribution or domestic plumbing.

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Monitoring Programmes

Regulation 7(2) permits the local authority to use measurement 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).