Drinking water 2016

Private water supplies in England

July 2017

A report by the Chief Inspector of Drinking Water

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Contents

Chapter 1: Summary

Chapter 1:

- Introduces the reader to the report and its contents.
- Summarises changes in numbers of private supplies.
- Puts the quality of private supplies in context relative to public supplies.
- Reports on the performance of local authorities in making returns.
- Indicates the extent to which local authorities are exercising powers to improve failing private supplies.
- Records the Inspectorate's support of local authorities in answering enquiries and providing technical advice.

Drinking water 2016 is the annual publication of the Chief Inspector of Drinking Water for England and Wales. It is the 27th year of the Inspectorate who publishes information about drinking water quality annually. Two reports describe private water supplies. This report is about private supplies in England.

This report is the seventh of its type and presents information based on the updated private supply records provided to the Inspectorate by local authorities in January 2017. Due to the geographical dispersion of private supplies across the country, the information in this report is generally presented by grouping local authority information into nine geographical regions as illustrated in Figure 1. The more detailed information about private supplies in each individual local authority area can be found in *Annex 1*.

Figure 1: Reporting regions

In 2016, local authority records contained the details of a total of 36,565 private supplies in England, 66% of which serve a single household. In England, over 766,000 live or work in a premises that relies on a private supply. Whereas the quality of public water supplies in England in 2016 was very high, with only 0.04% of tests failing to meet the European Union (EU) and national standards, the quality of private water supplies remains a concern, with 4.2% of tests failing to meet the standards in 2016. Nonetheless, this figure represents an improvement when compared to the 9.6% of tests that failed in 2010, the year when reporting for private supplies was first introduced.

The results of testing during 2016 demonstrate that private supplies in England and Wales, while showing an overall improvement over previous years, continue to be of unsafe microbiological quality, with 8.0% of samples containing *E.coli* (7.4% in England, 11.5% in Wales) and 8.7% containing Enterococci (7.9% in England and 11.3% in Wales). Failures of these two standards mean that the water supply is contaminated with

faecal matter and there is a risk that harmful pathogens will also be present. More detailed information about private supply test results can be found in *Chapter 4* and *Annex 2.*

Chapter 2 of this report contains information about the different types of private supplies throughout England. Unfortunately, one local authority in England (Harrow Council) has failed to comply with Regulation 13 by not providing a valid annual return to the Inspectorate in 2016. The Inspectorate makes a great effort to ensure as complete a record as possible and works with local authorities to correct obvious errors, however, the record is still not complete as two further local authorities (Calderdale Metropolitan Borough Council and Selby District Council) provided returns that could not be loaded into the dataset as parts of the mandatory information were missing or in a format that was not as specified. Errors included missing or mismatching supply references and missing information on the supply type.

The records show that in 2016 there were 517 private supplies (330 in England 187 in Wales) that were a potential danger to human health where local authorities had to require the owners to make improvements and take steps to protect public health by serving a Regulation 18 Notice. Overall this amounts to a 27% increase in supplies that are at risk. In England almost three-quarters (72%) of these failing private supplies are large supplies or supplies to commercial or public premises. More information about failing private water supplies can be found in *Chapter 3* together with three new case studies with learning points.

Chapter 3 also summarises the progress that local authorities have made towards compliance with Regulation 6 (duty to carry out a risk assessment within five years of each private supply other than a supply to a single dwelling not used for any commercial activity and not a public building). Across England and Wales as a whole, the number of private supplies that had been risk assessed was 10,155 (8,043 in England, 2,112 in Wales) covering over two-thirds (68%) of all relevant private supplies. This compares favourably to the situation published in *Drinking water 2015* where it was reported that less than two-thirds (65%) of relevant private supplies had been risk assessed after five years and represents a year-on-year improvement overall. However, in England there has been a small increase, from 61% to 66% of risk assessments completed while in Wales, the figure declined from 87% to 77% completed due to more risk assessments over five years old expiring then there were new risk assessments or reviews being carried out. Local authorities in England still have 34% of assessments to do, while in Wales there are only 23% of assessments requiring completion. A detailed breakdown of performance on risk assessment at local authority level is provided in *Annex 1*. Overall, this information shows that 92 local authorities (5 of which were in Wales)

have fully complied with the duty to risk assess all relevant supplies in their area. This is a reduction in the numbers compared to 2015 and this is because risk assessments carried out prior to 2012 now require review and are not counted as valid in the dataset. Valid risk assessments are those completed in 2012–2016 unless changes in the supply system require them to be reviewed earlier than the five-year review cycle.

During 2016, the Inspectorate has continued its advisory service to local authorities and private supply owners or users who make contact with an inspector through the Inspectorate's website or public phone enquiry line and details about the use of the enquiry service since 2008 can be found in *Annex 4*. In 2016, inspectors handled 440 contacts (compared to 428 in 2015) 70% of which were from local authorities, 20% were general enquiries about private supplies or enquiries from businesses making products for private water supplies and the remaining 10% were owners or users of private water supplies. The Inspectorate also provides its private supply risk assessment tool which is being widely used by local authorities and their contractors. This is provided under a non-commercial government licence protecting the intellectual property from 2013.

During 2016 one research project relevant to private water supplies was published, and a summary of this research *Comparison of Private Water Supply and Public Water Supply Ultraviolet (UV) Systems (DWI 70/2/306)*' can be found in *Chapter 4.1*. Defra and the Welsh Government transposed the Euratom Directive into the Private Water Supplies Regulations at the end of 2015 and in England the opportunity was taken to consolidate existing amendments and make a number of changes to other parts of the Regulations. After consultation, revised guidance was drafted and issued. Details of the key changes to the Regulations can be found in *Chapter 6*.

Chapter 2: Number and nature of private water supplies in England

Chapter 2:

- Provides details of private supply numbers by type and region.
- Summarises numbers of private supplies used in the provision of services to the public.
- Reports on the performance of local authorities in making returns.

The Regulations classify private water supplies according to their size and usage. These two factors denote their status in relation to the monitoring and reporting requirements of the European Union (EU) Drinking Water Directive. Large supplies, and supplies of any size serving public premises or used in a commercial activity, comprise those that fall in scope of EU monitoring and reporting, whereas for small, shared domestic supplies such reporting is voluntary at the present time. Supplies serving only single domestic premises are exempt from monitoring unless the owner requests this. The Regulations also recognise another category of private supply, where a person or organisation other than a licensed public water supplier further distributes water that originates from a public supply. These supplies require monitoring as determined by a risk assessment. The tables in this chapter summarise the number and nature of each type of private supply derived from the returns provided by local authorities in January 2017[1]. Anyone wishing to understand these figures in the context of a particular local authority area should refer to *Annex 1*, a look-up table listing the figures and other information by each local authority in England and Wales.

In England, 12 local authorities missed the deadline of 31 January 2017 for submitting a data return, and two returns (Calderdale Metropolitan Borough Council and Selby District Council) could not be loaded to the dataset as parts of the mandatory information were missing or in a format that was not as specified. Errors included missing or mismatching supply references and missing information on the supply type.

Only one local authority (Harrow Council) did not submit a return for 2016 and although they have no private supplies to record, the data return contains contact details for the appropriate person in the local authority

[1] On receipt of returns from local authorities the Inspectorate carries out checks and makes changes where there are obvious errors in relation to the type of supply.

which is helpful to enable efficient handling when the Inspectorate receives enquiries about private supplies in specific local authority areas.

Sample data was missing from 23 local authority returns for Regulation 9 supplies, which are reportable to the European Commission.

From Table 2 it can be seen that in 2016 there were 72,129 private supplies in the whole of the UK, of which 36,565 were in England. During 2016, 2,452 private supplies were removed from the register in England. It is to be expected that there will be some year-on-year variations in the number of private supplies in England for operational reasons (new supplies being commissioned and old supplies being abandoned) and the Inspectorate is satisfied that the majority of local authorities have met the basic requirements of Regulation 12 (keeping records) within the period of five years allowed for implementation of the new Regulations. The Inspectorate is also satisfied that all but one of the local authorities in England (Harrow Council) have met the requirements of Regulation 13 (notification of information to the Secretary of State). However, the Inspectorate remains concerned that returns are incomplete or statutory activities are still not being fully met. The Inspectorate made a basic check on whether local authorities were carrying out the required annual sampling of Regulation 9 supplies. In total, 88 out 219 local authorities in England reported at least one sampling visit to all their Regulation 9 supplies. Overall, this shows that 61% of Regulation 9 supplies are receiving an annual sample.

The area of England with the most private supplies (35%) is the South West of England. There are also significant numbers of private supplies in the West Midlands (17%), the North West (15%), East of England (10%) and Yorkshire and Humberside (10%). Table 3 also illustrates that private supplies can be found anywhere in the country with 13% (4,867) of all private supplies being located in the other regions of England.

Looking at Table 2, details have been provided of those private supplies used only for a domestic purpose other than drinking, cooking and personal hygiene (showering and bathing). The main use of these 'non-human consumption' supplies for domestic purposes is toilet flushing, but this category of supply can also include a supply used only for clothes washing (laundry). The separate recording of this type of private supply is necessary because while such supplies are required to be wholesome (Water Industry Act 1991), the current definition of wholesome in the Regulations does not apply. The Inspectorate has published a study[2] on

[2] Technical definition of wholesomeness in relation to water used for toilet flushing in private water supplies. DWI 70/2/303 http://www.dwi.gov.uk/research/completed-research/reports/DWI70-2-303.pdf

the outcome of research into the wholesomeness of water required for these supplies and has developed a simple risk assessment tool. This tool is being updated and piloted amongst local authorities *(see Risk Assessment section 3.1).*

Table 2: Number of private supplies reported in 2016, by region

Region	Large supplies and any size supply used in a public building or a commercial activity	Small, shared domestic supplies	Single domestic dwellings	Private distribution systems	Domestic purposes – other	Total
East Midlands	193	207	1,039	11	2	1,452
West Midlands	561	617	4,944	8	2	6,132
East of England	630	615	2,274	22	33	3,574
North East England	431	388	629	1		1,449
North West England	1,075	1,095	3,381	11	16	5,578
Yorkshire and Humberside	769	765	2,080	4	3	3,621
London and South East	394	359	1,174	33	6	1,966
South West England	2,382	1,587	8,769	47	8	12,793
England total	**6,435**	**5,633**	**24,290**	**137**	**70**	**36,565**
Wales total	**1,448**	**1,284**	**12,205**	**12**	**32**	**14,981**
Northern Ireland*						**147**
Scotland*						**20,436**
Grand total						**72,129**

*2015 data from the drinking water regulators for Scotland and Northern Ireland.
Data excludes local authorities that did not provide a return in time for inclusion or whose data could not be loaded due to errors.

Table 2 illustrates how two-thirds (66%) of all private supplies in England serve a single domestic dwelling. Apart from recording the location of this type of supply, local authorities are not currently required to risk assess and check the quality unless requested to do so by the owner, or if the supply comes to the attention of environmental health professionals for some other reason, for example, where there is a change of ownership or use, or a complaint about quality or sufficiency. Accordingly, less is known about these supplies and they have been excluded from the other tables in this chapter describing the characteristics of private supplies. Of the remaining 12,275 supplies, 12,068 require risk assessment and monitoring because they are either large supplies or supplies of any size used in the provision of services to the public (18%) or small, shared domestic supplies (15%). Supplies via piped systems that further distribute mains water and domestic purposes (other) require risk assessment on which any monitoring should be based.

Table 3 provides more detail about the private supplies in England used to provide water for drinking, cooking and washing as part of a public or commercial activity. In 2016, local authorities reported 184 fewer such situations (a total of 7,256 compared to 7,440 in 2015). Just over three-fifths of these supplies are used by the tourism and leisure sector (hotels, bed and breakfast accommodation, campsites, and hostels). Of the remainder, around a fifth serve food premises and less than a fifth supply public buildings. These figures reinforce the important contribution that private supplies make to the economy of England (particularly in the North West and the South West regions, which account for over half (54%) of all the private supplies used in the provision of services to the public). Table 4 also highlights where highly vulnerable individuals are exposed to private supplies, for example, there are private supplies serving 36 hospitals and 53 schools or other educational establishments. Local authorities should always consider the nature of the establishment and the potential consumers when risk assessing a supply, as for some establishments there are greater consequences of failures such as an insufficient supply with no contingency in place.

Table 3: Numbers of private water supplies used for commercial and public activity

Region	Educational and training establishments	Hospitals/care facilities	Food premises	Supplying water as part of a commercial service	Public buildings
East Midlands	1	5	81	154	77
West Midlands	5	4	126	361	103
East of England	12	6	181	375	175
North East England	1	1	94	329	111
North West England	8	2	331	777	107
Yorkshire and Humberside	8	3	198	645	186
London and South East	7	8	154	230	81
South West England	11	7	383	1,645	263
England total	**53**	**36**	**1,548**	**4,516**	**1,103**
Wales total	**3**	**8**	**304**	**1,088**	**149**
Some supplies have more than one type of activity.					

In *Drinking water 2014* the Inspectorate reported on areas where there are significant numbers of private supplies in some rural communities. The report highlighted that nationally, the failure rate for private supplies is much worse than for public supplies and commented on the progress being made on improving private water supplies. It considered the investment for addressing insufficiency of access to a safe and reliable water supply through the provision of a public supply. Within the Wessex Water region there are two local authorities where up to ten per cent of the population are served by private supplies and, following the report, Wessex Water took action to see what it could do to help within its wider remit of protecting public health for consumers.

The Inspectorate was pleased to report that Wessex Water started a project to gather information about the location of private supplies, develop a prioritisation model and undertake high level costings for

schemes to connect deficient private supplies to the public network. The project intended to look at the regulatory and legal barriers to successful transfer. The work has strong parallels with first-time sewerage provision, which has successfully operated for many years, connecting properties to the public sewerage system, subject to an economic viability assessment and support from the Environment Agency.

During 2016, Wessex Water continued to investigate the options with regard to the transfer of customers from private supplies to mains supplies. Over the last year, they have carried out high level costings to assess the order of magnitude of investment that would be required. This focused on identifying clusters of properties that could be cost effectively connected to their system. As part of customer research the company asked a representative sample of their existing customers for their priorities for future investment and connection of private supplies did not feature highly. The position to ensure affordable bills to their consumers means that first time mains connection for private supplies is unlikely to feature in the company business plan. This Inspectorate is disappointed that this work to reduce risks to public health is not being taken forward.

Chapter 3: Improving private water supplies

Chapter 3:

- Describes the progress of local authorities in risk assessing private supplies.
- Records the work of local authorities in relation to improving failing water supplies.
- Summarises relevant industry research supported by the Inspectorate.
- Highlights best practice learning points about risk management through case studies.

From the beginning of 2010, local authorities have been required to carry out a risk assessment of each relevant private supply in their area. This is to determine whether it poses a potential danger to human health and, if so, to take action to safeguard public health in the short term and to improve the supply in the long term. This duty transposes into law, actions required under Articles 3, 7, 8, 9 and 13 of the European Union (EU) Drinking Water Directive to safeguard human health and inform consumers about the quality of their water supply, with details of the nature and timescale of any necessary safeguards and improvements.

3.1 Risk assessments

Local authorities were given five years from 1 January 2010 to 31 December 2014 to identify and risk assess all relevant private supplies in their area (Regulation 6) and the Inspectorate has reported on progress each year. The methodology of risk assessment is based on the World Health Organisation's (WHO) *Guidelines for Drinking water quality*[3] and *Water Safety Plan Manual*[4] and local authorities have been provided with a risk assessment tool[5] created by the Inspectorate to enable this work to be carried out in a consistent manner across the country. Following feedback from local authorities about difficulties in printing from the Risk Assessment Tool and locking of systems, the Inspectorate has undertaken

[3] Guidelines for Drinking-water quality 4th Edition WHO, 2011.

[4] Water Safety Plan Manual (WSP manual): Step-by-step risk management for drinking-water suppliers – How to develop and implement a Water Safety Plan – A step-by-step approach using 11 learning modules. WHO 2009.

[5] DWI risk assessment tool is the subject of a non-commercial government licence which prohibits any change or use of the tool for commercial gain.

a piece of work to update the original tool. A revised 'Risk Assessment Lite' tool has now been developed and is currently undergoing pilot trials with selected local authorities with an aim to release this new tool across England and Wales. The new Risk Assessment Tool, will now be compatible with all versions of Excel and it has been designed to provide as many embedded drop-down options and prompt screens to assist with completing the assessment. During 2017, the Inspectorate intends to produce a webinar package to give step-by-step instructions on how to complete the revised risk assessment, although the basic data required remains the same. There is also some work to do with other regulators to try and get this tool embedded as a web-based app and the Inspectorate intends to further explore this option later this year. Enquiries about the tool and feedback from its use should be sent to *dwi.enquiries@defra.gsi.gov.uk*

The duty to carry out a risk assessment of every relevant supply is set out in Regulation 6. Table 4 summarises the overall compliance of local authorities with this Regulation and detailed information showing the performance of each individual local authority is set out in *Annex 1*.

Table 4: Percentage of supplies with risk assessments

Use of supply*	Percentage of reported supplies risk assessed with risk assessment in last five years 2012-2016**	% of risk assessments in place				
		Food premises	Premises supplying water as part of a commercial service	Public buildings	Shared domestic supplies	Total number of risk assessments in place**
East Midlands	68%	81%	83%	86%	61%	280
West Midlands	52%	81%	75%	57%	33%	616
East of England	62%	76%	67%	64%	59%	803
North East England	67%	87%	93%	81%	39%	547
North West England	63%	61%	69%	71%	61%	1,374
Yorkshire and Humberside	82%	91%	93%	93%	71%	1,237
London and South East	83%	81%	86%	84%	82%	655
South West England	63%	64%	78%	81%	55%	2,531
England Total	**66%**	**74%**	**79%**	**78%**	**57%**	**8,043**
Wales Total	**77%**	**81%**	**85%**	**84%**	**71%**	**2,112**
Total	**68%**	**75%**	**80%**	**79%**	**60%**	**10,155**

*Double counting may occur as some premises have more than one commercial activity.
** Includes all Reg 8, Reg 9 and Reg 10 supplies.

In England, the number of relevant private water supplies that had been risk assessed was 8,043, about two-thirds (66%) of those required. This compares favourably with the situation reported in *Drinking water 2015* where only 61% of risk assessments had been completed. However, it highlights that even a full year after the deadline for completion of all private water supply risk assessments, there is still a substantial gap in securing safe drinking water supplies. In addition there are notable regional variations, for example in the Yorkshire and Humberside area 82% of risk assessments have been completed, an area notable for having the third highest total number of risk assessments to complete (1,237). There has been a decline in the number of risk assessments carried out in some areas listed in Table 4. This is as a result of those assessments carried

out in 2011 no longer counting towards the numbers if not re-assessed, since the requirement is for assessments to be carried out at least every five years.

Local authorities were advised to prioritise risk assessing those private supplies, which are reportable under the EU Drinking Water Directive and are used in the provision of services to the public (known as Regulation 9 private supplies). From Table 4 it can be seen that this approach has generally been followed across England with higher compliance figures reported for these types of private supply: public buildings (78%), food premises (74%) and others supplying water as part of a commercial service e.g. hotels and bed and breakfast establishments (79%).

The Inspectorate has identified that the English local authorities listed in Table 5 have less than 20% of supplies covered by the required risk assessments. The majority of the local authorities in this group have ten or fewer supplies in their area and yet have not carried out any risk assessment activity. For some local authorities (Blackpool, Guildford, Hackney, Halton, St Albans City, Stoke on Trent and Waltham Forest) this situation has remained the same since 2014.

Particularly disappointing, is the progress made in Mid Devon (155 required, only one completed), Teignbridge (192 required, only 17 completed), Torridge (84 required and none completed) and Rossendale local authority (210 required, only 39 completed). Local authorities are reminded that this was a five-year action plan and **all** risk assessments were expected to be completed during the first five years. Risk assessments made early in the first five years are now starting to expire and will require review although this is likely to be less onerous than carrying out new risk assessments, as much of the detail will already be captured and only new information requires updating. Supplies that have not yet had any risk assessment will need to be completed. Carrying out risk assessments is proven methodology advocated by the World Health Organisation to secure safe, clean drinking water for those who use or supply water to others. Although the initial five-year period was one of initiating and embedding the process and learning, failure to meet the duties of the Private Water Supply Regulations avoids determining and reducing the residual risk to those consumers who are provided with water where one in 15 may contain faecal pollution and could be harmful to health. Local authorities must consider the outcome of a risk being realised in the absence of meeting the minimum standard required of them.

Table 5: English local authorities risk assessing 20% or fewer relevant private supplies in their area within five years

Local authority	Number of risk assessments requiring completion or update	Number of risk assessment completed or still in date	Percentage of risk assessment completed or still in date
Blackpool*	2	0	0
Bromley	3	0	0
Dartford	1	0	0
Exeter City	1	0	0
Guildford*	2	0	0
Hackney*	1	0	0
Halton*	1	0	0
Hyndburn	7	1	14
Ipswich	1	0	0
Mid Devon	155	1	1
Rossendale	210	39	19
St Albans City*	10	0	0
Stoke-on-Trent*	2	0	0
Sunderland	1	0	0
Tandridge	1	0	0
Teignbridge	192	17	9
Tendring	25	0	0
Torridge	84	0	0
Waltham Forest*	1	0	0
Those local authorities marked with * were highlighted in 2014 and 2015 as having risk assessed fewer than 20% of their relevant supplies.			

Regulation 6 of the Private Water Supply Regulations 2009 (2010 in Wales) requires local authorities to risk assess supplies within the first five years of the introduction of the Regulations and at least every five years afterwards. Single domestic dwellings are exempt from this requirement, but must be risk assessed if the owner or occupier of the dwelling requests it. In response to requests for assistance in undertaking these risk assessments, the Inspectorate developed a risk assessment tool for local authorities to use. This was released in July 2012, and the Inspectorate delivered a series of regional workshops during the latter half of 2012 to introduce the tool and to demonstrate how it should be used. Feedback is welcomed on the tool.

Since 2012 two subsequent versions have been issued and published comprising of a simpler version for systems with pre-filtration and/or UV disinfection, as well as one for Regulation 8 supplies. All of these are available at http://www.dwi.gov.uk/private-water-supply/locaut/ratool.html

Completed risk assessment reports are not sent to the Inspectorate, but local authorities populate a column in the annual data return to confirm when the risk assessment is complete. During 2016, the Inspectorate reviewed a number of risk assessments carried out since the tool was published to determine not only how many, but to what level of detail, the risk assessments had been completed.

Twenty-five local authorities were selected at random and approached for information on risk assessments they had completed in the period 2013–2014. Of those 25, all but two responded (City of London and Shropshire) and the remaining 23 either received a visit to discuss their risk assessments or provided a selection of risk assessments via email.

Most (18 out of the 23 examined) local authorities are using the risk assessment tool, and the vast majority of these are using the latest version. Of those not using the Inspectorate's risk assessment tool, three have developed their own methodology which involves using its hazard checklist and determining presence or absence of the hazard, rather than assessing likelihood. The use of likelihood is an accepted principle of risk assessment methodology advocated not only by WHO for water supply, but in other areas such as health and safety. Equally, a few authorities were using the original risk assessment methodology which is incomplete for supply systems and risks updates from learning being missed in an assessment.

Sixteen of the local authorities were the tool using it appropriately. The others, whilst using the tool, were not attributing a likelihood, or doing this for high risks only which reduces the effectiveness of the assessment. Half of those using the risk assessment tool take existing mitigation into account at the hazard checklist stage, and score hazards based on existing mitigation in place. The Inspectorate has acknowledged this approach, but on the proviso that a record of the assumptions are entered in the comments. For the remaining risk assessments it was unclear how or whether existing mitigation was being taken into account.

Eighteen of the 23 local authorities using the risk assessment tool are successfully developing action plans for the high and very high risks. However, very few are using the template action plans, instead populating the outstanding actions summary in preference. In the development of the tool, the action planning stage was designed to demonstrate any existing mitigation, and also how future actions would reduce the overall risk rating to medium or low, and therefore local authorities are encouraged to capture remedial actions here. They have been designed to be entirely flexible; a blank one can be used, hazards can be grouped or several action plans can be populated to represent risks throughout the supply system.

Over half of the local authorities involved are setting appropriate deadlines for completion of action. This can range from two or three months for very high risks to six months for other risks. Some action plans are staggered to enable very high risks to be mitigated first before tackling lesser risks. However, the remaining local authorities set no firm deadlines or inappropriate ones. Phrases such as ‘suggested deadline’, ‘ongoing’, ‘at the next risk assessment visit’ or ‘as soon as practicable’ are unhelpful to the relevant person and help reinforce an informal attitude to the remediation. The use of time-specific deadlines gives clear and unambiguous targets for supply owners and will help with any subsequent enforcement if required. Some local authorities advised us that they are not setting explicit deadlines as they do not have the resources to visit the supplies to confirm the actions are complete. In many situations it will be adequate for local authorities to verify completion of actions in other ways, e.g. submission of photographic evidence, copies of invoices or completion reports.

Risk assessments are most often carried out by the environmental health officers in the private supplies team, although in some cases officers from local authority food teams with experience of risk assessment have been used. In the case of two local authorities, risk assessments have been subcontracted to external consultants on occasion. Whilst this is entirely acceptable, the local authority should satisfy themselves that consultants can demonstrate the necessary competency and have a clear contractual framework of work.

The majority of local authorities deem their staff competent through a mixture of training and experience. Most local authorities report having received training through organisations including the Chartered Institute for Environmental Health, Public Health England, the Drinking Water Inspectorate and the University of Surrey. In addition, water companies have provided sampler training for some local authorities. None have formal audit procedures in place for ensuring staff maintain competency, but discussions take place at regional meetings which allow some peer review to take place.

Local authorities use a variety of sampling manuals. Fourteen of the 23 local authorities use a written procedure of some kind. These range from a simple flow diagram to internal written procedures to formal adoption of existing manuals such as the *Private Water Supplies Technical Manual*. Of the nine that don’t use a sample manual, some are using external sampling manuals as references, but no written procedures are in place, and others are not using or referring to any documented procedures. In one case, senior staff check more junior staff to ensure that sampling is being undertaken appropriately. In all other cases there is no checking, and staff are trusted to sample competently. In many cases, there is only a single

sampler, and there may not be anybody able to audit or assess the sampling procedures. The availability and use of procedures and processes, the training and supervision of those involved in private supplies and the robustness of records must underpin the local authority in securing safe drinking water and delivery of the requirements of the Regulations.

3.2 Risk management

Risk management, in the context of the private supply regulations, refers to the decisions and actions that local authorities are required to take when they become aware, through risk assessment, monitoring or by other means (such as consumer complaints or reports of water-related illness from health professionals) that a supply may pose a potential danger to human health or is insufficient or unwholesome. Risk management involves interpreting the results of either the risk assessment or any water quality tests or user complaints in the context of the particular water supply arrangements (source, infrastructure, treatment and management arrangements). It is particularly important that when a local authority receives a report of an adverse sample result from the laboratory that this is interpreted and acted upon in light of knowledge gained through the risk assessment about the particular hazards and controls (risk mitigation) pertaining to the supply in question. Where a risk assessment is in place, the decision making of the local authority should be relatively straightforward, with no further need for repeated sampling or seeking the opinion of health professionals. Instead, checks can be made immediately with the owner/manager of the supply to establish if there has been any change in the supply circumstances or any malfunction of control measures. The local authority can then decide if there is a good reason to carry out a site visit to update the risk assessment and independently validate the controls. In making this judgement, the local authority should take into account the competence, attitude and behaviour of the supply owner/manager, thereby focusing their own resources proportionately towards those situations where they add the greatest value in terms of public health protection.

Once a local authority has identified that a supply poses a potential danger to human health, or the quality of a private supply is not wholesome or the volume of water output is insufficient, then action must be taken to ensure that all consumers are informed and given appropriate advice to safeguard their health in the short term. Consumers must also be informed of the nature and timescale of any improvement works needed to affect a permanent remedy. This is achieved by putting in place a Notice formally setting out the requirements. There are two Notice options: for situations

where there is a potential danger to human health, a Regulation 18 Notice is used; for other situations where there is a problem only with regard to sufficiency or wholesomeness, a Notice under Section 80 of the Water Industry Act 1991 is used. In certain instances it may be appropriate to put in place both a Regulation 18 and a Section 80 Notice. Both types of Notice are flexible instruments that can be varied to reflect the owner's preferred option for providing a permanent remedy or to include additional requirements that come to light as a consequence of an investigation. The benefits of a Notice (compared to informal verbal or written advice) are twofold. If there is disagreement about the need for a supply to be improved, or there is a dispute over who is responsible for carrying out the work, the Notice provides for a formal process of mediation (appeal) and thereafter, the relevant person(s) is under a legal duty to carry out the necessary improvements.

Sometimes a local authority will encounter a lack of co-operation by a private supply owner and in these circumstances, if necessary, a stand-off situation can be resolved by the local authority serving the owner with a third type of Notice (Section 85 Notice under the Water Industry Act 1991). This type of Notice makes it an offence for the person on whom it is served not to provide specified information by a given date. Local authorities should advise residents within its area that they must register any new private water supplies with them, in order that it can carry out its duties under Section 77–82 of the Act. Failure to do so may result in a Section 85 Notice, with which failure to comply is an offence. In addition, if access to the premises for the purpose of carrying out a risk assessment or sampling is being denied, the Act gives local authorities specific powers of entry that they can and should exercise to gain entry. In 2016, the Inspectorate was not informed of any local authority serving a Section 85 Notice.

Table 6: Number of supplies where local authorities have served Regulation 18 Notices in 2016

Region	Number of local authorities serving Notices	Reg 8	Reg 9	Reg 10	SDDW	Total
East Midlands	4 local authorities	0	4	2	0	6
West Midlands	4 local authorities	0	12	5	3	20
East of England	10 local authorities	0	17	4	1	22
North East England	2 local authorities	0	4	4	0	8
North West England	13 local authorities	0	65	30	4	99
Yorkshire and Humberside	9 local authorities	0	35	3	2	40
London and South East	10 local authorities	0	34	14	1	49
South West England	15 local authorities	1	68	14	3	86
England total	**67** local authorities	**1**	**239**	**76**	**14**	**330**
Wales total	**15** local authorities	**0**	**131**	**39**	**16**	**187**
Grand total	**82** local authorities	**1**	**370**	**115**	**30**	**517**

Table 7: Number of supplies where local authorities have served Section 80 Notices in 2016

Region	Number of local authorities	Reg 8	Reg 9	Reg 10	SDDW	Total
East Midlands	1 local authority	0	1	0	1	2
West Midlands	1 local authority	0	0	1	0	1
East of England	1 local authority	0	1	0	0	1
North East England	none	0	0	0	0	0
North West England	5 local authorities	0	16	5	2	23
Yorkshire and Humberside	none	0	0	0	0	0
London and South East	1 local authority	2	0	0	0	2
South West England	1 local authority	0	2	0	0	2
England total	**10 local authorities**	**2**	**20**	**6**	**3**	**31**
Wales total	**1 local authorities**	**0**	**0**	**1**	**0**	**1**
Grand total	**11 local authorities**	**2**	**20**	**7**	**3**	**32**

Table 6 shows that in England in 2016 there were 330 private supplies in 67 different local authority areas where improvements were required to protect public health by means of a Regulation 18 Notice. This represents a decrease in this type of risk management activity compared to 2015 when 345 supplies in England were subject to such a Notice. Seventy-two per cent of these were served on supplies used in the provision of water to the public, for a commercial activity or which supply more than $10m^3$ per day.

Table 7 shows that in England 31 supplies were the subject of a Section 80 Notice, of which 65% were used in the provision of water to the public, for a commercial activity or which supply more that $10m^3$ per day. Four-fifths of these were served by local authorities in the North West of England.

3.3 Review of Notices

2014 Notices

In 2014 a total of 342 copies of Notices were received by the Inspectorate which compares unfavourably to the numbers reported in the annual data return (491 Regulation 18 Notices and 24 Section 80 Notices). Eighty-two per cent of the Regulation 18 Notices served were in response to microbiological exceedances. Six per cent were due to lead failures and 11% were due to unspecified unwholesome factors. In one instance a Section 80 Notice was served in response to an arsenic failure. Only one Notice was served based on a potential risk alone.

2015 Notices

In 2015 a total of 220 copies of Notices were received by the Inspectorate which compares unfavourably to the numbers reported in the annual data return (406 Regulation 18 Notices and 144 Section 80 Notices or Section 85 Notices). Eighty-five per cent of the Regulation 18 Notices were served in response to microbiological exceedances. Two per cent were in response to lead failures, and 15% were due to unspecified unwholesomeness factors.

2016 Notices

During 2016, the Inspectorate received copies of 135 Notices of the 522 served by local authorities in England and Wales. Of the total received, none were copies of Section 80 Notices (wholesomeness and sufficiency). This is a significant reduction in numbers over previous years and shows a diminishing return. The reasons might be that previously served Notices remain in existence, supplies are improving and Notices are not required in such quantity or local authorities see a reducing benefit, resource, motivation, are reluctant to serve Notices or are simply not copying all Notices to the Inspectorate. The likelihood is that it is a combination of all of these reasons but it is clear that the majority of Notices received by the Inspectorate were from local authorities in Wales, where there are fewer authorities compared with England. Similarly, the total number of Notices received by the Inspectorate where a potential risk to human health was identified is less than the number of risks indicated by breaches of relevant standards (e.g. faecal indicators) that were reported in the data returns or in the case of Section 80 Notices in relation to either insufficiency or wholesomeness, the data returns show breaches in iron and coliforms with no record of a Notice being served. The reluctance to serve Notices on physical supply hazards where there are risks to wholesomeness and/or human health identified within the risk assessment for preventative mitigation appears to be secondary to serving Notices on a reactive basis following breach of water quality standards. This implies that Notices are not served in all cases where risk exists and this is more likely to be the case in England. Where there is a known risk, should the hazard be realised then the required duty cannot be shown to have been completed by the relevant authority.

Local authorities are reminded that under Regulation 14 (2) they must, by 31 January every year send the Secretary of State (in effect the Inspectorate), a copy of the records mentioned in schedule 4. These include any Notices served under Section 80 of the Water Industry Act or under Regulation 18.

Table 8: Summary of number of Notices sent to the Inspectorate

	Notice type (total numbers)		
	Section 80 Notices	Regulation 18 Notices	Total number
England	0	40	40
Wales	0	95	95
Total	**0**	**135**	**135**

Table 9: Reasons for serving Notice

	Total number	Comments
Chemical parameters	14	Arsenic x3 Lead x3 Nitrate x1 Volatile organic compounds x 4 Manganese x2 Copper x1
Faecal indicators (*E.coli* and/or Enterococci)	95	
Coliforms only	1	Wiltshire Council
Risk assessment hazards	4	
None specified	4	City and county of Swansea x3 West Somerset District Council x1

Of the 135 Notices copied to the Inspectorate, just under 30% (39) required a 'boil water' Notice, in the absence of any stated remedial work. A 'boil water' Notice is a mitigation for microbial contamination which may arise from either the domestic distribution system, quite often the tap hygiene, or from the source. In both cases the discovery of contamination will require investigation to determine the cause and if it is found to arise from the tap, advice on hygiene and cleaning followed by a lift on the

Notice is appropriate. If the contamination is from the source then an investigation of how such contamination has arisen is critical since clearly the supply is at risk of further contamination and the consumer is also at risk. Without remedial work, the Notice is ineffective and the consumer remains at risk.

Similarly, some local authorities are specifying in the Notice that the supply presents risks, but are not giving the reason (the Notice template includes 'by virtue of…'). For the purposes of clarity and local supply records, local authorities should provide the explicit grounds for which the Notice has been served (Reg 18(b)). The Inspectorate provides Notice templates and examples on its website to help local authorities with this process.

Of these 39, 15 Notices, (11% of the total) (Powys 12, Herefordshire 2, West Somerset 1) had no deadline stated, suggesting that the boil water Notices were for an indefinite period. Therefore not only does the private supply remain without remediation, but the consumer remains at risk from boiling the water, a known risk in itself from scolding.

There were eight Notices, (6%) where a 'do not use' (DNU), Notice was issued, five of which also specified no deadline (Powys 3, Hereford 1, West Somerset 1). A DNU Notice requires consumers not to use the water for drinking, cooking or washing and is reserved for use only in those circumstances where there is unequivocal evidence of persistent contamination of the water supply with a substance (or radioactivity) at a level where short-term exposure is known to give rise to adverse health effects. This Notice poses a significant challenge due to the need to use alternative water supplies for everything except toilet flushing. Measures to restore the water supply to normal are likely to be protracted (weeks, rather than hours or days). Generally, the circumstances when a DNU Notice might be considered are when a contaminant cannot be detected by a change in appearance, taste or smell of water (meaning consumers would not be alerted to the problem and thus unlikely to take avoiding action without being warned. With no deadline specified in a notice the property or business has effectively no supply unless an alternative is available such as a public supply. Under such a Notice, the situation may go on indefinitely. This cannot and should not be the purpose of a Notice since the Notice should seek to resolve the cause. Local authorities are reminded that both Section 80 and Regulation 18 notices should be served to facilitate the timely remediation of risks in the medium and long term (as required by Regulation 18 (d)).

In conclusion, the serving of both Regulation 18 and Section 80 Notices continues to be driven by parameter exceedances as opposed to risk assessment. Regulation 18 Notices are most commonly used, and are

almost always in response to microbiological failures. Copies of Notices served are not all being sent to the Inspectorate, however, from those reviewed, the quality of information continues to be variable though largely adequate.

Local authorities continue to rely on informal action in remediating risks under Regulation 16. This is not appropriate where risks to human health have been identified and is in breach of Regulation 18. Regulation 18 requires that Notices ***must*** be served where such risks have been identified. Action is not restricted to where exceedances of health-based parameters have occurred, and local authorities are encouraged to adopt a risk-based approach in applying the Regulations, and to utilise the enforcement powers available to them to bring about improvements in private water supplies. Similarly local authorities should ensure that any Notices which are served adequately specify the remedial actions required rather than using Notices as a mechanism to issue boil water advice alone.

The Inspectorate has provided examples of both Regulation 18 and Section 80 Notices on their website to assist local authorities with their completion, and to ensure that a consistent approach is adopted that contains all required and appropriate information. Where local authorities are unsure of the content and format of Notices they should refer to http://www.dwi.gov.uk or contact the Inspectorate for advice.

Appeals

In 2016, three Section 80 Notices were appealed by the relevant person(s) on whom they were served. In these instances, the Inspectorate hears the appeal in the most appropriate forum; it may be dealt with by correspondence (exchange of information), a meeting between the key parties may be held, or a public meeting can be convened. Once all the available and relevant information has been assessed, the Chief Inspector may decide to uphold the Notice with or without modification, or revoke it.

In the first appeal, a Notice had been served following insufficient supplies to a property via a Regulation 8 supply, where there is further distribution of water from a licensed water supplier. The responsible person in control of the supply, terminated the connection after a dispute with the owners of the property being supplied. An appeal was lodged against the Notice by the ‘relevant person’ on the grounds that the existing pipework to the property did not comply with the Water Fittings Regulations 1999 and an alternative temporary supply had been offered. The appeal was rejected on the basis that the provision of bottles and or containers can only be a temporary arrangement for the provision of water for drinking, cooking, washing and domestic purposes and without a permanent connection the house would be deemed uninhabitable. Furthermore, failure to meet the

Water Fittings Regulations should be a matter for the water company. The Notice was upheld. Following this decision the solution was resolved by arranging a permanent and direct connection to the public water supply.

In the second appeal, the Notice was issued to two bungalows sharing a private supply that had been deemed by the local authority as liable to insufficiency due to inadequate abstraction capabilities. One of the relevant persons appealed on the grounds he did not have sole responsibility for both properties and as such would not consider the solution for resolving the sufficiency issues. The appeal was rejected and the Notice was upheld on the basis that both property owners had and continued to have an interest in the supply and there should be a joint agreement to improve the abstraction point.

A common element among both these cases confirms the general situation in many shared private water supplies, where there is a lack of clearly defined responsibilities and legally-binding agreements about the continued maintenance, what charges are made, how these are calculated and what aspects they cover (e.g. sampling and risk assessment costs, electricity bills, operational and capital maintenance work, alternative supplies during maintenance, treatment upgrades, cleaning of storage tanks, etc.).

In the third appeal, a Notice was issued to the person responsible for the supply to a number of private residents. The district council concluded that the private supply was, or was likely to be, unwholesome by virtue of the detection of unacceptable odours and/or tastes by consumers. The responsible person appealed against the Notice on the basis that there were no grounds to conclude the water was unwholesome under the Water Industry Act 1991. Water may be considered wholesome if it complies with the conditions set out in Regulation 4 of the Private Water Supplies (England) Regulations 2016, which includes meeting the concentrations or values prescribed in Part 1 of Schedule 1 for each parameter. The prescribed value for taste and odour is no abnormal change and acceptable to consumers. By virtue of the reports of unacceptable taste and/or odour by consumers of the supply it was concluded that the grounds for serving the Notice had been met and the Notice was upheld.

In all three instances, during 2016, the Notice was upheld with or without modification.

3.4 Risk management case studies – England and Wales

The Inspectorate has included case studies to illustrate the range and scope of the situations that can arise in the risk management of private supplies in each of its annual reports. This aspect of the report is particularly appreciated by local authorities and has been continued again this year. The selection of case studies is guided by enquiries received during 2016, either from local authorities or private supply owners and their service providers. The Inspectorate has also drawn on records of events notified to the Inspectorate by water companies to highlight, for learning purposes, those scenarios where the task of safeguarding water supplies relies on effective local collaboration and communications between the local authority and its local water company. The case studies published in *Drinking water 2016* will be added to the archive of published case studies on its website and this can be accessed at http://dwi.defra.gov.uk/private-water-supply/Case-studies/index.html as a learning tool for anyone coming new to the subject.

Case Study 1 – Change of status of a Regulation 8 supply

In October 2012 the Inspectorate received a contact from a consumer complaining of particulates in their drinking water. The Inspectorate's investigation revealed that this consumer was receiving their supply of water from a public distribution system via a storage reservoir sited on a neighbour's property which served both the consumer and their neighbour. This arrangement constituted a Regulation 8 supply under the Private Water Supplies Regulations 2009 as water arising from a water company was being distributed by the neighbour, who was a customer of the water company, through their reservoir to the consumer who was not a customer of the water company.

It was found that the complainant's water quality problem was the result of sediment disturbance in the reservoir. This occurred each time the neighbour turned off the pumps, which were located on his land and used to fill the reservoir. A long-standing dispute existed between the two neighbours originating over billing and maintenance costs and although both consumers had access to the pump under the terms of a covenant agreement, the complainant refused access on the grounds of trespassing, unless he first obtained written permission from his neighbour. Furthermore he was advised by the local water company that if he was granted permission to fill the reservoir for his own purposes by this action, that by default he would become a bill paying customer and be responsible for the reservoir remediation costs and those of upgrading the pump house. Consequently he refused to do so.

In December 2012, the water company carried out a water fittings inspection on this supply as part of the ongoing water quality investigation, under The Water Fittings Regulations 1999. This revealed contraventions associated with the storage reservoir, which presented water quality hazards from ingress. Remediation work to mitigate this risk was required of the owner by February 2013.

The local authority recognised this arrangement as a private water supply under Regulation 8 of the Private Water Supplies Regulations 2009. These Regulations bestow powers on the local authority to enforce on a relevant person under Section 80 of the Water Industry Act 1991 if the water is unwholesome or insufficient, and under Regulation 18 if the water presents a danger to human health. Unfortunately the local authority did not act in accordance with these requirements in a timely manner and between that time and February 2013 the owner of the primary premises disconnected his supply pipe from the water company's communication pipe in preference to repairing the reservoir. As a consequence of this the water supply arrangements ceased to constitute a Regulation 8 supply or a public supply and both the local authority and the water company were then unable to enforce under the respective regulations for which they are responsible, to bring about the necessary remediation of the reservoir.

The owner of the primary premises then set about establishing alternative water supply arrangements for his own property, allegedly using a redundant rainwater collection system, and gave the keys to and permission for, his neighbour to access the pumping system, should he wish to reconnect to the supply. However, the neighbour returned the keys, refusing to step onto his neighbour's land and instead sought assistance from the local water company to make a direct connection to the public main at the required pressure to maintain sufficiency. The costs associated with this were, however, very expensive due to the topography of the land, and were beyond his means. He remained therefore without a supply of drinking water, other than bottled water, and water for other sanitary purposes from a relative living in the near vicinity into 2014. During this time the local authority sought further legal advice regarding their position and concluded they had no further responsibility for the case. The water company felt that they had done all that they could and had no further obligation to pursue the matter. This left only the Inspectorate to lobby for a solution as a duty of care.

In the summer of 2014, the Chief Inspector engaged with the water company at a senior level to ask them to step in and further investigate other options to remediate the situation. The Inspectorate acknowledges and welcomes that the company responded accordingly without any regulatory obligation to do so. In September 2014, the company put forward a feasible compromise proposal to bring about a solution, which

was subject to agreements and the funding by both parties. This entailed installing a new water supply from a powered pump, removing the need for the water reservoir and land access to operate the pump except for essential maintenance purposes. Once a new water supply was installed a new billing arrangement would be set up so that both parties paid for their water usage directly to the company without being incumbent on each other.

Unfortunately an agreement to accept this arrangement could not be reached by both parties due to ongoing conflicts of interest and eventually in 2015 the owner of the secondary parcel of land sold the premises to a developer who has since renovated the property.

A service pipe (common supply pipe) has since been installed to the boundary of the primary premise, from where the pipe divides to supply both properties on each privately owned premises. Each property will have its own meter.

This case study demonstrates how water supply arrangements between neighbours sharing water within the context of Regulation 8 can lead to disputes, resulting in public health risks and compromising situations that are difficult to resolve. In this scenario the unhelpful response of an individual acting under these circumstances led to the unusual position where those empowered under the Water Industry Act 1991 to bring about the necessary remedial actions on a failing supply through enforcement were unable to do so. Nevertheless this very protracted and concerning unsanitary situation was avoidable if the local authority had acted in a timely manner to issue an appropriate Notice when the risk of insufficiency was known.

This case study also highlights the varying nature of private water supply arrangements, particularly those of Regulation 8 supplies. ***This illustrates that while the Inspectorate has developed guidance for local authorities providing basic criteria to determine where Regulation 8 applies, realistically, circumstances will vary and may involve factors that complicate remediation of identified risks in a timely manner.***

This particular case study is an example of where the Inspectorate has used its discretion as an independent advisory body for private water supplies to bring about a resolution to an unusual and difficult scenario.

Case Study 2 – Successful prosecution of a relevant person for non-compliance with a Regulation 18 Notice

This case study was initially reported in the Private Water Supplies annual report for 2015. The supply consists of a borehole supplying three properties, one owned by the farmer on whose land the source was located and two separate downstream properties.

In October 2012, following a local authority risk assessment, the supply was deemed to constitute a potential danger to human health. There was broken fencing around the borehole headworks, the head of the borehole was not sealed and there was evidence of sheep having defecated directly onto the borehole apron as Figure 10 shows. Water was stored in four tanks downstream of the borehole in a shed. The tanks had no lids and the shed roof had holes allowing contamination of the tanks with particles of rust and polystyrene. Figure 11 is an example of holes in the roof which allowed the potential for further contamination or vermin to enter.

Figure 10: area directly around borehole

Figure 11: storage tank with holes in roof

The results of the sampling confirmed the presence of Enterococci, *E. coli* and coliforms in the supply, indicating faecal contamination. A Regulation 18 Notice was served, containing health protection actions requiring all water to be boiled before consumption. The Notice also required repairs to be made to the borehole chamber to prevent surface water ingress, together with installation of a stock-proof fence, new watertight chamber covers, installation of treatment, new reservoir tanks, vermin-proof overflow pipes and other actions to ensure suitable air gaps and backflow protection were in place. The local authority also provided a copy of the risk assessment, highlighting the key areas of risk.

The local authority arranged meetings to see how work was progressing in December 2012 and March 2013. The owner did not make himself available on either of these occasions, but on one of the visits a further sample taken from an outdoor sample point contained Enterococci, *E. coli* and

coliforms. A further visit was undertaken in April 2013 when it became apparent that no work had been done to improve the supply. Despite assurances from the owner that quotes for work were being sought, no progress was made, so a Regulation 18 Notice was served in October 2013 based on new information from the most recent sampling requiring all water to be boiled before consumption. The Notice also required the other outstanding repairs to be made.

The owner was invited to attend an interview under caution with the local authority (under the requirements of the Police and Criminal Evidence Act). He did not attend either of two dates set for this meeting. At this point the local authority issued a summons for the owner to appear in court in November. The owner did not respond to any solicitor's letters and did not turn up for the hearing. Following this, a further summons was issued in February and the owner was prosecuted in court in February 2015.

The magistrate had not previously encountered any cases involving private water supplies and initially thought that the case was just about a breach of a Notice. Once the public health risk was explained by the local authority, the magistrate took a very serious view of the offence. The local authority was called into the witness box in order for the magistrate to understand the difference between actual and potential risk. The local authority pointed to the failed sample results, but said that even if the samples had been clear a Notice would have been served based on the potential risk observed in the assessment.

The magistrate found in favour of the local authority and, in summing up, stated that there was a real risk to public health as downstream properties included young children and elderly residents. The defendant was fined £1,500 plus costs for non-compliance with the Notice, and the Notice was re-served with a deadline of May 2015.

Having still not undertaken any works, the owner returned to court in November 2015, where he pleaded guilty and received a sentence of eight weeks suspended for six months. Despite further visits and correspondence, the owner did not comply with the Notice, and was summoned to appear in court in July 2016.

The owner failed to appear, and due to the previous prosecutions for breach of the Notice and being subject to a suspended prison sentence, an arrest warrant was issued. The owner was duly arrested and pleaded guilty to the offences in Salisbury Magistrates' Court in August 2016. The owner produced quotes for works to the supply, and sentencing was adjourned until October, under condition that if works were completed within six weeks then he would not receive a prison sentence. Following this the local authority served a Section 80 Notice, allowing the works to be completed in default.

The local authority visited the site in October 2016. Works had started, and were due for completion by the end of October. The court was informed of this, and a custodial sentence was not handed down. The owner was ordered to pay fines and costs of £9,000.

The local authority visited the site again in November 2016 to review progress and sample the supply. The works had all been completed and the requirements of the Notice satisfied. The supply will be sampled again next year and risk assessed in five years.

This case study highlights the powers that local authorities have at their disposal to regulate private water supplies and protect public health. These powers can ultimately be enforced in a court of law if necessary and incur additional cost for the supply owner.

Case Study 3 – Private supplies in salad growing nurseries

Case study 8, published in *Drinking water 2015*, described a number of Regulation 9 private water supplies that were being used for domestic purposes by migrant workers on a salad growing nursery site in southeast England. These supplies had been poorly managed and maintained over decades, leading to a multitude of hazards manifesting, which in some cases presented risks to human health. These risks had developed, in part, due to inadequate regulations prior to 2009, which did not require relevant persons to proactively put in place the necessary preventative control measures to mitigate risks, based on identified source to tap hazards, in the way that the current regulations require. Previously, by contrast, action was only taken when routine samples exceeded the regulatory standard and in most cases, where a satisfactory resample followed, the matter was closed. As part of the risk-based methodology now required under Regulation 5, local authorities are duty bound to serve a Regulation 18 Notice where there is a potential risk to human health.

In this case, the local authority duly served a total of 25 Regulation 18 Notices in relation to risks to human health throughout 2015 and 2016. In all cases, the relevant persons concerned were largely nursery owners who were surprised and disgruntled by what they felt was a sudden and unnecessarily heavy-handed approach by the local authority. In the absence of specific sample failures they felt there was no substantive evidence to justify the enforcement and lodged a formal complaint to the council via a local nursery growers' association. Unfortunately, they were unaware that, since 2010, local authorities had a mandatory obligation to enforce where risks to human health had been identified in a risk assessment. Nevertheless, in many cases the nursery owners sought to comply with the Notices by seeking a connection to the public supply from

the relevant water undertaker. However, whilst this offered a long-term solution, the required measures to mitigate the risks were not carried out within the time period specified in the Notices due to delays that the growers felt were beyond their control. Furthermore, the local authority was concerned that the interim requirements to restrict the supplies and provide an alternative, as specified in the Notices, were not fully being met.

In this instance, the local authority took the decision not to initiate legal proceedings in the short term but to seek a more collaborative way forward that would not further antagonise what is a prominent and economically significant local industry. Consequently in early January 2017, chaired by the authority's senior executive officer, a meeting took place between a representative of some of the growers, the National Union of Farmers, the local authority enforcement officers and a representative of the local growers association. The Inspectorate attended to provide independent verification of the current legislative requirements from central government, and in particular an explanation of risk-based regulation.

The meeting highlighted that the relevant persons did not fully understand the requirements of the Regulations, or the reasoning for the enforcement. In addition, there was a lack of understanding that a multi-barrier approach should be applied to provide the most effective protection to consumers, and that the installation of a simple UV unit is not necessarily the most appropriate or reliable mitigation of risk in all cases.

A number of actions were agreed at this meeting, notably that the local authority would share site specific risks with the growers and that appropriate steps to remedy the risks, both in the short to medium term and the long term would be drawn up in a co-operative manner. The local authority were reminded subsequently that the Notices should be updated to reflect the agreed remedial steps that growers committed to and that these must be appropriate and completed to timely deadlines that were driven by their own expectations.

This case study highlights that despite seven years of new regulation requiring risk assessment, the reactive basis of historic legislation remains in the mind-set of many relevant persons. It illustrates an example of a common, if not deep seated, assumption by relevant persons (and sometimes local authorities) that a supply presents a risk only by virtue of a sample failure, and remediation can only be enforced when sample evidence is available. This case study also shows that a lack of understanding in risk-based regulation can lead to unhelpful behaviour by relevant persons, which in turn can seriously hinder the progression of risk mitigation through a breakdown of communication and trust between the parties involved. The Inspectorate appreciates that the change to risk-

based regulation will take time to embed and be accepted by relevant persons, but as this case study shows it is advantageous for the local authority to inform and update relevant persons of regulatory changes by all available means (e.g. through its website, as well as written and verbal communication) where possible. This includes the updates to the Regulations that were implemented in 2016.

This case study also shows that persons responsible for the provision of a wholesome supply can sometimes be unappreciative of the stringent measures required to protect consumers, due to a basic lack of understanding of what constitutes a safe and reliable system. As this case study demonstrates, this can lead to a misguided view of what is acceptable and bring them into conflict with the regulator where uncontrolled risks have been highlighted. Local authorities must use their powers of enforcement in accordance with Regulation 18 of the Private Water Supplies Regulations 2016, and apply a collaborative approach where possible. Notices can be updated and amended at the discretion of local authorities, but must bring about the mitigation of risks in a manner that is both timely and practicable by the most appropriate means, ensuring consumers are protected at all times whilst the Notice is in place.

Chapter 4: Summary of research on private water supplies and collaborative work by the Inspectorate

Chapter 4:

- Summarises the outcome of research and collaborative work that applies to private water supplies.

During the year, the Inspectorate published one research report specific to private supplies and a summary is provided below.

4.1 Comparison of Private Water Supply and Public Water Supply Ultraviolet (UV) Systems (DWI 70/2/306)

The objective of this study was to understand the differences between ultraviolet (UV) technologies used on public and private supplies, to review international standards for UV validations and develop a test procedure that could usefully evaluate a UV system based on dose validation. The project delivered guidance for private supply owners to help them select a suitable UV system and guidance for local authorities in the assessment of existing installations. This guidance will be published at www.dwi.gov.uk

This study involved visits to a number of UV disinfection installations on private water supplies and determined that they usually included pre-treatment such as filtration, but were often designed based on limited water quality data. There was limited monitoring and control of the systems, although there were examples where valving was designed to prevent a maximum flowrate being exceeded. There were very few instances where UV transmittance (UV_T) or turbidity was measured, thus making it difficult to assess whether the units operated within their design parameters. Systems were generally serviced annually, although a lack of alarms on many systems means that power cuts or lamp failure may go unnoticed for some time. The consultants concluded that the quality of design and installation varied considerably.

A number of validation standards exist for UV systems, although the majority are designed for public supplies. A British Standards Institute (BSI) standard exists, but this is only intended for the conditioning of mains water in buildings. The Önorm and DVGW[6] standards are considered the most appropriate standards, although the BS:EN 14987 standard has

[6] German Technical and Scientific Association for Gas and Water (DVGW).

similar requirements to Önorm, despite not being designed for private supplies. The final report documents a recommended test procedure for validation of systems for use on PWS. However, all existing standards where UV is installed for disinfection purposes require installation of a UV index sensor. These are unlikely to be found except on the largest private water supply systems.

The researchers made several key recommendations:

- A licensing or approved contractor scheme should be implemented for installers of equipment for private water supplies.
- Copies of manufacturers'/suppliers' operating and maintenance instructions should be provided and retained by the supply owner.
- A maintenance log should be kept by the owner to record details of maintenance carried out and schedules for future maintenance.
- Audible and visual alarms should be more prominent, particularly where the UV system is sited away from the user's premises.
- UV systems should include automatic shutdown of the water supply in the event of power or lamp failure.

The risk assessment tool developed by the Inspectorate includes many of these considerations in its hazard identification section for UV disinfection.

4.2 Workshops with local authorities across the country

The Inspectorate carried out a series of six workshops spread across the country during 2016. The aim was to provide an overview for local authorities on the changes to the Private Water Supplies Regulations, coming into force in late 2017. The Regulations transpose the amendments to the Drinking Water Directive Annexes II and III most importantly changing monitoring requirements. Under these changes, local authorities may reduce, cease or add parameters under certain circumstances. In particular there is a requirement to consider sampling frequencies based upon the risk assessment of monitoring. For example, where no risk is identified in the site risk assessment, a reduction in sampling will be permitted. This will require consideration of three years' sampling data and may necessitate some further sampling together with provision of other information such as geological risk to be taken into account during the assessment.

Other changes in the Private Supply Regulations arising from the Directive require quality management systems for the management of sampling and analysis using International Standards. The purpose is to ensure the consistency of quality when producing analytical data. As these standards

have been adhered to for a number of years this will not impact those who already provide this level of service, but will encourage those few where this is not the case.

During 2016, the Inspectorate prepared a *Sampling Procedures Manual* for use by local authorities in progressing accreditation for their sampling activities. This was made available and discussed at the workshops and can now be found on http://www.dwi.gov.uk the Drinking Water Inspectorate's website.

The recharging for private supply work by local authorities was considered in the workshops. Local authorities are able, under current legislation, to recover reasonable costs incurred. However, it is clear that local authorities are unable to recover their costs based on the upper limits that were set for private water supply activities. The Inspectorate has recognised this point and in response previously provided guidelines of expected cost recovery. Additionally, in the forthcoming consultation, options to the Regulations update are available in the re-draft for local authorities to comment on limits and accountability for reasonable recharge. This consultation will be available to all private water supply owners and local authorities in 2017.

In response to the publication of the Private Water Supplies Regulations 2016 (England) and the Private Water Supplies (Wales) (Amendment) Regulations 2016 (Wales) and feedback from local authorities, the Inspectorate conducted a review of the private water supply section of the website to ensure it continued to give relevant information to stakeholders.

Launched in September 2016, the new website retains the same style, however, the four information sections have been renamed in order to allow more specific information to be given within their respective sub-sections. See http://www.dwi.gov.uk/private-water-supply/index.htm for details.

- Regulations and guidance.
- Local authorities.
- Users of private water supply.
- Private water supply installations.

Further improvements to the site also include:

- Introduction of guidance documents to complement the new Regulations.
- Removal of information required during the first five years of the Regulations.
- Case studies are now split into relevant topics and further examples are given around Regulation 8 supplies.
- Removal of repetitive links and information.

The new design allows the Inspectorate to include further guidance documents and additional information topics if and as required by stakeholders.

4.3 Radioactivity

Radioactivity and the transposition of the Euratom remains a key matter of interest to the Inspectorate and the local authorities due to the potential impact of monitoring and subsequent costs. Recognising this, the workshop focused on background to radioactivity and included a presentation by Public Health England.

4.3.1 Background[7]

Radioactivity from several naturally occurring and man-made sources is present throughout the environment. Water contains a small and variable quantity of natural radioactivity from the decay of uranium and thorium and their daughters, together with potassium-40. Natural radionuclides, including potassium-40, and those of the thorium and uranium decay series, in particular radium-226, radium-228, uranium-234, uranium-238, and lead-210, can be found in water for natural reasons (e.g. desorption from the soil and wash-off by rain water) or releases from technological processes involving naturally occurring radioactive materials (e.g. the mining and processing of mineral sands or phosphate fertilizer production and use).

[7] Reference sources: BSEN 13165-3: 2015 Water Quality – Radium 226; ISO BSEN 9698:2010 Water Quality – Determination of Tritium activity;ISO BSEN 9698:2015; PHE RadonUK.org website for Radon; SCA Blue book 94 for radon.

Man-made radionuclides such as the transuranium elements (americium, plutonium, neptunium, curium), tritium, carbon-14, strontium-90, and gamma emitters radionuclides can also be found in natural waters as they can be authorised to be routinely released into the environment in small quantities in the effluent discharge from nuclear fuel cycle facilities and following their use in unsealed form in medicine or industry. They are also found in the water as a result of past fallout contamination resulting from the explosion in the atmosphere of nuclear devices and accidents such as those that occurred in Chernobyl and Fukushima.

4.3.2 Indicative dose

Drinking water can contain radionuclides at activity concentrations which could present a risk to human health. In order to assess the quality of drinking water with respect to its radionuclide content and to provide guidance on reducing health risks by taking measures to decrease radionuclide activity concentrations, water resources (groundwater, river, lake, (sea), etc.) and drinking water are monitored for their radioactivity content. This is carried out by monitoring for alpha (α) and beta (β) emissions and calculating the indicative dose. The regulatory level for drinking water for indicative dose is the activity concentration based on an intake of two litres per day of drinking water for one year that results in an effective dose of 0.1mSv per year for members of the public, an effective dose that represents a very low level of risk that is not expected to give rise to any detectable adverse health effect, but it does not include radon or tritium.

Overall, the risk of high levels of radioactive elements in drinking water in the UK is low. Generally, alpha and beta analysis is carried out as a surrogate to the indicative dose measurements as this method is specialised. There may be some cases where the monitoring for alpha emitters exceed 0.1Bq/l, but on further investigation are found to be below the annual indicative dose level and risk assessments are updated to show this additional information for future sample results.

4.3.3 Tritium

The tritium present in the environment is mainly of man-made origin, but some tritium can be formed naturally. Man-made origins are formed as a result of atmospheric nuclear weapon testing, emissions from nuclear engineering installations, and the application and processing of isotopes, relatively large amounts of tritium have been released to the environment. Despite the low dose factor associated to tritium, the monitoring of tritium activity concentrations in the environment is necessary in order to follow its circulation in the hydrosphere and biosphere.

Levels of tritium in drinking water in the UK are usually around or below the method limit of detection of 10Bq/l, the level for investigation is 100Bq/l.

4.3.4 Radon

It is one of the commonest radioactive elements occurring naturally in British waters, chiefly as radon-222. Radon is a gas and can easily be removed even though it is appreciably soluble in water; it is not measured with the other alpha emitters in the method for gross alpha radiation.

4.3.5 Measurement

Radon is a new parameter and both water companies and local authorities only started to carry out measurements and assessing risk to supplies in 2016. DWI has provided the technical advice needed for local authorities, but are not radiochemical experts, and are also on the same steep learning curve as regards radon as local authorities and water companies. This year has seen some changes to advice in ways of monitoring for radon which has caused some confusion. Our guidance changed with regard to radon in air measurements on the advice of Public Health England who are the experts in this field. Testing for radon in air is not as useful as originally suggested in the Ricardo AEA radon research project carried out prior to the introduction of the Regulations in determining whether the drinking water prescribed concentration or value (PCV) of 100Bq/l may have been exceeded. This is because a drinking water supply concentration at the PCV is only likely to contribute around 10Bq/m^3 in air which is less than the average radon concentration in UK homes (20Bq/m^3).

The UKRadon.org website has the following information:

- The average home has a background level of 20Bq/m^3.
- The target level for a safe level in homes is 100 Bq/m^3.
- At levels between 100 and 200Bq/m^3 consideration should be taken to reduce levels to below 100 where smokers or ex-smokers are in the home.
- The action level for action to be taken to reduce radon in air levels is 200Bq/m^3.

The measurement of radon in air as a surrogate for radon in water is therefore no longer advised as the PCV roughly equates to a level below normal background levels, only a level significantly higher than the PCV

level would have an impact on the radon in air measurement. Additionally, the test is time consuming requiring the detector to be in situ for weeks and the cost is relatively expensive compared with commercially available testing in water. In order to decrease the impact and cost on the private supply owner, measurement of radon preferentially should be in water.

However, where it is already known or established that the radon in air is between 100Bq/m^3 and 200Bq/m^3, then investigating whether the radon in water is an additional contributor to the radon in air measurement (and takes into account the advice for the protection of smokers and ex-smokers), may have a bearing on how mitigation for radon-in-air is carried out (ground released radon-in-air versus water released radon-in-air).

The main route of radon entering the body is through inhalation and not ingestion, however, the Euratom directive legislated a level for drinking water which was required to be transposed to national legislation. During 2016, both local authorities and the Inspectorate (through water company data submissions) started gathering information on the actual 'at tap' risks of radon in drinking water and the likelihood of breaches of the legislation and further need to monitor. By the end of 2016, water companies started submitting applications for their drinking water monitoring points for reducing or ceasing monitoring for radon. This is information which LAs can use to assist the risk where water is from the same aquifer, this information may remove the need to monitor and provide the evidence for the risk assessment.

4.4 Information notes

Information notes related to each Regulation have been continuously updated throughout the year. As part of the website upgrade, a table has been placed under 'hot topics' which highlights any changes to Information notes, and any substantial alteration would include an email notification to local authorities. *Annex 3* contains details of the changes.

Chapter 5: Drinking water testing results

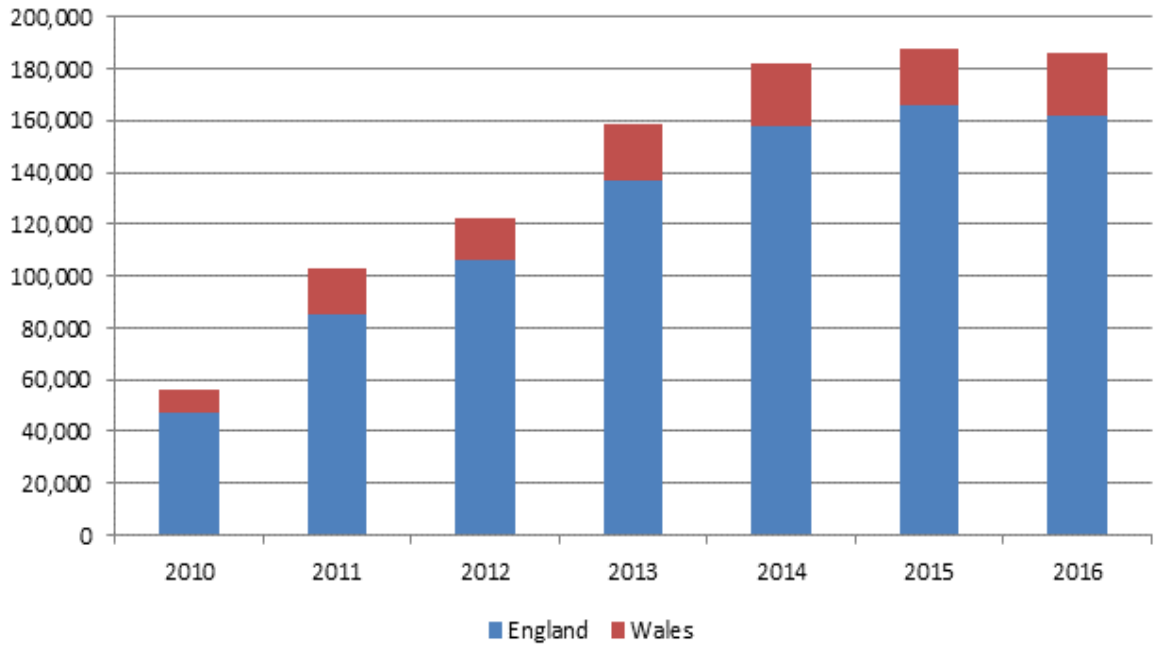
Chapter 5:

- Describes the progress of local authorities in providing test results.
- Summarises the results of private supply testing.

5.1 Local authority progress in reporting test results

This chapter summarises the information provided by local authorities to the Inspectorate about the results of the testing of private water supplies. In total, for the calendar year of 2016, there were 185,984 test results submitted to the Inspectorate by local authorities (a slight overall reduction in the number from 2015 which was 188,054), however, the volume of tests submitted for England fell slightly while those for Wales increased slightly.

Figure 12: Numbers of test results sent to the Inspectorate 2010–2016



5.2 Results of 2016 monitoring

In preparing Tables 13 to 15 it should be noted that when pooling data from local authorities, the Inspectorate checked for and corrected any simple errors (incorrect units, obvious input errors such as decimal point in the wrong place) to enable these results to be included in the report. Where the Inspectorate corrected data, the local authority was contacted, and the problem and changes explained and agreed. Some of the issues identified with annual returns were:

- Analytical sample results entered in the wrong units.
- There was inappropriate use of < (less than) symbols, for example, nickel reported as <20µg/l when the standard is 20µg/l. This is either a shortcut being used by local authorities to speed data entry (saying in effect the sample did not fail, or that the method is not sufficiently sensitive and that the limit of detection is at the same value as the standard.
- There was inappropriate use of > (greater than symbols) on chemical parameters.
- Analytical data for parameters not contained within the Regulations.
- Some analyses for taste and odour do not comply with the required method.
- Obvious typographical errors (typos).
- Poor correlation between samples flagged as failing with those actually failing the standard.
- Confusion of nitrate and nitrite results with figures for nitrate (NO_3) being entered instead of figures for nitrite (NO_2).

The drinking water standards in the private water supply Regulations are the same as those that apply to public water supplies and most derive from the EU Drinking Water Directive. An explanation of the standards can be found in *Annex 5*. In the Regulations[8], the standards are set out by parameter in Schedule 1.

Annex 2 shows a summary of test results for 2016 for England and Wales. The total number of breaches during 2016 was slightly lower than 2015, a reduction from 6.9% to 5.6%. This continues the year-on-year improvements in water quality of private water supplies. However, there

[8] The Private Water Supplies Regulations 2016.

remain some underlying concerns particularly regarding microbiological failures.

In considering this year's data, a source to tap approach has been considered and the parameters have been divided into three groups:

- Those which are most likely to arise in the source water and are present pre-abstraction, and are present due to the quality of untreated raw water in the catchment.
- Those which are most likely to arise due to conditions post-abstraction, either within treatment or distribution.
- Those which may arise at any point in the supply chain.

Pre-abstraction – England

Table 13: Parameters most likely to arise due to quality of water in the catchment

Parameter	Current standard or specified concentration	Total number of tests	Number of tests not meeting the standard or specification	Percentage of tests not meeting the standard
EU parameters				
Nitrate	50µg/l	5,524	573	10.4
Fluoride	1.5mg/l	1,134	74	6.5
Arsenic	10µg/l	1,774	50	2.8
Pesticides (individual)*	0.1ug/l	60,100	1,569	2.6
Trichloroethene and Tetrachloroethene	10µg/l	313	6	1.9
Boron	1mg/l	775	10	1.3
Selenium	10µg/l	830	10	1.2
Pesticides (total by calculation)	0.5µg/l	210	1	0.5
Benzene	1µg/l	707	1	0.1
Cyanide	50µg/l	508	0	0.0
1,2-Dichloroethane	3µg/l	629	0	0.0
National parameters				
Manganese	50µg/l	5,784	395	6.8
Tetrachloromethane	3µg/l	601	16	2.7
Colour	20mg/l Pt/Co	5,634	91	1.6
Indicator parameters				
Hydrogen ion (pH)	6.5 – 9.5	8,520	678	8.0
Radioactivity – Gross Alpha	0.1 Bq/l	194	15	7.7
Sulphate	250mg/l	761	26	3.4
Chloride	250mg/l	795	17	2.1
Ammonium	0.5mg/l	5,994	118	2.0
Conductivity	2500µS/cm	8,369	6	0.1
Total Organic Carbon	No abnormal change	376	0	0.0
Radioactivity – Gross β	1.0 Bq/l	190	0	0.0
Tritium	50µg/l	94	0	0.0
Indicative dose	0.10 mSv/year	39	0	0.0
Radon	100 Bq/l	3	0	0.0

Nitrate is detected in drinking water, usually as a consequence of agricultural activity, and continues to pose a challenge for those supplies in rural areas where access to an alternative supply or treatment is difficult. With 573 failing samples in 2016 (11% from 5,524 total samples taken), nitrate continues to be the biggest risk to water quality in the catchment. The presence of nitrate in drinking water can pose a risk to

bottle fed infants and consideration for this must be made when assessing risk and considering notices.

Like nitrate, pesticides deriving from agriculture contribute significantly to the number of failures from catchment, without appropriate catchment control for small supplies treatment such as using a carbon-based treatment is an option. However, without appropriate mitigation, pesticides will continue to be detected in numbers.

In 2016, 5.1% of samples were found to contain DDT, (six out of a total of 118 samples). DDT is an insecticide that was widely used during the Second World War to protect the troops and civilians from the spread of malaria, typhus and other vector-borne diseases. After the war, DDT was widely used on a variety of agricultural crops and although it was banned in the UK about 30 years ago, it remains detectable in the environment along with its metabolites, which are resistant to breakdown. In its time it was extremely effective at controlling insects and was used in malarial control.

There were 3% of all samples where bentazone was detected in 2016 (nine out of 305 samples). Bentazone is a herbicide approved for use in the EU. It is highly soluble in water, volatile and, as it is mobile, may present a risk of leaching to groundwater. It is not likely to be persistent in soil systems, but may be persistent in water under certain conditions. It is moderately toxic to humans and a recognised skin and eye irritant. Bentazone is also moderately toxic to birds, fish, aquatic invertebrates and earthworms.

The presence of diuron was found in 2.8% of all samples in 2016 (eight out of 287 samples). Diuron is used as a herbicide on a variety of both crop and non-crop areas. It is also used as a mildewicide in paints and stains, and as an algaecide in commercial fish production. It is widely used to control weed growth in crops, particularly peas and asparagus, but is particularly prevalent in use on rail tracks and clearing walkways of weeds.

During 2016, 8.1% of all samples showed the presence of hexachlorobutadiene, (five out of 62 samples). Hexachlorobutadiene is used mainly as an intermediate in the manufacture of rubber compounds, but is also used as a solvent in chlorine gas production, a lubricant, a gyroscopic fluid, a pesticide and a fumigant in vineyards. No information is available on the health effects of hexachlorobutadiene in humans. Animal studies have reported effects on the kidney and respiratory system from acute inhalation exposure.

Trichlorobenzene (TCB) was found in just one sample out of 17 (5.9%) in 2016. Trichlorobenzenes are being used as an intermediate in the production of herbicides and pesticides. However, they were historically used as dye carriers, which adsorb into the polyester fibres. TCBs are

likely to adsorb to organic sediments, particularly in river sediments. This results in high concentrations in river sediments, making them 'pollution hot spots'. They are immobile and very persistent in these soils. TCBs are not considered to be carcinogenic although they have been shown to cause acute toxicity to algae, crustaceans and fish.

Sodium chlorate – a non-selective weed killer was banned across Europe in 2009. However it was a very popular weed killer and may remain in an individual's shed or old storage. As such, any detections are likely due to localised applications. Only one sample was taken and it showed the presence of sodium chlorate in 2016.

Equally, natural fluoride also plays an important factor when assessing catchments (74 failures from a total of 1,134 samples–6.5%). Fluoride is a common element distributed within the earth's crust and the detection of this element above the standard may result in skeletal or dental fluorosis. Local authorities should consider mitigation strategies to reduce risk to the consumer which may include active removal, dilution or an alternative supply.

Arsenic continues to be detected in private supplies where 2.8% of 1,774 samples failed (50 failures). Arsenic is often introduced into water through the dissolution of rocks, minerals and ores, from industrial effluents, including mining wastes and via atmospheric deposition, and is known to be toxic and a carcinogen to humans. There are a number of treatments which can reduce arsenic which may, like fluoride include active removal, dilution or an alternative supply where practicable. Nevertheless, identification of this element must require appropriate action.

Looking at the national parameters: manganese is one of the most abundant metals in the Earth's crust, usually occurring with iron and is often found in water supplies. It is an element essential to the proper functioning of both humans and animals, as it is required for the functioning of many cellular enzymes. At concentrations exceeding 0.1mg/l, manganese imparts an undesirable taste to beverages and stains plumbing fixtures and laundry. At concentrations as low as 0.02mg/l, manganese can form coatings on water pipes that may later slough off as a black precipitate. In 2016, 395 out of a total of 5,784 samples (6.8%) failed for manganese.

The major contribution to chemical breaches is hydrogen ion, where although there has been a decrease in failures in 2016 (9.7% compared to 11.4% in 2015), it still means that almost one-tenth of all supplies are affected. The acidity of water is measured by pH. The standard for pH requires it to be above 6.5 and below 9.5. The most frequent problems arise in upland areas where water may pick up iron and humic acids from peaty soil, resulting in acidic raw water (low pH), which is commonly

described as ‘soft water’. Such water has an increased potential to corrode iron pipes. Where pH values above 9.5 occur this is usually due to leaching from cement mortar-lined mains. Additionally, the pH of water can be affected when a treatment device within premises artificially softens the tap water.

With the first returns being made for radioactivity, 7.7% were found to have failed for gross α, (194 samples with 15 failures). Analysis for alpha radiation is simple, cost effective and a practical approach to screening supplies to determine if further specific analysis is required. Whilst the screening level is highly conservative, where exceeded concentrations of individual radionuclides should be determined. This result is shown as indicative dose and the standard for this is less than a third of an equivalent dose received by a person from the average annual exposure to the sun. There were no subsequent failures on further testing when using this standard.

Post Abstraction – England

Table 14: Parameters most likely to arise from treatment and distribution

	Current standard or specified concentration	Total number of tests	Number of tests not meeting the standard or specification	Percentage of tests not meeting the standard
EU and national parameters*				
Nitrite – treatment works	0.1mg/l	1,119	123	11.0
Sodium	200mg/l	1,071	57	5.3
Lead	10µg/l	2,426	99	4.1
Nickel	20µg/l	1,323	33	2.5
Copper	2mg/l	1,646	40	2.4
Antimony	5µg/l	910	7	0.8
Nitrite – Consumers’ taps	0.5µg/l	4,274	19	0.4
Bromate	10µg/l	622	2	0.3
Cadmium	5µg/l	1,086	2	0.2
Trihalomethanes (total by calculation)	100µg/l	568	1	0.2
Chromium	50µg/l	1,046	1	0.1
Mercury	1µg/l	471	0	0.0
*No indicator parameters were assigned to the post abstraction table.				

Nitrite is the biggest influence in post treatment samples. A total of 123 samples, from 1,119 samples taken, failed for nitrite (11%). Whilst nitrite is not usually present in aerobic surface or groundwaters it is primarily formed in two ways; in distribution as part of the nitrification of ammonia by oxidising bacteria; or by denitrification of nitrate containing water in oxygen poor drinking water in galvanised pipes. Therefore, both catchment and distribution play a part in this risk and should be assessed since the toxicity of nitrate to humans is mainly attributable to its reduction to nitrite.

Sodium showed a 5.3% failure rate (from 1,071 samples), this element is often found where softeners are used prior to the drinking water tap. A simple bypass of the softener for drinking water is recommended. More rarely sodium may be due to influence from saline intrusion into water courses or aquifers, and determination of this is geological. Sodium salts are generally highly soluble in water and are leached from the terrestrial environment to groundwater and surface water. They have a variable influence on taste and odours of drinking waters. As expected there is quite a degree of variation in hydrogen ion, due to the range of geological conditions, rocks or peat moors and their effects on water being abstracted.

Continuing the theme of plumbing metals, 99 samples from a total of 2,426 (4.1%) failed for lead. There were 40 failures of copper (2.4%), attributable to leaching from copper pipework and 33 nickel failures from 1,323 samples (2.5%) associated with nickel presence in chrome taps. A recent enquiry from a local authority, related to a nickel failure where, in response to other bacterial problems, the consumer's taps were replaced. Unfortunately, even though these were WRAS approved nickel, which is layered under the chrome in taps, is exposed at the spout. This is a known cause of nickel failures. It is important to consider the whole system when risk assessing a site, as even though the taps were newly installed, they had introduced a new parameter failure. Simple replacement of part of a system does not necessarily exclude it from further investigation of failures.

System wide – England

Table 15: Parameters that can arise throughout the catchment and in distribution

Parameter	Current standard or specified concentration	Total number of tests	Number of tests not meeting the standard or specification	Percentage of tests not meeting the standard
EU and national parameters				
*Pseudomonas aeruginosa**	0/250ml	143	17	11.9
Enterococci	0/100ml	5,648	444	7.9
Escherichia coli (*E.coli*)	0/100ml	11,495	853	7.4
Iron	200µg/l	6,036	429	7.1
Odour	No abnormal change	4,936	325	6.6
Taste	No abnormal change	4,257	205	4.8
Aluminium	200µg/l	3,923	85	2.2
Turbidity	4 NTU	8,286	157	1.9
Benzo(a)pyrene	0.01µg/l	290	3	1.0
Polycyclic Aromatic Hydrocarbons (total by calculation)	0.1µg/l	241	0	0.0
Indicator parameters				
Coliform bacteria	0/100ml	11,278	1,610	14.3
Turbidity	1 NTU	740	64	8.6
Clostridium perfringens	0/100ml	4,405	288	6.5
*Pseudomonas aeruginosa only sampled in the case of water in bottles or containers.				

During 2016, 7.4% of 11,495 samples failed for *E.coli* while 14.3% of 11,278 samples failed for coliforms. Additionally there were detections of enterococci or *Clostridium perfringens.* The presence of these organisms demonstrate a health risk as water which has been contaminated by faecal material has the potential for pathogens to be present. Faecal pollution may arise throughout the supply and up to the tap, often through poorly controlled catchments, poor source protection as well as poorly constructed and protected wells, inadequate treatment such as disinfection and poorly maintained reservoirs, tanks and distribution. Risk assessments should examine in detail any and all of these areas and the Inspectorates risk assessment tool will help identify these areas and mitigations to progressively reduce failures.

Taste and odour represents a considerable proportion of failures and because these are perceptible, this often leads to rejection of the water and loss of confidence. During 2016, 4.8% of samples failed for taste and 6.6% failed for odour. There is a multitude of reasons why water may have a taste and odour, ranging from the catchment and the type of geology, speed of passage of water through strata, presence of algae, bacteria, minerals and surface contaminant's and through treatment with disinfectants, storage, distribution and the materials used in the supply. It is important to capture the taste or odour descriptor as this often points to the source of the problem, e.g. from the less obvious such as musty for algal problems, or pencil shavings from black alkathene pipework to the more obvious, but not so easy to solve, such as phenol or TCP type odours from the interaction of chlorine and rubber products.

The continuing high level of failures in private supplies represents an equally high level of risk with a potential consequential risk of unfavourable health outcomes. Careful consideration must be given to the risk assessment, matching risk with monitoring to verify the effectiveness of mitigations, a key aspect of the incoming Regulations in late 2017.

Chapter 6: Legislative updates

Chapter 6:

- Highlights work on the revision of the Regulations and accompanying guidance.

6.1 Revised Private Water Supply (England) Regulations 2016

Background

Drinking water quality Regulations in England and Wales transpose the requirements of the Directive 98/83/EC (the Drinking Water Directive) which came into force on 25 December 2003. Private water supplies are regulated by local authorities. The Inspectorate has a supervisory role, and provides technical advice and support on policy and strategy to ensure implementation of the Private Water Supplies Regulations.

The Private Water Supplies Regulations 1991 (SI 1991/2790) were replaced by the Private Water Supplies Regulations 2009 in England (SI 2009/3101) and the Private Water Supplies (Wales) Regulations 2010 (SI 2010/66 W.16) in Wales, as the original 1991 Regulations did not fully transpose the Drinking Water Directive.

The European Commission approved a proposal for new requirements for the monitoring of drinking water for radioactive substances in November 2013. Member States had until 28 November 2015 to transpose the Directive into national legislation. During the revision to the Regulations in England, the opportunity was taken to consolidate a small earlier amendments.

Euratom requirements

A parametric value or standard was set for radon in drinking water (100Bq/l) with provision for Member States to set a level up to 1,000Bq/l provided water supply is not compromised, i.e. a level of protection is maintained. Minimum frequencies for monitoring have been specified for monitoring for tritium and indicative dose (ID). Monitoring will not be required if it can be demonstrated that the radioactive parameters are not likely to be present or will be at levels well below the parametric value. This demonstration should be based on representative surveys, monitoring data or other reliable information. In addition, monitoring for tritium is required only where there is a man-made source.

The new Regulation 11 contains the requirements for monitoring radioactive substances. For radon, a representative survey must be carried

out to determine the likelihood of a supply failing the standard. The representative survey (risk assessment) for radon should cover the scale and nature of likely exposure to radon from different sources and wells in different geological areas; and the impact of geology and hydrology of the area and radioactivity of rock and soil and well type.

For ID, a screening method for gross alpha and gross beta activity may be used and if the trigger values are exceeded, further analysis must be carried out for specific radionuclides.

The maximum concentrations or values or states for radioactivity parameters are set out in Schedule 1, Part 3, Table D:

- Addition of a standard for radon [100Bq/l]; and
- Addition of gross alpha and gross beta 'trigger' values 0.1Bq/l and 1Bq/l respectively for screening for ID.

A new part to Schedule 3 (Part 3) sets out the methodologies for monitoring for individual radionuclides. This is currently in guidance, but is now required to be set out in the legislation. The screening method for gross alpha and gross beta to monitor for ID is described, and the requirement to monitor for individual radionuclides when the screening values are exceeded.

The Regulations entitled, the Private Water Supplies (England) Regulations 2016 consolidated previous amendments and amended specific Regulations as appropriate on the transposition of the Euratom Directive. The exemptions for water used for food production purposes has been expanded to allow for a competent authority (in this case, the Food Standards Agency) to confirm that it is satisfied that the quality of water cannot affect the wholesomeness of a foodstuff in its finished form. Regulations 6, 9 and 10 have been amended to clarify that the Regulations apply where water is used as part of a commercial activity, not to commercial premises.

Regulation 5 (Products or substances in contact with private supplies) the reference to Regulation 31 of the Water Supply (Water Quality) Regulations 2000 (as amended) has been removed. This is now a freestanding provision which sets out the requirements as regards products or substances used in the treatment or distribution of private water supplies. This reflects the existence of a more flexible approach to approve products and substances that have been used historically in the treatment and distribution of private water supplies with no detrimental effect on water quality, as well as the process for approving products and substances for public water supplies.

In Regulation 6, the requirement to carry out a risk assessment within five years of the Regulations coming into force has been removed as it is now time expired. However, the requirement to review and update the risk assessment every five years has been retained.

A new Regulation has been introduced for new supplies. Any new supplies or any supply not used for a period of 12 months (except single domestic dwellings not used as part of a commercial activity or provided to the public), must be risk assessed and monitored as soon as the local authority becomes aware of its existence. The supply must not be brought into use until the local authority is satisfied that it does not constitute a risk to health.

Regulation 16 has been amended to clarify the action following investigations into the cause of a water supply becoming unwholesome. If the cause is due to the distribution system within a domestic premises (i.e. the pipework and fittings), the local authority must inform the people concerned and offer advice on measures to protect health. However, if the cause is due to the distribution system within a public building, the local authority must inform the people concerned, offer advice on measures to protect health and ensure appropriate remedial action is taken.

Regulation 16 has also been amended, to exclude the provision which had allowed local authorities to take no action where an investigation has established that the water is unwholesome. Where a local authority has carried out an investigation and established the cause of the water being unwholesome or insufficient, the relevant person has 28 days to remediate the situation, otherwise the local authority must now serve a Notice under Section 80 of the Water Industry Act 1991.

Revised annexes were published in October 2015 with transposition by October 2017. Annex II of the Drinking Water Directive sets out the check and audit monitoring frequencies for water supplies, now to be termed Group A and Group B parameters, while Annex III sets out the specifications for analysis of these parameters. There is a move away from rigid monitoring frequencies based on volume and local authorities will be able to adjust monitoring for certain parameters based on risk assessments of the sites. The Inspectorate has carried out a piece of work to establish which parameters can be reduced, as although the Directive states the only fixed parameter is *E. coli,* other parameters such as microbial indicators or lead and plumbing metals, are likely to vary considerably by site, so it is reasonable to expect these will be sampled at a fixed frequency. The Directive requires that the risk assessment process meets ISO standards. The current risk assessment tool provided by the

Inspectorate does meet these criteria and is recommended for use by local authorities. Any other risk assessment which is used by local authorities in compliance with the Regulations will need to meet this standard and be approved by the nominated accreditation body.

To qualify for a reduction of monitoring, local authorities must have the previous three years' worth of data taken at regular intervals to demonstrate low risk of failing that parameter. If data shows that all results are below 30% of PCV, monitoring may cease. If data shows that all results are below 60%, a reduced monitoring frequency is permitted. Local observations from any risk assessments must also be taken into account and any risk assessments must take into account any data held for Water Framework Directive purposes. The Inspectorate are working with other regulators to produce heat maps and risk areas for local authorities to determine whether aquifers or supply zones are in areas of low, medium or high risk for selected parameters. Updates on progress will be available on the Inspectorate's website.

Analytical specification is currently based on 'trueness and precision', and this defines analytical quality control appropriate for laboratory analysis. Revised Annex III moves to 'Uncertainty of measurement' from 2019, which means a change in procedures for laboratory analysis and the rewriting of quality standards. In the interim, laboratories may carry out their analysis by either method. The revisions also specify new methods for some microbiological parameters.

The Inspectorate has taken this amendment to Regulations as an opportunity to revisit the concern of charging raised at workshops. Following various discussions, proposals have been submitted for consultation that includes removing the upper cap on local authority fees. Any reasonable costs for local authority work on private water supplies, will be recoverable under the new proposals.

Guidance

The guidance on the Regulations has now been updated. This supercedes the previous guidance document (October 2010), and it is now published in separate information notes for each individual Regulation, with an overarching guidance note covering monitoring. These are published on the Inspectorate's website and may be subject to individual revisions and updates if necessary. Due to the difference in timetable for the revision to the Regulations between England and Wales, separate notes have been produced for each and these will be amended as and when required. *Annex 3* provides a list of the updates that have been made to guidance.

Annex 1 – Numbers of supplies, risk assessments and evidence of monitoring and enforcement.

England and Wales Council name **Note** **Councils marked with a * did not make a valid return or returned too late to have their data for 2016 incorporated so the latest available data has been used.**	Total supplies	Single domestic dwellings	Further distribution of mains water by someone other than a licensed water supplier (Regulation 8)	Large supplies and any size supply used in a public building or a commercial activity (Regulation 9)	Small, shared domestic supplies (Regulation 10)	% risk assessments completed for Regulation 9 supplies	% risk assessments completed for Regulation 8 and 10 supplies	Evidence of monitoring of Regulation 9 supplies provided?	Evidence of monitoring of Regulation 8 and Regulation 10 supplies provided?	Evidence of having served Regulation 18 or Section 80 Notices?	Non-domestic purposes or domestic purposes – other
Adur District Council	3			1	2	100	100	Y	Y		
Allerdale Borough Council	278	127	4	105	27	69	0	Y	Y	Y	15
Amber Valley Borough Council	62	45	1	8	8	75	33	Y	Y		
Arun District Council	13	6		3	4	33	75	Y	Y		
Ashfield District Council	3	3				N/A	N/A	N/A	N/A		
Ashford Borough Council	7	6			1	N/A	100	N/A	N		
Aylesbury Vale District Council	35	23		6	6	100	100	Y	Y		
Babergh District Council	151	111	1	14	25	93	77	Y	Y		
Barking and Dagenham Borough Council	1					N/A	N/A	N/A	N/A		1
Barnet Borough Council	1			1		100	N/A	Y	N/A		
Barnsley Borough Council	1			1		100	100	Y	Y	Y	
Barrow-in-Furness Borough Council	41	32		6	3	100	N/A	Y	N	Y	
Basingstoke & Deane Borough Council	3	2		1		100	100	Y	Y	Y	
Bassetlaw Borough Council	24	10		11	3	100	100	Y	N		

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Bath & North East Somerset District Council	73	44	1	14	14	100	93	Y	Y	Y	
Bedford Borough Council	11			2	2	100	100	Y	N		7
Birmingham City Council	2			2		100	N/A	Y	N/A		
Blaby District Council	8	7			1	N/A	100	N/A	N		
Blackburn with Darwen Borough Council	89	65		3	21	100	100	Y	Y		
Blackpool Borough Council	2			2		0	N/A	N	N/A		
Blaenau Gwent County Borough Council	30	26		4		75	N/A	Y	N/A		
Bolsover District Council	1				1	N/A	100	N/A	N		
Bolton Metropolitan Borough Council	32	13		1	17	0	100	N	N	Y	1
Bradford Metropolitan District Council	342	178		75	88	96	95	Y	Y	Y	1
Braintree District Council	186	139		19	27	95	89	Y	Y		1
Breckland District Council	270			169	101	46	9	Y	Y	Y	
Brentwood Borough Council	3	3				N/A	N/A	N/A	N/A		
Bridgend County Borough Council	76	69		6	1	100	100	Y	N	Y	
Brighton & Hove City Council	4	1	1	2		100	0	N	N		
Broadland District Council	584	425		63	96	100	100	Y	Y	Y	

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Bromley (London Borough of)	3			3		0	N/A	Y	N/A		
Bromsgrove District Council	28	23		1	4	100	75	Y	Y	Y	
Broxbourne Borough Council	4	4				N/A	N/A	N/A	N/A		
Broxtowe Borough Council	2			2		100	N/A	Y	N/A		
Burnley Borough Council	87	29		26	32	73	94	Y	Y	Y	
Bury Metropolitan Borough Council	68	44	5	7	12	43	53	N	Y		
Caerphilly County Borough Council	71	57		4	10	100	100	Y	Y		
*Calderdale Metropolitan Borough Council (figures from 2015)	794	551		38	205	No data	No data	No data	No data	No data	No data
Canterbury City Council	5	4			1	N/A	100	N/A	Y		
Cardiff Council	25	17		2	6	50	83	Y	Y	Y	
Carlisle City Council	171	126		25	20	72	85	Y	Y	Y	
Carmarthenshire County Council	2,356	2,111	7	59	14	69	71	Y	N	Y	165
Central Bedfordshire Council	30	19		9	2	78	100	Y	Y	Y	
Ceredigion County Council	1,435	1,268		82	85	100	100	Y	Y	Y	
Charnwood Borough Council	17	13		1	3	100	100	Y	Y	Y	
Chelmsford Borough Council	15	11	1	1	2	100	100	Y	N		

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Cheltenham Borough Council	22	13			8	N/A	50	N/A	N		1
Cherwell District Council	150	111	1	11	27	82	96	Y	Y		
Cheshire East Council	444	365		60	18	92	94	Y	Y	Y	1
Cheshire West & Chester Council	64	37		9	17	100	100	Y	Y		1
Chichester District Council	73	28	6	9	30	78	36	Y	Y		
Chiltern District Council	22	18		2	2	100	100	Y	Y		
Chorley Borough Council	18	15		1	2	100	50	Y	Y		
City of London	2			2		100	N/A	Y	N/A		
Colchester Borough Council	45	41		2	2	100	100	Y	Y		
Conwy County Borough Council	524	420		78	25	71	92	Y	Y	Y	1
Copeland Borough Council	235	140		69	26	97	96	Y	Y		
Cornwall Council	3,731	2,712	9	571	439	73	14	Y	Y	Y	
Cotswold District Council	230	81	5	125	19	98	100	Y	Y	Y	
Coventry City Council	1			1		100	N/A	Y	N/A		
Craven District Council	737	362		208	167	92	88	Y	Y	Y	
Dacorum Borough Council	39	23	6	4	6	25	92	Y	Y		
Darlington Borough Council	5			5		20	N/A	Y	N/A		

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Dartford Borough Council	1				1	N/A	0	N/A	Y		
Daventry District Council	109	87			16	N/A	56	N/A	N		6
*Denbighshire County Council Note : Monitoring data not loaded	994	474		184	336	80	52	See note	See note	Y	
Derbyshire Dales District Council	225	159		39	27	64	81	Y	Y		
Doncaster Metropolitan Borough Council	27	11	4	12		100	25	Y	N		
Dover District Council	3	3				N/A	N/A	N/A	N/A		
Dudley Metropolitan Borough Council	2	2				N/A	N/A	N/A	N/A		
Durham County Council	317	131		90	96	69	41	Y	Y	Y	
East Cambridgeshire District Council	38	24	1	11	2	100	100	Y	Y	Y	
East Devon District Council	1,133	828		172	131	77	94	Y	Y	Y	2
East Dorset District Council	45	23		8	14	100	93	Y	N		
East Hampshire District Council	55	35	2	8	8	75	60	Y	Y	Y	2
East Hertfordshire Council	135	93		17		65	N/A	Y	N/A	Y	25
East Lindsey District Council	191	151	1	14	25	64	0	Y	Y	Y	
East Northamptonshire District Council	26	17		1	6	100	67	Y	Y		2

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East Riding of Yorkshire Council	259	120		40	15	95	100	Y	Y		84
East Staffordshire Borough Council	19	12		7		57	N/A	Y	N/A		
Eastleigh Borough Council	2	2				N/A	N/A	N/A	N/A		
Eden District Council	595	251		172	172	59	97	Y	Y	Y	
Elmbridge Borough Council	10	10				N/A	N/A	N/A	N/A		
Enfield (London Borough of)	2			2		100	N/A	Y	N/A		
Epping Forest District Council	76	28	4	31	13	45	47	Y	Y	Y	
Epsom and Ewell Borough Council	1	1				N/A	N/A	N/A	N/A		
Erewash Borough Council	1	1				N/A	N/A	N/A	N/A		
Exeter City Council	1			1		0	N/A	Y	N/A		
Fareham Borough Council	1			1		100	N/A	Y	N/A		
Flintshire County Council	85	79		6		33	N/A	Y	N/A		
Forest Heath District Council	49	21		13	15	85	60	Y	Y		
Forest of Dean District Council	63	48		11	4	82	100	Y	N		
Fylde Borough Council	2	1		1		100	N/A	N	N/A		
Gateshead Metropolitan Borough Council	1	1				N/A	N/A	N/A	N/A		

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Gedling Borough Council	19	4		5	8	100	88	Y	Y		2
Gravesham Borough Council	4	3		1		100	N/A	Y	N/A		
Great Yarmouth Borough Council	52	44		4	4	100	100	Y	N		
Guildford Borough Council	8	6		1	1	0	0	Y	N		
Gwynedd County Council	862	499	4	293	51	81	20	Y	Y	Y	15
Hackney (London Borough of)	1				1	N/A	0	N/A	N		
Halton Borough Council	2	1		1		0	N/A	Y	N/A		
Hambleton District Council	266	161		39	63	79	22	Y	Y	Y	3
Hammersmith and Fulham	1			1		100	N/A	Y	N/A		
Harborough District Council	37	24		5	8	100	100	Y	Y	Y	
Harlow District Council	1			1		100	N/A	Y	N/A		
Harrogate Borough Council	584	334		124	126	94	80	Y	Y	Y	
Hart District Council	11	6	3	2		100	0	Y	N	Y	
Hartlepool Borough Council	1			1		100	N/A	Y	N/A		
Herefordshire Council	2,517	2,132		239	144	72	57	Y	Y	Y	2
Hertsmere Borough Council	7	3		3	1	67	100	Y	Y		

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High Peak Borough Council	295	217	2	35	41	80	47	Y	Y		
Hillingdon (London Borough of)	1			1		100	N/A	Y	N/A		
Hinckley and Bosworth Borough Council	59	48	2		8	N/A	90	N/A	Y		1
Horsham District Council	15	8		3	2	100	0	Y	Y	Y	2
Huntingdonshire District Council	10	8		2		100	N/A	N	N/A		
Hyndburn Borough Council	37	30		2	5	50	0	N	Y		
Ipswich Borough Council	1			1		0	N/A	Y	N/A		
Isle of Anglesey County Council	205	169		27	9	85	100	Y	Y		
Isle of Wight Council	21	14		5	2	80	50	Y	N		
Isles of Scilly	65	35		23	2	100	100	N	N		5
Kensington and Chelsea (Royal Borough of)	2			2		100	N/A	Y	N/A		
King's Lynn and West Norfolk Borough Council	75	42		18	15	94	40	Y	Y		
Kirklees Council	236	165		18	53	56	87	Y	N	Y	
Knowsley Metropolitan Borough Council	2			2		100	N/A	Y	N/A		

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Lancaster City Council	193	119		43	31	14	68	Y	Y	Y	
Leeds City Council	45	17		16	11	75	100	Y	N		1
Lewes District Council	14	2		8	4	100	100	N	N		
Lichfield District Council	11	7		4		100	N/A	Y	N/A		
Maidstone Borough Council	14	8		2	4	100	100	Y	Y		
Maldon District Council	22	15		2	5	100	100	Y	Y		
Malvern Hills District Council	228	204		14	10	100	50	Y	Y	Y	
Manchester City Council	3			3		67	N/A	Y	N/A		
Medway Council	2		2			N/A	50	N/A	Y		
Melton Borough Council	15	7		8		38	N/A	Y	N/A	Y	
Mendip District Council	145	76	3	28	38	89	83	Y	Y	Y	
Merthyr Tydfil County Borough Council	19	18		1		100	N/A	Y	N/A		
Mid Devon District Council	302	147		143	12	0	8	Y	Y		
Mid Suffolk District Council	118	81	1	16	20	81	86	Y	Y		
Mid Sussex District Council	4	2		1	1	100	100	Y	Y		
Milton Keynes Council	10	8		1	1	100	0	Y	N		
Mole Valley District Council	8	5			3	N/A	100	N/A	N		

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Monmouthshire County Council	701	542		47	112	70	96	Y	Y	Y	
Neath Port Talbot County Borough Council	178	161		9	8	100	100	Y	N	Y	
New Forest District Council	27	17			10	N/A	80	N/A	N		
Newark and Sherwood District Council	14	11	2	1		100	50	N	N		
Newcastle-under-Lyme Borough Council	30	22			8	N/A	100	N/A	Y		
Newport City Council	37	23		4	10	100	80	N	Y	Y	
North Devon District Council	1,150	843	2	221	84	75	92	Y	Y	Y	
North Dorset District Council	80	33		23	24	61	100	Y	Y	Y	
North East Derbyshire District Council	151	117		12	17	100	71	Y	Y		5
North East Lincolnshire Council	44	34		8	2	88	100	Y	Y		
North Hertfordshire District Council	58	31		7	20	100	100	Y	Y		
North Kesteven District Council	13	6		4	3	100	100	Y	Y		
North Lincolnshire Council	21	11		5	5	100	100	Y	Y		
North Norfolk District Council	389	220		111	49	41	4	Y	Y	Y	9
North Somerset District Council	12	6	2	3	1	100	33	Y	Y	Y	
North Warwickshire Borough Council	21	9		6	4	100	75	Y	Y		2

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Northumberland County Council	1,078	469		330	279	100	35	Y	Y	Y	
Norwich City Council	4	1		3		33	N/A	Y	N/A		
Nottingham City Council	2			2		100	N/A	Y	N/A		
North West Leicestershire District Council	18	10	2	2	4	100	50	Y	N		
Oldham Metropolitan Borough Council	188	149		9	30	100	90	Y	Y		
Pembrokeshire County Council	947	836		75	36	85	8	Y	Y		
Pendle Borough Council	277	196		13	66	31	94	Y	Y	Y	2
Peterborough City Council	10	4		3	3	67	0	Y	N		
Powys County Council	6,138	5,050		531	529	84	78	Y	Y	Y	28
Preston City Council	18	8		6	4	100	100	Y	Y		
Purbeck District Council	65	41		18	6	100	83	Y	Y		
Reading Borough Council	12	9		2	1	100	100	Y	N		
Redbridge	1			1		100	N/A	Y	N/A		
Redcar & Cleveland Borough Council	42	24	1	4	13	75	86	Y	Y		
Redditch Borough Council	4	4				N/A	N/A	N/A	N/A		

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Reigate and Banstead Borough Council	1	1				N/A	N/A	N/A	N/A		
Rhondda Cynon Taff County Borough Council	89	67		7	15	86	93	Y	N		
Ribble Valley Borough Council	312	195		38	79	100	91	Y	Y	Y	
Richmondshire District Council	445	284		72	89	99	42	Y	Y	Y	
Rochdale Metropolitan Borough Council	114	60		11	42	100	36	Y	Y		1
Rossendale Borough Council	460	250		9	201	89	15	Y	Y	Y	
Rother District Council	30	21	1	3	3	100	75	Y	Y		2
Rotherham Metropolitan Borough Council	3			2	1	100	100	Y	Y		
Rugby Borough Council	20	19			1	N/A	100	N/A	N		
Runnymede Borough Council	5	3	2			N/A	50	N/A	N		
Rushcliffe Borough Council	2	2				N/A	N/A	N/A	N/A		
Rushmoor Borough Council	2		2			N/A	100	N/A	Y		
Rutland County Council	24	15	1	1	7	100	100	N	N		
Ryedale District Council	274	152		60	61	98	11	Y	Y	Y	1
Salford City Council	2	1		1		100	N/A	Y	N/A		

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Scarborough Borough Council	322	193		69	60	100	100	Y	Y		
Sedgmoor District Council	30	7		17	4	88	100	Y	Y	Y	2
*Selby District Council	36	14		7	15	100	93	Y	N		7
Sevenoaks District Council	16	4	4	5	2	100	17	Y	Y		1
Sheffield City Council	6			5	1	100	100	Y	Y	Y	
Shepway District Council	3	2			1	N/A	100	N/A	N		
Shropshire Council	2,123	1,638	2	154	325	75	7	N	N		4
Slough Borough Council	2			2		100	N/A	Y	N/A		
Solihull Metropolitan Borough Council	18	15		3		67	N/A	Y	N/A		
South Buckinghamshire District Council	6	3		3		100	N/A	Y	N/A		
South Cambridgeshire District Council	139	110		6	23	100	0	Y	Y	Y	
South Derbyshire District Council	32	19		6	7	100	0	Y	Y		
South Gloucestershire Council	57	31	9	7	2	100	100	Y	Y		8
South Hams District Council	732	479		196	57	38	44	N	N		
South Holland District Council	8	6		1	1	100	0	N	N		
South Kesteven District Council	50	25		20	5	45	100	Y	Y		
South Lakeland District Council	1,761	1,076	2	431	252	55	39	Y	Y	Y	

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South Norfolk Council	279	197		27	54	74	74	Y	Y	Y	1
South Northamptonshire Council	47	27		12	7	100	100	Y	Y		1
South Oxfordshire District Council	147	108	1	31	7	94	100	Y	Y	Y	
South Ribble Borough Council	6	4		2		100	N/A	Y	N/A		
South Somerset District Council	437	327		27	76	96	100	Y	Y	Y	7
South Staffordshire District Council	55	43		4	8	100	100	Y	N		
South Tyneside Metropolitan Borough Council	1	1				N/A	N/A	N/A	N/A		
Spelthorne Borough Council	1			1		100	N/A	N	N/A		
St Albans District Council	57	47		3	7	0	0	N	N		
St Edmundsbury Borough Council	91	63		14	14	93	86	Y	Y		
Stafford Borough Council	143	110		9	24	100	75	Y	Y		
Staffordshire Moorlands District Council	467	378		56	33	38	36	Y	Y		
Stockport Metropolitan Borough Council	39	29		3	7	100	86	Y	N		
Stockton on Tees Borough Council	3	3				N/A	N/A	N/A	N/A		
Stoke-on-Trent City Council	3	1	2			N/A	0	N/A	N		
Stratford-on-Avon District Council	194	142	4	33	15	94	68	N	N		

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Stroud District Council	172	115	1	31	21	94	95	Y	Y		4
Suffolk Coastal District Council	388	286	2	24	76	92	83	Y	Y	Y	
Sunderland City Council	1			1		0	N/A	Y	N/A		
Sutton (London Borough of)	1			1		100	N/A	Y	N/A		
Swale Borough Council	16	4		10	1	30	100	Y	Y		1
Swansea City and Borough Council	103	85		7	11	100	91	Y	N	Y	
Swindon Borough Council	10	4		3	3	100	100	N	Y		
Tameside Metropolitan Borough Council	34	24		2	8	100	100	Y	Y		
Tandridge District Council	2	1		1		0	N/A	Y	N/A		
Taunton Deane Borough Council	248	157		31	60	100	100	Y	Y	Y	
Teignbridge District Council	575	383		96	96	14	4	N	N		
Telford & Wrekin Council	89	62		12	14	92	93	Y	Y		1
Tendring District Council	126	101	1	8	16	0	0	N	N		
Test Valley Borough Council	231	133		43	55	88	100	Y	Y	Y	
Tewkesbury Borough Council	108	62	7	12	26	58	58	Y	N		1
Three Rivers District Council	21	15		3	3	100	100	Y	N		
Tonbridge and Malling Borough Council	28	20	1	3	3	33	75	N	Y		1

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Torbay Council	4	1		3		33	N/A	Y	N/A		
Torfaen County Borough Council	65	53		7	5	71	100	Y	N	Y	
Torridge District Council	531	447		58	26	0	0	Y	Y	Y	
Tower Hamlets (London Borough of)	3			3		33	N/A	Y	N/A		
Tunbridge Wells Borough Council	6	3		3		100	N/A	Y	N/A		
Uttlesford District Council	50	28	5	10	7	50	75	Y	Y	Y	
Vale of Glamorgan Council	28	16		6	6	83	100	Y	N		
Vale of White Horse District Council	59	33		20	4	100	100	Y	Y	Y	2
Wakefield Metropolitan District Council	3	1		1	1	100	100	Y	N		
Waltham Forest (London Borough of)	1			1		0	N/A	N	N/A		
Wandsworth (London Borough of)	1			1		100	N/A	Y	N/A		
Warrington Borough Council	2			2		100	N/A	Y	N/A		
Warwick District Council	33	25		3	5	100	100	Y	Y		
Watford Borough Council	2	1		1		100	N/A	N	N/A		
Waveney District Council	34	25		4	5	75	40	Y	Y		
Waverley Borough Council	8			5	3	100	100	Y	N		
Wealden District Council	46	28	3	8	6	100	44	Y	Y		1

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Wellingborough Borough Council	3	3				N/A	N/A	N/A	N/A		
Welwyn Hatfield District Council	14	10		4		75	N/A	Y	N/A		
West Berkshire District Council	200	110		40	44	83	43	Y	Y	Y	6
West Devon Borough Council	960	761		90	109	94	47	Y	N		
West Dorset District Council	515	284		96	135	76	61	Y	Y	Y	
West Lancashire District Council	2	2				N/A	N/A	N/A	N/A		
West Lindsey District Council	11	7		3	1	91	100	Y	Y		
West Oxfordshire District Council	90	13		67	10	87	70	Y	Y	Y	
West Somerset District Council	711	476	1	132	101	100	100	Y	Y	Y	1
Westminster City Council	3	2		1		83	43	Y	N/A		
Weymouth and Portland Borough Council	1				1	N/A	100	N/A	N		
Wigan Metropolitan Borough Council	12	10		1	1	100	100	Y	Y	Y	
Wiltshire Council	608	305	7	222	74	93	95	Y	Y	Y	
Winchester City Council	165	95		19	51	95	92	Y	Y	Y	
Windsor and Maidenhead	82	68	1	11	2	100	100	Y	Y		
Wirral Metropolitan Borough Council	3			3		67	N/A	Y	N/A		

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Wokingham Borough Council	111	94		10	7	70	100	Y	Y		
Wolverhampton City Council	1			1		100	N/A	Y	N/A		
Wrexham County Borough Council	190	165	1	9	15	56	88	Y	Y	Y	
Wychavon District Council	105	81		10	14	80	57	Y	N		
Wycombe District Council	69	50	2	5	5	100	100	Y	Y		7
Wyre Borough Council	28	12		11	5	100	100	Y	N		
Wyre Forest District Council	25	15		2	8	50	50	Y	N		
York City Council	17	11		2	4	50	50	Y	N		

Councils reporting no private water supplies

Basildon District Council	Harrow (London Borough of)	Oxford City Council
Bexley Borough Council	Hastings Borough Council	Plymouth City Council
Boston Borough Council	Havant Borough Council	Poole Borough Council
Bournemouth Borough Council	Havering (London Borough of)	Portsmouth City Council
Bracknell Forest Borough Council	Hounslow (London Borough of)	Redbridge (London Borough of)
Brent (London Borough of)	Hull City Council	Richmond upon Thames (London Borough of)
Bristol City Council	Islington (London Borough of)	Rochford District Council
Cambridge City Council	Kettering Borough Council	Sandwell Metropolitan Borough Council
Camden (London Borough of)	Kingston upon Thames (Royal Borough of)	Sefton Metropolitan Borough Council
Cannock Chase District Council	Lambeth (London Borough of)	Southampton City Council
Castle Point Borough Council	Leicester City Council	Southend-on-Sea Borough Council
Chesterfield Borough Council	Lewisham (London Borough of)	Southwark (London Borough of)
Christchurch Borough Council	Lincoln Council	St Helens Metropolitan Borough Council
Corby Borough Council	Liverpool City Council	Stevenage Borough Council
Crawley Borough Council	Luton Borough Council	Surrey Heath Borough Council
Croydon (London Borough of)	Mansfield District Council	Tamworth Borough Council
Derby City Council	Merton (London Borough of)	Thanet District Council
Ealing (London Borough of)	Middlesbrough Borough Council	Thurrock Council
Eastbourne Borough Council	Newcastle-upon-Tyne City Council	Trafford Metropolitan Borough Council
Fenland District Council	Newham (London Borough of)	Walsall Metropolitan Borough Council
Gloucester City Council	Northampton Borough Council	Woking Borough Council
Gosport Borough Council	North Tyneside Metropolitan Borough Council	Worcester City Council
Greenwich (Royal Borough of)	Nuneaton & Bedworth Borough Council	Worthing Borough Council
Haringey (London Borough of)	Oadby and Wigston Borough Council	

Annex 2: Summary of test results for 2016 (England and Wales)

Parameter	Standard	Number of samples	Number of failures	Percentage of failures in 2016	Percentage of failures in 2015
Escherichia coli	0/100 ml	13,467	1,079	8.0	8.9
Enterococci	0/100 ml	7,335	635	8.7	10.2
Colony counts after 48 hours at 37°C	No abnormal change	10,349			-
Colony counts after 3 days at 22°C	No abnormal change	10,165			-
Coliform bacteria (indicator)	0/100 ml	12,945	1,924	14.9	17.8
Clostridium perfringens	0/100 ml	5,636	366	6.5	7.3
Pseudomonas aeruginosa	0/250ml	150	17	11.3	2.6
1 2-Dichloroethane	3.0µg/l	642	0	0.0	0.0
Aluminium	200µg/l	5,043	108	2.1	1.7
Ammonium	0.5mg/l	7,066	132	1.9	2.7
Antimony	5.0µg/l	1,063	7	0.7	0.5
Arsenic	10µg/l	1,935	55	2.8	3.2
Benzene	1.0µg/l	721	1	0.1	0.2
Benzo(a)pyrene	0.01µg/l	294	3	1.0	0.0
Boron	1.0µg/l	799	10	1.3	0.5
Bromate	10µg/l	646	2	0.3	0.5
Cadmium	5.0µg/l	1,245	2	0.2	0.1
Chloride	250mg/l	840	17	2.0	1.3
Chromium	50µg/l	1,242	1	0.1	0.0
Colour	20mg/l Pt/Co	6,750	113	1.7	1.6
Conductivity	2500 µS/cm at 20°C	9,706	6	0.1	0.1
Copper	2.0mg/l	2,568	65	2.5	1.7
Cyanide	50µg/l	521	0	0.0	0.0
Fluoride	1.5mg/l	1,317	74	5.6	6.9
Hydrogen ion (pH)	6.5 – 9.5	9,805	949	9.7	11.4
Iron	200µg/l	7,184	491	6.8	7.1
Lead	10µg/l	3,353	124	3.7	3.9
Manganese	50µg/l	6,936	481	6.9	8.1
Mercury	1.0µg/l	484	0	0.0	0.0
Nickel	20µg/l	1,457	33	2.3	2.8
Nitrate	50µg/l	5,885	580	9.9	9.6
Nitrite – consumers' taps	0.5µg/l	4,543	19	0.4	1.0
Nitrite – treatment works	0.1µg/l	1,184	125	10.6	3.3
Odour	No abnormal change	5,314	350	6.6	5.9
Polycyclic Aromatic Hydrocarbons	0.1µg/l	241	0	0.0	2.4
Radioactivity – gross α	0.1 Bq/l	202	15	7.4	
Radioactivity – gross β	1.0 Bq/l	198	0	0.0	
Radon	100 Bq/l	6	0	0.0	
Selenium	10µg/l	915	11	1.2	1.3
Sodium	200mg/l	1,136	58	5.1	4.4
Sulphate	250mg/l	873	26	3.0	2.8
Taste	No abnormal change	4,498	222	4.9	4.5
Tetrachloromethane	3.0µg/l	614	16	2.6	2.5
Indicative dose	0.1mSv/year	39	0	0.0	0.0
Total organic carbon	No abnormal change	384	0	0.0	0.0
Trichloroethene and Tetrachloroethene	10µg/l	314	6	1.9	0.5
Trihalomethanes	100µg/l	581	1	0.2	0.7
Tritium	100 Bq/l	94	0	0.0	0.0
Turbidity at tap	4NTU	792	66	8.3	5.6
Turbidity at works	1NTU	9,629	184	1.9	2.1

Annex 2: continued

Parameter	Standard	Number of samples	Number of failures	Percentage of failures in 2016	Percentage of failures in 2015
Pesticides					
Aldrin	0.03µg/l	273	0	0.0	0.3
Dieldrin	0.03µg/l	279	0	0.0	0.0
Heptachlor	0.03µg/l	268	0	0.0	0.0
Heptachlor Epoxide	0.03µg/l	253	1	0.4	0.0
Other pesticides*	0.1µg/l	12,933	33	0.3	0.2
Total pesticides	0.5µg/l	214	1	0.5	1.0
Total		183,328	8,409	4.6	5.2

Annex 2.1: Pesticide detections – England and Wales 2016

Pesticide	Number of samples	Number of failures	Percentage of failures
1,1,1-trichloro-2,2-ethane pp'-DDT	118	6	5.1
1,1-dichloro-2,2-bis-ethane pp'-DDE	80	1	1.3
2 4-D	268		0.0
2 4-DB	196		0.0
2,3,6-Tba	135		0.0
2,4,5-T	279		0.0
Alachlor	1		0.0
Aldicarb	12		0.0
Alpha-HCH	73		0.0
Ametryn	38		0.0
Asulam	122		0.0
Atrazine	332	2	0.6
Azinphos methyl	57		0.0
Azoxystrobin	7		0.0
Benazolin	128		0.0
Bendiocarb	2		0.0
Bentazone	305	9	3.0
Beta-HCH	65		0.0
Boscalid	13		0.0
Bromacil	56		0.0
Bromoxynil	264		0.0
Carbaryl	13		0.0
Carbendazim	122		0.0
Carbetamide	141		0.0
Carbofuran	2		0.0
Carbophenothion	37		0.0
Chlorbufam	13		0.0
Chlordane	4		0.0
Chlordane-alpha	35		0.0
Chlorfenvinphos	15		0.0
Chloridazon	15		0.0
Chlormequat	8		0.0
Chlorothalonil	103		0.0
Chloroxuron	1		0.0
Chlorpropham	13		0.0
Chlorpyrifos ethyl	58		0.0
Chlorpyriphos Methyl	17		0.0
Chlorthal	2		0.0
Chlortoluron	279		0.0
Clomazone	5		0.0
Clopyralid	194		0.0
Crufomate	1		0.0
Cyanazine	57		0.0
Cyfluthrin	69		0.0
Cypermethrin	66		0.0
Cyproconazole	76		0.0
Cyprodinil	1		0.0

Pesticide	Number of samples	Number of failures	Percentage of failures
Cyromazine	3		0.0
Delta-HCH	66		0.0
Deltamethrin	66		0.0
Demeton	1		0.0
Demeton-S-methyl	12		0.0
Desethylatrazine	59		0.0
Desmetryn	1		0.0
Diazinon	91		0.0
Dicamba	285		0.0
Dichlobenil	173		0.0
DichlorodiphenyldichlorethanePp'-DDD TDE	68		0.0
Dichlorodiphenyldichloroethyle op'-DDE	52		0.0
Dichlorprop	298		0.0
Dichlorvos	15		0.0
Difenconazole	5		0.0
Diflufenican	34		0.0
Dimethoate	54		0.0
Disulfoton	13		0.0
Diuron	287	8	2.8
Endosulfan A (alpha-Endosulfan)	85		0.0
Endosulfan B (beta-Endosulfan)	80		0.0
Endosulfan	25		0.0
Endrin	118		0.0
enthiopyrad	1		0.0
Epoxyconazole	81		0.0
Epsilon-HCH	1		0.0
EPTC	40		0.0
Ethion (Diethion)	2		0.0
Ethofumersate	10		0.0
Etrimfos	1		0.0
Fenchlorphos	1		0.0
Fenitrothion	21		0.0
Fenoprop	162		0.0
Fenpropidin	12		0.0
Fenpropimorph	56		0.0
Fenthion	3		0.0
Fenuron	1		0.0
Fenvalerate	58		0.0
Fluazifop-butyl	1		0.0
Flufenacet	5		0.0
Fluroxypyr	274		0.0
Flurtamone	6		0.0
Flusilazole	80		0.0
Flutriafol	118		0.0
Fonofos	11		0.0
Gamma-HCH (Lindane)	222		0.0
Glyphosate	97		0.0
Heptenophos	36		0.0
Hexachlorobenzene	84		0.0

Pesticide	Number of samples	Number of failures	Percentage of failures
Hexachlorobutadiene	62	5	8.1
Imazapyr	166		0.0
Ioxynil	202		0.0
Iprodione	1		0.0
Isodrin	74		0.0
Isoproturon	284		0.0
Kresoxim-methyl	13		0.0
Lambda-cyhalothrin	1		0.0
Lenacil	2		0.0
Linuron	294		0.0
Malathion	55		0.0
MCPA	311		0.0
MCPB	280		0.0
MCPP(Mecoprop)	245		0.0
Mecoprop-P	60		0.0
Mesosulfuron-methyl	4		0.0
Mesotrione	1		0.0
Metalaxyl	16		0.0
Metaldehyde	189		0.0
Metamitron	14		0.0
Metazachlor	148		0.0
Methabenzthiazuron	61		0.0
Methiocarb	13		0.0
Methoxychlor	71		0.0
Metoxuron	7		0.0
Metribuzin	3		0.0
Metsulfuron	1		0.0
Mevinphos	14		0.0
Monolinuron	1		0.0
Monuron	53		0.0
Napropamide	1		0.0
op'-DDD (TDE)	64		0.0
Oxadixyl	92		0.0
Oxamyl	1		0.0
Parathion ethyl	15		0.0
Parathion methyl	3		0.0
PCB - Arochlor 1250	1		0.0
PCB - Total	3		0.0
PCB Congener 101	33		0.0
PCB Congener 118	31		0.0
PCB Congener 138	32		0.0
PCB Congener 153	32		0.0
PCB Congener 180	32		0.0
PCB Congener 28	30		0.0
PCB Congener 52	17		0.0
PCT - Total	2		0.0
Pendimethalin	129		0.0
Pentachlorobenzene	2		0.0
Pentachlorophenol	142		0.0

Pesticide	Number of samples	Number of failures	Percentage of failures
Permethrin	8		0.0
Permethrin-cis	51		0.0
Permethrin-trans	63		0.0
Phenmedipham	1		0.0
Phorate	12		0.0
Phosalone	13		0.0
Picloram	8		0.0
Pirimicarb	38		0.0
Pirimiphos ethyl	3		0.0
Pirimiphos methyl	13		0.0
Prochloraz	1		0.0
Prometryne	137		0.0
Propachlor	16		0.0
Propamocarb	4		0.0
Propazine	167		0.0
Propetamphos	17		0.0
Propham	15		0.0
Propiconazole	38		0.0
Propoxur	1		0.0
Propyzamide	247		0.0
Prosulfocarb	4		0.0
Quinmerac	63		0.0
Quintozene	1		0.0
Simazine	318		0.0
Sodium Chlorate	1	1	100.0
Spiroxamine	1		0.0
TCA	1		0.0
Tebuconazole	75		0.0
Tebuthiuron	1		0.0
Tecnazene	94		0.0
Terbuthylazine	46		0.0
Terbutryn	189		0.0
Triadimefon	37		0.0
Tri-allate	162		0.0
Triazophos	15		0.0
Trichloro-2(2chlorophenyl)2eth op'-DDT	57		0.0
Trichlorobenzene	17	1	5.9
Triclopyr	289		0.0
Trietazine	138		0.0
Trifluralin	88		0.0
Triforine	1		0.0
Vinclozolin	1		0.0

Annex 3: Guidance and technical advice

The following advice and guidance was published in 2016 on the Inspectorate's website http://www.dwi.gov.uk.

Document	Date of update	Relevant to	Details of change
Information Note on Regulation 9	October 2016	England only	Added text to point (c) in relation to supplies to tenanted properties. This was to clarify that Regulation 9 applies where a private water supply serves, not just a single dwelling, but where a tenanted dwelling is one of several properties on the supply.
Information Note on Regulation 9	October 2016	England only	The inclusion of a flow diagram to help classify supplies
Information Note for Regulation 10	October 2016	England only	The inclusion of a flow diagram to help classify supplies
Information Note on Regulation 11	October 2016	England only	Change to information regarding application of radon in air in relation to monitoring of radon in water, as advised by PHE
Information Note on Regulation 16	October 2016	England only	Inclusion of text to clarify that a relevant person(s) must give 28 day's written notice from the time of the risk being identified
Information Note on Regulation 16 (England and Wales)	October 2016	England and Wales	Additional text to clarify the position where a supply is unwholesome by virtue of a breach of the standard for nitrate in relation to the serving of notices.
Sampling manual (Version 1.2)	November 2016	England and Wales	Modification to radon sampling method in line with SCA Inclusion of pre-flush swabs for investigational purposes in the order of sampling. Transit and storage temperatures put in a consistent format
Information Note on regulation 10 A (Version 1.2)	November 2016	Wales only	Change to information regarding application of radon in air in relation to monitoring of radon in water, as advised by PHE

Annex 4: Enquiries about private water supplies handled by the Drinking Water Inspectorate

Numbers of enquiries received 2008–2016 for England

	2008	2009	2010	2011	2012	2013	2014	2015	2016
Enquiries from local authorities	10	42	133	306	290	97	348	269	284
Enquiries from owners of private supplies	6	9	22	35	23	9	41	50	31
Enquiries about private water supplies – general	11	25	40	50	58	19	75	65	78
Total	**27**	**76**	**195**	**391**	**371**	**125**	**464**	**384**	**393**

Number of enquiries received from 2008–2016 indicating the origin of the enquiry – England

Annex 5: Glossary and description of standards

Aluminium occurs naturally in some source waters. It is removed from drinking water by conventional water treatment (coagulation and filtration). The standard is 200µg Al/l.

Ammonium salts are naturally present in trace amounts in most waters. Their presence might indicate contamination of sanitary significance and they interfere with the operation of the disinfection process. The guide value is 0.5mg NH_4/l.

Antimony is rarely found in drinking water. Trace amounts can be derived from brass tap fittings and solders. The standard is 5µg Sb/l.

Arsenic occurs naturally in only a few sources of groundwater. Specific water treatment is required to remove it. The standard is 10µg As/l.

Benzene is present in petrol. It is not found in drinking water, but it can migrate through underground plastic water pipes if petrol is spilt in the vicinity. Some bottled waters and soft drinks which include sodium benzoate as an ingredient have been reported as containing benzene. The standard is 1µg/l.

Benzo(a)pyrene is one of several compounds known as polycyclic aromatic hydrocarbons (PAHs). Their source in drinking water is as a result of the deterioration of coal tar which was used to line water pipes up until the early 1970s. The standard is 0.01µg/l.

Boron in surface water sources comes from industrial discharges or from detergents in treated sewage effluents. It can be present in partially desalinated seawater when this is used to supplement drinking water supplies. Concentrations found in drinking waters are generally very low. The standard is 1mg B/l.

Bromate can be formed during disinfection of drinking water as a result of a reaction between naturally occurring bromide and strong oxidants (usually ozone). It may be generated in the manufacture of sodium hypochlorite disinfectant. It can also arise from using an inappropriate grade of sodium hypochlorite for water treatment. Exceptionally, groundwater beneath an industrial site can become contaminated with bromate. The standard is 10µg BrO_3/l.

Cadmium is rarely detected in drinking water and trace amounts are usually due to the dissolution of impurities from plumbing fittings. The standard is 5µg Cd/l.

Chloride is a component of common salt. It may occur in water naturally, but it may also be present due to local use of de-icing salt or saline intrusion. The guide value is 250mg Cl/l.

Clostridium perfringens is a spore-forming bacterium that is present in the gut of warm-blooded animals. The spores can survive disinfection. The presence of spores in drinking water in the absence of *E.coli* and Enterococci indicates historic or remote faecal contamination that requires investigation. The standard is 0 per 100ml.

Chromium in drinking water comes from the coatings on some taps and plumbing fittings. The standard is 50µg Cr/l.

Coliform bacteria are widely distributed in the environment often as a result of human or animal activity, but some grow on plant matter. Their presence in a water supply indicates a need to investigate the integrity of the water supply system. The standard is 0 per 100ml.

Colony counts are general techniques for detecting a wide range of bacteria, the types and numbers being dependent on the conditions of the test. These counts, if done regularly, can help to inform water management, but they have no direct health significance. The standard is 'no abnormal change'.

Colour occurs naturally in upland water sources and is caused by natural organics which are characteristic of these catchments. Colour can be the cause of elevated disinfection byproducts where chlorine is used for disinfection. The standard is 20mg/l on the Pt/Co scale.

Conductivity is a non-specific measure of the amount of natural dissolved inorganic substances in source waters. The guide value is 2,500µS/cm.

Copper in drinking water comes mostly from copper pipes and fittings in households. In general, water sources are not aggressive towards copper, but problems very occasionally occur in new installations. These 'blue water' events can be avoided by good plumbing practices. The standard is 2mg Cu/l.

Cyanide is not normally present in drinking water, but could be present in surface water as a result of a specific industrial contamination incident. The standard is 50µg CN/l.

1,2-Dicholoroethane is a solvent that may be found in groundwater in the vicinity of industrial sites. Where necessary it can be removed by special water treatment. The standard is 3µg/l.

Escherichia coli (E.coli) **and Enterococci** are bacteria present in the gut of warm-blooded animals. They should not be present in drinking water and, if found, immediate action is required to identify and remove any source of faecal contamination that is found. The standard is 0 per 100ml.

Fluoride occurs naturally in many water sources, especially groundwater. It cannot be removed by conventional water treatment, so high levels must be reduced by blending with another low fluoride water source. The standard is 1.5mg F/l.

Hydrogen ion (pH) gives an indication of the degree of acidity of the water. A pH of 7 is neutral; values below 7 are acidic and values above 7 are alkaline. A low pH water may result in pipe corrosion. This is corrected by adding an alkali during water treatment. The guide value is a range between 6.5 and 9.5.

Indicative Dose is a measure of the effective dose of radiation the body will receive from consumption of the water. It is calculated only when screening values for gross alpha or gross beta (radiation) are exceeded. The guide value is 0.10mSv/year.

Iron is present naturally in many water sources. However, the most common source of iron in drinking water is corrosion of iron water mains. The standard is 200µg Fe/l.

Lead very occasionally occurs naturally in raw waters, but the usual reason for its presence in drinking water is lead plumbing in older properties. The permanent remedy is for householders to remove lead pipes and fittings. The standard is currently 25µg Pb/l. A stricter standard of 10µg Pb/l will apply from 2013 onwards.

Mercury is not normally found in sources of drinking water in the UK. The standard is 1µg Hg/l.

Nickel occurs naturally in some groundwater and, where necessary, special treatment can be installed to remove it. Another source of nickel in drinking water is the coatings on modern taps and other plumbing fittings. The standard is 20µg Ni/l.

Nitrate occurs naturally in all source waters although higher concentrations tend to occur where fertilisers are used on the land. Nitrate can be removed by ion exchange water treatment or through blending with other low nitrate sources. The standard is 50mg NO_3/l.

Nitrite may occur where ammonia is present in the source and chlorine is used for disinfection. Careful operation of the disinfection process ensures that levels of nitrite are below the standards of 0.1mg NO_2/l in water leaving water treatment works and 0.5mg NO_2/l at consumers' taps.

Odour and taste can arise as a consequence of natural substances in surface waters, particularly between late spring through to early autumn. The standard is described as acceptable to consumers and no abnormal change in odour or taste.

Pesticides – organochlorine compounds (aldrin, dieldrin, heptachlor, heptachlor epoxide) are no longer used in the UK because they are persistent in the environment. They are very unlikely to be found in drinking water. The standard for each compound is 0.03µg/l.

Pesticides – other than organochlorine compounds are a diverse and large group of organic compounds used as weed killers, insecticides and fungicides. Many water sources contain traces of one or more pesticides as a result of both agricultural uses mainly on crops and non-agricultural uses, mainly for weed control on highways and in gardens. The standard is 0.1µg/l for each individual substance and 0.5µg/l for the total of all pesticides.

Polycyclic aromatic hydrocarbons is a group name for several substances present in petroleum-based products such as coal tar. The standard is 0.1µg/l for the sum of all the substances (see Benzo(a)pyrene listed above for more information).

Radon is a colourless, odourless radioactive gas. It is formed by the radioactive decay of the small amounts of uranium that occur naturally in all rocks and soils. The standard is 100Bq/l.

Selenium is an essential element and a necessary dietary component. Amounts in drinking water are usually well below the standard of 10µg Se/l.

Sodium is a component of common salt (sodium chloride). It is present in seawater and brackish groundwater. Some water treatment chemicals contain sodium. Concentrations in drinking water are extremely low, but some water softeners can add significant amounts where they are installed in homes or factories. The standard is 200mg Na/l.

Sulphate occurs naturally in all waters and cannot be removed by treatment. The guide value is 250mg SO_4/l.

Tetrachloroethane and Trichloroethene are solvents that may occur in groundwater in the vicinity of industrial sites. Where necessary they are removed by specialist treatment. The standard is 10µg/l for the sum of both substances.

Trihalomethanes are formed during disinfection of water by a reaction between chlorine and naturally occurring organic substances. Their production is minimised by good operational practice. The standard is 100µg/l.

Vinyl chloride may be present in plastic pipes as a residual of the manufacturing process of polyvinyl chloride (PVC) water pipes. Its presence in drinking water is controlled by product specification. The standard is 0.5µg/l.

Tetrachloromethane is a solvent that may occur in groundwater in the vicinity of industrial sites. Where necessary it is removed by specialist water treatment. The standard is 3µg/l.

Total Organic Carbon represents the total amount of organic matter present in water. The guide value is 'no abnormal change'.

Tritium is a radioactive isotope of hydrogen. Discharges to the environment are strictly controlled and there is a national programme of monitoring surface waters. The guide value for drinking water sources is 100Bq/l.

Turbidity measurement is an important non-specific water quality control parameter at water treatment works because it can be monitored continuously on line and alarms set to alert operators to deterioration in raw water quality or the need to optimise water treatment. The standard at treatment works is 1NTU. Turbidity can also arise at consumers' taps following disturbance of sediment within water mains; the standard at consumers' taps is 4NTU.

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