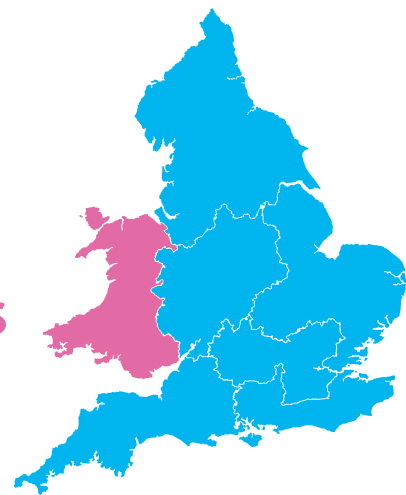


Drinking water 2009

Drinking water quality in Wales

July 2010

A report by the Chief Inspector of Drinking Water





Drinking water in Wales 2009



Published by
Drinking Water Inspectorate
55 Whitehall
London
SW1A 2EY

Tel: 030 0068 6400

Website: <http://www.dwi.gov.uk>

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ISBN: 978-1-905852-46-8

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Drinking Water 2009 is the annual report of the Drinking Water Inspectorate and comprises a number of parts.

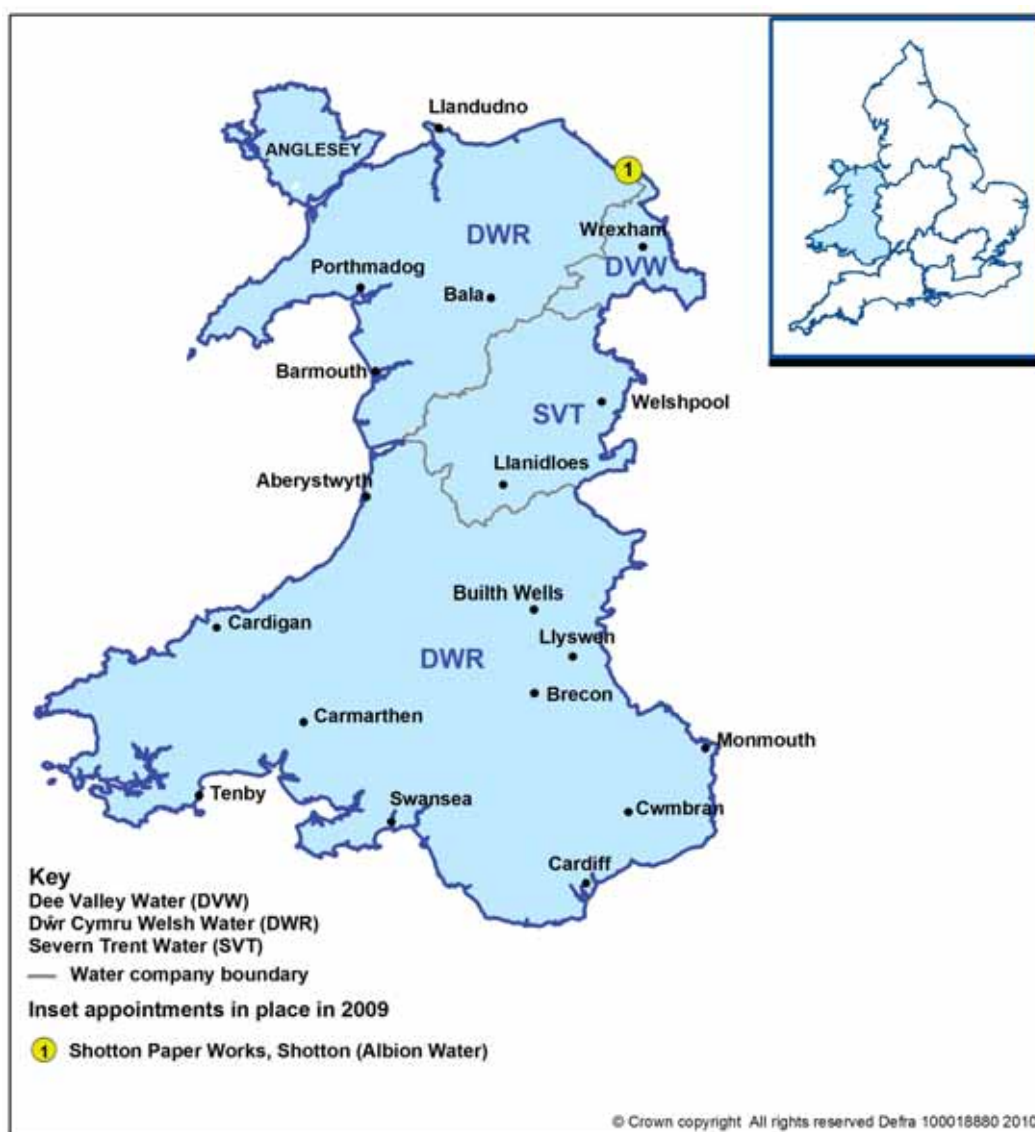
This part describes drinking water quality in Wales. The Inspectorate also publishes a series of companion reports for regions of England (Central, Eastern, Northern, Southern, Thames and Western regions)

All parts are available on the Inspectorate's website <http://www.dwi.gov.uk> and on the CD accompanying this report along with separate summary data for water company sampling programmes.

Introduction to the report for Wales

Drinking Water 2009 is published as a series of seven reports, one of which covers Wales. This report presents information about drinking water quality in Wales in a form that meets the needs of those who have an interest in the quality and safe management of drinking water supplies from the consumer's perspective, namely the local authorities and the Consumer Council for Water in Wales.

The report describes the key facts about the quality of drinking water in Wales, which is served by four water companies (Albion Water, Dee Valley Water, Dŵr Cymru Welsh Water and Severn Trent Water) together delivering public water supplies to close to three million consumers.



The results of testing in 2009 demonstrated that the overall quality of drinking water in Wales was good. The figure for compliance with drinking water standards at consumers' taps was 99.95%, unchanged from 2008 and equal to that of England and the industry as a whole. This figure is made up of the results of all the tests for 39 parameters with European or national standards. The circumstances of the few failures and the actions taken to safeguard public health are discussed in the body of the report.

When the Welsh water industry is judged by the Inspectorate's four indices of water quality performance, which look in turn at water treatment, service reservoir integrity and network maintenance in 2009, the main change for the better relates to disinfection, which at 99.98% has recovered from a low point of 99.86% in 2008. However, compared to last year, other aspects of water treatment have declined (99.95%), likewise reservoir integrity (99.94%) and network maintenance (99.72%). Putting aside the improved disinfection performance, the indices for Wales rank below the industry average with the figure for service reservoir maintenance being below the equivalent figure for each of the regions of England. Individual water company figures are reported in *Annex 6*.

This is the first year where reporting on water quality events uses the Inspectorate's new risk-based approach to classification and assessment. Events are classified into five categories: Not significant, Minor, Significant, Serious and Major. In total, there were 50 events across Wales and close to half (23) were of a type that necessitated a detailed investigation by an inspector. In addition, there were three events which were serious enough to warrant a major investigation. This compares unfavourably with the other regions of England in respect of the risk-related resource demand on the Inspectorate. In terms of the nature of the events reported on this year, the two most common water quality risks were discolouration and water treatment failures. The particular focus of the Inspectorate's work in Wales this year has been auditing and enforcing improvement by Dŵr Cymru Welsh Water in relation to the adequacy of water treatment. The Inspectorate has put in place a combination of statutory notices and schemes of work and made site visits to witness the steps being taken by the company to remedy deficiencies in treatment and the monitoring of both raw water and alarm responses. In 2009, Dŵr Cymru Welsh Water admitted the offence of supplying water unfit for human consumption and was cautioned by the Inspectorate. As described in the report, this offence arose because the company connected a property to a local sewer instead of the water main. Detailed findings regarding all the significant events in 2009 can be found in *Annex 3*.

There is a longer term and positive improving trend in public confidence in the region's drinking water quality, as measured by consumers. The number of people across the region expressing concern about the quality of their tap water (appearance, taste and illness) has continued to

fall. By comparison to the other regions in England, Wales still has a relatively high contact rate (4 per 1,000 population), however, the figures for discolouration have fallen in the past three years from 3.8 to 2.6 per 1,000 population. As a result of the completion this year of its strategic investment programme in water mains renovation, Dŵr Cymru Welsh Water is now receiving 30% fewer discoloured water reports from consumers. These public confidence figures demonstrate the benefits realised by the industry's investment to date in drinking water quality. *Annex 4* provides information about the schemes of work delivered in 2009 and those planned for delivery over the next five years.

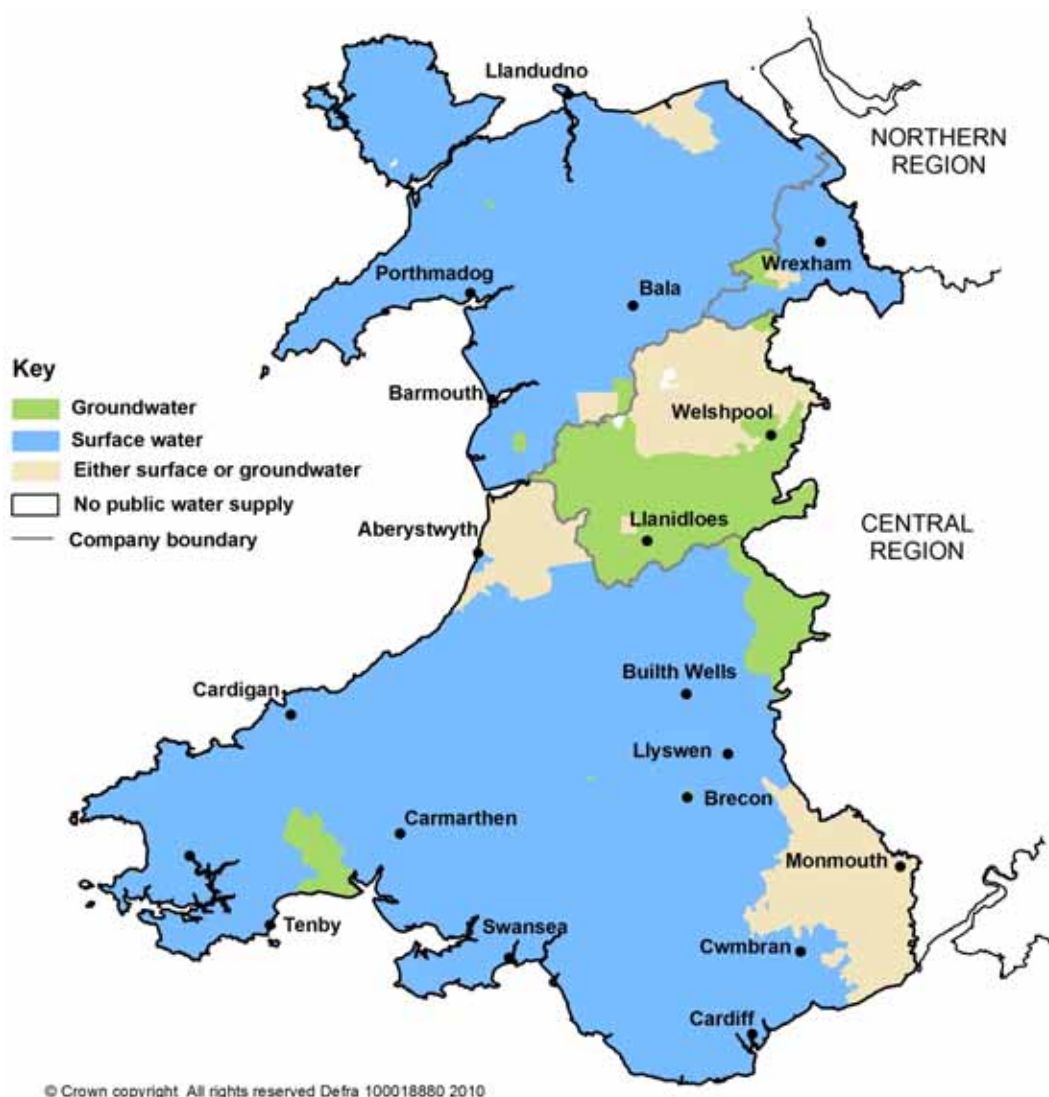
Looking forward, the standard for lead becomes stricter in 2013. Progress made towards meeting the future standard is shown in a graph in the body of the report. The Inspectorate has calculated that if the stricter standard had been in force in 2009 then the figure for overall compliance with drinking water standards would have been 99.93%, instead of 99.95%. This highlights the importance of companies in Wales implementing the Inspectorate's Guidance, whereby failures of the future as well as current lead standard are investigated and water safety plans updated with action plans to minimise consumer exposure to lead in older housing in collaboration with local authorities.

During 2009, the Welsh Assembly Government took steps to safeguard those consumers who are served by about 8,682 private water supplies in Wales. Details of the new risk-based regulations and how they will work are described in this report, together with a case example showing how similar new powers have been put into immediate and good effect by one local authority in England. This change marks an important step forward; action can more readily be taken by local authorities to improve those private supplies that pose a risk to health and the information provided to the Inspectorate will enable open reporting on all drinking water supplies in Wales.

Water supply arrangements

Four water companies supply drinking water in Wales: Albion Water (ALB), Dee Valley Water (DVW), Dŵr Cymru Welsh Water (DWR) and Severn Trent Water (SVT). Severn Trent Water mainly supplies consumers in England, but it is included here because it also supplies water to consumers in the central eastern area of Wales.

Figure 1: Map illustrating sources of drinking water by zone across the region



Much (93%) of the water supplied to consumers in Wales is surface water abstracted from rivers such as the Dee, Severn, Towy and Wye. The upland areas of Wales are important catchments for water resources. Water is drawn from many reservoirs including the Alwen, Elan, Taff Fechan and Vyrnwy, some of which also supply consumers in England.

For example, the Elan reservoir supplies the city of Birmingham and the Vyrnwy reservoir supplies consumers in North Cheshire and Merseyside. Across Wales, a small proportion (6%) of water supplies come from groundwater sources.

Summary facts about the drinking water supply infrastructure of the region are given in Tables 2 and 3 with outline geographical and demographic information.

Table 2: Number of abstraction points (for regulation 16a purposes)

Company	Groundwater	Surface water	Mix of ground and surface water	Total
Dee Valley Water	1	3	0	4
Dŵr Cymru Welsh Water	17	55	1	73
Severn Trent	5	0	0	5
Total	23	58	1	82

Note: Albion Water do not directly abstract water and so have no abstraction points.

Table 3: Key facts about the supply arrangements in Wales

Key facts	
Population supplied	2,982,260
Water supplied (l/day)	835 million
Number of local authorities	22
Number of local health boards	22
Approximate number of private water supplies	8,682
Area of supply	
Anglesey, Blaenau Gwent, Bridgend, Caerphilly, Cardiff, Cardiganshire, Carmarthenshire, Conwy, Denbighshire, Flintshire, Gwynedd, Merthyr Tydfil, Monmouthshire, Neath and Port Talbot, Newport, Pembrokeshire, Powys, Rhondda Cynon Taff, Swansea, Torfaen, Vale of Glamorgan, Wrexham County Borough.	
Treatment works	88
Service reservoirs	631
Water supply zones	104
Length of mains pipe (km)	27,334
Water composition	
Surface sources	93%
Groundwater sources	6%
Mixed sources	1%

Drinking water quality testing

Throughout 2009, water companies sampled drinking water across the region to test for compliance with the standards in the drinking water regulations. Close to one-third of the tests were carried out on drinking water drawn from consumers' taps selected at random. For monitoring purposes, company water supply areas are divided into zones based on population (maximum 100,000). Generally, zones are sampled at consumers' taps with the number of required tests being greatest in zones with larger populations. Other sample locations are water treatment works and treated water (service) reservoirs. Collectively, the four water companies carried out a total of 287,223 tests during 2009. Only 99 of these tests failed to meet the standards set down in the regulations.

Table 4: Number of tests carried out by companies in the region

Company	Place of sampling			Number of tests per company	Estimate of population
	Water treatment works	Service reservoirs	Consumers' taps (zones)		
Albion Water	0 (0)	0 (0)	568 (1)	568	260
Dee Valley Water	8,419 (4)	9,224 (29)	7,134 (13)	24,777	159,000
Dŵr Cymru Welsh Water	40,314 (77)	119,144 (453)	74,660 (80)	234,118	2,770,000
Severn Trent Water	3,432 (2)	21,810 (57)	2,518 (10)	27,760	53,000
Wales overall	52,165 (83)	150,178 (539)	84,880 (104)	287,223	2,982,260

Note: Numbers in brackets reflect the number of works, reservoirs or zones operated by that company in Wales in 2009. Some companies are permitted to carry out some tests on samples taken from supply points rather than from consumers' taps.

The regulations require companies to test for specified parameters at prescribed frequencies. Most of the testing is for parameters with European or national standards, however, water companies are also required by the regulations to test for other parameters such as ammonium, sulphate and colony counts.

Results of interest are discussed in this report. A full summary of the results of testing by each company can be found on the DWI website (www.dwi.gov.uk) and on the CD accompanying this report. The tables summarising the results of testing provide the annual minimum, maximum and mean levels for individual parameters for each company.

Drinking water quality results

The key water quality results for Wales are presented in two tables, one showing the results for microbiological parameters (Table 5), the other dealing with chemical and physical parameters (Table 7).

The microbiological quality of water is discussed first. Companies report all the results of the tests on a monthly basis to the Inspectorate.

A summary of the results of the tests from each company is presented on the Inspectorate's website (www.dwi.gov.uk) and is also available on the CD accompanying this report. Additionally, statistics describing the performance of each company supplying in Wales are summarised in *Annex 6*.

Microbiological quality

To protect public health, microbiological standards have to be met at each individual treatment works and service reservoir. The results confirm the overall microbiological safety of drinking water supplies in the region. The significance of the individual test results for each microbiological parameter at each location varies and a single positive result cannot be interpreted without other information. All companies are expected to follow best practice as set out in *The Microbiology of Drinking Water* published by the Standing Committee of Analysts (SCA), which can be found by visiting the Environment Agency's website (www.environment-agency.gov.uk).

Table 5: Microbiological tests
The number of tests performed and the number of tests not meeting the standard

Parameter	Current standard	Total number of tests	Number of tests not meeting the standard	Additional information
Water leaving water treatment works				
<i>E.coli</i>	0/100ml	6,825	1	DWR (1)
Coliform bacteria	0/100ml	6,825	5	DWR (5)
<i>Clostridium perfringens</i>	0/100ml	2,288	2	SVT (1), DWR (1)
Turbidity ¹	1NTU	10,117	5	DVW (3), DWR (2)
Water leaving service reservoirs				
<i>E.coli</i>	0/100ml	25,039	4	DVW (1), DWR (3)
Coliform bacteria	0/100ml in 95% of tests at each reservoir	25,039	22	DVW (5), DWR (16), SVT (1) All 539 reservoirs in the region met the 95% compliance rule
Water sampled at consumers' taps				
<i>E.coli</i>	0/100ml	7,855	1	DWR (1)
Enterococci	0/100ml	638	0	
Notes:				
¹ Turbidity is a critical control parameter for water treatment and disinfection.				

***E.coli* and coliforms at works**

In 2009, a total of 6,825 tests at works were carried out by all the companies across the region. On detecting *E.coli*, companies are required to act promptly to protect public health. Their immediate response when finding *E.coli* at a works is to sample again, and more widely, to confirm that water being received by consumers is safe. *E.coli* was detected in only one sample (Dŵr Cymru Welsh Water).

Following detection in April of *E.coli* and coliforms in a sample from Alwen Works near Betws-y-Coed a boil water notice was issued to 75,000 properties in the Connah's Quay, Flint, Mold and Holywell areas of Denbighshire. Dŵr Cymru Welsh Water's investigative samples taken over the next few days contained coliforms but not *E.coli*. The boil water notice remained in place for nine days and was lifted only after several sets of satisfactory results had been obtained.

The company investigation initially focused on two potential causes: the recently replaced sampling facilities or a challenge to the treatment process from the raw water quality. The company took various steps which ruled out the sampling facilities as a cause. Following an earlier coliform failure in January 2009, the company had begun a review of the treatment processes at the site and the Inspectorate had planned an audit of the site for May 2009.

The Inspectorate's audit identified problems with the adequacy of disinfection at the site. As a result of these findings the Inspectorate issued a Notice under Regulation 28(4) which, among other things, restricted the output volume of Alwen works until such a time as all necessary improvements to the disinfection process have been completed by the company.

In *Drinking water 2008* a failure of the standard for *E.coli* at Cwellyn works, near Caernarfon, was discussed. The Inspectorate took enforcement action to require Dŵr Cymru Welsh Water to investigate and optimise the treatment processes and examine the efficacy and appropriateness of sampling, filtration and disinfection processes at the site. The outcome of this work was a decision by the company to make significant investment in additional treatment at Cwellyn works to address the continued presence of *Cryptosporidium* in the source water. The scheme was completed in March 2010 and benefits 108,521 consumers in Caernarfon, Bangor, North and South Anglesey.

Table 6: Detection of *E.coli* and Enterococci at treatment works, service reservoirs and consumers' taps

Company	<i>E.coli</i> in water leaving treatment works	<i>E.coli</i> in water leaving service reservoirs	<i>E.coli</i> at consumers' taps	Enterococci at consumers' taps
Albion Water	0 – 0	0 – 0	0 – 12	0 – 4
Dee Valley Water	0 – 1,146	1 – 1,537	0 – 480	0 – 96
Dŵr Cymru Welsh Water	1 – 5,187	3 – 19,867	1 – 7,204	0 – 513
Severn Trent Water	0 – 492	0 – 3,635	0 – 159	0 – 25
Wales overall	1 – 6,825	4 – 25,039	1 – 7,855	0 – 638
Note: Results are shown as the number of positive tests – the total number of tests.				

Testing for coliform bacteria gives reassurance that water entering the supply was treated adequately to remove bacterial and viral pathogens.

Repeated occurrences of coliform bacteria in samples from the same works in one year are thus of concern and require action to be taken. In 2009, this situation occurred at just one out of the 88 works in Wales. This was the situation at Alwen works described above.

At Alaw works, in the North Anglesey area of Wales, Dŵr Cymru Welsh Water detected coliforms in a sample taken in July. Despite extensive sampling, which gave satisfactory results, no cause was found. The Inspectorate noted that there had been power losses in the area a few days prior to the failure.

The Inspectorate has noted that coliform bacteria were found in four other samples from treatment works in Wales during the year (4 DWR) and this information will be taken into account during the Inspectorate's risk-based programme of technical audit.

***Cryptosporidium* at works**

The regulations relating to *Cryptosporidium* monitoring of treated water changed with effect from 1 October 2008 when *Cryptosporidium* specific risk assessments and associated monitoring were replaced by comprehensive multi-hazard risk assessments for each treatment works and associated supply system (Regulation 27 and 28). Under the new regime, raw water monitoring becomes a regulatory requirement.

Across Wales there are 38 sites where Dŵr Cymru Welsh Water has identified a risk relating to *Cryptosporidium* which has been confirmed through the monitoring. There are now 30 statutory improvement programmes in place to deal with the risk of *Cryptosporidium*. Eight of these relate to concessionary supplies and out of the remaining 22 schemes, two involve abandoning the supply and the rest require the installation of UV disinfection, often in association with other treatment improvements. Additionally, the Inspectorate has put in place Regulation 28(4) Notices requiring Dŵr Cymru Welsh Water to mitigate the risk of *Cryptosporidium* at a further eight sites either through enhanced turbidity and other monitoring (4) or by improved filtration or disinfection arrangements (4). Details of all these programmes of work can be found in Annex 4.

Clostridium perfringens

This organism is a spore-forming bacterium that is exceptionally resistant to unfavourable conditions in the water environment, such as extremes of temperature and pH, and disinfection processes, such as chlorination and ultraviolet light. It is a normal component of the intestinal flora of up to 35% of humans and other warm-blooded animals. These characteristics make it a useful indicator of either intermittent or historical faecal

contamination of a groundwater source or surface water filtration plant performance. The detection of any *Clostridium perfringens* in the supply should trigger an investigation by the water company.

In 2009, out of 2,288 samples taken across the whole of Wales just two did not meet the specified value for *Clostridium perfringens* (1 DWR, 1 SVT).

A sample taken in December, at Felindre works near Swansea, contained *Clostridia perfringens*. Dŵr Cymru Welsh Water reported that all subsequent samples were satisfactory and the works appeared to be operating normally at the time. The Inspectorate has noted that Felindre works draws its water from the River Towy which exhibits variable water quality. The company's risk assessment for Felindre works concludes that the treatment in place is sufficient to mitigate against the 'flashiness' of the source.

Clostridium perfringens was found in a sample taken by Severn Trent Water from a consumer's tap in the Machynlleth water quality zone in January. There have been no previous or subsequent detections of *Clostridia perfringens* in this zone. The zone is supplied by Llanwrin works comprising groundwater and disinfection with chlorine.

Turbidity at works

Turbidity is a measure of how much light can pass through water and indicates the condition or 'cloudiness' of water. Turbidity is caused by particles suspended in the water and is an important critical control measure for disinfection. Turbidity is measured at two points in the water supply chain, at treatment works where a value of 1NTU applies and at consumers' taps where the standard of 4NTU applies. The following discussion focuses on the results of samples taken at treatment works. For information on tests taken at consumers' taps, see the heading *Turbidity* in the *Chemical quality* section.

In Wales, in 2009, there were five occasions out of a total of 10,117 tests when the value of 1NTU was exceeded at a water treatment works (3 DVW, 2 DWR). This compares favourably to the 14 unsatisfactory results reported in 2008.

In February, turbidity exceeded 1NTU in a sample collected from New Pendinas works near Llandegla, which is operated by Dee Valley Water. However, the on-line monitor reading was less than 1NTU at the time of sampling and there were some indications that the sample line may have been a contributory factor.

In 2009, there was a single sample result of greater than 1NTU from Dee Valley Water's Legacy works, near Wrexham, in September. This compares to three unsatisfactory results from the same works in 2008. The company

has already undertaken remedial work to remove accumulated manganese deposits from the contact tank and the on-line monitor reading was less than 1NTU at the time of the unsatisfactory result in September. The company has since replaced the sample line and all subsequent turbidity results in 2009 were satisfactory.

At Boughton works an elevated level of turbidity was recorded in a sample collected in October. Other samples of water leaving the works collected at the same time exhibited lower satisfactory turbidity results and turbidity monitor readings were below 1NTU. All further turbidity results from Boughton works have proved satisfactory.

At Dŵr Cymru Welsh Water's Lower Carno works, in Powys, a value of 3.8NTU was attributed to deposits accumulated within the sample line which was replaced by the company. All subsequent samples have given satisfactory results.

In July, an elevated turbidity result was obtained from a sample collected from Cwmtillery works, Blaenau Gwent. This failure followed a planned shutdown of the works including the disinfection system. Companies regularly undertake this type of simulated testing to ensure the robustness of auto shutdown procedures in the event of a loss of disinfection. Cwmtillery works is linked to another works (Talybont) and the planned shutdown caused changes in flow in the network. Dŵr Cymru Welsh Water concluded that suspension of manganese deposits in the main was the cause of the turbidity failure. The company's risk assessment identifies manganese as a hazard which is mitigated by manganese removal treatment. The Inspectorate has recommended that start up and shut down procedures are reviewed and improved to prevent any future adverse effects on equipment and treatment performance.

Collectively, all five instances in 2009 of elevated turbidity reinforce the need for companies to be more vigilant when installing and maintaining monitoring equipment, including sample lines, taking care to ensure the work demonstrably takes account of, and militates against, the likelihood of generating results that are not representative of water entering supply.

E.coli at service reservoirs

In 2009, across the region, a total of 25,039 tests were carried out at service reservoirs by all the companies.

E.coli was detected on four occasions in 2009 at four service reservoirs: Garth Glyn reservoir operated by Dee Valley Water, Frongoch reservoir, Bryn Llys reservoir and Spa reservoir all belonging to Dŵr Cymru Welsh Water. This compares to three failures in 2008 from a total of 26,145 service reservoir samples across Wales.

On detecting *E.coli*, companies are required to act promptly to protect public health. The immediate response when finding *E.coli* at a service reservoir is to sample again, and more widely, to confirm that water being received by consumers is safe. In 2009, these additional tests gave satisfactory results in all but one case, Spa reservoir, where consumers were issued with a precautionary boil water notice until the company were able to complete their investigations and quality of the water could be assured.

At Garth Glyn service reservoir, near Glyn Ceriog, *E.coli* and coliform bacteria were present in a routine sample collected by Dee Valley Water in May. The company took the site out of supply and carried out an internal inspection. This revealed a point of ingress in the roof. The company carried out remedial work in July and returned the site to supply. The company has since abandoned Garth Glyn service reservoir and commissioned a new reservoir in April 2010.

Also in May, Dŵr Cymru Welsh Water found *E.coli* and coliform bacteria in Frongoch reservoir near Bala. The company investigations showed that at the time of the sampling it had been raining heavily and there were large trees that overhung the sampling point, raising questions about the integrity of the sample point. The chlorine dose at the Bontgoch works was increased as a precaution and all additional samples from the works, a downstream reservoir and customer properties gave satisfactory results. Subsequently the reservoir was taken out of supply for an internal inspection. This revealed a number of issues, including cracks in the floor and potential areas of ingress in the roof. The company carried out remedial work in November 2009 and the Regulation 27 risk assessment was updated to reflect the measures taken to mitigate the risk. Since this time there have been no further failures. The Inspectorate noted the company's comprehensive and timely response based on the water safety plan approach.

On 24 and 25 August 2009, *E.coli* and coliforms were detected in samples from both Bryn Lllys service reservoir, near Llyn Conwy, and nearby Spa reservoir. Both occurrences were reported to the Inspectorate as water quality events.

Spa service reservoir is an elevated tank serving three properties including two farms. On investigation, coliforms were repeatedly present in samples from the reservoir and taps in these properties necessitating the issuing of boil water advice. Earlier in the year (April) the company had carried out an external inspection of the tank. Although there were no evidential structural issues, the company identified low turnover and the potential for ingress to occur in the future and the site was scheduled for abandonment. Unfortunately the enabling work to facilitate abandonment was delayed and during this period the failure occurred. While the company were quick to

remove the tank from supply after the failure, the Inspectorate was critical of these delays which ultimately led to consumers receiving water which was not wholesome and suffering the inconvenience of a notice to boil their water.

Although the failures for *E.coli* and coliforms at Bryn Lllys service reservoir were unrelated to those at the Spa site, there was a common factor in so much as the company had scheduled enabling works to facilitate abandonment of the site and these works were delayed. The identified risk at this site related to the unsatisfactory sampling arrangements. These were served by a supply pipe of approximately one kilometre in length crossing open farmland. The reservoir supplies nine properties and samples demonstrated that water quality at consumers' taps was satisfactory.

The Inspectorate was sufficiently concerned over the emerging pattern of failures relating to service reservoirs during August that it visited the offices of Dŵr Cymru Welsh Water, in early September, to audit the company's arrangements for service reservoir management and maintenance. Although the visit demonstrated that the company had in place a dedicated team overseeing service reservoir management, with clear operating instructions for each site, the Inspectorate was critical of the number of high risk sites where the records showed that remedial action was needed, but delayed, and problems remained unresolved. The Inspectorate recommended the development and implementation of a central policy on the delivery and ownership of the reservoir cleaning and inspection programme with clear links to the company's investment delivery function. The Inspectorate is closely monitoring the company's implementation of planned actions (see the *Technical audit activity* section).

Both these events demonstrate the need for arrangements to allow a rapid response to risks identified through water safety plans.

Coliform bacteria at service reservoirs

Testing for coliform bacteria gives reassurance that the quality of water held at these strategic points in the distribution system is adequately maintained. The national standard requires that at least 95% of no less than 50 samples collected from each service reservoir throughout one year are free from all coliform bacteria. In 2009, all 631 service reservoirs (including water towers) in the region met the standard.

In 2009 there were 22 occasions where coliform bacteria were detected in samples from reservoirs (5 DVW, 16 DWR, 1 SVT). This compares to 23 positive detections of coliforms at reservoirs in 2008. Although overall performance for Wales has not changed, for reservoirs managed by Severn

Trent Water in 2009, there was only one unsatisfactory sample, from Caemmas reservoir near Newtown in February, compared to three occasions in 2008.

Dee Valley Water reported coliform bacteria in samples from Penrhos and Penypalment, Gilfach, and Church Hill service reservoirs. These failures occurred in the period July – September and all three sites are supplied by the same works (Llwyn Onn). The company have identified a common factor of low and declining levels of chlorine residual disinfectant during the summer months. The company took action to boost chlorine levels at each of the sites to protect public health in the short-term, but the Inspectorate is critical of this as an approach to failures of coliforms in the absence of *E.coli* because it may hinder the investigation and mask any wider contamination. Dee Valley Water has since decommissioned Penypalment reservoir and replaced it in conjunction with a new pumping station.

The company has reported that they are considering the use of secondary chlorination at Church Hill reservoir to maintain higher and more consistent chlorine levels in the area generally. Companies are reminded that the use of booster chlorination is not a substitute for maintaining microbiological integrity within the distribution network. The Inspectorate is closely monitoring Dee Valley Water's progress in carrying out remedial action at these sites and this will be taken into account during the Inspectorate's risk-based audit programme in 2010.

In December, coliforms were detected at Beudy Mawr reservoir near Llanbedrog. Dŵr Cymru Welsh Water increased the turnover at the site by isolating part of an upstream reservoir at Saethon Fawr and following detections of coliform bacteria in investigative samples from the reservoir and downstream, increased the chlorine residual. Subsequently the company took the site out of supply for an internal inspection and found a number of problems which may have allowed ingress of contamination into the reservoir. The site remains out of supply pending completion of structural improvements.

A sample collected by Dŵr Cymru Welsh Water from Rhosymryson reservoir in June contained coliform bacteria and an external inspection of the site found a leak on the copper sampling line. The company has since replaced the sampling line and there have been no further failures to date.

A coliform positive sample from Dŵr Cymru Welsh Water's Pantycadno reservoir, Monmouthshire, in February was associated with a report by the sampling technician that the sample tap had been damaged by hedge cutting activity in the vicinity. The sampling facilities are situated away from the reservoir by the side of a road and this is an example of where it can be difficult for companies to ensure the integrity of sampling facilities (when they are remote from the company reservoir compound and exposed

to the risk of either vandalism or third party damage). In these circumstances it is important for samplers to report and record if the sample is likely to be unrepresentative at the time of sampling. The tap and kiosk have since been replaced and no further failures have occurred.

During February there were a series of coliform detections at reservoirs operated by Dŵr Cymru Welsh Water, all of which were served by Alwen works. Coliform bacteria were detected at Ruthin and Cricor reservoirs on the same day and there was also an unusually high colony count in a sample from Clwyd Gate reservoir. An investigative sample also contained coliform bacteria. A week later coliform bacteria were detected in a sample from Meifod reservoir and investigative samples also contained Enterococci, Clostridia and a high colony count. The situation was not notified to the Inspectorate, nor was it managed promptly as a quality event. A subsequent investigation by the Inspectorate confirmed serious deficiencies at Alwen works. Given the company's shortcomings in terms of promptly identifying and mitigating risks, the Inspectorate issued a Notice under Regulation 28(4) placing conditions on the company's operation of the works to safeguard public health until such as time as a permanent robust remedy could be put in place at Alwen (see *E.coli at works* section).

The Inspectorate has noted that coliform bacteria were found in samples from 22 service reservoirs in Wales during the year and this information will be taken into account during the Inspectorate's risk-based programme of technical audit.

***E.coli* and Enterococci at consumers' taps**

A total of 7,855 consumers' taps were tested in 2009 for *E.coli* and Enterococci and only one was positive (1 DWR) for *E.coli*. There was no indication, from information gathered by Dŵr Cymru Welsh Water, of a faecal contamination event affecting other properties in these zones.

The single failure in December was from a consumer's property in the Llandudno area. The sample contained both *E.coli* and coliform bacteria. Dŵr Cymru Welsh Water found that the consumer had fitted a water filter to the supply. The original cartridge had been in place for an extended period of time and there were problems with the associated water fittings. The consumer was provided with advice on care of water within the home and advised to remove the fitting.

Like *E.coli*, the presence of Enterococci is indicative of faecal contamination and neither bacterium should be found in any sample. In 2009, the companies carried out 638 tests for Enterococci at consumers' taps. None of these samples contained Enterococci.

Chemical quality

The drinking water regulations set out the minimum testing requirements for all chemical and physical parameters. A full summary of the results of testing by each company, including the results for indicator parameters, is provided on the DWI website and on the CD accompanying this report.

The following text and Table 7 set out the results for those parameters where there has been a failure to meet a European or national standard (mandatory quality standards) and any other parameter of interest. In addition, at the request of local authorities, the results of testing for fluoride, iron, lead, manganese, nitrate, nitrite and pesticides are given.

Table 7: Chemical and physical parameters
The number of tests performed and the number of tests not meeting the standard

Parameter	Current standard or specified concentration ¹	Total number of tests	Number of tests not meeting the standard	Additional information
Aesthetic parameters				
– odour	No abnormal change	1,729	8	DWR (8)
– taste		1,555	1	DWR (1)
Aluminium	200µg/l	1,831	5	DWR (5)
Fluoride	1.5mg/l	625	0	
Iron	200µg/l	2,426	15	DVW (1), DWR (14)
Lead (current standard)	25µg/l	660	1	DWR (1)
Lead (future standard)	10µg/l	660	7	DVW (3), DWR (4)
Manganese	50µg/l	1,802	3	DWR (3)
Nickel	20µg/l	661	1	DWR (1)
Nitrate	50mg/l	911	0	
Nitrite	0.5mg/l	912	1	DWR (1)
Pesticides – total	0.5µg/l	617	0	
Pesticide – individual ²	0.1µg/l	23,716	2	MCPA DWR (1) Propyzamide DWR (1)
pH (Hydrogen ion)	6.5 – 9.5	2,206	2	DVW (1), DWR (1)
Trihalomethanes Total	100µg/l	660	1	DWR (1)
Notes:				
¹ For comparison, 1mg/l is one part in a million, 1µg/l is one part in a thousand million.				
² A further 2,425 tests were done for aldrin, dieldrin, heptachlor, heptachlor epoxide, all of which met the relevant standard.				

Aesthetic parameters

Consumers expect their drinking water to be clear and bright in appearance and free from discernible taste or odour. In recognition of this the regulations stipulate national standards for colour, odour and taste.

In 2009, a total of nine samples from consumers' taps across Wales exhibited a positive taste or odour. All tests in the region met the standard for colour.

The positive detections of taste and odour are summarised below in relation to their nature and cause as determined by the investigations carried out by the companies. From this information it can be seen that

some did not reflect the quality of drinking water, but instead were due to a fault in the way the testing was carried out. The Inspectorate has issued guidance to companies to prevent these errors from arising in future years.

- Pencil: (2 DWR) 1 taste and 1 odour was reported in a consumer's tap sample collected from the Llyswen zone in June (DWR). This descriptor is specific to a substance associated with unapproved black plastic pipe, for which the remedy is to advise the householder to replace the pipe with approved medium density polyethylene pipe. The company's investigation identified that the properties in the area were used as holiday homes or were often unoccupied which meant there was a very low turnover of water in this area. The company has since issued advice to the property owners and carried out flushing of the area to mitigate against further problems.
- Sulphur: 6 (DWR). All six samples exhibited a sulphurous odour. This descriptor relates to carrying out the test where excess dechlorinating agent remains in the sample as presented to the panellists; the Inspectorate has issued guidance to companies which should ensure these errors are not repeated in future years. A revised Standing Committee of Analysts (SCA) method is being developed to address problems with the process of dechlorinating samples for taste and odour analysis which are the cause of these unrepresentative results.
- Sweet: 1 odour (DWR) detected in Bridgend/Porthcawl zone in January. All odour samples at the works were satisfactory and there have been no other odour detections in samples from this zone.

In March 2010, Dŵr Cymru Welsh Water completed a programme of work at its Court Farm works designed to improve water quality in respect of taste and odour. The work involved the installation of granular activated carbon absorbers to reduce natural substances in the raw water. Around 603,745 consumers in and around Newport, Cardiff, Penarth, Malpas and Chepstow areas will benefit from this investment in water quality.

Aluminium

Aluminium can occur naturally in some drinking water sources. Also, aluminium-based water treatment chemicals may be used at surface water works to aid the process of filtration.

In 2009, a total of 1,831 samples were tested for aluminium in Wales. Dee Valley Water and Severn Trent Water achieved 100% compliance with the aluminium standard. Just five tests exceeded the standard (5 DWR).

Three of the failures arose from localised disturbance of deposits accumulated in the distribution network. Sometimes the failure was an unavoidable consequence of planned work. On two occasions, other standards (iron or manganese) were exceeded at the same time.

During 2009, three of the five aluminium failures occurred in the summer in zones supplied by Pontsticill works operated by Dŵr Cymru Welsh Water. The failures in Rhymney/Bargoed zone (aluminium and iron) in August were associated with a loss of control of the coagulant process at the works. This initial failure of coagulation may have led to the later failures due to a build up of deposits in the distribution system which the company are taking action to address through flushing (see *Drinking water quality events* section). Companies are required by law to continuously operate an adequate treatment works and this includes effective control of the coagulation process. The Inspectorate considers that the presence of aluminium in the network should be taken into account in companies risk assessments in relation to the measures in place to secure the adequacy of water treatment.

A sample taken by Dŵr Cymru Welsh Water in the Holywell/Mold zone in February exceeded the standards for aluminium and iron. The company has identified this area as having historic mains deposits. The company took action to flush the area to reduce the level of these deposits and continues to monitor the situation through its Distribution, Operation and Maintenance Strategy (DOMS).

Fluoride

Traces of fluoride occur naturally in many water sources, particularly in groundwaters. Consumers can obtain specific information on the level of fluoride in the drinking water supply to their home or workplace from their water company.

Fluoride is not removed by conventional water treatment. Some companies fluoridate water supplies at the request of the local health authority as a protection against tooth decay. There are no current or proposed fluoridation schemes in Wales. In 2009, all 625 tests for fluoride taken across the region met the regulatory standard (1.5mg/l). Please refer to the DWI website (www.dwi.gov.uk) for more information on fluoridation.

Iron

Iron may be present naturally in raw water, iron compounds may be added as part of water treatment or it can be released as a consequence of the corrosion of iron mains. Effective water treatment prevents these problems arising at source. Nowadays, most samples failing the standard for iron

are from places where the distribution network contains a large proportion of old cast iron pipes. When deposits in these pipes are disturbed by an operational problem (such as a burst main) they turn the water orange-brown. Elevated levels of iron are objectionable to consumers because the water may appear turbid, it may have an astringent or bitter taste and the deposits are unsightly and may stain water fittings.

Table 8 summarises the progress made by companies with programmes of work to address discoloured water in 2009. All strategic mains renovation work in Wales was completed by 31 March 2010. The Inspectorate will continue to closely monitor that discolouration complaints are adequately addressed in future through the companies' ongoing distribution maintenance programmes.

Table 8: Progress with strategic improvement programmes on distribution systems

Company	Length of main renovated in 2009	Length of main still to be renovated	Renovation completed	Completion due
Albion Water	None	None	N/A	N/A
Dee Valley Water	None	None	Sep 2004	N/A
Dŵr Cymru Welsh Water	164.2 km	None	Mar 2010	Dec 2009
Severn Trent Water	None	None	Feb 2005	N/A
Wales overall	164.2 km	None		

Note: The lengths given here relate to zones which are wholly or mainly in Wales.

In 2009, Dee Valley Water reported one failure of the iron standard in the Saltney zone in July, which was an isolated event dealt with by flushing and not indicative of a wider problem.

Dŵr Cymru Welsh Water reported 14 iron failures in samples collected during 2009. This is a deterioration in performance compared to 2008, when there were eight iron failures reported by the company. Five of the unsatisfactory samples in 2009 came from the Rassau/Sirhowy Valley area and some also failed the standard for manganese. The company attributed all these failures to planned work underway to rehabilitate the local distribution network. The company has since completed this work (31 March 2010).

A sample taken by Dŵr Cymru Welsh Water, in the Preseli zone in January, failed the standard for iron. The cause was identified as a small section of unlined cast iron main serving a single property. The company

has implemented a weekly flushing programme until work to rehabilitate the main can be completed.

Samples taken from Chepstow/Caldicot and Llyswen zones in August showed levels of iron above the standard and also elevated levels of zinc. Dŵr Cymru Welsh Water identified the likely cause as galvanised supply pipes serving the properties. The company has given advice to the consumers that the pipes should be replaced to prevent further problems.

A sample taken in the Rhiw Goch zone in October failed the standards for both iron and manganese, triggering a wider investigation by Dŵr Cymru Welsh Water. The mains in the area had all been renovated with extensive additional work to upgrade some customer communication pipes. The area is usually supplied from Rhiw Goch works, but during 2009 the supply was switched to Cilfor works to facilitate some of the maintenance.

The company has ruled out this change of supply as a cause of the failures and considers that a series of mains bursts in September were probably responsible for mobilising mains deposits from areas yet to be renovated. The company flushed the area to reduce the risk of further problems.

In 2009, Dŵr Cymru Welsh Water reported a failure in the Rassau/Sirhowy Valley zone in October. This was the fifth iron failure in this zone and it correlated with treatment problems at Nantybwich works in the preceding days. Poor control of coagulation leads to excess loading on clarifiers and filters. If this continues for any length of time, and there is evidence that it did so for five days, then water quality in the supply will be adversely impacted and sediment will build up in the network. This occurs even if aluminium levels leaving the works are below the standard. It is essential that companies control all processes at their works with operational targets designed to proactively maintain water quality. The Inspectorate considers it is inappropriate for companies to manage treatment simply to comply with the standard at the works, as this ignores the need to maintain the condition of the network and, in the long-term, fails to secure compliance at consumers' taps. The Inspectorate will consider any further failures in this zone as evidence of a potential failure by the company to maintain an adequate treatment process (potentially a breach of Regulation 26 which is an offence).

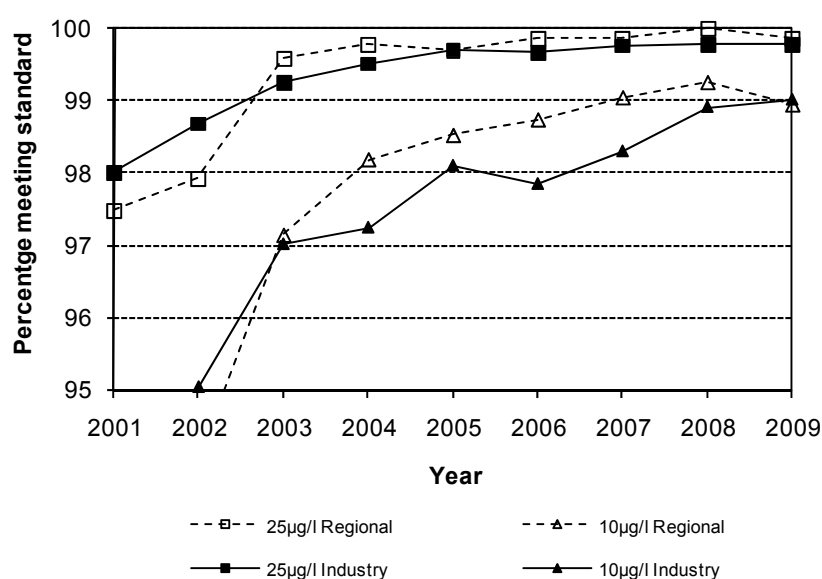
Lead

The pipe connecting a property to the water company main, together with internal plumbing, is the most common source of lead in drinking water. Properties built or renovated since 1970 are unlikely to have lead pipes and lead solder was banned for use with copper drinking water installations in the early 1970's. The only other recognised source of lead in drinking water in some buildings is fittings made from brass. The extent

of lead pick up depends on various factors; temperature, acidity (pH), water hardness, the length of pipe and the time that water is left to stand in the pipe (stagnation) before it is drawn off.

The monitoring data collected by companies during 2009 has been added by the Inspectorate to that gathered in previous years to provide an updated picture of progress towards meeting the future standard for lead of 10µg/l by the end of 2013 (see Figure 9).

Figure 9: Percentage of tests meeting the current and future standard for lead between 2001 and 2009



Water companies notify both the consumer and the relevant local authority whenever a failure of the current lead standard of 25µg/l occurs. In 2009, the Inspectorate was notified of one failure in the region (1 DWR).

In February, Dŵr Cymru Welsh Water reported a result of 26µg/l of lead in a sample taken at a consumer’s tap in Denbigh. The company investigations concluded that there was lead plumbing at the property. The company issued the consumer with advice on the need to consider replacement of the pipe and the need to flush water prior to use for drinking or food preparation.

Also during 2009, out of a total of 660 samples just seven samples exhibited a lead value above the future standard of 10µg/l (3 DVW, 4 DWR). The region saw a slight increase in failures of the future standard during 2009 and generally the picture now reflects the industry average. The Inspectorate’s *Guidance on the Regulations* (2008) reminded companies that they should be notifying local authorities of breaches of

the future (as well as the current standard) and giving advice to householders whenever lead is found in a tap sample. Figure 9 illustrates the importance of companies and local authorities in Wales acting now to secure compliance with the future lead standard by 2013 by developing action plans to minimise consumer exposure to lead in older housing in collaboration with local authorities.

In June 2009, Dŵr Cymru Welsh Water completed a scheme at its Talybont works to install additional water treatment and improve the capacity of the works to deal with lead and taste and odour forming compounds present in the raw water. This work has benefited around 298,676 consumers in the Newport, Malpas, Ebbw Vale, Bwlch and Abergavenny areas.

In addition, during 2009, companies in the region have responded to 218 consumer requests to check the level of lead in drinking water in their property.

Manganese

Manganese occurs naturally in many sources of water. It can be removed from raw water by converting the soluble form to an insoluble precipitate (oxidation). Treatment can be simple to achieve (aeration), but for some waters more complex processes are needed. If effective treatment is not in place then black deposits may collect in the distribution pipes. When disturbed, such deposits may turn the water black. Even small traces of manganese are objectionable to consumers. Typical complaints relate to the staining of laundry or the discolouration of vegetables during washing or cooking. The purpose of the standard for manganese is to minimise these problems. In 2009, Dŵr Cymru Welsh Water reported three failures of the manganese standard.

In July a sample from the Penderyn zone, near Aberdare, failed the standard for manganese. There was no specific evidence to determine a cause for this failure, but disturbance of historic deposits in the mains following changes in water flow in the area could not be ruled out. The zone is supplied by Hirwaun works which experienced coagulation and process control problems later on in the year. The Inspectorate will be closely monitoring the situation for any evidence that inadequate water treatment is giving rise to water quality problems in this zone.

A sample taken in October in the Rhiw Goch zone failed both the manganese and iron standard (see *Iron* section).

Nickel

Nickel may be present in coatings on modern tap fittings. In 2009, a total of 661 tests were carried out for nickel and all but one met the standard

(20µg/l). A level of 59µg/l nickel was reported in a sample from a consumer's tap in the Sketty/Gower zone. Dŵr Cymru Welsh Water concluded that the tap fitting was responsible. Samples taken from neighbouring properties were all satisfactory and the company gave advice to the householder on replacement of the fitting.

Nitrate and nitrite

Nitrate occurs naturally in all source waters due to the decay of vegetable material in soil. Nitrogenous fertilisers used on arable farmland are a significant source of nitrate in groundwater. Rainfall washes nitrate from the soil into lakes, rivers and streams. Nitrate levels can be reduced by water treatment or by blending with another, low nitrate, water source. In 2009, all 911 tests for nitrate met the standard (50mg/l).

Nitrite may be formed when chloramine is used as the residual disinfectant to maintain the microbiological quality in the distribution network. The formation of nitrite is controlled by careful optimisation of the chloramination process. A number of supplies in Wales are chloraminated. Nitrite can also form in samples of water, after collection and before analysis, especially if the sample is not kept cool. In 2009, out of a total of 912 tests carried out across the country all except one met the nitrite standard (1 DWR).

In October, a nitrite failure occurred in the East Anglesey zone supplied from Cefni works by way of Pentraeth reservoir. The company made changes at the reservoir to increase turnover and to optimise the disinfection process at the works. There have been no further failures since this time.

Pesticides and related products

This group of substances, generically called pesticides, includes many organic chemicals ranging from weed killers, to insecticides and fungicides. Water sources may contain traces of pesticide residues as a result of agricultural use (pest control on crops) and non-agricultural uses (herbicides for weed control on highways etc.). Water companies are required to assess the risk to drinking water supplies of pesticide use in their catchments and test for those which might be present. Companies have documented potential and actual pesticide hazards through their Regulation 27 risk assessments, which are informed by raw water monitoring and identify the control measures in place. When pesticides are first detected, water companies will enhance their monitoring of raw water and notify the Environment Agency to facilitate appropriate action to safeguard drinking water quality.

In 2009, none of the tests in the region exceeded the standard for total pesticides. Likewise, there was 100% compliance for the four pesticides with the standard of 0.03µg/l (2,425 tests). Out of a total of 23,716 tests for those individual pesticides with a standard of 0.1µg/l just two failures were recorded. The circumstances and substances involved are summarised below.

MCPA

MCPA is frequently found with other herbicides. It is mainly used for weed control in lawns, amenity agriculture and cereals. The standard is 0.1µg/l.

In June, MCPA was detected at a level 0.12µg/l in a sample from Dŵr Cymru Welsh Water's Capel Dewi works (near Camarthen). The company attributed the result to short lived usage of this pesticide in the catchment, as additional samples were all satisfactory and there have been no further detections of MCPA at this location. The Inspectorate reminds companies in Wales of the need to take proactive measures to understand the usage of these types of pesticide through enhanced catchment management. During 2009, a number of companies in England recruited dedicated catchment management officers whose role supports regulatory risk assessments and includes liaison with farmers, chemical distributors and the Environment Agency. The Inspectorate strongly supports this water safety plan approach to securing compliance with the pesticide standard and expects companies in Wales to be equally proactive.

Propyzamide

Propyzamide is a herbicide of moderate solubility in water used to control grasses among trees, vines and some salad crops.

In January, propyzamide was detected at a level 0.133µg/l in a sample taken from a consumer's tap in Preseli. This zone is supplied by Preseli works which currently has no treatment in place to deal with pesticides. This was the first year when Dŵr Cymru Welsh Water had included this pesticide in their monitoring programme. There was a delay in the reporting of this result which meant the company's investigation was also delayed. When samples fail it is important that companies respond quickly as both pesticide usage and consequent impact on the water course may be short-term. This can reduce the ability of subsequent sampling to help detect the origins of the problem.

The Inspectorate considers that following the change in regulations companies should now be making raw water the focus of pesticide monitoring with only those pesticides known to be present in the raw

water being tested for routinely at a treated water supply point (or consumer taps).

pH (Hydrogen ion)

pH is a measure of the acidity of the water. Where water is supplied from upland areas the water naturally picks up iron and humic acids from the peaty soils, resulting in slightly acidic water with a low pH, which is commonly described as 'soft water'. Such water has an increased potential to corrode iron pipes and leach material from cement lined mains. Acidity can also be affected when water is artificially softened by a treatment device in a consumer's property. The standard is a range of 6.5–9.5.

In Wales, out of a total of 2,206 tests, the standard was exceeded on two occasions in 2009 (1 DVW, 1 DWR).

Dee Valley Water attributed a low pH result in December, in the Wrexham zone, to the impact of the very cold weather on water quality in the distribution system. Temperature is known to affect water chemistry in some types of waters. The company increased the the dose of lime at Llwyn Onn works and subsequent tests have given satisfactory results.

Dŵr Cymru Welsh Water reported a high pH value in a sample from the Preseli zone in July. The company has identified through its water safety plan for Preseli works, the need for additional treatment to address pH correction at the works and the replacement of strategic cement lined mains in the network. In the short-term, the company will flush those parts of the network comprising cement lined mains. The Inspectorate will be closely monitoring the company's ongoing actions within this zone to prevent a recurrence of the high pH levels seen in 2009. The Inspectorate has put in place a Notice requiring the company to carry out improvement at the works within an agreed timescale.

Trihalomethanes

Trihalomethanes (THMs) arise when chlorine is added to water containing naturally occurring organic substances. Treatment processes are optimised by water companies to minimise their production. In 2009, out of 660 tests, only one exceeded the standard in Wales (1 DWR).

In September, a sample from a consumer's tap in the South Anglesey zone marginally exceeded the standard of 100µg/l. Dŵr Cymru Welsh Water was able to show that trihalomethane levels in water leaving all the works feeding into this zone were relatively low (less than 50µg/l) at the time. All samples taken in the zone during the preceeding year met the

standard. South Anglesey zone receives a blend of water from Myndd Llandegai works and Cwellyn works. During 2009, major schemes of work were in progress to construct additional treatment (coagulation) which will reduce the potential for the formation of trihalomethanes. The Cwellyn scheme was completed in March 2010. Major work at Myndd Llandegai is ongoing but should be completed by the end of 2010.

Private water supplies

New private water supply regulations came into effect in Wales on 4 February 2010. These regulations implement the 1998 European Drinking Water Directive and replace the previous 1991 regulations. Initial guidance for local authorities on the implementation of the new legislation is available on www.privatewatersupplies.gov.uk and the Inspectorate's website (www.dwi.gov.uk). Whereas in the past the approach to improving these small water supplies has been informal and based on advice and encouragement, it is now an enforceable duty for these supplies to be risk assessed, reported and enforcement action taken whenever there is evidence of a breach of the drinking water standards or a potential risk to public health. The principle changes are summarised below.

Private distribution systems

The new regulations close a gap in the old legislation which could not be used to improve the quality of drinking water from privately operated distribution systems. The new regulations now cover water that is *'...supplied by a water undertaker or licensed water supplier and then further distributed by a person other than a water undertaker or licensed water supplier...'*

Private water distribution systems occur when the water originates from a public water supply, but is then distributed on to buildings/properties within premises whose occupants are often charged for the supply by a person other than the public water supply company. Typical examples of where this type of private supply may be found are:

- caravan and camp sites;
- military establishments;
- hospitals, school, college and university campuses where water is distributed to buildings which are occupied by other organisations;
- shopping centres where the water is distributed to organisations in shopping outlets, administration offices and other public buildings;

- airports/ports/train stations where water is distributed to organisations in various buildings within the transport site; and
- estates where water is distributed to organisations occupying other buildings such as the National Trust.

Local authorities will work in collaboration with water companies to identify those situations where a distribution system is subject to the private water supply regulations. Water companies will provide guidance on situations controlled by the Water Supply (Water Fittings) Regulations 1999.

Main duties on local authorities

Local authorities must keep and maintain records of all private water supplies and forward these each year to the Inspectorate. This ensures that in future national reports about drinking water quality will include information on all supplies to consumers, apart from those serving a single private household where there is no commercial activity.

Local authorities must risk assess all private supplies in their area within five years. Once completed these risk assessments must be kept under regular review. See the Inspectorate's website (www.dwi.gov.uk) or www.privatewatersupplies.gov.uk for guidance on carrying out a risk assessment.

Local authorities must continue to monitor all 'large' private supplies in accordance with frequencies set according to the volume of water used. However, risk assessment enables local authorities to tailor the scope of monitoring and exclude parameters where there is reliable data to verify compliance with the drinking water standard. Large supplies are those providing 10m³/day or more (serving more than 50 persons). Monitoring is also required for any supply, irrespective of size which is part of a commercial or public activity.

Local authorities have more discretion over monitoring smaller supplies and private distribution systems. Within five years each of these supplies must be tested for a few very important parameters (known as Regulation 10 monitoring) and any other parameters as indicated by the risk assessment.

Private supplies serving a single dwelling are exempt, but a local authority must carry out monitoring if requested to do so by the occupant or owner.

Local authorities must take steps to safeguard consumers if, as a consequence of their risk assessment or monitoring, a potential danger to human health is identified. These steps involve serving a notice to prohibit or restrict the use of the supply until appropriate remedial action has been taken. It is an offence for the relevant person not to comply with a Notice

and the local authority can have the Notice enforced on application to a Magistrates' court. The relevant person also has the right of appeal to the Magistrates' courts, aggrieved by the Notice.

Local authorities must investigate and determine the cause of all breaches of standards and ensure that appropriate remedial action is taken by the serving of a Notice. Local authorities may provide advice and negotiate with owners on the exact nature of the improvements required.

Implementing the new private water supply regulations – case example

The first Notice under the new English private water supply regulations was served by Sevenoaks District Council on 23 March 2010. This Regulation 18 Notice identified that a private water supply serving 76 domestic dwellings and four commercial properties was a potential danger to human health due to the presence of organisms indicative of faecal contamination (*E.coli*, coliform bacteria and *Clostridium perfringens*). The risk assessment and investigation by the local authority and the private water supply manager identified structural and integrity issues with a storage reservoir. The new regulations enabled the local authority to document in the Notice the nature of the steps that need to be taken to improve the water supply, such as requiring a structural report identifying the remedial measures needed to prevent ingress of contaminants. The benefit of the new type of Notice to the local authority and consumers is that non-compliance by the relevant person (owner, operator etc) is an offence so the provisions of the Notice can be enforced relatively straightforwardly by the courts, if necessary.

Sevenoaks District Council had tested the supply six times a year under the old private supply regulations in England. Although some of the samples had given unsatisfactory results and despite the local authority being aware that maintenance of the supply had been sporadic and not sufficient, the prescriptive regime of relatively infrequent monitoring meant that the contamination went largely unobserved. The absence of successive failures of the drinking water standards made it difficult for the local authority to take action because monitoring was insufficient to confirm that the failures were not trivial and likely to recur.

Sevenoaks District Council are to be commended for promptly taking advantage of the risk-based approach in the new regulations by assessing the whole supply, including the network, and identifying appropriate remedies that will safeguard water quality and consumers in the future. This case example clearly demonstrates the deficiencies of infrequent monitoring of small supplies, which was at the heart of the old style approach to private water supplies. The Inspectorate looks forward to

supporting other local authorities in improving drinking water quality for all consumers reliant on small supplies.

Risk assessments

The changes to the drinking water regulations in 2007 required water companies to risk assess all of their water supply systems using methodology based on the water safety plan approach in the World Health Organisations' *Guidelines for Drinking Water Quality*. The approach includes identifying actual and potential hazards throughout the water supply system from the catchment to consumers' taps. For each identified hazard, the company determines the associated risk considering any control measures already in place. In some cases, the company will conclude that the risk is sufficiently mitigated through existing controls. Where this is not the case, the residual risk is highlighted as needing further mitigation measures and an action plan put in place.

The regulatory reporting process required companies to provide the Inspectorate, by October 2008, with information about the hazards which the company considers to be adequately controlled, together with details of the action plans relating to those hazards for which further mitigating measures have been identified as necessary. Where the Inspectorate considers that there has been or may be a risk of supplying water that would constitute a potential risk to public health, it may serve a Regulation 28(4) Notice to enforce and, if needs be, vary the mitigating steps set out by the company in its action plan. The Notices typically specify the following types of actions: maintenance, regular reviews and audits of controls, conditions under which supply is prohibited, progress reporting and information requirements.

Table 10: Outputs of risk assessments within the region

Company	Number of risk assessments	Number of Reg 28(4) Notices ¹	What is Notice about?			
			Source protection	Change in source of supply	Distribution maintenance	Improvements at works
Dŵr Cymru Welsh Water	23	83	1	6	28	48
Dee Valley Water	7	0	-	-	-	-
Severn Trent Water	10	0	-	-	-	-
Albion Water	1	0	-	-	-	-
SSE Water ²	1	0	-	-	-	-
Wales overall	42	83	1	6	28	48
England and Wales	857	238	7	28	52	159
¹ Some notices are classified under more than one category						
² SSE Water submitted a risk assessment but are not yet supplying.						

Table 10 shows the mitigation actions being carried out by companies in Wales as a result of their risk assessment of drinking water supplies. Out of a total of 42 supply system risk assessments in Wales, the Inspectorate has put in place 83 Regulation 28(4) Notices. The majority of these Notices address risks relating to inadequate water treatment at works operated by Dŵr Cymru Welsh Water.

The action plans delivered through Notices make up part of the overall, rolling, drinking water quality improvement programme of each water company. *Annex 4* summarises all legally binding schemes of work (known as undertakings) put in place through the Periodic Price Review process together with remedial work specified in Regulation 28(4) Notices.

An important element of the risk assessment and risk management processes now in place is the monitoring of raw water quality. Each water company has put in place a regulatory raw water monitoring programme for each of its abstraction points. The main purpose of this testing is to inform the management of risk and to ensure that all hazards are identified promptly and controlled effectively. During 2009, companies have worked with the Inspectorate (and carried out pilot studies) to facilitate the future transfer of raw water quality data to the regulators. Table 11 summarises the scope and scale of the raw water quality monitoring data gathered by water companies in Wales in 2009. This water company information is

being shared by the Inspectorate with the Environment Agency and contributes to the overall monitoring of environmental water quality required by European law.

Table 11: Numbers of tests taken at abstraction points in 2009

Nature of parameter	Company			
	Dee Valley Water	Dŵr Cymru Welsh Water	Severn Trent	Total
Natural properties	320	8,223	627	9,170
General water quality indicators	320	20,373	318	21,011
Microbiological indicators	160	9,325	324	9,809
Pesticides	628	24,698	0	25,326
Chemicals (other than pesticides)	241	398	194	833
Total tests	1,669	63,017	1,463	66,149
Number of abstraction points	4	73	5	82

Catchment risk assessment – case example

An important element of the water safety plan methodology, that underpins regulatory risk assessments, is dialogue between water companies and other stakeholders to identify hazards and manage risks within specific water supply catchments. An example of such work is Dŵr Cymru Welsh Water's approach towards an issue of sedimentation occurring in the Cantref reservoir catchment near Merthyr Tydfil. The company's water safety plan methodology identified two tributaries feeding into the reservoir as being responsible for highly coloured and turbid water following intense rainfall. In March 2010 the company organised a workshop with representatives from the Environment Agency, Forestry Commission, Countryside Council for Wales, Local Commoners Association, tenant farmer, Brecon Beacons National Park, The National Trust, Coed Cymru, ADAS, Commons Vision and the Welsh Assembly Government. The workshop, which was positively received by all the stakeholders, discussed future possible management solutions and a steering group was

formed to take forward work to scope out a catchment study.

The Inspectorate is encouraged to note that regulating for risk assessment and risk management in 2007 is proving to be an effective incentive for water companies to implement this type of collaborative proactive and preventative water quality approach.

Drinking water quality events

From 1 January 2009, in line with the Hampton Principles in the *Regulator's Compliance Code*, the Inspectorate updated its approach to the assessment of water quality events. The risk-based approach enables the Inspectorate to target resources where they can be most effective in terms of maintaining public confidence in drinking water quality. Based on the preliminary information provided by the company (three day report), each event is classified into one of the following five categories:

Not significant (category 1): no further information required by inspector to assess the event.

Minor (category 2): no further information required by inspector to assess the event.

Significant (category 3): full company report required to enable inspector to assess the event.

Serious (category 4): in addition to a full company report, the assessment requires action by more than one inspector.

Major (category 5): in addition to a full company report, the assessment requires action by senior inspectors.

In 2009, companies in Wales notified the Inspectorate of 50 events. Table 12 shows how these events were classified.

Table 12: Water quality events in Wales in 2009

Nature of event	Risk assessment category (DWI)				
	1	2	3	4	5
Air in water	-	-	-	-	-
Chemical	-	3	-	-	-
Discoloured water	-	2	7	1	-
Inadequate treatment	-	-	2	-	-
Loss of supplies/poor pressure	-	1	2	-	-
Microbiological	2	6	4	-	-
Taste/Odour	-	3	-	-	-
Health concern	-	-	-	-	-
Public concern	2	6	3	1	1
Other	-	2	2	-	-
Wales	4	23	20	2	1
England and Wales	63	213	141	4	1
Category 1 = Not significant, Category 2 = Minor, Category 3 = Significant, Category 4 = Serious, Category 5 = Major.					

A summary of the nature, cause and duration of each event categorised as Significant, Serious or Major is set out in *Annex 3* along with details of the Inspectorate's findings. Most events were of relatively short duration and the company took action to inform and safeguard consumers and notify other stakeholders as appropriate.

Close to half (23 out of 50) of the events in Wales during 2009 were of a type that necessitated a detailed investigation by an inspector and there were three events which were serious enough to warrant a major investigation by the Inspectorate. This compares unfavourably to the regions in England in terms of the amount of inspector effort spent on investigating events.

Three events which occurred in 2009 are summarised below because of the learning points highlighted by the findings of the Inspectorate's investigation.

Loss of supplies and discoloured water, South Wales

- Maerdy works, operated by Dŵr Cymru Welsh Water, is situated at the head of the Rhondda Fach Valley and supplies around 22,400 consumers in Maerdy, Ferndale, Tylorstown and the surrounding areas. The raw water gravitates to the works from two surface water reservoirs, Lluest Wen and Castell. Following a spell of severe cold weather, significant discolouration of the raw water supply occurred because of freezing which caused scouring of manganese rich deposits within the above ground sections of the raw water mains.

This caused operational problems with treatment which led ultimately to a shutdown of the works and loss of water supplies in the network. Following start up of the works there was a series of burst mains with a consequential disruption to the network and discolouration. Plans are being progressed to replace sections of the raw water system and thereafter clean out the whole raw water supply system.

The Inspectorate was very critical of the company, most notably the lack of a regular cleaning programme for the raw water mains. This lack of maintenance was despite manganese deposition being a known risk recorded in the regulatory risk assessment.

The Inspectorate also recommended a review of alarm settings and subsequent actions in response to raw water monitoring to ensure early alerting to potential raw water quality changes.

The Inspectorate remains concerned about the situation at this site which suffered a further similar event in early 2010.

The Inspectorate accepts that severe weather conditions will occur from time to time, however, the Inspectorate expects companies to plan for this and prioritise mitigation measures. This event caused significant, prolonged and widespread disruption to a large number of consumers which necessarily caused political concern and generated local press interest.

Misconnection of new main, Oxwich near Swansea

- A new water supply connection was laid by a contractor of Dŵr Cymru Welsh Water to a property adjacent to Coastlands, Oxwich near Swansea. Subsequently, a plumber working at the property on behalf of the owner noticed a sewage odour in the water supply and investigations by the company and its contractor revealed that the property had been connected in error to a local sewer. A new connection was made to the water main and all pipework, fixtures and fittings inside the property were replaced and disinfected. The investigation found inaccuracies in the company's records of water mains and sewers for the local area. As well as updating these records the company also made improvements to its procedures for new mains connections, notably testing after new supply connections and a requirement to seek advice where findings on site differ from those on the job request or plans.

In 2009, Dŵr Cymru Welsh Water admitted the offence of supplying water unfit for human consumption and was cautioned by the Inspectorate. This event highlights the serious consequences that can arise when a company fails to keep accurate records of assets and does not carry out adequate checks following the making of new connections. It was very fortunate indeed that the fault was

identified by an alert plumber employed by the owner before the property was occupied.

Loss of treatment, various locations

- There were a number of events in Wales during 2009 that were similar in nature and cause (see *Annex 3*). The problems centred on a loss of control of water treatment processes, notably coagulation, resulting in elevated turbidity and detections of *Cryptosporidium* oocysts. A number of common features emerged from the Inspectorate's assessment of these events; inadequate treatment in relation to known variability of the quality of raw water, delays in responding to water quality on line alarms, and delayed or insufficient action by the company in response to changes in raw water quality. Following consideration of enforcement action by the Inspectorate, Dŵr Cymru Welsh Water is taking steps to improve water treatment at several of its works. The Inspectorate has put in place a combination of statutory notices and schemes of work and made site visits to witness the improvements being taken by the company in practice. This close scrutiny of delivery of improvements by the company continues. Details of notices can be seen in Table 10 and audits are reported below.

No offences are currently under consideration by the Inspectorate in connection with any of the events that occurred in the region in 2009.

Technical audit activity

The Inspectorate has operated a risk-based approach to technical audit since 2005. In line with better regulation principles, no technical audit takes place without a reason and those that are carried out are targeted on the basis of an assessment of risk.

The Inspectorate's tool for generating the technical audit programme looks at the critical components of the safe management of drinking water supplies, including information on water quality monitoring, event assessments, previous audits, consumer complaints and other relevant intelligence. Through this ranking of all relevant water company assets, procedures and practices, inspectors are able to prioritise and focus their technical audit work where it will have most benefit.

Information on the key findings of the technical audits undertaken during 2009 in Wales is set out in Table 13.

Table 13: Summary of the Inspectorate's technical audits in the region

Site name	Audit topic	Main findings from audit
Dŵr Cymru Welsh Water		
Mynydd Llandegai works	<i>Cryptosporidium.</i>	<p>Generally satisfactory</p> <p>Recommendations were made relating to:</p> <ul style="list-style-type: none"> • Site risk assessment and catchment management. • The need for regular review of on-site test and laboratory data and appropriate triggers for additional action. • Management of Ffynnon Llugwy raw water reservoir. • Keeping site documentation up-to-date. • Treatment of process wash-water. • Emergency shut-down arrangements. • Verifying compliance with regulatory requirements for disinfection including management of turbidity levels prior to disinfection.
Alwen works	Disinfection process following microbiological failure	<p>Unsatisfactory</p> <p>Recommendations were made relating to:</p> <ul style="list-style-type: none"> • Authorisation and documentation of critical process changes. • The need for regular review of on-site test and laboratory data and appropriate triggers for additional action, to inform process performance and optimisation. • Disinfection arrangements at the site including validation of current disinfection arrangements and achievement of a minimum required contact time (Regulation 28(4) Notice put in place by Inspectorate). • Mass/flow balance of quantities of polyelectrolyte used to mitigate risk of contravening water quality standards.
Llyswen works	Water quality event and problems with coagulation process and lime dosing plant	<p>Generally satisfactory</p> <p>Recommendations were made relating to:</p> <ul style="list-style-type: none"> • The need to review site procedures for dealing with periods of deterioration in raw water quality. • Determination and verification of contact time values to including arrangements in place for flow conditions when contact time cannot be met.
Broomy Hill works	Repetition of water quality events	<p>Generally satisfactory</p> <p>Recommendation made relating to keeping the site schematic up-to-date.</p>

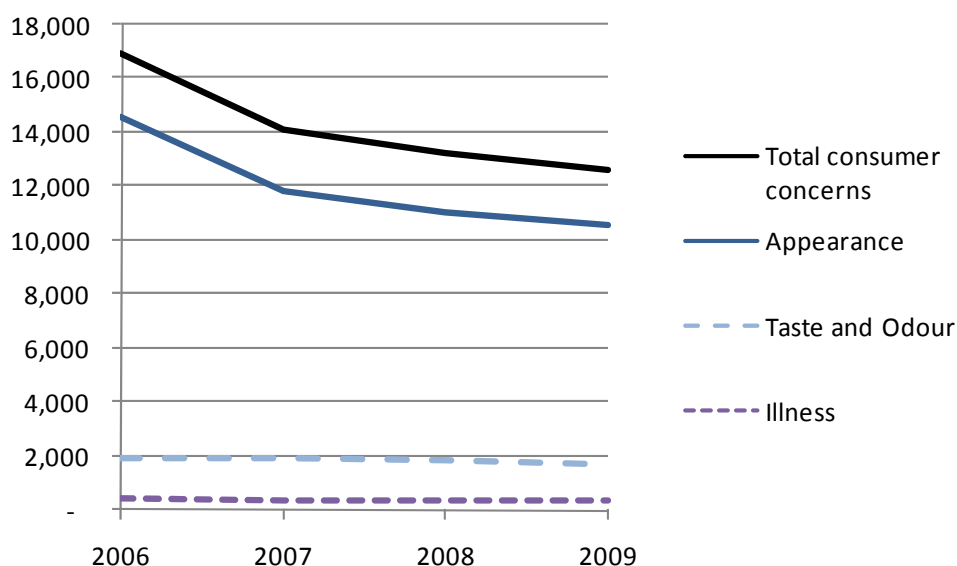
(continued)

Site name	Audit topic	Main findings from audit
Dŵr Cymru Welsh Water (continued)		
Capel Dewi works	Multiple water quality events	Generally satisfactory Recommendations were made relating to: <ul style="list-style-type: none"> • The control system in place for the coagulation process. • The need for a review of turbidity monitoring arrangements post-filtration and pre-disinfection (particularly after filter backwashing). • Site disinfection arrangements. • Regulatory sampling arrangements.
Pendine works	Multiple water quality events	Generally satisfactory Recommendation made relating to provision of information demonstrating that the required contact time could be maintained at the works at all times.
Llwyn Onn works	Multiple water quality events	Generally satisfactory
Company Policy and Practice for service reservoir maintenance	Multiple microbiological failures	Generally satisfactory Recommendations were made relating to: <ul style="list-style-type: none"> • Development of a company wide policy on the delivery and ownership of the cleaning and inspection programme. • Formal review mechanism for reservoir site operating instructions.

Public confidence in drinking water quality

When consumers have a question or a concern about drinking water quality their first point of contact is the water company. All companies record these contacts using definitions agreed with the Inspectorate.

In 2009, the number of Welsh consumers reporting concerns about the quality of their tap water (appearance, taste and odour or illness) continued to decline and this improved situation was mainly due to the fall in the number of consumers reporting problems with the brown, black or orange water or white water caused by entrained air. This is illustrated in Figure 14.

Figure 14: Numbers of consumer concern contacts 2006-2009

Discoloured water – black, brown or orange

In 2009 the contact rate per 1,000 population for Welsh consumers reporting discoloured water was 2.6, down from 3.8 in 2006. However, despite this improvement, Wales still has the second highest contact rate for this type of problem, compared to the English regions where the highest contact rate in 2009 was 3.1 per 1,000 in the Western region.

As a result of the completion of strategic investment programme in water mains renovation (see section on *Iron*), overall there are 30% fewer contacts from customers of Dŵr Cymru Welsh Water about discoloured water compared with 2006. While consumer contact numbers for Dee Valley Water are small by comparison, this year, has shown the start of a reverse in what had been a rising trend between 2006 and 2008. The number of consumer discolouration contacts for the area supplied by Severn Trent Water has continued to remain very small.

Figures 15 and 16 illustrate consumer contact rates for black, brown or orange water in 2006 and 2009.

Figure 15: Rate of consumer contacts per 1,000 population reporting black, brown or orange water in 2006

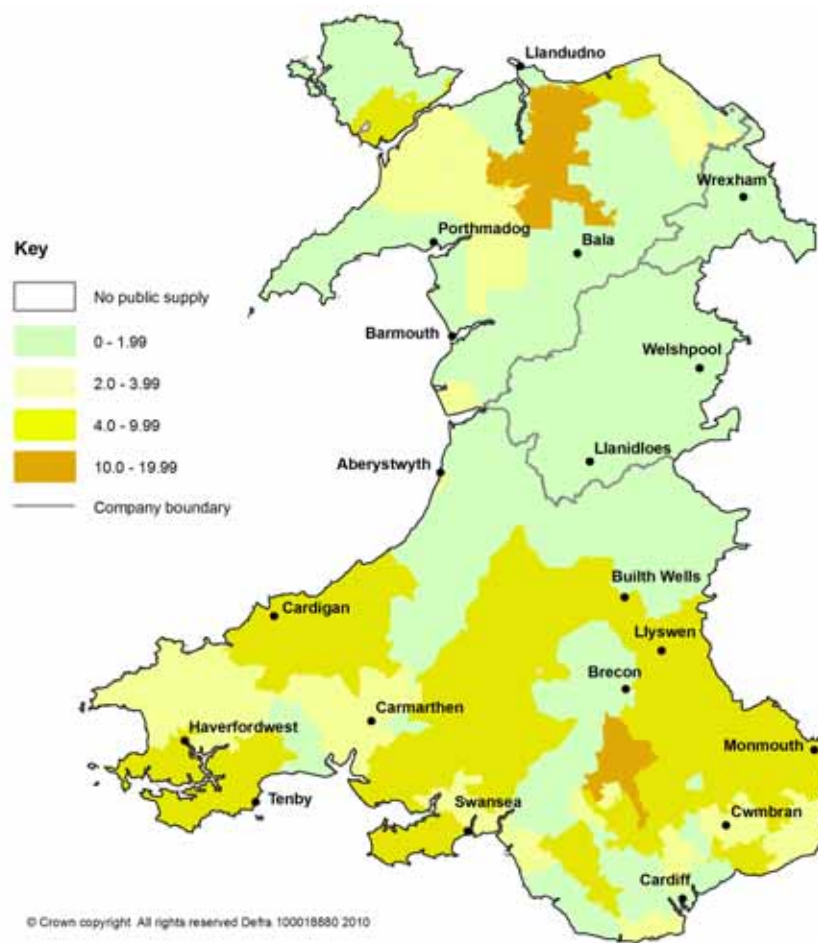
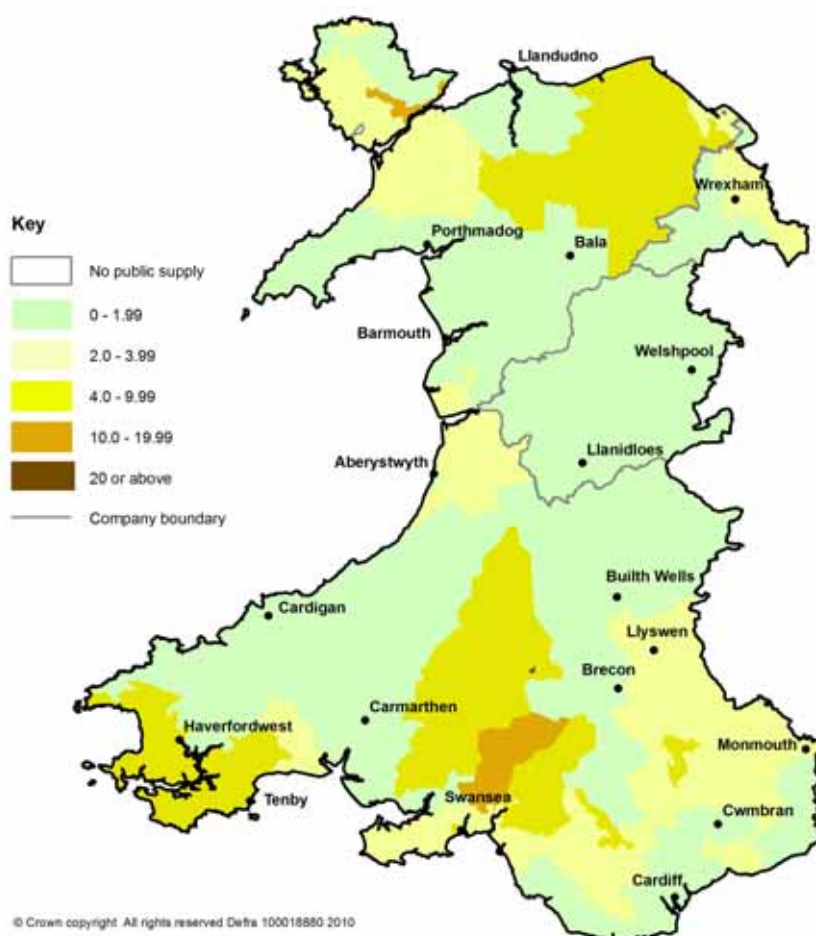


Figure 16: Rate of consumer contacts per 1,000 population reporting black, brown or orange water in 2009



The maps illustrate the fall in the contact rates in and around Cardigan, Carmarthen and South East Wales generally. Higher than average numbers of contacts about discolouration persist in the central Southern and Northern areas of Wales.

White water – air

Consumers also contact their water companies when they experience water that appears white, due to entrained air. Although this is the second highest category of contacts in Wales the situation appears to be improving, with a fall in numbers since 2006 from over 2,500 to close to 1,800 contacts. Again, the majority of the contacts are from customers of Dŵr Cymru Welsh Water and other companies' contributions to these figures are small.

Complaints to the Inspectorate

When the response of a company to a consumer contact about drinking water quality fails to provide the necessary reassurance or remedy then the consumer may contact the Inspectorate for advice. In 2009, there were six consumers sufficiently dissatisfied with the water company's initial response to raise the matter further with the Inspectorate and the reasons for these complaints to the Inspectorate are provided in Table 17.

Table 17: Contacts from consumers in Wales received by the Inspectorate

Category ¹	Number of contacts
Appearance	4
Taste and odour	2
Report of illness	0
Water quality concern	0
Total number of contacts to DWI from consumers by company. DWR (6)	
¹ Categories are as defined in Information Letter 1/2006.	

Case example

In April, a consumer living in Dyfed, Pembrokeshire, contacted the Inspectorate to report that her tap water was undrinkable. She had experienced white water several times in over three years and this was causing her to become alarmed about the safety of her tap water. White water is due to entrained air and is harmless, and it can be diagnosed by checking to see if the cloudiness clears from the bottom to the top of glass when the water is left to stand. However, the problem is preventable and companies should make every effort to minimise its occurrence because it induces concern in consumers when the cause remains unexplained.

In this case, the Inspectorate established that Dŵr Cymru Welsh Water were aware of the problem which related to power supply interruptions affecting a nearby pumping station. The company took a phased approach to resolving the problem over several weeks, including flushing when problems recurred. However, the consumer contacted the Inspectorate again when her tap water became discoloured (brown) and when Dŵr Cymru Welsh Water wanted to install a valve in her front garden as part of the remedial action.

Although the company maintained communication with the consumer throughout the period, she was not fully reassured and her original concerns were heightened by the company's contractors not giving a full

explanation of work being carried out nearby. This case illustrates the adverse impact that aeration has on public confidence in drinking water. It also highlights the need for water companies to act quickly to resolve white water events and take particular care to ensure that all communication with consumers is thorough, reassuring and consistent.

For further information on the Water Supply (Water Quality) Regulations 2010 (Wales), or the microbiological and chemical parameters covered by the regulations please refer to the DWI website (www.dwi.gov.uk).

If you have a need for more specific information than that on our website, please contact us on the DWI enquiry line: 030 0068 6400.

Annex 1

Further sources of information

The publication *Drinking water 2009* comprises the regional reports for England and a report covering Wales. There are six regional reports for England (Central, Eastern, Northern, Southern, Thames and Western) and one for Wales (in two languages). Each report presents information from 2009 under the following headings:

- Introduction to the report.
- Water supply arrangements.
- Drinking water quality testing.
- Drinking water quality results.
- Private water supplies.
- Risk assessments.
- Drinking water quality events.
- Technical audit activity.
- Public confidence in drinking water quality.

The reports and other content are published on the DWI website (www.dwi.gov.uk).

Content of the CD

The CD supplied with the printed report holds all of the above content and additionally it contains:

Water company look-up tables

These summarise all the results of water company monitoring in 2009. They provide information on:

- what was tested;
- how many tests were performed;
- the range of the results of testing; and
- how many tests failed to meet the standards.

Significant drinking water quality events in England and Wales 2009

To promote shared learning, the Inspectorate has compiled a list of all incidents that occurred in 2009 which illustrate the nature and cause of each incident, the main actions by the company and findings from the inspectors' assessments. Relevant content from this overall list is contained in an annex to each regional report.

Annex 2

Glossary and description of standards

These definitions will assist the understanding of the report where technical terms have been used.

1,2-Dichloroethane	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. A European health-based standard of 3µg/l applies.
Acrylamide	European health-based standard. A monomer is not normally found in drinking water. It is produced in the manufacture of polyacrylamides occasionally used in water treatment. Its presence in drinking water is limited by control of the product specification. Standard is 0.1µg/l.
Aggressive	a term used to indicate that the water has a tendency to dissolve copper (and other metals) from the inner surface of a pipe or water fitting such as a tap.
Aesthetic	associated with the senses of taste, smell and sight.
Alkali	a solution containing an excess of free hydroxyl ions, with a pH greater than seven.
Aluminium	occurs naturally in some source waters. It is removed from drinking water by conventional water treatment (coagulation and filtration). Aluminium sulphate and polyaluminium chloride may be used as water treatment chemicals at some water treatment works. A national standard of 200µg/l applies.
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. An indicator parameter with a guide value of 0.5mg/l.
Analytical quality control (AQC)	the method used to ensure that laboratory analysis methods are performing correctly.

Antimony	is rarely found in drinking water. Trace amounts can be derived from brass tap fittings and solders. A European health-based standard of 5µg/l applies.
Aquifer	water-containing underground strata.
Arsenic	occurs naturally in only a few sources of groundwater. Specific water treatment is required to remove it. A European health-based standard of 10µg/l applies.
Authorised departure	authorisation for a water company to temporarily supply water exceeding a drinking water standard, granted by the authorities only when there is no risk to human health.
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. A European health-based standard of 1µg/l applies.
Benzo(a)pyrene (BaP)	is one of several compounds known as polycyclic aromatic hydrocarbons (PAHs). Their source in drinking water is as a result of deterioration of coal tar, which many years ago was used to line water pipes. Due to extensive water mains refurbishment and renewal it is now rare to detect this substance in drinking water. A European health-based standard of 0.01µg/l applies.
Boron	in surface water sources comes from industrial discharges or from detergents in treated sewage effluents. The very low concentrations found in some drinking waters are not a concern to public health. A European health-based standard of 1mg/l applies.
Bromate	can be formed during disinfection of drinking water through a reaction between naturally occurring bromide and strong oxidants (usually ozone). It may be generated in the manufacture of sodium hypochlorite disinfectant. Exceptionally, groundwater beneath an industrial site can become contaminated with bromate. A European health-based standard of 10µg/l applies.

Bulk supply	water supplied in bulk, usually in treated form, from one water company to another.
Cadmium	is rarely detected in drinking water and trace amounts are usually due to dissolution of impurities from plumbing fittings. A European health-based standard of 5µg/l applies.
Chloramine	a substance formed by reaction between chlorine and ammonia, used as a disinfectant in distribution systems because of its long-lasting properties compared to chlorine.
Chloramination	the process of generating a chloramine disinfectant residual in water leaving a treatment works.
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. An indicator parameter with a guide value of 250mg/l.
Chlorine residual	the small amount of chlorine or chloramines present in drinking water to maintain its quality as it passes through the water company's network of pipes and household plumbing.
Chromium	is not present in drinking water. A European health-based standard of 50µg/l applies.
<i>Clostridium perfringens</i>	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 indicates historic contamination that requires investigation. The standard is 0 per 100ml.
Coagulation	a process employed during drinking water treatment to assist with the removal of particulate matter.
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. It is removed by conventional water treatment. A national standard of 20mg/l on the Platinum/Cobalt (Pt/Co) scale applies.
Communication pipe	the connection from the water main to the consumer's property boundary.
Compliance assessment	a comparison made by the Inspectorate of data gathered by water companies against standards and other regulatory requirements.
Compound	a compound consists of two or more elements in chemical combination.
Concessionary supplies	historical free supplies of water for a householder, established when a company wanted to lay mains across land and the landowner might agree, subject to a permission, to take a supply of water from the main.
Conductivity	is a non-specific measure of the amount of natural dissolved inorganic substances in source waters. An indicator parameter with a guide value of 2,500 μ S/cm.
Contact tank	a tank, normally situated on a treatment works site, which forms part of the disinfection process. A disinfectant chemical (normally chlorine) is dosed into the water as it flows into the tank. The period of time that the water takes to flow through the tank allows sufficient 'contact' time for the chemical to kill, or deactivate, any viruses or pathogenic organisms that may be present in the water.
Contravention	a breach of a regulatory requirement.
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 on new housing estates. These 'blue water' events can be avoided by good plumbing practices. A European health-based standard of 2mg/l applies.

Cryptosporidium	is a parasite that causes severe gastroenteritis and can survive disinfection. In the UK, continuous monitoring is undertaken at works classified by the company as being at significant risk.
Cyanide	is not present in drinking water. A European health-based standard of 50µg/l applies.
Dead leg	refers to a piece of piping which is stopped off at one end, but is connected to the supply at the other end and can result in stagnant water in the pipework.
Distribution systems	a water company's network of mains, pipes, pumping stations and service reservoirs through which treated water is conveyed to consumers.
Drinking water standards	the prescribed concentrations or values listed in regulations.
EC Drinking Water Directive	Council Directive 98/83/EC December 1998 – setting out drinking water standards to be applied in member states.
Enforcement action	the means, as set out in the Water Act 1989 and consolidated into the Water Industry Act 1991, by which the Secretary of State requires a water company to comply with certain regulatory requirements.
Enterococci	see <i>Escherichia coli</i> .
Environment Agency	the Environment Agency is responsible for maintaining or improving the quality of fresh, marine, surface and underground water in England and Wales.
Epichlorhydrin	can be found in trace amounts in polyamine water treatment chemicals. Its presence in drinking water is limited by control of the product specification. A European health-based standard of 0.1µg/l applies.
Epidemiology	a process of studying the distribution of cases of disease within a population in relation to exposure to possible sources of the infection, with a view to establishing the actual source of the infection.

<i>Escherichia coli</i> and Enterococci	are bacteria present in the gut of warm-blooded animals. They should not be present in drinking water and, if present, immediate action is required to identify and remove any source of faecal contamination that is found. The standard is 0 per 100ml.
Event	water companies have to inform the Inspectorate about occasions when water quality or sufficiency is affected or when public confidence in drinking water quality may be impacted. The Inspectorate refer to these instances as 'Events'.
Filtration	the separation of suspended particulate matter from a fluid.
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. Some water companies are required by the local health authority to fluoridate water supplies as a protection against tooth decay. The drinking water standard ensures levels are safe in either circumstance. Fluoridation of water is a Department of Health policy. A European health-based standard of 1.5mg/l applies.
Geosmin	a substance produced by the growth of algae, normally in surface waters which gives rise to a characteristic 'earthy' or 'musty' taste or odour.
Granular activated carbon	an adsorbent filtration media used to remove trace organic compounds from water.
Groundwater	water from aquifers or other underground sources.
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. A specification of between 6.5 and 9.5 applies.
Improvement programmes	water company improvement works, these are legally binding on the company and each programme will remedy an actual or potential breach of a drinking water standard within a specified time period.

Indicator parameter	something that is measured to check that control measures, such as water treatment, are working effectively.
Indicator organism	an organism which indicates the presence of contamination and hence the possible presence of pathogens.
Information Letter	formal guidance to water companies given by the Inspectorate and published on the Inspectorate's website at www.dwi.gov.uk
Inspectorate	The Drinking Water Inspectorate.
Iron	is present naturally in many water sources. It is removed by water treatment. Some iron compounds are used as water treatment chemicals. However, the commonest source of iron in drinking water is corrosion of iron water mains. A national standard of 200µg/l applies.
Lead	very occasionally occurs naturally in raw waters, but the usual reason for its presence in drinking water is plumbing in older properties. If the water supply has a tendency to dissolve lead then water companies treat the water to reduce consumer exposure. The permanent remedy is for householders to remove lead pipes and fittings. A European health-based standard of 25µg/l applies, but 10µg/l will apply from 2013 onwards.
Manganese	is present naturally in many sources and is usually removed during treatment. A national standard of 50µg/l applies.
Mean zonal compliance percentage	a measure of compliance with drinking water standards introduced by the Inspectorate in 2004.
Mercury	is not found in sources of drinking water. A European health-based standard of 1µg/l applies.
Microbiological	associated with the study of microbes.
m³/d	cubic metre per day.
mg/l	milligram per litre (one thousandth of a gram per litre).

MI/d	megalitre per day (one MI/d is equivalent to 1,000 m ³ /d, or to 220,000 gallon/d).
µg/l	microgram per litre (one millionth of a gram per litre).
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. A European health-based standard of 20µg/l applies.
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. A European health-based standard of 50mg/l applies.
Nitrite	is sometimes produced as a by-product when chloramine is used as the essential residual disinfectant in a public water supply. Chloramine is the residual disinfectant of choice in large distribution systems because it is more stable and long-lasting. Careful operation of the disinfection process ensures levels of nitrite are kept below the standard. A European health-based standard of 0.5mg/l applies.
Odour	can arise as a consequence of natural processes in surface waters, particularly between late spring and early autumn. Water treatment with activated carbon or ozone will remove natural substances causing taste. The standard relates to the evaluations of a panel of people assessing samples in the laboratory.
Ofwat	the water industry's economic regulator.
Oocyst	the resistant form in which <i>Cryptosporidium</i> occurs in the environment, and which is capable of causing infection.
Organoleptic	characteristics of a substance as detected by our senses, for example taste, odour or colour.
Ozone process (ozonation)	the application of ozone gas in drinking water treatment.

Parameters	the substances, organisms and properties listed in Schedule 2 and Regulation 3 of the regulations. Parameter definitions can be found further on in this annex.
Pathogen	an organism which can infect humans and cause disease.
PCV	see 'Prescribed concentration or value'.
Periodic review	the economic regulator's process of setting water prices.
Pesticides	any fungicide, herbicide, insecticide or related product (excluding medicines) used for the control of pests or diseases.
Pesticides – organochlorine compounds (aldrin, dieldrin, heptachlor, heptachlor epoxide)	are no longer used in the UK because they are persistent in the environment. They are not found in drinking water. A European chemical standard of 0.03µg/l for each compound applies.
Pesticides – other than organochlorine compounds	is 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 and non-agricultural uses, mainly on crops and for weed control on highways and in gardens. Where needed, water companies have installed water treatment (activated carbon and ozone) so that pesticides are not found in drinking water. Water companies must test for those pesticides used widely in their area of supply. Pesticide monitoring thus varies according to risk. A European chemical standard of 0.1µg/l for each individual substance and 0.5µg/l for the total of all pesticides applies.
Phosphate dosing	treatment of water that results in a protective film building up on the inside of pipes minimising the likelihood of lead being present in drinking water supplied through lead pipes.
Plumbosolvency	the tendency for lead to dissolve in water.
Polycyclic aromatic hydrocarbons (PAHs)	is a group name for several substances present in petroleum-based products such as coal tar. (see Benzo(a)pyrene listed above for more information). A European health-based standard of 0.1µg/l for the sum of all the substances applies.

Powdered activated carbon (PAC)	powdered activated carbon is employed in treatment processes to remove pollutants.
Pre- and post- renovation assessment (PPRA)	a programme of assessment before and after mains renovation to demonstrate justification for the work, and the improvements achieved by the renovation.
Prescribed concentration or value (PCV)	the numerical value assigned to drinking water standards defining the maximal or minimal legal concentration or value of a parameter.
PR09	the periodic review process for setting water prices for 2010-2015.
Private supplies	water taken from private sources or supplied by non-licensed suppliers; supplies of water provided otherwise than by a statutorily appointed water undertaker.
Protozoan parasites	a single cell organism that can only survive by infecting a host.
Public Register	drinking water quality information made available to the public by water companies as required by regulations.
Public supplies	water supplied by a company licensed for that purpose.
Raw water	water prior to receiving treatment for the purpose of drinking.
Regulations	The Water Supply (Water Quality) Regulations 2000 (England), 2010 (Wales).
Remedial action	action taken to improve a situation.
Residual disinfectant	the small amount of chlorine or chloramines present in drinking water to maintain its quality as it passes through the water company's network of pipes and household plumbing.
Secretary of State	Secretary of State for Environment, Food and Rural Affairs.
Selenium	is an essential element and a necessary dietary component. Amounts in drinking water are usually well below the standard. A European health-based standard of 10µg/l applies.

Service connection	connection between the water company's main to a consumer's property.
Service pipe	the service pipe is the pipe that connects the consumer's property to the water company main. It comprises two parts – the communication pipe, which is the connection from the water main to the consumer's property boundary (normally at the outside stop tap), and the supply pipe, which runs from the boundary of the property to the consumer's inside stop tap.
Service reservoir	a water tower, tank or other reservoir used for the storage of treated water within the distribution system.
Sodium	is a component of common salt. It is present in seawater and brackish groundwater. Some treatment chemicals contain sodium. Concentrations in drinking water are extremely low, but some water softeners can add significant amounts to drinking water where they are installed in homes or factories. A national standard of 200mg/l applies.
Springs	groundwater appearing at the surface at the outcrop of the junction of a permeable stratum with an impermeable stratum.
Sulphate	occurs naturally in all waters and is difficult to remove by treatment. An indicator parameter with a guide value of 250mg/l.
Supply pipe	pipe connecting between the boundary of a consumer's property to the inside stop tap.
Supply point	a point other than a consumer's tap authorised for the taking of samples for compliance with the regulations.
Surface water	untreated water from rivers, impounding reservoirs or other surface water source.
Taste	can arise as a consequence of natural processes in surface waters, particularly between late spring and early autumn. Water treatment with activated carbon or ozone will remove natural substances causing taste. The standard relates to the evaluations of a panel of people assessing samples in the laboratory.
Technical audit	the means of checking that water companies are complying with their statutory obligations.

Tetrachloroethane and Trichloroethene	are solvents that may occur in groundwater in the vicinity of industrial sites. Where necessary they are removed by specialist treatment. A European health-based standard of 10µg/l for the sum of both substances applies.
Tetrachloromethane	is a solvent that may occur in groundwater in the vicinity of industrial sites. Where necessary it is removed by specialist water treatment. A national standard of 3µg/l applies.
Time of supply	the moment when water passes from the water company's pipework into a consumer's pipework.
Total 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. An indicator parameter with a guide value of 0.10mSv/year.
Total organic carbon	represents the total amount of organic matter present in water. An indicator parameter with a guide value of 'no abnormal change'.
Toxicology	the study of the health effects of substances.
Treated water	water treated for use for domestic purposes as defined in the regulations.
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. A European health-based standard of 100µg/l applies.
Tritium	is a radioactive isotope of hydrogen. Discharges to the environment are strictly controlled and there is a national programme of monitoring surface waters. An indicator parameter with a guide value of 100Bq/l.

Turbidity	<p>is a measure of the cloudiness of water.</p> <p>At treatment works, measurement is an important non-specific water quality control parameter 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. An indicator parameter with a guide value of 1NTU.</p> <p>When detected at the consumer's tap it can arise from disturbance of sediment within water mains. A national standard of 4NTU applies in this case.</p>
Vinyl chloride	<p>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. A European health-based standard of 0.5µg/l applies.</p>
Water supply zone	<p>a pre-defined area of supply for establishing sampling frequencies, compliance with standards and information to be made publicly available.</p>
WHO	<p>World Health Organisation.</p>
Wholesome/wholesomeness	<p>a legal concept of water quality which is defined by reference to standards and other requirements set out in the regulations.</p>

Annex 3

Significant drinking water quality events

Date and duration	Area	Estimate of population affected	Nature and cause of the event	Main actions and findings from the Inspectorate investigation
06 Jan 2009 For 5 days (DWR)	Maerdy, Ferndale and parts of the Rhondda Valley	22,400	Brown discolouration due to raw water deterioration.	<p>The Inspectorate classified this event as serious.</p> <p>Dŵr Cymru Welsh Water action:</p> <ul style="list-style-type: none"> • Shut down treatment works. • Sampled affected area. • Provided an alternative supply by tanker/bowser. • Provided bottled water on request. • Repaired main. • Rezoned area (brought in water from different source). • Other actions carried out included flushing the raw water mains to waste in agreement with the Environment Agency. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • Recommended that the company review the alarm settings and priorities for the raw water parameters at the works to ensure the most prompt notification of potential raw water quality problems and attendance at site if appropriate. • Recommended that the company review its maintenance strategy and policy for raw water mains to ensure that a risk-based cleaning programme is in place at all works identified to be at risk from similar problems.

Date and duration	Area	Estimate of population affected	Nature and cause of the event	Main actions and findings from the Inspectorate investigation
01 Feb 2009 For 1 day (DWR)	Pendine works, supplying parts of South West Carmarthenshire	7,781	<i>Cryptosporidium</i> and problems with coagulation.	<p>The Inspectorate classified this event as significant.</p> <p>Dŵr Cymru Welsh Water action:</p> <ul style="list-style-type: none"> • Repaired faulty equipment. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • Commended the operators rapid response to instigate standby coagulant dosing. This action undoubtedly reduced the subsequent duration of the loss of treatment. • DWI minded to recommend that coagulant dosing alarms were fitted, however, it was noted work is currently in progress to install flow meters and telemetry alarms. • Recommended that the company reviews how it ensures disinfection is adequate and undertakes appropriate monitoring.

Date and duration	Area	Estimate of population affected	Nature and cause of the event	Main actions and findings from the Inspectorate investigation
01 Apr 2009 For 20 hours (DWR)	Pendarnddu near Merthyr Tydfil	9,500	Brown discolouration due to planned work.	<p>The Inspectorate classified this event as significant.</p> <p>Dŵr Cymru Welsh Water action:</p> <ul style="list-style-type: none"> • Repaired faulty equipment. • Rezoned area (brought in water from different source). • Sampled affected area. • Provided an alternative supply by tanker/bowser. • Provided bottled water on request. • Review of procedures. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • Inadequate risk assessment. • Recommended in future all works shuts are properly risk assessed to encompass all possible scenarios and eventualities. • Recommended that in the interim period before isolation and cleaning of this reservoir that procedures are put in place to prevent the disturbance of the deposits in this reservoir. • Recommended that the company apply learning from this event to all relevant sites, with specific reference to the management of reservoir levels during events.

Date and duration	Area	Estimate of population affected	Nature and cause of the event	Main actions and findings from the Inspectorate investigation
10 Apr 2009 For 2 days (DWR)	Pontardulais and Gorseinon, near Swansea	39,530	Brown discolouration due to planned work.	<p>The Inspectorate classified this event as significant.</p> <p>Dŵr Cymru Welsh Water action:</p> <ul style="list-style-type: none"> • Provided bottled water on request. • Review of procedures. • Sampled affected area. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • Inadequate procedures. • Each consumer reporting discoloured water was contacted again on 14 April to confirm that all discolouration had cleared from the system and DWI commended the company for this action. • Recommended that the company undertake a further review of the procedures to take into account whether or not any additional changes are required to incorporate the findings of the modelling exercise. • Recommended that the company undertake a review to understand what other options are available for better management of flows and velocities at Bryngwyn works and in this potentially sensitive distribution system.

Date and duration	Area	Estimate of population affected	Nature and cause of the event	Main actions and findings from the Inspectorate investigation
22 Apr 2009 For 8 hours (DWR)	Aberdare	25,851	Brown discolouration due to burst main.	<p>The Inspectorate classified this event as significant.</p> <p>Dŵr Cymru Welsh Water action:</p> <ul style="list-style-type: none"> • Sampled affected area. • Replaced faulty equipment. • Provided an alternative supply by tanker/bowser. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • Inadequate investigations into root cause. • Supplied unwholesome water in breach of regulations. • Recommended, that the company consider other measures to monitor this type of situation and make better use of online telemetry to monitor the distribution system.
28 Apr 2009 For 1 day (DWR)	West of Chester Denbigh	175,000	Issue of boil notice, microbiological contamination at works.	<p>The Inspectorate classified this event as major.</p> <ul style="list-style-type: none"> • Investigation ongoing. <p>Dŵr Cymru Welsh Water action:</p> <ul style="list-style-type: none"> • Issued a boil water notice. • Sampled affected area. • Made alterations to treatment works disinfection process. • Reduced flow through the works • Investigated and reviewed catchment, treatment performance and water quality data.

Date and duration	Area	Estimate of population affected	Nature and cause of the event	Main actions and findings from the Inspectorate investigation
29 Apr 2009 For 8 days (DVW)	Old Warren near Chester and Glyndyfrdwy near Llangollen	383	Boil notice due and microbiological contamination at works.	<p>The Inspectorate classified this event as serious.</p> <p>Dee Valley Water action:</p> <ul style="list-style-type: none"> • Issued a boil water notice. • Sampled affected area. • Provided bottled water on request. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • Company commended for its management of this event which related to a supply from Dŵr Cymru Welsh Water.
13 May 2009 For 4 days (DVW)	Chester and across the border into Wales	106,000	Media interest about taste of water.	<p>The Inspectorate classified this event as significant.</p> <p>Dee Valley Water action:</p> <ul style="list-style-type: none"> • Sampled affected area. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • The Inspectorate recommended additional monitoring measures to be put in place to protect customers and to provide early warning (e.g. customer complaint triggers, early run to waste of backwash water).
19 May 2009 For 6 hours (DWR)	Llysven works supplying Hay on Wye, Clyro, Glasbury, Painscastle, Talgarth and Bronllys	10,000	<i>Cryptosporidium.</i>	<p>The Inspectorate classified this event as significant.</p> <p>Dŵr Cymru Welsh Water action:</p> <ul style="list-style-type: none"> • Sampled affected area. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • Recommended the company inform the Inspectorate how this event learning has been incorporated in the water safety plans. • Recommended the company analyses all samples for appropriate parameters.

Date and duration	Area	Estimate of population affected	Nature and cause of the event	Main actions and findings from the Inspectorate investigation
01 Jun 2009 For 24 hours (DWR)	Abergele, North Wales	2,200	Cloudy discolouration.	<p>The Inspectorate classified this event as significant.</p> <p>Dŵr Cymru Welsh Water action:</p> <ul style="list-style-type: none"> • Sampled affected area. • Flushed mains. • Rezoned area (brought in water from different source). <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • Supplied unwholesome water in breach of regulations. • Inadequate follow-up sampling. • Inadequate number of samples taken. • Sampling was not timely enough. • Recommended that in future the company takes an appropriate numbers of samples in a timely manner for appropriate parameters to determine the nature and extent of an event. • Recommended that the company reviews and updates its site operating manual, telemetry and alarms for this site to ensure consistency is maintained. • Recommended the company reviews the operation of all automated inlet valves at its service reservoirs and, where appropriate, adjusts trigger levels and flow conditions to allow for self-cleansing of the incoming main or alternatively undertakes a risk-based programme of mains flushing.

Date and duration	Area	Estimate of population affected	Nature and cause of the event	Main actions and findings from the Inspectorate investigation
10 Jun 2009 For 4 days (DWR)	Carmel, Llandybie, Tumble, Gorslas	8,000	Brown discolouration due to planned work.	<p>The Inspectorate classified this event as significant.</p> <p>Dŵr Cymru Welsh Water action:</p> <ul style="list-style-type: none"> • Flushed mains. • Provided bottled water on request. • Sampled affected area. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • Inadequate procedures. • Recommended that the company visually inspect the water entering a service reservoir when inlet valves are opened.
17 Jun 2009 For 6 hours (DWR)	Llwynon works supplying Cardiff, Merthyr and Caerphilly area	200,000	Loss of ferric dosing due to plant failure.	<p>The Inspectorate classified this event as significant.</p> <p>Dŵr Cymru Welsh Water action:</p> <ul style="list-style-type: none"> • Repaired faulty equipment. • Sampled affected area. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • Recommended that the company ensure that sampling for <i>Cryptosporidium</i> is considered and initiated at an early stage, particularly for those events where poor coagulation performance is known to be a factor. • Recommended that the company put in place procedures to ensure that such problems are rectified promptly.
03 Jul 2009 For 24 hours (DWR)	Builth works Builth Wells, Wales	15,000	<i>Cryptosporidium</i> .	<p>The Inspectorate classified this event as significant.</p> <p>Dŵr Cymru Welsh Water action:</p> <ul style="list-style-type: none"> • Replaced faulty equipment. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • Lack of maintenance of equipment.

Date and duration	Area	Estimate of population affected	Nature and cause of the event	Main actions and findings from the Inspectorate investigation
16 Jul 2009 For 12 hours (DWR)	Llanigon service reservoir supplying the Hay on Wye area	3,750	Loss of supplies/poor pressure.	<p>The Inspectorate classified this event as significant.</p> <p>Dŵr Cymru Welsh Water action:</p> <ul style="list-style-type: none"> • Rezoned area (brought in water from different source). • Provided an alternative supply by tanker/bowser. • Provided bottled water on request. • Sampled affected area. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • The Inspectorate was highly critical that it was necessary for the company to run Llyswen works to waste following issues with pH, which resulted in the drain down of Llanigon service reservoir and subsequent loss of supplies downstream. • Critical of the company for delays in the construction of the new Kalic plant to address the pH dosing issues, which have caused events previously. • Suggested that contingency measures be put in place and procedures implemented until the new lime dosing plant is fully commissioned.

Date and duration	Area	Estimate of population affected	Nature and cause of the event	Main actions and findings from the Inspectorate investigation
20 Aug 2009 For 4 days (DWR)	Treharris, Wales	52,500	Loss of supplies/poor pressure due to burst main.	<p>The Inspectorate classified this event as significant. The Inspectorate initiated enforcement action requiring the company to enter into a legally binding agreement to take action to investigate and mitigate against further discolouration of water supplies.</p> <p>Dŵr Cymru Welsh Water action:</p> <ul style="list-style-type: none"> • Repaired main. • Provided bottled water on request. • Provided an alternative supply by tanker/bowser. • Sampled affected area. • Investigated elevated concentrations of aluminium from upstream treatment works. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • Recommended the company ensures all relevant information is provided in their 20 day report.
25 Aug 2009 For 1 day (DWR)	Spa service reservoir supplying Pontardawe, Swansea	8	Boil notice issued due to microbiological contamination at service reservoir.	<p>The Inspectorate classified this event as significant.</p> <p>Dŵr Cymru Welsh Water action:</p> <ul style="list-style-type: none"> • Issued a boil water notice. • Increased chlorine residuals at service reservoir. • Sampled affected area. • Removed service reservoir from supply. • The company have now permanently abandoned the service reservoir. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • Recommended that the company review its procedures to ensure that where an asset is proposed for abandonment, particularly as a result of water quality risks, that abandonment is progressed at the earliest possible opportunity.

Date and duration	Area	Estimate of population affected	Nature and cause of the event	Main actions and findings from the Inspectorate investigation
27 Aug 2009 For 24 hours (DWR)	Crai works and supply zones supplying the Upper Swansea Valley area	23,750	Iron.	<p>The Inspectorate classified this event as significant.</p> <p>Dŵr Cymru Welsh Water action:</p> <ul style="list-style-type: none"> • Review of procedures. • A works instruction issued to prevent this type of incident occurring again. <p>DWI Comments and Findings:</p> <ul style="list-style-type: none"> • Investigation ongoing. • Inadequate procedures. • Inadequate treatment process – Filtration. • The discolouration was caused by high headloss due to the flow being restricted at the filters and not at the reservoir outlet or the master filter outlet flow. This has been addressed by the issue of a works instruction to prevent it happening again.
13 Oct 2009 For 12 hours (DWR)	Bridgend in Swansea	7,500	Brown discolouration.	<p>The Inspectorate classified this event as significant.</p> <p>Dŵr Cymru Welsh Water action:</p> <ul style="list-style-type: none"> • Flushed mains. • Provided bottled water on request. • Sampled affected area. • Company circulated a bulletin to Network Inspectors regarding the identification of geared valves on trunk mains. • Company reminded the individual to follow company procedures. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • Recommended the information system was updated as soon as possible. • The Inspectorate commended the company for proactively calling back consumers who complained of discolouration, to help establish the extent and duration of this event.

Date and duration	Area	Estimate of population affected	Nature and cause of the event	Main actions and findings from the Inspectorate investigation
12 Nov 2009 For 6 days (DWR)	Penyffodd, near Prestatyn	908	Boil notice issued due to microbiological contamination following a burst water main.	<p>The Inspectorate classified this event as significant.</p> <p>Dŵr Cymru Welsh Water action:</p> <ul style="list-style-type: none"> • Review of procedures. • Provided bottled water on request. • Sampled affected area. • Increased chlorine residuals in the distribution system. • Issued a boil water notice. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • The Inspectorate concluded that the company has since taken action to address issues highlighted by this event.
25 Nov 2009 For 24 hours (DWR)	Preseli works supplying North Pembrokeshire including the towns of Fishguard and Newport	19,000	Higher than usual pH due to plant failure.	<p>The Inspectorate classified this event as significant.</p> <p>Dŵr Cymru Welsh Water action:</p> <ul style="list-style-type: none"> • Repaired faulty equipment. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • Inspectorate minded to recommend the company review the process of alarm response from the Control Centre to ensure a more timely response, but action has been taken to amend the procedures to ensure that managers are informed when high level alarms are being triggered to validate and authorise any decision to delay a response to that alarm. • Inspectorate minded to recommend the company review and amend their procedures for overriding emergency shutdown systems, however, since the time of event the company have carried out an investigation surrounding the issues of this event and have now amended the procedures regarding authorisation of overrides and recording of the time at which the overrides are activated.

Date and duration	Area	Estimate of population affected	Nature and cause of the event	Main actions and findings from the Inspectorate investigation
03 Dec 2009 For 6 days (DWR)	Kinmel Bay, Conwy (Wales only)	4,573	Coliforms following a burst main.	<p>The Inspectorate classified this event as significant.</p> <p>Dŵr Cymru Welsh Water action:</p> <ul style="list-style-type: none"> • Repaired faulty equipment. • Sampled affected area. • Flushed mains. • Repaired main. • Increased chlorine residuals in the distribution system. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • Recommended that the company takes action to ensure that an assessment of the impact of flushing is conducted prior to its commencement and that past events are used to identify appropriate flushing velocities.
23 Dec 2009 For 31 days (DWR)	Hirwaun works supplying Rhondda Cynon Taff	12,195	Iron breakthrough due to plant failure.	<p>The Inspectorate classified this event as significant.</p> <p>Dŵr Cymru Welsh Water action:</p> <ul style="list-style-type: none"> • Replaced faulty equipment. • Sampled affected area. • Review of procedures. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • Inadequate treatment process – clarification. • Inadequate treatment process – dosing. • Inadequate treatment process – disinfection. • Inadequate treatment process – filtration. • Recommended the company review and update their Regulation 27 risk assessment report, where appropriate, to take into account the risks to the treatment process associated with adverse weather conditions. • Recommended the company fully investigates the cause of the turbidity spikes and considers short, medium and long term measures to prevent their continued occurrence.

Date and duration	Area	Estimate of population affected	Nature and cause of the event	Main actions and findings from the Inspectorate investigation
25 Dec 2009 For 5 days (DWR)	Holywell, Penyffordd, Greenfield, Milwr, Gwespyr, Mostyn, Carmel, Whitford, Llanasa and Trelogan.	15,618	Brown discolouration due to burst main.	<p>The Inspectorate classified this event as significant.</p> <p>Dŵr Cymru Welsh Water action:</p> <ul style="list-style-type: none"> • Sampled affected area. • Repaired main. • Provided bottled water on request. • Flushed mains. • The company is planning to replace the service reservoir soon with one which has two compartments which will facilitate inspections and cleaning. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • Satisfactory resolution of the event and no further action required.

Note: A complete table of significant events in England and Wales in 2009 can be found on the CD in the folder. It is named **Significant drinking water quality events in England and Wales 2009.pdf**. It is also available on the DWI website (www.dwi.gov.uk).

Annex 4 Planned drinking water quality improvements

Company	Parameter, hazard or driver	Site	Due for completion	Status	Legal instrument
DWR	Aluminium	Pontsticill	31-Mar-12	Ongoing	Undertaking
DWR	Coliform bacteria and <i>E.coli</i>	Cwellyn	31-Mar-10	Completed 24-Mar-10	Undertaking
DWR	Concessionary supplies	Abertrinant PUTS	31-Aug-12	Ongoing	Notice
DWR	Concessionary supplies	Lower Lodge	31-Aug-12	Ongoing	Notice
DWR	Concessionary supplies	Pantyreos	31-Aug-12	Ongoing	Notice
DWR	Concessionary supplies	Penyrheol	31-Aug-12	Ongoing	Notice
DWR	Concessionary supplies	Cefn Golau Myddfai	31-Mar-15	Ongoing	Notice
DWR	Concessionary supplies	Cray	31-Mar-15	Ongoing	Notice
DWR	Concessionary supplies	Garw leisiaui	31-Mar-15	Ongoing	Notice
DWR	Concessionary supplies	Lliw	31-Mar-15	Ongoing	Notice
DWR	<i>Cryptosporidium</i>	Dunfield	31-Jul-10	Completed 22-Oct-09	Notice
DWR	<i>Cryptosporidium</i>	Nant Peris	31-Jul-09	Completed 24-Mar-09	Notice
DWR	<i>Cryptosporidium</i>	Pilleth	30-Sep-09	Completed 09-Oct-09	Notice
DWR	<i>Cryptosporidium</i>	Pendine	31-Dec-09	Completed 16-Oct-09	Notice
DWR	<i>Cryptosporidium</i>	Abergynolwyn	30-Jun-09 (UV) 31-Mar-10 (bypass)	Completed 10-Jun-09 Ongoing	Notice
DWR	<i>Cryptosporidium</i>	Rogerstone Grange	30-Jun-10	Ongoing	Notice
DWR	<i>Cryptosporidium</i>	Brecon	31-Dec-09 (UV) 31-Mar-11 boreholes	Completed 26-Feb-09 Ongoing	Notice

Company	Parameter, hazard or driver	Site	Due for completion	Status	Legal instrument
DWR	<i>Cryptosporidium</i>	Dinas Mawddwy	30-Jun-09 (UV) 31-Mar-11 (bypass)	Completed 11-Jun-09 Ongoing	Notice
DWR	<i>Cryptosporidium</i>	Vowchurch	31-Jan-10 (UV) 31-Mar-11 (BH)	Completed 26-Feb-10 Ongoing	Notice
DWR	<i>Cryptosporidium</i>	Leintwardine	31-Mar-13	Ongoing	Notice
DWR	<i>Cryptosporidium</i>	Llannerch	31-Aug-09 (UV) Transfer to Glascoed 30-Jun-13	Completed 17-Jul-09 Ongoing	Notice
DWR	<i>Cryptosporidium</i> and various	Cwm Avon	30-Jun-10	Ongoing	Notice
DWR	<i>Cryptosporidium</i> / Manganese	Cwm Dulyn	30-Jun-10	Ongoing	Notice
DWR	<i>Cryptosporidium</i> / Total Trihalomethanes	Cwellyn	31-Mar-10	Ongoing	Notice
DWR	<i>Cryptosporidium</i> / Total Trihalomethanes	Rhiw Goch	01-Apr-09 (UV) 31-Mar-10 (DAF etc)	Completed 1-Apr-09 Ongoing	Notice
DWR	<i>Cryptosporidium</i> / Total Trihalomethanes	Mynydd Llandegai	30-Sep-08 (UV) 30-Sep-10 (DAF etc)	Completed Ongoing	Notice
DWR	<i>Cryptosporidium</i> / Total Trihalomethanes	Eithin Fynydd	30-Jun-09 (UV) 31-Mar-11 (DAF)	Completed 5-Mar-09 Ongoing	Notice
DWR	<i>Cryptosporidium</i> / Total Trihalomethanes	Penycefn	31-Mar-09 (UV) 30-Jun-11 (DAF)	Completed 19-Feb-09 Ongoing	Notice
DWR	<i>Cryptosporidium</i> / Total Trihalomethanes	Capel Curig	31-Jan-09 (UV) 30-Sep-11 (ozone and GAC)	Completed Ongoing	Notice
DWR	<i>Cryptosporidium</i> / Total Trihalomethanes	Cilfor	30-Sep-11	Ongoing	Notice
DWR	<i>Cryptosporidium</i> / Total Trihalomethanes	Llidardau Bala	30-Jun-09 (UV) 30-Sep-12 (DAF and coagulation)	Completed 17-Jun-09 Ongoing	Notice

Company	Parameter, hazard or driver	Site	Due for completion	Status	Legal instrument
DWR	<i>Cryptosporidium</i> / Total Trihalomethanes	Cwmystradllyn	30-Dec-13	Ongoing	Notice
DWR	Inadequate disinfection	Alwen	31-Aug-11	Ongoing	Notice
DWR	Inadequate disinfection	Bryn Cowlyd	31-Dec-10	Ongoing	Notice
DWR	Inadequate disinfection	Dolbenmaen	31-Mar-11	Ongoing	Notice
DWR	Inadequate disinfection	Strata Florida	31-Mar-11	Ongoing	Notice
DWR	Inadequate disinfection	Bretton	31-Mar-13	Ongoing	Notice
DWR	Inadequate disinfection	Nant Peris	31-Mar-13	Ongoing	Notice
DWR	Inadequate disinfection	Cefni	31-Dec-13	Ongoing	Notice
DWR	Inadequate disinfection	Llyswen	31-Dec-13	Ongoing	Notice
DWR	Inadequate disinfection	Alaw	31-Dec-14	Ongoing	Notice
DWR	Insufficient treatment	Capel Dewi	31-Nov-10	Ongoing	Notice
DWR	Insufficient treatment	Cantref	31-Mar-13	Ongoing	Notice
DWR	Insufficient treatment	Llyn Conwy	31-Mar-13	Ongoing	Notice
DWR	Insufficient treatment	Bontgoch	31-Mar-15	Ongoing	Notice
DWR	Insufficient treatment	Glascoed	31-Mar-16	Ongoing	Notice
DWR	Insufficient treatment/control	Bolton Hill	31-Dec-09	Completed	Notice
DWR	Insufficient treatment/control	Bryngwyn	31-Mar-12	Ongoing	Notice
DWR	Insufficient treatment/control	Llyswen	31-Jul-12	Ongoing	Notice
DWR	Insufficient treatment/control	Preseli	31-Mar-14	Ongoing	Notice
DWR	Insufficient treatment/control	Garreglwyd	31-Mar-15	Ongoing	Notice
DWR	Insufficient treatment/control	Sluvad	31-Mar-15	Ongoing	Notice
DWR	Insufficient treatment/control	Portis	31-Mar-16	Ongoing	Notice
DWR	Integrity	Llanigon	31-Dec-09	Ongoing	Notice
DWR	Integrity	Llechryd	31-Dec-09	Ongoing	Notice

Company	Parameter, hazard or driver	Site	Due for completion	Status	Legal instrument
DWR	Integrity	Castell	30-Jun-10	Ongoing	Notice
DWR	Integrity	Onnen Asaph	31-Dec-10	Ongoing	Notice
DWR	Integrity	Wern	31-Mar-11	Ongoing	Notice
DWR	Integrity	Bryneglwys	31-Dec-11	Ongoing	Notice
DWR	Integrity	Ffreithwen	31-Dec-11	Ongoing	Notice
DWR	Integrity	Gwelfor Road	31-Dec-11	Ongoing	Notice
DWR	Integrity	Tafarnaubach	31-Mar-12	Ongoing	Notice
DWR	Integrity	Cwm Peddol	31-Dec-12	Ongoing	Notice
DWR	Integrity	Waterloo	31-Dec-12	Ongoing	Notice
DWR	Integrity	Bedwas	31-Mar-15	Ongoing	Notice
DWR	Integrity	Ganllwyd	31-Mar-15	Ongoing	Notice
DWR	Integrity	Rhiwbina	31-Mar-15	Ongoing	Notice
DWR	Integrity	Pengarnddu	31-Mar-16	Ongoing	Notice
DWR	Iron, Manganese, Aluminium and turbidity	Distribution system	31-Dec-09	Completed 31-Mar-10	Undertaking
DWR	Lead, taste and odour	Talybont	31-Dec-09	Completed 30-Jun-09	Undertaking
DWR	Manganese	Crai	31-Mar-10	Completed 19-Apr-10	Undertaking
DWR	Manganese	Llyn Conwy	31-Dec-12 (AC) 30-Sep-13 (cleaning)	Ongoing	Notice
DWR	Manganese	Crai Distribution	31-Jul-15	Ongoing	Undertaking
DWR	Manganese	Talybont Distribution	31-Jul-15	Ongoing	Undertaking
DWR	Network maintenance	Maerdy	31-Sep-10	Ongoing	Notice
DWR	Network maintenance	Penderyn Distribution	31-Nov-09	Completed	Notice
DWR	Network maintenance	Graiglwyd Llwyn Onn	31-Mar-09	Completed	Notice
DWR	Network maintenance	Builth, Elan and Conyn	30-Jun-09	Completed	Notice
DWR	Network maintenance	Ty'n Ffrith	30-Apr-10	Ongoing	Notice
DWR	Network maintenance	9" Porthkerry Main	31-Mar-11	Ongoing	Notice

Company	Parameter, hazard or driver	Site	Due for completion	Status	Legal instrument
DWR	Network maintenance	Merthyr/ Abercynon Distribution	31-Mar-11	Ongoing	Notice
DWR	Network maintenance	Whitecastle main	31-Dec-12	Ongoing	Notice
DWR	Network maintenance	Dorestone	31-Dec-13	Ongoing	Notice
DWR	Network maintenance	Beggars Bush	31-Mar-15	Ongoing	Notice
DWR	Network maintenance	Pydew	31-Mar-15	Ongoing	Notice
DWR	Network maintenance	10" St Lythans to Rhoose via Molton	31-Mar-16	Ongoing	Notice
DWR	Raw water protection	Abertrinant	31-Aug-12	Ongoing	Notice
DWR	Raw water protection	Leintwardine borehole	31-Mar-13	Ongoing	Notice
DWR	Raw water protection	Llanymawddwy	31-Mar-13	Ongoing	Notice
DWR	Raw water protection	Ty Neuadd	31-Mar-15	Ongoing	Notice
DWR	Structural issues	Llwyndu	TBC	Ongoing	Notice
DWR	Taste and odour	Court Farm	31-Mar-10	Completed 30-Mar-10	Undertaking

Annex 5

Competition in the water industry

The following table indicates the extent of competition in the water industry in England and Wales.

Inset appointments in place in 2009

Site	Appointee	Incumbent and region	Status
Buxted Chicken, Flixton	Anglian Water	Essex and Suffolk Water, Eastern region	Supplying water
Shotton Paper, Shotton	Albion Water	Dŵr Cymru, Wales	Supplying water
Fairfield Park and Lower Wilbury Farm, Arlesey	Veolia Water Central	Anglian Water, Eastern region	Supplying water
The Portway, near Salisbury	SSE Water	Wessex Water, Western region	Supplying water
Wynyard, near Wolviston	Hartlepool Water	Northumbrian Water, Northern region	Supplying water
Long Croft Road, Corby	Independent Water Networks Ltd	Anglian Water, Eastern region	Supplying water
Priors Hall, Corby	Independent Water Networks Ltd	Anglian Water, Eastern region	Supplying water
Great Billing Way, Northampton	Independent Water Networks Ltd	Anglian Water, Eastern region	Supplying water
Media City, Salford Quays	Peel Water Networks Ltd	United Utilities, Northern region	Supplying water
MoD Tidworth near Andover	Veolia Water Projects	Thames Water, Western region	Supplying water
Hale Village, Tottenham	SSE Water	Thames Water, Thames region	Supplying water

New inset appointments in place for 2010 (by 31 May 2010)

Site	Appointee	Incumbent and region	Status
Llanilid Park, South Wales	SSE Water	Dŵr Cymru, Wales	Appointment granted
Kennet Island, Reading	SSE Water	Thames Water, Thames region	Supplying water
Brooklands, Milton Keynes	Independent Water Networks Ltd	Anglian Water, Eastern region	Supplying water
Bromley Common, Bromley	SSE Water	Thames Water, Thames region	Supplying water
Park Views, Epsom	SSE Water	Thames Water, Thames region	Supplying water
The Bridge, Dartford	Independent Water Networks Ltd	Thames Water, Thames region	Appointment granted

Water supply licenses in place in 2010

Name of company	License type	Date license granted by Ofwat	Status
Aquavitae	Combined	1 December 05	Licence revoked
Watercall Ltd	Combined	1 December 05	Inactive
Severn Trent Water Select Ltd	Combined	1 December 05	One retail customer Eastern region
YorWater Ltd	Retail	21 March 06	Not yet operating
Satec Ltd	Combined	24 May 06	Not yet operating
UU Water Sales Ltd	Combined	3 January 07	Not yet operating
Osprey Water Services Ltd	Combined	5 January 07	Not yet operating
Business Stream	Retail	23 January 09	Not yet operating

Annex 6

Water company indices

Albion Water Limited

Water supply arrangements

Company assets		Water supplied	
Number of treatment works	0	Water supplied (l/day)	38000
Number of service reservoirs	0	Percentage from surface sources	100
Number of water supply zones	1	Percentage from ground sources	0
Length of mains pipe (km)	0	Percentage from mixed sources	0
Population served		Area of supply	
Population supplied	260	Flintshire	
Number of local authorities	1		

Drinking water quality summary data

	Company figure			Industry average
	2007	2008	2009	2009
Overall drinking water quality¹	99.38%	100%	100%	99.95%
Water treatment				
Process Control Index	96.43%	100%	100%	99.97%
Disinfection Index	N/A	N/A	N/A	99.94%
Distribution systems				
Distribution Maintenance Index	100%	100%	100%	99.86%
Reservoir Integrity Index	N/A	N/A	N/A	99.96%
Building water systems				
Parameters influenced by domestic water systems	100%	100%	100%	99.87%

Consumer contacts

	Company figure			Industry average
	2007	2008	2009	2009
Informing consumers				
Total number	0	0	0	N/A
Rate per 1,000 population	0	0	0	1.38
Acceptability of water to consumers				
Total number	0	6	0	N/A
Rate per 1,000 population	0	23.08	0	2.21
Complaints to the Drinking Water Inspectorate				
No consumers of Albion Water Limited directly contacted DWI in 2009.				

Note: Summary results for each company of tests for individual parameters are supplied on the DWI website at www.dwi.gov.uk

¹Overall drinking water quality as represented by mean zonal compliance for 39 parameters.

Dee Valley Water plc

Water supply arrangements

Company assets		Water supplied	
Number of treatment works	6	Water supplied (MI/day)	64
Number of service reservoirs	31	Percentage from surface sources	98
Number of water supply zones	18	Percentage from ground sources	2
Length of mains pipe (km)	1,848	Percentage from mixed sources	0
Population served		Area of supply	
Population supplied	260,000	Cheshire, Flintshire, Denbighshire	
Number of local authorities	4		

Drinking water quality summary data

	Company figure			Industry average
	2007	2008	2009	2009
Overall drinking water quality¹	99.97%	99.92%	99.99%	99.95%
Water treatment				
Process Control Index	99.92%	99.99%	100%	99.97%
Disinfection Index	99.22%	99.77%	99.90%	99.94%
Distribution systems				
Distribution Maintenance Index	100%	99.61%	99.92%	99.86%
Reservoir Integrity Index	99.85%	99.88%	99.82%	99.96%
Building water systems				
Parameters influenced by domestic water systems	99.92%	99.84%	99.93%	99.87%

Consumer contacts

	Company figure			Industry average
	2007	2008	2009	2009
Informing consumers				
Total number	232	202	185	N/A
Rate per 1,000 population	0.89	0.77	0.71	1.38
Acceptability of water to consumers				
Total number	493	689	598	N/A
Rate per 1,000 population	1.89	2.64	2.30	2.21

Complaints to the Drinking Water Inspectorate

No consumers of Dee Valley Water plc directly contacted DWI in 2009.

Note: Summary results for each company of tests for individual parameters are supplied on the DWI website at www.dwi.gov.uk

¹Overall drinking water quality as represented by mean zonal compliance for 39 parameters.

Dŵr Cymru Welsh Water

Water supply arrangements

Company assets		Water supplied	
Number of treatment works	87	Water supplied (MI/day)	829
Number of service reservoirs	557	Percentage from surface sources	95
Number of water supply zones	92	Percentage from ground sources	4
Length of mains pipe (km)	27,127	Percentage from mixed sources	1
Population served		Area of supply	
Population supplied	2,950,000	Conwy, Anglesey, Blaenau Gwent, Bridgend, Gwynedd, Caerphilly, Cardiff, Cardiganshire, Flintshire, Carmarthenshire, Denbighshire, Powys, Merthyr Tydfil, Newport, Monmouthshire, Neath and Port Talbot, Pembrokeshire, Rhondda Cynon Taff, Swansea, Torfaen, Vale of Glamorgan, part of Herefordshire	
Number of local authorities	23		

Drinking water quality summary data

	Company figure			Industry average
	2007	2008	2009	2009
Overall drinking water quality¹	99.95%	99.95%	99.94%	99.95%
Water treatment				
Process Control Index	99.84%	99.99%	99.94%	99.97%
Disinfection Index	99.90%	99.88%	99.98%	99.94%
Distribution systems				
Distribution Maintenance Index	99.84%	99.83%	99.67%	99.86%
Reservoir Integrity Index	99.91%	99.95%	99.95%	99.96%
Building water systems				
Parameters influenced by domestic water systems	99.89%	99.84%	99.89%	99.87%

Consumer contacts

	Company figure			Industry average
	2007	2008	2009	2009
Informing consumers				
Total number	4,476	2,654	5,226	N/A
Rate per 1,000 population	1.52	0.9	1.77	1.38
Acceptability of water to consumers				
Total number	14,682	13,301	12,439	N/A
Rate per 1,000 population	4.98	4.5	4.22	2.21

Complaints to the Drinking Water Inspectorate

A total of six consumers of Dŵr Cymru Welsh Water directly contacted DWI in 2009.

Note: Summary results for each company of tests for individual parameters are supplied on the DWI website at www.dwi.gov.uk

¹Overall drinking water quality as represented by mean zonal compliance for 39 parameters.

Severn Trent plc

Water supply arrangements

Company assets		Water supplied	
Number of treatment works	185	Water supplied (MI/day)	1,853
Number of service reservoirs	667	Percentage from surface sources	65
Number of water supply zones	217	Percentage from ground sources	32
Length of mains pipe (km)	52,452	Percentage from mixed sources	3
Population served		Area of supply	
Population supplied	7,633,000	Derbyshire, Nottinghamshire, Leicestershire, Warwickshire, Gloucestershire, Worcestershire, Shropshire, Staffordshire, West Midlands, Powys	
Number of local authorities	68		

Drinking water quality summary data

	Company figure			Industry average
	2007	2008	2009	2009
Overall drinking water quality¹	99.96%	99.97%	99.97%	99.95%
Water treatment				
Process Control Index	99.92%	>99.99%	>99.99%	99.97%
Disinfection Index	99.98%	99.98%	99.93%	99.94%
Distribution systems				
Distribution Maintenance Index	99.86%	99.94%	99.95%	99.86%
Reservoir Integrity Index	99.95%	99.96%	99.98%	99.96%
Building water systems				
Parameters influenced by domestic water systems	99.84%	99.87%	99.90%	99.87%

Consumer contacts

	Company figure			Industry average
	2007	2008	2009	2009
Informing consumers				
Total number	801	806	942	N/A
Rate per 1,000 population	0.11	0.11	0.12	1.38
Acceptability of water to consumers				
Total number	13,250	12,329	11,887	N/A
Rate per 1,000 population	1.81	1.67	1.56	2.21
Complaints to the Drinking Water Inspectorate				
A total of five consumers of Severn Trent plc directly contacted DWI in 2009.				

Note: Summary results for each company of tests for individual parameters are supplied on the DWI website at www.dwi.gov.uk

¹Overall drinking water quality as represented by mean zonal compliance for 39 parameters



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