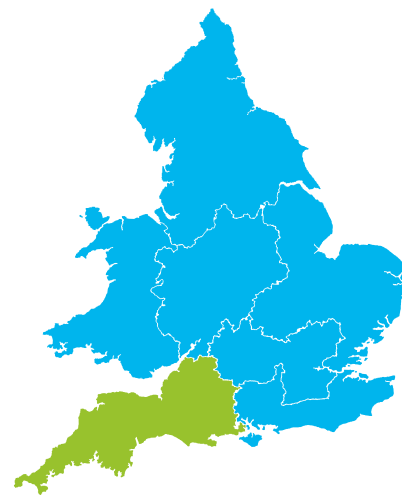


Drinking water 2009

Western region of England

July 2010

A report by the Chief Inspector of Drinking Water





Drinking water 2009

Western region of England



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Contents

Introduction	4
Water supply arrangements	7
Drinking water quality testing	9
Drinking water quality results	11
Private water supplies	30
Risk assessments	33
Drinking water quality events	36
Technical audit activity	39
Public confidence in drinking water quality	41
Annex 1: Further sources of information	45
Annex 2: Glossary and description of standards	46
Annex 3: Significant drinking water quality events	59
Annex 4: Planned drinking water quality improvements	75
Annex 5: Competition in the water industry	78
Annex 6: Water company indices	80

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

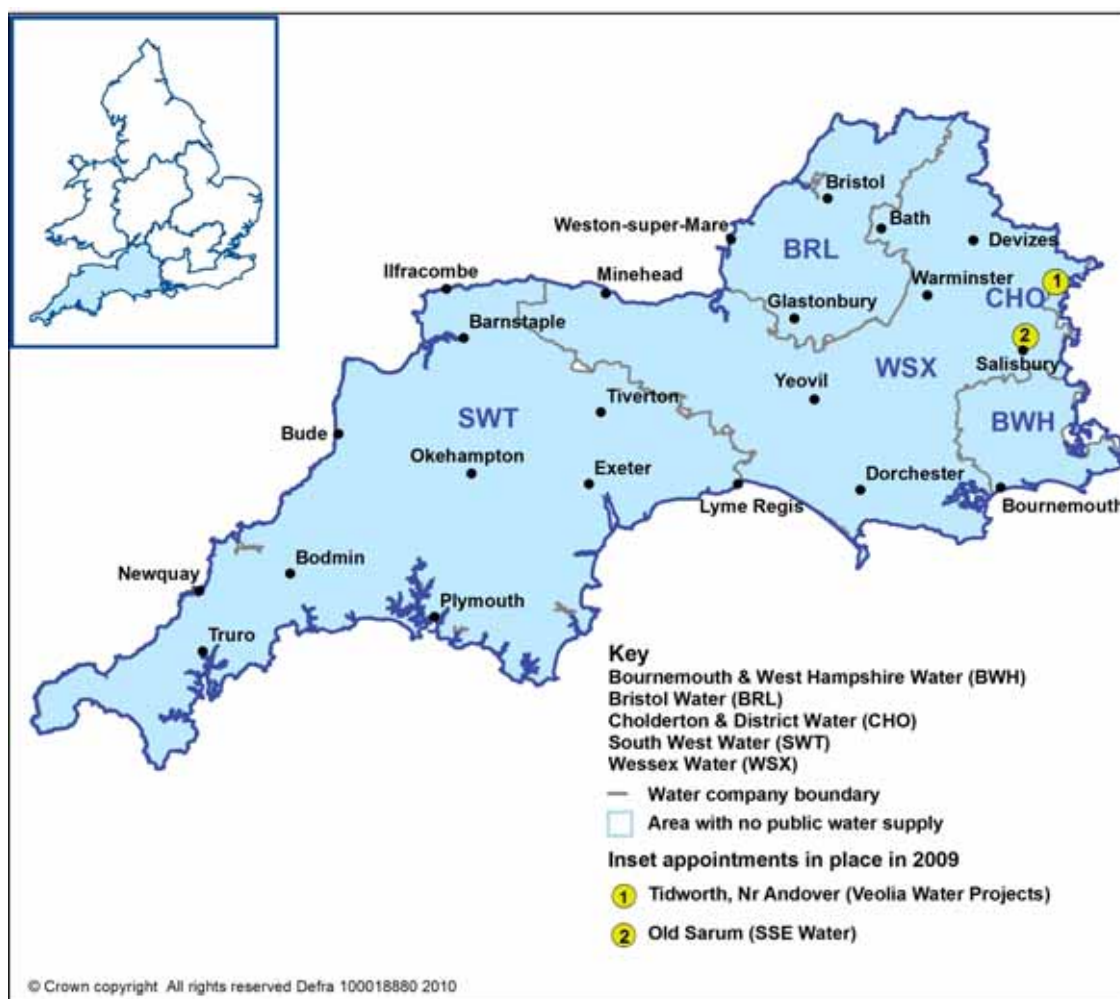
This part describes drinking water quality in the Western region. The Inspectorate also publishes a series of companion reports for other regions of England (Central, Eastern, Northern, Southern and Thames regions) and a separate report for Wales.

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 the Western region

Drinking Water 2009 is published as a series of seven reports covering Wales and the six regions of England. Each report presents information about drinking water quality 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 perspective, namely the local authorities and the regional committees of the Consumer Council for Water.

The report describes the key facts about the quality of drinking water in the Western region, which is served by Bournemouth and West Hampshire Water, Bristol Water, Cholderton and District Water, South West Water, and Wessex Water. Additionally, the inset appointments, SSE Water, serve Old Sarum, Salisbury and Veolia Water Projects Ltd took over the management of water supply arrangements at Tidworth from Thames Water in June 2009. Between them, the companies deliver public water supplies to over four million consumers.



The results of testing in 2009 demonstrated that the overall quality of drinking water in the Western region was good. The figure for compliance with drinking water standards at consumers' taps was 99.97%, up from 2008 and above the industry figure of 99.95%. 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 of standards and the actions taken to safeguard public health are discussed in the body of the report.

When the Western region is judged by the Inspectorate's indices of water quality performance, which look in turn at water treatment, service reservoir integrity and network maintenance, in 2009 there has been improvement in network maintenance (99.94%) which is now consistently above the industry figure. Service reservoir maintenance has also improved to equal the industry average of 99.96%. The area of weakness, highlighted by the figures, relates to one aspect of water treatment, disinfection where the figure fell in 2009 to 99.93%, below the industry average of 99.94%. 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 41 events across the Western region and around half (18) were of a type that necessitated a detailed investigation by an inspector. This compares unfavourably with other regions of England in respect of inspector effort, because two Wessex Water events were sufficiently serious to warrant a major investigation and subsequent regulatory action. In terms of the nature of the events reported on this year, there was a theme around discolouration and microbiological failures. 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. In comparison to other regions of England and Wales, the Western region continues to have the highest contact rate for discoloured water (black, brown or orange), however, the figure has fallen from 5.2 contacts per 1,000 population in 2007 to 3.1 per 1,000 population in 2009. The problem and the improvement are focused sharply in the part of the region served by South West Water. Completion by the company of its long-term strategic distribution mains renovation work in December is the main driver behind the improving situation. Also there are now fewer Bristol Water customers reporting discoloured water, however, the picture

is less favourable elsewhere, with a year-on-year rise in the discoloured water contact rate of Wessex Water. These public confidence figures demonstrate the benefits already 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.

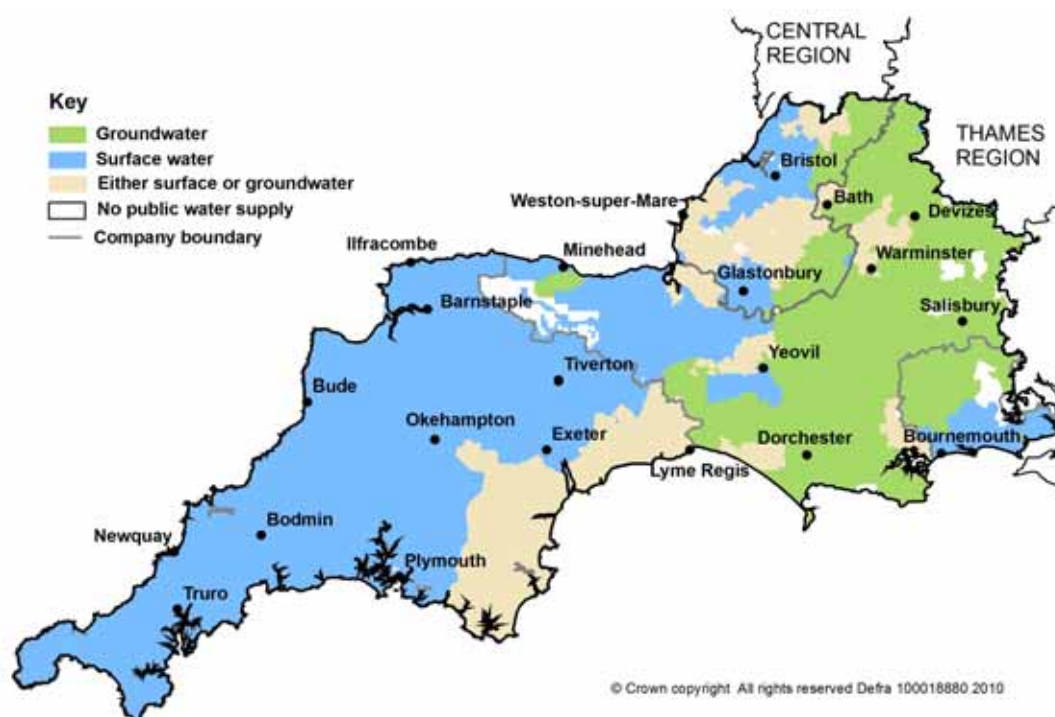
Looking forward, the standard for lead becomes stricter in 2013. Progress made towards meeting the future standard is shown in a graph in the body of the report. The Inspectorate has calculated that if the stricter standard had been in force in 2009 then the figure for overall regional compliance with drinking water standards would have been 99.96%, instead of 99.97%. Despite the good progress made so far it remains important for companies in the Western region to deliver on their business plan and water safety plan commitments, to minimise consumer exposure to lead in older housing in collaboration with local authorities.

During 2009, the Government took steps to safeguard those consumers who are served by about 8,996 private water supplies in the Western region. Details of the new risk-based regulations and how they will work are described in this report, together with a case example showing how the 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 the region.

Water supply arrangements

Seven water companies supply drinking water in the Western region: Bournemouth and West Hampshire Water (BWH), Bristol Water (BRL), Cholderton and District Water (CHO), South West Water (SWT) and Wessex Water (WSX). Two inset appointments were in operation in 2009; Veolia Water Projects Ltd (VWP) has supplied consumers in the Tidworth area since June 2009, prior to this the supplier was Thames Water (TMS). SSE Water (SSE) serves Old Sarum, Salisbury.

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



Much of the water in the region is derived from surface water (67%) abstracted from rivers such as the Severn, the Hampshire Avon, Dart, Exe, Fowey, Tamar and the Dorset Stour. There is a major transfer of water into the region via the river Severn from reservoirs in Wales which provide half of the daily supply for consumers in the Bristol Water area.

Additionally, the upland areas of Bodmin Moor, Dartmoor, Exmoor and the Mendips are important catchments for water resources in the region. Surface water is drawn from many reservoirs, including Chew Valley Lake, Clatworthy, Colliford, Roadford and Wimbleball. Groundwater provides a valuable resource (27%) in the region, with many boreholes drawing water from the chalk aquifer of the Wessex basin. The Permian and Triassic sandstone aquifer in the Otter Valley is also an important groundwater source for East Devon. Cholderton and District Water, relies exclusively on

the chalk aquifer of the Wessex basin. Across the region, a small proportion of water supplies (6%) can be drawn from either surface or 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 ¹	Groundwater	Surface Water	Mix of ground and surface water	Total
Bournemouth and West Hampshire Water	9	4	0	13
Bristol Water	2	5	14	21
Cholderton Water	1	0	0	1
South West Water	25	29	2	56
Thames Water ²	3	0	0	3
Veolia Water Projects ²	3	0	0	3
Wessex Water	170	28	0	198
Total	213	66	16	295

Note:
¹SSE Water do not directly abstract water.
²Thames Water managed a supply system at Tidworth until June 2009 when the management of arrangements was transferred to Veolia Water Projects

Table 3: Key facts about the Western region supply arrangements

Key facts			
Population supplied	4,410,661	Treatment works	152
Water supplied (l/day)	1,194 million	Service reservoirs	809
Number of local authorities (with a further 6 partially covering the region)	27	Water supply zones	189
Approximate number of private water supplies	8,996	Length of mains pipe (km)	35,548
Area of supply		Water composition	
Cornwall, Devon, Dorset, Gloucestershire (part), Hampshire (part), Somerset and Wiltshire (part)		Surface sources	67%
		Groundwater sources	27%
		Mixed sources	6%

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. Approximately 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 eight water companies carried out a total of 583,003 tests during 2009. Only 134 of these tests failed to meet the standards set down in the regulations.

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.

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

Company	Place of sampling ¹			Number of tests per company	Estimate of population
	Water treatment works	Service reservoirs	Consumers' taps (zones)		
Bournemouth and West Hampshire Water	11,658 (6)	6,228 (20)	15,963 (10)	33,849	426,000
Bristol Water	25,525 (18)	50,718 (169)	39,426 (52)	115,669	1,109,208
Cholderton and District Water	380 (1)	318 (1)	295 (1)	993	2,100
South West Water	49,985 (33)	87,797 (294)	63,060 (32)	200,842	1,682,000
SSE Water	0 (0)	0 (0)	267 (1)	267	353
Thames Water ² (Tidworth) 1 Jan-30 Jun	632 (2)	804 (6)	504 (1)	1,940	9,000
Veolia Water Projects Ltd ² (Tidworth) 1 Jul-31 Dec	644 (2)	795 (6)	537 (1)	1,976	9,000
Wessex Water	77,459 (84)	92,984 (296)	57,024 (92)	227,467	1,182,000
Region overall	166,283 (144)	239,644 (786)	177,076 (189)	583,003	4,410,661

¹Numbers in brackets reflect the number of works, reservoirs or zones operated by that company in the region in 2009. Some companies are permitted to carry out some tests on samples taken from supply points rather than from consumers' taps.

²Thames Water managed a supply system at Tidworth until June 2009 when the management of arrangements was transferred to Veolia Water Projects

Drinking water quality results

The key water quality results for the Western region 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 the region 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	23,434	2	SWT (1), WSX (1)
Coliform bacteria	0/100ml	23,434	17	BWH (2), SWT (2), WSX (13)
<i>Clostridium perfringens</i>	0/100ml	5,163	4	BRL (1), BWH (1), SWT (2)
Turbidity ¹	1NTU	23,372	17	BWH (3), SWT (3), WSX (11)
Water leaving service reservoirs				
<i>E.coli</i>	0/100ml	40,008	3	BRL (2), WSX (1)
Coliform bacteria	0/100ml in 95% of tests at each reservoir	40,007	32	BRL (3), BWH (1), SWT (20), WSX (8) All 786 reservoirs in the region met the 95% compliance rule
Water sampled at consumers' taps				
<i>E.coli</i>	0/100ml	12,113	0	
Enterococci	0/100ml	1,471	1	WSX (1)
Notes: ¹ Turbidity is a critical control parameter for water treatment and disinfection.				

***E.coli* at works**

In 2009, a total of 23,434 tests at works were carried out by all the companies across the region and *E.coli* was detected in just two samples (1 SWT, 1 WSX).

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. In 2009, these additional tests gave satisfactory results in all cases and there were no subsequent *E.coli* failures.

Wessex Water detected *E.coli* in a sample taken from Tucking Mill works, near Bath, in May. The company identified unrepresentative sampling facilities and installed a new sampling point in a different location.

This failure was notified to the Inspectorate as an event and from other

information provided by the company the Inspectorate concluded that disinfection at the site was inadequate and issued a Regulation 28(4) Notice placing conditions upon the use of this works (for further details see *Drinking water quality events* section).

At Littlehempston works, near Totnes in Devon, South West Water detected *E.coli* in a sample in June. The company investigation did not identify any problems with treatment at the site and all further samples were satisfactory. However, a problem was revealed with sample collection. A raw water sample bottle had broken during transit from the sample point to the van. The company has updated its sampling procedures to prevent these circumstances in the future.

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
Bournemouth and West Hampshire Water	0 – 1,457	0 – 1,038	0 – 1,158	0 – 90
Bristol Water	0 – 3,626	2 – 8,454	0 – 3,019	0 – 388
Cholderton and District Water	0 – 53	0 – 53	0 – 12	0 – 4
South West Water	1 – 7,088	0 – 14,634	0 – 4,268	0 – 387
SSE Water	0 – 0	0 – 0	0 – 13	0 – 5
Thames Water (Tidworth)	0 – 104	0 – 162	0 – 12	0 – 4
Veolia Water Projects Ltd	0 – 106	0 – 159	0 – 12	0 – 4
Wessex Water	1 – 11,000	1 – 15,508	0 – 3,619	1 – 589
Region overall	2 – 23,434	3 – 40,008	0 – 12,113	1 – 1,471
Note: Results are shown as the number of positive tests – the total number of tests.				

Coliform bacteria at works

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 only one site: Fulwood works (WSX).

Following the detection of coliforms at Fulwood works (near Taunton) in July, Wessex Water moved the sample tap because it was felt to be at risk of contamination. Then, in September, a further sample contained coliforms and on this occasion Wessex Water identified the need to move a pH dosing point to improve the disinfection contact time at the site. Subsequent samples have been satisfactory. Out of 13 coliform failures reported by Wessex Water in 2009, on nine occasions the company found it necessary to improve the sampling facilities.

Coliforms were detected on a single occasion at Bratton Fleming works, near Barnstaple, Devon, in August. South West Water subsequently detected coliforms at a downstream service reservoir three weeks later (see *Coliform bacteria at service reservoirs* section). Although treatment appeared to be operating normally at the time of both these failures, it was noted that there had been heavy rainfall at the time. In February 2010, the company moved the sampling tap from an outside cabinet to indoors to protect it.

The Inspectorate expects companies to have systems in place for recording and acting upon observations by sampling staff of inappropriate sampling facilities so that maintenance can be undertaken routinely and not only in response to adverse results. It is a duty to ensure that all samples are representative and repeated evidence of a lack of maintenance will result in enforcement action.

The Inspectorate has noted that coliform bacteria were found in 17 samples from treatment works in the Western region during the year and this information will be taken into account during the Inspectorate's risk-based programme of technical audit.

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 5,163 samples taken in the region, four did not meet the specified value (1 BRL, 1 BWH, 2 SWT).

In March, Bristol Water detected *Clostridium perfringens* in a sample from Purton works, near Gloucester. The company did not find any deficiencies with treatment at the site, and no further detections have occurred.

A similar finding was reported by Bournemouth and West Hampshire Water after detecting *Clostridium perfringens* in a sample from Knapp Mill works, near Bournemouth, in January. Additionally, South West Water found nothing untoward when investigating a report of *Clostridium perfringens* in a sample taken in January from St Cleer works, near Liskeard in Cornwall.

In January, after detecting *Clostridium perfringens* at its Crownhill works, in Plymouth. South West Water replaced the sample line and tap as a precaution. All further samples have been satisfactory.

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 February, Bournemouth and West Hampshire reported turbidity failures on two consecutive days at Woodgreen works, near Fordingbridge. *Cryptosporidium* oocysts were present in treated water at the same time, however, the company attributed the turbidity results to iron deposits building up in the sample line. The Inspectorate was disappointed to note that this deposition problem had been identified previously in relation to turbidity failures in 2008, but action to improve the monitoring arrangements was outstanding when these failures occurred in February 2009. The sample line has now been changed and the on-line turbidity monitor moved to ensure it is representative of water in supply. During an audit of Woodgreen works, the Inspectorate observed turbidity spikes above 1NTU in filtered water, particularly after backwashes (see *Technical audit activity* section). A Regulation 28(4) Notice has been issued in

respect of the risk of *Cryptosporidium* at this site and the company will be installing ultraviolet disinfection by December 2011.

In January and March, Wessex Water detected turbidity values >1NTU in samples from Codford works, near Warminster. On both occasions the company attributed the problem to the operating status of the pumps at the time of sampling. The company have updated their sampling procedures to ensure that samples are collected only when the high lift pumps are operational. As a further precaution, the sample line and tap were replaced in July and additional turbidity monitoring has been installed to enable run to waste in response to turbidity peaks following plant start up.

South West Water detected turbidity in excess of 1NTU twice in December, at Bratton Fleming works, near Barnstaple in Devon. This site has an unusual configuration with manganese removal treatment situated after disinfection at the end of the treatment process. Investigation of the elevated turbidity results revealed a rising trend of manganese in the raw water for which the treatment process had not been adjusted.

The company adjusted the backwashing cycle for the filters and there have been no further unsatisfactory results since.

The number of high turbidity results at works across the region in 2009 was 17, the same as reported in 2008, which does not represent an improvement, however, it should be noted that all results were satisfactory for works operated by Bristol Water in 2009.

***E.coli* at service reservoirs**

In 2009, across the region, a total of 40,008 tests were carried out at service reservoirs by all the companies. *E.coli* was detected once at three locations: Almondsbury reservoir operated by Bristol Water; Millmarsh belonging to Bristol Water; and Knowle Hill owned by Wessex Water. These figures represent a significant improvement over 2008, when there were nine detections of *E.coli* at service reservoirs across the region.

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 all gave satisfactory results and there were no subsequent *E.coli* failures.

At Almondsbury reservoir, Bristol Water's investigation of an *E.coli* failure in August revealed that the sampling facilities were being upgraded at the time of sampling, therefore the sampler had used another infrequently used tap. In such circumstances, companies must ensure samplers are empowered to reschedule sampling to a later date when a representative sample can be collected.

Bristol Water did not find a cause for *E.coli* detection at Millmarsh reservoir in December. All samples taken upstream and downstream of this reservoir on the same day were satisfactory. However, a recent inspection of the reservoir had taken place and remedial works carried out.

A sample from Knowle Hill reservoir taken in October contained *E.coli*. Wessex Water inspected the reservoir and cleaned it as a precaution. At the time, it was noted that a local farmer had moved a dung heap to within a few meters of the sample tap. The company liaised with the farmer to move the dung heap and in January, the sample point was moved to a more secure location to prevent a recurrence.

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 786 service reservoirs (including water towers) in the region met the standard.

South West Water's Bratton Fleming works feeds Bratton Fleming service reservoir, which in turn serves South Molton reservoir. In 2009, the works was associated with a coliform failure and two detections of turbidity above 1NTU (see *Coliform bacteria at works* and *Turbidity at works* sections) and coliforms were reported in samples from the downstream reservoirs on two occasions – Bratton Fleming reservoir in August and October and South Molton in November and December. To date the company has identified a possible ingress point at Bratton Fleming reservoir which was repaired in December and taken action to increase the turnover of water. There are a total of 11 reservoirs in this relatively complex supply system and the results from the other nine reservoirs were all satisfactory during the year.

When coliforms were detected at Shipham reservoir in May, investigational downstream samples also contained coliforms prompting Bristol Water to take the reservoir out of supply. An inspection of the roof found possible integrity problems. All further samples following repairs have been satisfactory.

South West Water found defects which were likely to have contributed to the detection of coliforms at the following reservoirs during 2009: Hingston Down Braithwaite reservoir and Kit Hill reservoir in May; Marypole Head reservoir in July, Trendlebere, St Mary's and Elburton reservoirs in September, Bratton Fleming and Gnaton reservoirs in October, and at Roundaways and Tolroy reservoirs in November. The company has undertaken repairs at all these sites and all further samples have been

satisfactory. The Inspectorate is encouraged to see the company taking robust and expeditious risk-based steps to safeguarding water quality in the network, mirroring similar successful strategies adopted by companies in other regions over recent years.

Defects found during investigations into the detection of coliforms at Mapperton reservoir in July and Yatton Keynall reservoir in September may have allowed ingress to these structures. The necessary repairs were made at both sites by Wessex Water before returning them to supply. Action has also been taken by the company to improve the turnover in Feltham reservoir following a coliform detection in August. In the longer term the company is considering the feasibility of abandonment because the reservoir serves a very small number of properties. The Inspectorate is pleased to note that longer term, not just short-term mitigation measures, are being adopted in line with the water safety plan approach.

The Inspectorate has noted that coliform bacteria were found in 32 samples from service reservoirs in the Western region during the year (3 BRL, 1 BWH, 20 SWT, 8 WSX) 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 12,113 consumers' taps were tested in 2009 for *E.coli* and none were positive. 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 1,471 tests for Enterococci at consumers' taps and just one sample (1 WSX) was positive. There was no indication, from information gathered by the water company, of a faecal contamination event affecting other properties in these zones.

In Wessex Water's investigation into the detection of Enterococci in the Maundown Central zone in August it was noted that the tap was of an unusual type. A problem with tap hygiene was suspected but not proven.

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	3,542	4	BRL (1), WSX (3)
– taste		3,471	7	BRL (1), BWH (1), SWT (1), WSX (4)
Benzo(a)pyrene	0.01µg/l	1,450	1	SWT (1)
Copper	2mg/l	1,807	2	WSX (2)
Fluoride	1.5mg/l	1,195	0	
Iron	200µg/l	4,206	7	BRL (3), SWW (2), WSX (2)
Lead (current standard)	25µg/l	1,466	2	WSX (2)
Lead (future standard)	10µg/l	1,466	8	BRL (1), WSX (7)
Manganese	50µg/l	4,204	2	BRL (1), SWT (1)
Nickel	20µg/l	1,463	4	BRL (2), WSX (2)
Nitrate	50mg/l	1,854	0	
Nitrite	0.5mg/l	1,855	1	WSX (1)
Pesticides – total	0.5µg/l	1,326	0	
Pesticide – individual ²	0.1µg/l	37,005	2	MCPA WSX (2)
Turbidity (at consumers' taps)	4NTU	4,974	1	BRL (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 3,599 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 11 samples from consumers' taps in the

region 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, in several cases, the failures have pointed to wider issues with water treatment or within the distribution system.

- Bitter: two taste (1 BRL, 1 WSX); this descriptor may relate to a number of causes, including low pH, metals within the network or building water systems or transient residues of household products and certain food and drinks. The source can be difficult to detect, particularly if the taste is not replicated in investigational samples. This was the case in respect of the failures from the Allington zone in March and the Banwell Wroughton and Churchill zone in November.
- Earthy/Musty: two odour, three taste (1 SWT, 4 WSX) these descriptors relate to situations where harmless, but objectionable, substances are produced by the growth of algae in raw water storage reservoirs or the growth of fungi in the network or building water systems with low turnover. In July, a musty taste and odour was reported in a sample taken in the Hampton Down zone and this was detected in further samples collected by Wessex Water. This related to a known problem of low turnover in the distribution system. The company has since introduced a regular six monthly flushing regime in this network. In November, a musty taste and odour in a sample from a consumer's tap in the Porlock zone was associated with low levels of geosmin, an algal product, and the property was located at the end of a long supply pipe.

A sample taken in the College zone, operated by South West Water, contained a musty taste in November. The property was situated at the end of a long service pipe, however, traces of algal products were detected during the investigation. The Inspectorate has noted that South West Water completed a legally binding programme of work in 2008 to address taste and odour in the raw water at the upstream treatment works. This work involved improving reservoir management and cleaning the distribution system.

- Sweet: one taste (1 BWH); The investigation by Bournemouth and West Hampshire Water found that the kitchen tap was fed from a water softener. Samples from the unsoftened supply (outside tap) were satisfactory. The householder was advised that the tap for drinking and cooking should be connected directly to the mains.

- Sulphurous: one odour (1 BRL); 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 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.
- The Inspectorate noted that Wessex Water failed to record the descriptor for a taste and odour reported in May from a consumer's tap in Dunkerton zone, prompting the company to update its procedures to prevent future reporting errors.

In February, Bristol Water completed an improvement programme to improve taste and odour and meet other standards at Rowberrow and Banwell works benefitting over 100,000 consumers in the areas of Cheddar and Weston-super-mare in Somerset.

Wessex Water completed an improvement programme at Maundown works, near Taunton, in February, to address musty tastes and odours derived from algae in raw water storage reservoirs. The area of supply serves over 160,000 consumers. Following commissioning, the chlorine residual was adjusted but this action was not sufficient to prevent a high number of consumer contacts reporting chlorinous tastes or odours. It was several months before consumers stopped reporting the change in their water quality. The Inspectorate is on record as strongly advising companies of the need to put in place advance customer communications about planned changes to the quality or source of a water supply – failure to do so, as this case demonstrates, has an adverse impact on consumer confidence.

South West Water has an ongoing improvement programme to address taste and odour at their Stithians works, near Redruth in Cornwall. This involves installing mixers to assist in reservoir management and depending on the success of this measure, installing further filtration or cleaning the distribution system. This scheme is due for completion by September 2011.

Copper

Copper in drinking water usually derives from copper pipes and fittings in household plumbing. In general, water supplies in the UK are not aggressive towards copper, but there can be occasional problems with new plumbing installations. In 2009, a total of 1,807 tests were carried out for copper across the region and all but two met the standard of 2mg/l (2 WSX).

A level of 2.37mg/l copper was reported in a sample from a consumer's tap in the Allington zone in January. Wessex Water advised the householder that the cause was probably a length of copper piping that was hidden from view under the floor. The company also reported a high copper result (2.42mg/l) from a consumer's tap in the Fovant zone in November. In response, the consumer has replaced their copper pipework.

Fluoride

Traces of fluoride occur naturally in many water sources, particularly in groundwaters. For example, fluoride occurs in water drawn from the great Oolite limestone in the area of North East Somerset and West Wiltshire (particularly around Lacock). 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 fluoridation schemes in the Western region. In 2009, all 1,195 tests for fluoride taken across the region met the regulatory standard (1.5mg/l). For more information on fluoridation please refer to the DWI website (www.dwi.gov.uk).

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: 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
Bournemouth and West Hampshire Water	None	None	Dec 1998	N/A
Bristol Water	None	None	Dec 2003	N/A
Cholderton and District Water	None	None	N/A	N/A
South West Water	186 km	<i>See note</i>	<i>See note</i>	Dec 2009
Wessex Water	None	None	Mar 2006	N/A
Region overall	186 km	See note		
Note: The Inspectorate is in dialogue with South West Water about work that was not completed.				

Following completion of long-term strategic programmes of mains renovation work, future compliance with the standard for iron is through companies' Distribution, Operation and Maintenance Strategies (DOMS).

In 2009, Bristol Water company reported failures of the iron standard in three zones (Kingston Seymore Yatton and Congresbury; Long Ashton Failand and Abbots Leigh; and Nailsea Backwell and Clevedon zones) where a legally binding programme of flushing mains to address discolouration was completed in March 2010. The company also completed another legally binding programme of work to clean specified trunk mains in March 2010. Both of these programmes will benefit around one million consumers.

South West Water reported two failures of the iron standard in 2009. One, in the Littlehempston Tottiford zone, was considered to be an isolated event dealt with by flushing, the other in the Burrows zone, was associated with a corroded galvanised iron service pipe to the property. The householder was advised of the need to replace the pipe.

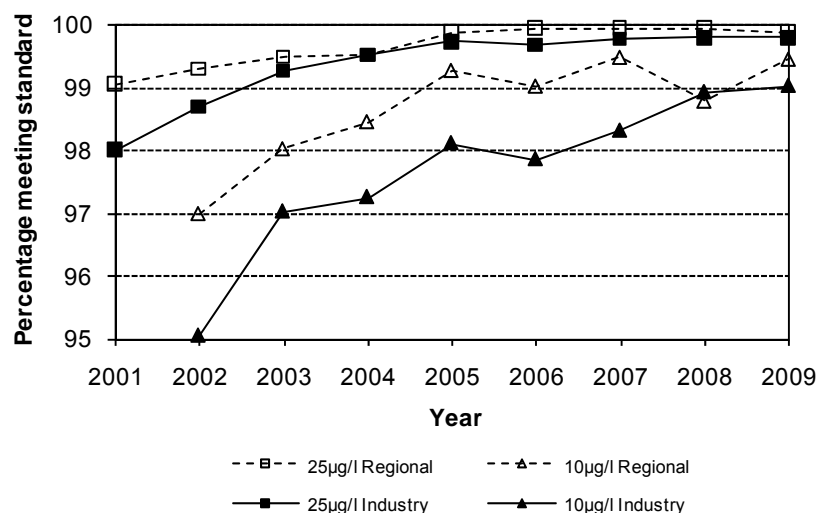
A failure of the iron standard in the Porlock zone in January led to Wessex Water identifying a section of corroded main requiring renovation. The company has prioritised this work and put in short-term mitigation measures namely regular flushing of the main. Wessex Water also reported an iron failure in Odcombe zone which was considered to be an isolated event not indicative of a wider problem.

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 in the region and for the industry, 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 lead standard occurs. In 2009, the Inspectorate was notified of a total of two failures in the region (2 WSX) compared to one in 2008. Across the region in 2009, out of total of 1,466 tests there were eight samples which exhibited a lead value above the future standard of 10µg/l (1 BRL, 7 WSX). Generally, the region is making good progress towards securing compliance with the future lead standard by 2013.

The Inspectorate's *Guidance on the Regulations*, issued in 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 acting now to secure compliance with the future lead standard by 2013.

In respect of a failure of the lead standard in the Zeals zone in April, Wessex Water ruled out the supply pipe and plumbing as the cause and wrote to both the householder and the local authority advising them of the findings and the need for further investigations into the source. In respect of a failure in November at a property in the Maundown zone, lead pipes were identified and Wessex Water worked with the consumer to replace all pipes at the property in March 2010.

The business plans of Wessex Water and South West Water for the next five year investment period (AMP5) include an integrated package of measures to address the residual risk of consumer exposure to lead above the future standard. The companies have since entered into a legally binding agreement with the Inspectorate to deliver the specified activities. The Inspectorate will be reviewing the approach to lead risk assessments taken by all companies in the region.

In addition, during 2009, companies in the region have responded to 364 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, Bristol Water and South West Water each reported one failure of the manganese standard.

South West Water detected manganese above the standard in Venford zone in March. The company has a legally binding programme of work to remove manganese from the source water by September 2011 at the Venford works which serves this zone. The historic deposits in the

distribution network will be removed after the manganese removal plant has been commissioned.

There was a manganese failure in November in the Wells and Wookey Hole zone, which is included in a legally binding programme of work by Bristol Water to clean its mains by strategic flushing. This work was completed in March 2010.

Nickel

Nickel may be present in coatings on modern tap fittings. In 2009, a total of 1,463 tests were carried out for nickel and all but four (2 BRL, 2 WSX) met the standard (20µg/l).

A level of 36µg/l nickel was reported in a sample from a consumer's tap in the Filton and Northville zone. Bristol Water found that the consumer had replaced the original tap with a chrome one a few months prior to sampling. A sample taken after the tap was flushed was satisfactory.

In the City Centre St Philips and Netham zone, Bristol Water detected a relatively high result for nickel (100µg/l) and on investigation it was established that the tap was located in an industrial building and was rarely used. After flushing the company obtained satisfactory results. The Inspectorate expects companies to empower their samplers to select alternate sampling points whenever the tap in the randomly selected property is unlikely to give a representative sample.

In January, Wessex Water took samples from two premises which receive a free (concessionary) supply and where the householders have refused to give access to their properties. The samples were thus taken from the point of use treatment device. High levels of nickel (53.9µg/l and 32.4µg/l) were reported at this unconventional sampling point. Further samples after flushing were satisfactory. The Inspectorate has noted the reason why unrepresentative samples were collected.

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 tests for nitrate met the standard (50mg/l).

During 2009, Wessex Water completed nitrate improvement programmes at several works (Winterbourne Abbas, Empool, Dean's Farm and Eagle Lodge). This work has provided improved water quality to over 65,000 people and is continuing.

From extensive information gathered by the water companies in the Western region, a likelihood of drinking water supplies in the region failing the nitrate standard in the longer term has been confirmed at some sites. Table 10 shows the number of raw water abstraction points in the region that are monitored for nitrate and the percentage of those points where nitrate above 50mg/l has been detected in 2009. Annex 4 lists the planned work to address nitrate in the region and blending is already in place at some sites.

Table 10: Numbers of raw water abstraction points monitored for nitrate and percentage exceeding 50mg/l in 2009

Company	Groundwater		Surface Water ¹	
	Number of abstraction points monitored for nitrate	Percentage with sample(s) exceeding 50mg/l in 2009	Number of abstraction points monitored for nitrate	Percentage with sample(s) exceeding 50mg/l in 2009
Bournemouth and West Hampshire Water	9	0%	4	0%
Bristol Water	1	0%	19	0%
Cholderton and District Water	1	0%	-	-
South West Water	24	29%	29	0%
Thames Water ²	3	0%	-	-
Veolia Water Projects ²	3	0%	-	-
Wessex Water	159	3%	28	0%
Total	197	6%	82	0%
Notes: ¹ Surface water figures contain -groundwater abstraction points influenced by surface water ² Thames Water managed a supply system at Tidworth until June 2009 when the management of arrangements was transferred to Veolia Water Projects				

As a consequence, legally binding agreements are in place for catchment and blending solutions, if required, at several Wessex Water sites: Bulbridge, Chirton, Dunkerton, Fonthill Bishop, Hooke, Sturminster and Wylfe. Similarly, a blending scheme is to be progressed by Bristol Water at Frome. All these improvements are planned to be delivered before the end of March 2018.

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. In the Western region, Bournemouth and West Hampshire Water practices chloramination. 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 1,855 tests carried out across the region, just one exceeded the nitrite standard (1 WSX). In January, Wessex Water reported a nitrite failure at a free (concessionary) supply in the Porlock (domestic) zone where treatment is by means of a point of use device. The company updated its procedures to increase the length of time the tap is run before samples are collected, samples taken since have been satisfactory.

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 (3,599 tests) for the four pesticides with a standard of 0.03µg/l. Out of a total of 37,005 tests for those individual pesticides (with a standard of 0.1µg/l) just two (2 WSX) exceeded the standard. The circumstances and substances involved are summarised below.

MCPA

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

In May, MCPA was detected twice by Wessex Water at a level of 0.25µg/l in the Portland zone and 0.3µg/l in the Portesham zone. Both zones are served by Friar Waddon works (near Weymouth) which was affected by a pollution event in the catchment. It was found that a sprayer had become clogged and was washed out onto the soil, resulting in elevated levels of MCPA and MCPB in the raw water (see *Drinking water quality events* section).

Polycyclic aromatic hydrocarbons

Polycyclic aromatic hydrocarbons (PAHs) are present in coal tar. Before 1970, coal tar was widely used to line iron pipes. Therefore PAHs, including benzo(a)pyrene, may be present in the water as a result of degradation of these linings.

In 2009, throughout the region, none of the tests failed the standard for PAH (0.1µg/l) and only one out of the 1,450 tests exceeded the benzo(a)pyrene standard of 0.01µg/l (1 SWT).

In the Pynes South zone, benzo(a)pyrene was detected at a level of 0.02µg/l at a consumer's tap in February. South West Water had been carrying out mains renovation work in the area around the same time. Satisfactory results were obtained from a sampling survey following completion of the work in April.

Turbidity

Turbidity is the cloudiness of water as determined by measuring the degree of scattering of a beam of light as it passes through the water. Turbidity may be measured by on-line instruments, usually located at a water treatment works, in addition to tests carried out on samples sent to a laboratory. The national turbidity standard for water at the consumer's tap is 4NTU. Failures of this standard are usually associated with the disturbance of sediment within water mains.

Additionally, and importantly, water companies must measure turbidity at the water treatment works. Treated water entering the distribution system must not exceed the regulatory turbidity specification of 1NTU.

The following discussion focuses on the results of samples taken from consumers' taps. For information on tests taken at water treatment works, see the heading *Turbidity* in the *Microbiological quality* section.

In 2009, a total of 4,974 samples from consumers' taps across the region were tested for turbidity and all but one met the standard of 4NTU (BRL). The failure in the Eastville and Easton zone in February was investigated by Bristol Water and appeared to be an isolated event. There had been no work on the network and no discoloured water contacts from consumers. All further samples have been satisfactory.

Private water supplies

New private water supply regulations came into effect in England on 1 January 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 the Magistrates' courts. The relevant person also has the right of appeal to the Magistrates' courts, if they are 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 11 shows the mitigation actions being carried out by companies in the Western region as a result of their risk assessment of drinking water supplies. Out of a total of 153 supply system risk assessments in the region, the Inspectorate has put in place 25 Regulation 28(4) Notices. Most of the Notices require improvements at works operated by Bristol Water and Wessex Water and also in distribution operated by Wessex Water

Table 11: 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
Bournemouth and West Hampshire Water	7	1	-	-	-	1
Bristol Water	17	6	-	-	-	6
Cholderton and District Water	1	-	-	-	-	-
South West Water	32	1	-	1	-	-
Veolia Water Projects	1	-	-	-	-	-
SSE Water	1	-	-	-	-	-
Wessex Water	93	17	2	-	8	7
Region overall	152	25	2	1	8	14
England and Wales	857	238	7	28	52	159

¹Some notices are classified under more than one category

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 12 summarises the scope and scale of the raw water quality monitoring data gathered by water companies in the Western region 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 12: Number of tests taken at abstraction points in 2009

Nature of parameter	Company							Total
	BWH	BRL	CHO	SWT	TMS ¹	VWP ¹	WSX	
Natural properties	359	7,777	7	8,010	81	204	900	17,338
General water quality indicators	1,299	14,708	21	4,378	299	608	24,597	45,910
Microbiological indicators	2,833	7,340	44	428	162	462	9,152	20,421
Microbiological pathogens	79	266	0	331	0	0	0	676
Pesticides	1,647	5,523	0	22,301	0	208	17,711	47,390
Chemicals other than pesticides	547	60	7	6,219	0	134	6,292	13,259
Total tests	6,764	35,674	79	41,667	542	1,616	58,652	144,994
Number of abstraction points	13	21	1	56	3	3	198	291
¹ Thames Water managed a supply system at Tidworth until June 2009 when the management of arrangements was transferred to Veolia Water Projects								

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 in the region relates to identifying nitrate as a particular hazard in the catchment of Wessex Water. The company has developed close working relationships with individual farmers helping them appreciate how some farming practices can lead to a deterioration in the quality of water resources.

These advisory measures have been documented to ascertain how effective changes in farming practices have been in providing both quantitative and qualitative data for mandatory farm documentation. This site-specific work has been underpinned by regular strategic meetings with the National Farmers Union, the Country Landowners Association,

Natural England, the Environment Agency and the National Trust, resulting in increased engagement and shared support.

Drinking water quality events

From 1 January 2009, in line with the Hampton Principles in the *Regulator's Compliance Code*, the Inspectorate has applied an updated 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), an 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 the Western region notified the Inspectorate of 41 events. Table 13 shows how these events were classified.

Table 13: Water quality events in the region in 2009

Nature of event	Risk assessment category (DWI)				
	1	2	3	4	5
Air in water	-	-	-	-	-
Chemical	-	-	1	1	-
Discoloured water	-	5	5	-	-
Inadequate treatment	-	-	1	-	-
Loss of supplies/poor pressure	1	5	1	-	-
Microbiological	5	3	5	-	-
Taste/Odour	-	-	-	-	-
Health concern	-	-	-	-	-
Public concern	2	2	2	-	-
Other	-	-	2	-	-
Region overall	8	15	17	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 Significant, Serious or Major, along with details of the Inspectorate's findings are set out in *Annex 3*. Most events were of relatively short duration and the company took action to inform and safeguard consumers and other stakeholders as appropriate.

Close to half (18 out of 41) of the events in the Western region during 2009 were of a type that necessitated a detailed investigation by an inspector. One was sufficiently serious to warrant a major investigation by the Inspectorate. This compares unfavourably to the other regions in England, where a much smaller amount of inspector time was spent on investigating events. In two instances regulatory action and considerable inspector effort was required because the cause was a failure by the company to act fully or there was evidence of a failure to act on recommendations made following previous similar events.

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

Detection of E.coli, south of Bath

- An investigation was initiated at Tucking Mill works after a routine sample taken in May contained *E.coli*. The site feeds two zones south of Bath, with a population of around 28,000. Wessex Water

initially concluded that contamination of the final treated water sample point was responsible and replaced the tap as an immediate interim measure. Subsequently, the entire sampling facility was refurbished. When assessing the information provided by the company, the Inspectorate became concerned about the adequacy of disinfection, notably that calculations did not accurately reflect some recent changes to the disinfection tank. A lack of monitoring equipment in the blended water tank prior to disinfection was a contributory factor. There had been work in 2007 on the contact tank and in 2008 there had been a disinfection failure whereby water short circuited the intended path by flowing over the baffles within the tank. The Inspectorate also noted that the company had failed to act on the findings of an inspection of the contact tank in 2008 (a leak in the roof) and recommendations (to assess critical control points to determine if they remain appropriate and to accurately calculate the retention time within the contact tank). As a consequence, the Inspectorate has taken enforcement action to safeguard public health. A Regulation 28(4) Notice is in place prohibiting the supply until the company rectifies specified faults. The works remains out of supply.

Detection of pesticides, parts of Weymouth and Portland, Dorset

- The herbicides MCPB and MCPA occurred in May, and again in August and September, in samples from Friar Waddon works which serves close to 19,000 consumers in parts of Weymouth and Portland, Dorset, and also supports a supply from Portesham works serving a rural area to the east of Weymouth. A legally binding agreement has been in place since 2005 to address a pesticide risk at Friar Waddon. Wessex Water's original plans involved granular activated carbon (GAC) treatment, but this had been revised to a catchment management approach after it was determined that the source of the pesticides was one farm complex.

Wessex Water had in place an agreement with the farm owner to restrict pesticide spraying on the land in the immediate catchment and for the make-up of pesticide solutions in a dedicated bunded building. However, in May 2009 when a spray operative made up his solution in accordance with the agronomists instructions, it solidified in the spray tank and he was unable to clean the clogged spray filter in the make-up yard. He then moved outside the building to the yard, contrary to procedures, and using steam and pressure washers cleaned the filter, causing a concentrated residue to run off a grassed area into a ditch. The ditch passes Friar Waddon boreholes via a culvert. Following this event a new legally binding agreement has been put in place which contains short, medium and long-term

measures based on the company's updated risk assessment. The company has committed to enhanced raw water monitoring to identify pesticide trends and modifications to enable the site to be shut down for several days. The company is proactively working with the farm owner and the Environment Agency to manage the risk.

Discoloured water, Bridgwater, Somerset

- In May there were widespread complaints of discoloured water from customers in the town of Bridgwater, Somerset. This happened during a high risk planned network operation, when the sequence of steps, to operate a key valve, was not carried out in the correct order leading to the suspension of mains sediment downstream. The Inspectorate noted that a previous discolouration event in Portland during October 2008 had occurred for similar reasons. Wessex Water was advised that immediate and firm action was needed by the company to ensure all staff are aware of and adhere to method statements. The Inspectorate was very concerned that the company's previous action to prevent recurrence was not effective. It was noted that the method statement and risk assessment process could be further improved and the Inspectorate suggested the need for additional supervision and managerial sign off in relation to high risk jobs.

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 places 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 the Western region is set out in Table 14.

Table 14: Summary of the Inspectorate’s technical audits in the region

Site name	Audit topic	Main findings from audit
Wessex Water		
Fovant No2 works	Microbiological quality	Generally satisfactory.
Chard service reservoir	Microbiological quality	Unsatisfactory. A recommendation was made relating to: <ul style="list-style-type: none"> • review and update where necessary, sampling point labels, the labels at the site were incorrect.
Snowdon service reservoir	Microbiology	Generally satisfactory.
Fulwood works	Taste and odour event and catchment management	Generally satisfactory. <ul style="list-style-type: none"> • A recommendation was made relating to control measures for algal by-products.
SSE Water		
Wessex Water Scientific centre	Vertical audit of <i>E.coli</i> sample	Generally satisfactory.
South West Water		
Countess Wear laboratory	Colony counts	Unsatisfactory. Recommendations were made relating to: <ul style="list-style-type: none"> • the company consider use of batch to batch testing of YEA media to ensure continued performance. • all failures of AQC are investigated appropriately and sample results rejected where relevant. • all times on the Potable Process Control sheet to have a specific date associated with the time to help to determine when the plates were read.
Bristol Water		
Purton works	Water quality event	Satisfactory.

Table 14 (continued)

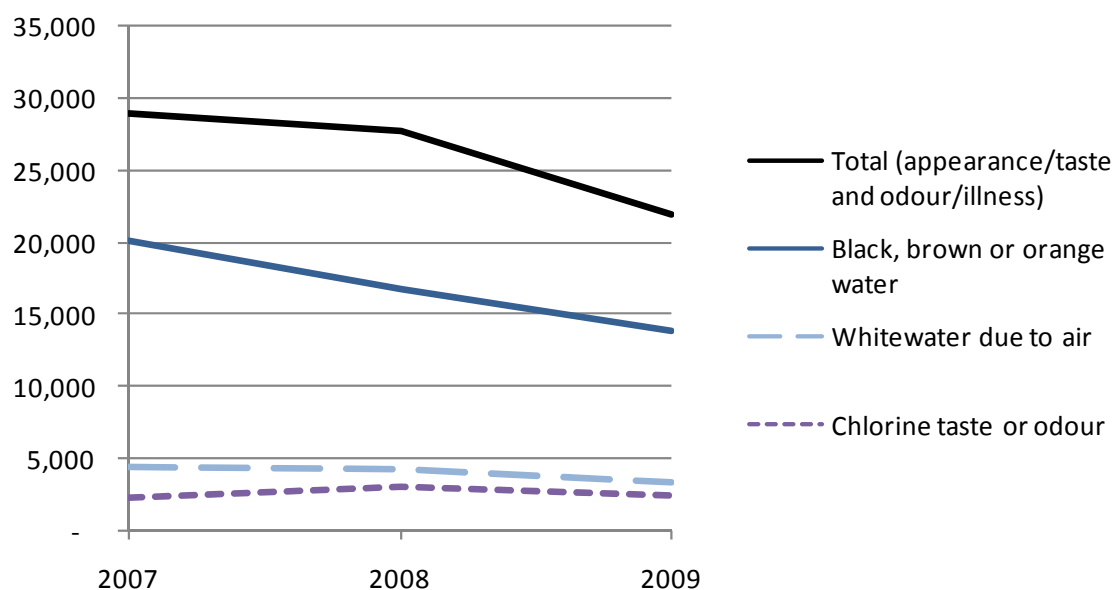
Site name	Audit topic	Main findings from audit
Bournemouth and West Hampshire Water		
Woodgreen works	Event relating to commissioning	<p>Unsatisfactory.</p> <p>Recommendations were made relating to:</p> <ul style="list-style-type: none"> carefully monitor turbidity after each filter backwash. check the variation in the turbidity monitors on the outlet of the filters. maintenance of optimum control of the chloramination process. the overall chlorine demand of the disinfection process. review of alarm list and settings of on-site water quality monitors.

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 the Western region, the number of consumers reporting concerns about the quality of their tap water (appearance, taste and odour, or illness) has continued to decline and the improvement made during 2009 was almost entirely due to the fall in the number of consumers reporting discoloured water (black, brown or orange water). This is illustrated in Figure 15.

Figure 15: Numbers of consumer contacts 2006-2009



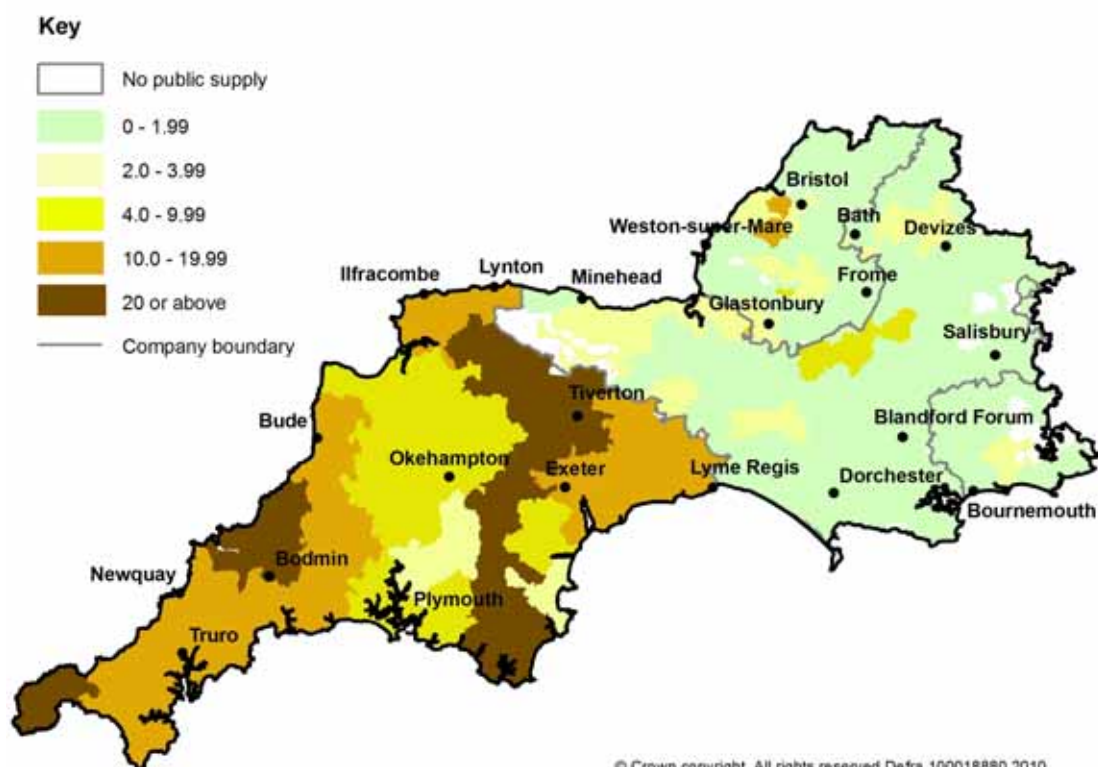
Discoloured water – black, brown or orange

In comparison to other regions of England and Wales, the Western region has the highest contact rate for discoloured water (black, brown or orange), however, the figure has decreased from 5.2 contacts per 1,000 population in 2007 to 3.1 contacts per 1,000 population in 2009.

The problem and the improvement are focused on the area served by South West Water and demonstrate the progress of, and benefits flowing from, the company's strategic renovation work on the distribution system. There has been a small decline in discoloured water contacts by customers of Bristol Water. The company completed its strategic mains renovation programme in December 2003. The picture is less favourable when looking at the discoloured water contacts trend for Wessex Water which exhibits a year-on-year rise since completion of the company's strategic mains programme in 2006. This will be taken into account during the Inspectorate's forward programme of technical audit.

The following maps, Figures 16 and 17, illustrate the changing situation for the customer contacts about black, brown or orange water in zones between 2006 and 2009.

Figure 16: Contact rate per 1,000 population for black, brown or orange water in 2006



Inspectorate; reasons for contacting the Inspectorate are provided in Table 18.

Table 18: Contacts from consumers in the region received by the Inspectorate

Category ¹	Number of contacts
Appearance	1
Taste and odour	1
Report of illness	0
Water quality concern	1
Number of contacts to DWI from consumers by company. BRL (1), BWH (1), SWT (1)	
¹ Categories are as defined in Information Letter 1/2006.	

Case example

A consumer from Ringwood, Hampshire complained to Bournemouth and West Hampshire Water about white water in July. At the time the company explained this was due to work on the network, however, after the cloudiness had disappeared, the consumer started to feel ill. He contacted the water company again to request sampling as a means of reassurance that his illness was not related to the white water event. The company provided verbal and written assurance. Four months later the consumer raised his concerns about his drinking water quality with the Inspectorate. Samples taken subsequently by Bournemouth and West Hampshire were satisfactory. This case example emphasises how white water events impact adversely on consumer confidence in the safety of drinking water supplies. Companies must recognise the need to empower staff to carry out 'reassurance' sampling. White water events are alarming to some consumers and, for these people, alarm is quickly replaced by distrust. Company protocols for responding to consumers need to reflect this reality.

For further information on the Water Supply (Water Quality) Regulations 2000, 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.

<i>Cryptosporidium</i>	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 distributions 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. 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. 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
13 Jan 2009 For 2 days (BWH)	Fordingbridge, Hants	3,010	Brown discolouration due to planned work.	<p>The Inspectorate classified this event as significant.</p> <p>Bournemouth and West Hampshire Water action:</p> <ul style="list-style-type: none"> • Sampled affected area. • Undertook a risk assessment in advance of the planned work. • Acted promptly and effectively to resolve the issue. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • Supplied unwholesome water in breach of regulations. • Recommended updating the model of local distribution system to reflect the lessons learnt during the course of this event. • Recommended enhancing procedures to extend the use of flow modelling for planned work, particularly for valving operations on large diameter mains. • Recommended review of condition of the mains network in this district metered area (DMA) and incorporating findings into its Distribution, Operation and Maintenance Strategies.

Date and duration	Area	Estimate of population affected	Nature and cause of the event	Main actions and findings from the Inspectorate investigation
25 Jan 2009 For 3 hours (BRL)	Littleton works supplying Almondsbury and Avonmouth	100,000	Loss of ozone due to plant failure.	<p>The Inspectorate classified this event as significant.</p> <p>Bristol Water action:</p> <ul style="list-style-type: none"> • Replaced faulty equipment. • Plan to upgrade works control and automation system. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • At time of the event the works was not configured to shut down on loss of communications from ozone equipment. This was rectified at Littleton and a recommendation was made that all treatment works are reviewed. • Recommended a modification to ensure that sample pumps do not fail on works shutdown. • Recommended action regarding commissioning and testing of new equipment. • CCWater were not informed of this event and the company were reminded of their obligation to do so.
29 Jan 2009 For 2 hours (SWT)	Venford works, Dartmoor area	56,600	Inadequate disinfection due to plant failure.	<p>The Inspectorate classified this event as significant.</p> <p>South West 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"> • The company did not liaise with local/health authorities. • Disinfection was less than specified for this site for approximately 90 minutes following plant malfunction during a chlorine gas cylinder changeover.

Date and duration	Area	Estimate of population affected	Nature and cause of the event	Main actions and findings from the Inspectorate investigation
03 Mar 2009 For 20 weeks (WSX)	Maundown works, Taunton, Somerset	147,178	Chlorine taste/odour due to changes in treatment process.	<p>The Inspectorate classified this event as significant.</p> <p>Wessex Water action:</p> <ul style="list-style-type: none"> • The company adjusted chlorine residuals at the site in anticipation of the improvements, but still received substantial numbers of consumer contacts. • The company will use lessons learnt regarding advance communication to consumers in relation to changes in water supply. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • Criticisms were made regarding the lack of communication with consumers regarding changes to water supply.

Date and duration	Area	Estimate of population affected	Nature and cause of the event	Main actions and findings from the Inspectorate investigation
26 Mar 2009 For 2 days (BWH)	Fordingbridge, Hants	3,010	Brown discolouration due to planned work.	<p>The Inspectorate classified this event as significant.</p> <p>Bournemouth and West Hampshire Water action:</p> <ul style="list-style-type: none"> • Flushed mains. • Sampled affected area. • Provided bottled water on request. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • Planned work was undertaken to isolate the existing treated water tank at the works supplying this area, to test a newly built second tank. • The tank was not isolated as predicted and the works was shut down for a short period while this was rectified. • Following restoration of supplies a flow surge in the downstream supply system resulted in discolouration for two days. • The company uncovered a valve in the wrong position. • A formal risk assessment was not carried out in advance and the risk of discoloured water was not anticipated despite a previous discolouration event in this area. The company have now updated their procedures. • Inadequate follow-up sampling. • Inadequate information was provided in the final report, specifically on consumer contacts received. • Criticisms were made regarding the delay (two years) in programming a systematic flushing exercise in the area, as there have been two significant discolouration events this year.

Date and duration	Area	Estimate of population affected	Nature and cause of the event	Main actions and findings from the Inspectorate investigation
07 May 2009 For 3 days (WSX)	Bridgwater, Somerset	45,000	Brown discolouration due to planned work.	<p>The Inspectorate classified this event as significant.</p> <p>Wessex Water action:</p> <ul style="list-style-type: none"> • Provided bottled water on request. • Flushed mains and turned over water in the reservoir to remove discolouration. • Sampled affected area. • Rezoned area (brought in water from different source). • Reviewed their procedures. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • Inadequate training/competence of staff. • The operative failed to follow the valve sequence set out in the method statement, which has been central to previous events.

Date and duration	Area	Estimate of population affected	Nature and cause of the event	Main actions and findings from the Inspectorate investigation
12 May 2009 For 2 days (WSX)	Tucking Mill works supplying the Bath area	28,000	<i>E.coli</i> at treatment works.	<p>The Inspectorate classified this event as significant.</p> <p>Wessex Water action:</p> <ul style="list-style-type: none"> • The treatment works was shut down once the company recognised the site did not achieve adequate disinfection of the water. • The company have confirmed that they are unlikely to re-introduce the works into supply. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • Inadequate treatment process – disinfection. • Recommended review of operational functionality of all sample facilities. • Recommended company reviews disinfection at all of its works to ensure they meet the minimum company standard and risk assessments are updated as appropriate. • A notice was served on the company prohibiting supply from this works until tests to accurately calculate disinfection and necessary improvements are made. • Recommendations were made regarding the location and calibration of monitors.

Date and duration	Area	Estimate of population affected	Nature and cause of the event	Main actions and findings from the Inspectorate investigation
24 May 2009 For 10 days (WSX)	Friar Waddon works supplying the Weymouth and Portland areas of Dorset	15,295	Pesticides (MCPA and MCPB) detection.	<p>The Inspectorate classified this event as significant.</p> <p>Wessex Water action:</p> <ul style="list-style-type: none"> • Following pollution event at a neighbouring farm, the company turned over water in main service reservoir to reduce concentrations. • The company introduced a blend into Portland zone (only a benefit to part of the zone). • Company resampled in zones, works and service reservoir. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • The site was the subject of a legally binding undertaking for pesticides at the time of the pollution event. • The company failed to notify West Dorset District Council. Company were not monitoring for pesticides in raw water at the time, recommended this should be implemented. • Recommended that the risk assessment for the site was reviewed in light of this event and a revised report is submitted or confirmation that current report is acceptable.

Date and duration	Area	Estimate of population affected	Nature and cause of the event	Main actions and findings from the Inspectorate investigation
27 May 2009 For 1 hour (SWT)	Allers works, supplying Tiverton	30,000	Inadequate disinfection due to change in water treatment.	<p>The Inspectorate classified this event as significant.</p> <p>South West Water action:</p> <ul style="list-style-type: none"> • Sampled affected area. • Increased chlorine residuals at treatment works. • Repaired faulty equipment. • Review of procedures. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • Critical of inadequate procedures for returning granular activated carbon contactors to supply as no checks on water quality were required or undertaken. The company has since reviewed and updated its procedures to include chlorine demand tests when a contactor has been out of service for more than two weeks. Recommended extending these tests in line with industry best practice. • A critical monitor on the outlet of the filter was not working during the event, which has now been resolved, although a suggestion was made that the number of monitors be reviewed. • Inadequate disinfection during this event and a recommendation was made to implement mechanisms to identify such circumstances at an early stage. • Information provided during the final report was inconsistent.

Date and duration	Area	Estimate of population affected	Nature and cause of the event	Main actions and findings from the Inspectorate investigation
05 Jul 2009 For 1 day (SWT)	Saracen Way, Penryn	75	Boil water notice.	<p>The Inspectorate classified this event as significant.</p> <p>South West Water action:</p> <ul style="list-style-type: none"> • Increased chlorine residuals in the distribution system. • Improved procedures relating to: <ul style="list-style-type: none"> a) any abandoned mains identified during excavations are to be sealed to prevent surface water transfer between excavations; b) all temporary pipework, bypasses etc are to be removed and pieced in prior to the transfer of disinfection equipment; c) any trickle flushing on the system to be double checked and confirmed to be shutdown prior to the transfer of the disinfection equipment; d) ensuring that staff and contractors are aware of the new procedures through a series of familiarisation training. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • Inadequate procedures. • Recommended that where booster chlorination is installed that close monitoring of the chlorine residuals be undertaken especially during inclement weather.

Date and duration	Area	Estimate of population affected	Nature and cause of the event	Main actions and findings from the Inspectorate investigation
18 Jul 2009 For 2 days (SWT)	Bastreet works supplying Launceston, Cornwall	27,000	Coagulation problems and <i>Cryptosporidium</i> .	<p>The Inspectorate classified this event as significant.</p> <p>South West Water action:</p> <ul style="list-style-type: none"> • Sampled affected area. • Changes made to improve responsiveness of works to changes in raw water quality, this includes an additional alarm for raw water colour to provide an 'early warning' of potential problems. • Express analysis requested for subsequent <i>Cryptosporidium</i> samples but no further oocysts detected. • The company has taken action to improve control of the coagulation process at the works. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • The risk of <i>Cryptosporidium</i> was identified in the company's risk assessment, for which the mitigation is designated to be multiple barriers in place. This is verified by continuous monitoring for <i>Cryptosporidium</i> in the treated water and monthly in the raw water. • Prior to this event heavy rain caused increased raw water colour. As a result, problems with coagulation control were experienced and subsequently the treated water was found to contain <i>Cryptosporidium</i>. • A suggestion was made regarding notification of all appropriate stakeholders for reportable events.

Date and duration	Area	Estimate of population affected	Nature and cause of the event	Main actions and findings from the Inspectorate investigation
06 Aug 2009 For 1 day (WSX)	Winsley service reservoir supplying Bradford on Avon, Wiltshire	1,000	Loss of supplies/poor pressure due to structural failure at service reservoir.	<p>The Inspectorate classified this event as significant.</p> <p>Wessex Water action:</p> <ul style="list-style-type: none"> • Replaced faulty equipment. • Sampled affected area. • Review of procedures. • Provided bottled water on request. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • Inadequate supply of critical spares, although company has taken actions to rectify this. • Inadequate checks and procedures in place at the time, the company have also addressed this issue.
06 Aug 2009 For 3 weeks (WSX)	Friar Waddon works supplying the Weymouth and Portland areas of Dorset	15,295	Pesticide (MCPA and MCPB)	<p>The Inspectorate classified this event as serious.</p> <p>Wessex Water action:</p> <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • Further exceedance of the pesticide standard during the investigation and resolution of the previous event in May at this works. The cause was the same and a further legally binding undertaking was required from the company to secure compliance with the standard in the future.

Date and duration	Area	Estimate of population affected	Nature and cause of the event	Main actions and findings from the Inspectorate investigation
07 Aug 2009 For 5 days (SWT)	Dousland works, Tavistock, Plymouth and South Hams	2,500	Failure of lime dosing and <i>Cryptosporidium</i> .	<p>The Inspectorate classified this event as significant.</p> <p>South West Water action:</p> <ul style="list-style-type: none"> • Replaced faulty equipment. • Sampled affected area. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • Inadequate treatment process – failure of lime dosing system occurred at the time of three consecutive detections of <i>Cryptosporidium</i> oocysts. • Filtered water turbidity remained below 1NTU and disinfection was maintained.
03 Sep 2009 For 1 day (BRL)	Westbury on Trym and Henleaze, Bristol	35,278	Brown discolouration due to planned work.	<p>The Inspectorate classified this event as significant.</p> <p>Bristol Water action:</p> <ul style="list-style-type: none"> • Sampled affected area. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • Inadequate sampling as turbidity was only measured once during the flushing and revalving operations. More monitoring would have assisted in understanding the effectiveness of the work being carried out. • The trunk mains feeding the area are planned for renovation as part of a legally binding undertaking, but the two zones involved are not included – recommended that the company reviews its distribution strategy and confirms how they plan to reduce the risk of discolouration.

Date and duration	Area	Estimate of population affected	Nature and cause of the event	Main actions and findings from the Inspectorate investigation
09 Oct 2009 For 75 hours (SWT)	Roskrow, Penryn near Falmouth	9,700	Brown discolouration.	<p>The Inspectorate classified this event as significant.</p> <p>South West Water action:</p> <ul style="list-style-type: none"> • Flushed mains. • Updated their procedures for mains swabbing. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • Inadequate procedures for swabbing including keeping a section of main in supply at the time, when a parallel main was available. • Inadequate risk assessment. • The Inspectorate were critical that the company were unable to determine how a swab was not recovered at the planned flushing point and was located in a downstream service reservoir 11 days later.

Date and duration	Area	Estimate of population affected	Nature and cause of the event	Main actions and findings from the Inspectorate investigation
17 Nov 2009 For 24 hours (BRL)	Purton works, supplying Littleton-Upon-Severn, near Bristol	403,000	Treatment failure and <i>Cryptosporidium</i> .	<p>The Inspectorate classified this event as significant.</p> <p>Bristol Water action:</p> <ul style="list-style-type: none"> • Repaired faulty equipment. • Reduced flow. • Investigated moving flow meters. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • As the cause of the dosing failure was found to be a dosing pump which failed, a suggestion was made that dosing arrangements are reviewed and the possibility of a duty standby arrangement with an automatic change over is investigated to make the process more robust. • The company have reviewed and updated their procedures for restarting the clarifiers, to reduce the impact of floc carry over on the filter performance. Until the protocol is in place all shift controllers should be made aware of the possible impacts of restarting the clarifiers. • A suggestion was made that the company ensures all relevant stakeholders are notified.

Date and duration	Area	Estimate of population affected	Nature and cause of the event	Main actions and findings from the Inspectorate investigation
22 Nov 2009 For 3 days (WSX)	Upton Scudamore works supplying the areas between Warminster and Bath	122,500	<i>Cryptosporidium</i> levels due to raw water deterioration.	<p>The Inspectorate classified this event as significant.</p> <p>Wessex Water action:</p> <ul style="list-style-type: none"> • Sampled affected area. • Investigated the raw water sources. • Removed raw source water from supply. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • Improved monitoring for <i>Cryptosporidium</i> oocysts in response to raw water monitoring information ensured the event was identified and responded to quickly. • Good communication took place between the company and the local Health Protection Team.

Events in the Western region outstanding from 2008

Date and duration	Area	Estimate of population affected	Nature and cause of the event	Main actions and findings from the inspectorate investigation
20 June 2008 For 3 days (SWT)	South Dartmoor and the eastern outskirts of Plymouth	18,000	Boil notice due to microbiological contamination.	<p>South West Water action:</p> <ul style="list-style-type: none"> • Flushed mains. • Issued a boil water notice. • Sampled affected area. • Review of procedures. • New instructions issued to staff. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • Inadequate procedures. • Supplied unwholesome water in breach of regulations. • Inadequate training of staff.
07 Dec 2008 For 1 days (WSX)	Easterton works, supplying Devizes, Wiltshire	5,175	Turbidity due to plant failure.	<p>Wessex Water action:</p> <ul style="list-style-type: none"> • Flushed mains. • Provided bottled water on request. • Shut down treatment works. • Sampled affected area. • Rezoned area (brought in water from different source). <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • Inadequate treatment process – filtration. • Lack of maintenance of equipment.

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
BRL	<i>Cryptosporidium</i>	Cheddar	31-Dec-13	Ongoing	Notice
BRL	<i>Cryptosporidium</i>	Littleton	31-Dec-12	Ongoing	Notice
BRL	<i>Cryptosporidium</i>	Purton	31-Dec-11	Ongoing	Notice
BRL	<i>Cryptosporidium</i>	Shipton Moyne	31-Dec-12	Ongoing	Notice
BRL	<i>Cryptosporidium</i>	Stowey	31-Dec-13	Ongoing	Notice
BRL	Iron	Barrow	31-Mar-10	Completed 10-Mar-10	Undertaking
BRL	Iron and Manganese	Distribution system	31-Mar-10	Completed 31-Mar-10	Undertaking
BRL	Iron and Manganese	Distribution system – trunk mains	31-Mar-10	Completed 17-Dec-09	Undertaking
BRL	Lead	Sherborne	31-Jul-13	Ongoing	Notice
BRL	Metalddehyde	Banwell	31-Mar-15	Ongoing	Undertaking
BRL	Metalddehyde	Purton and Littleton	31-Mar-15	Ongoing	Undertaking
BRL	Metalddehyde	Stowey	31-Mar-15	Ongoing	Undertaking
BRL	Nitrate	Frome	04-Sep-14	Ongoing	Undertaking
BRL	Taste, Odour, Manganese and Arsenic	Rowberrow and Banwell	30-Sep-07	Completed 23-Feb-09	Undertaking
BRL	Total Trihalomethanes	Purton and Littleton	31-Dec-11	Ongoing	Undertaking
BWH	<i>Cryptosporidium</i>	Woodgreen	31-Dec-11	Ongoing	Notice
BWH	Iron	Distribution system	31-Mar-15	Ongoing	Undertaking
SWT	<i>Cryptosporidium</i> , colour, NTU	Bovey Cross	31-Mar-12	Ongoing	Notice
SWT	Iron and Manganese	Distribution system	31-Dec-09	Completed 31-Dec-09	Undertaking
SWT	Lead	Distribution system	31-Mar-15	Ongoing	Undertaking
SWT	Manganese	Avon	31-Mar-10	Completed	Undertaking
SWT	Manganese	Lowermoor	31-Mar-10	Completed	Undertaking
SWT	Manganese	Tottiford	31-Mar-12	Ongoing	Undertaking

Company	Parameter, hazard or driver	Site	Due for completion	Status	Legal instrument
SWT	Manganese	Venford	30-Sep-11	Ongoing	Undertaking
SWT	Pesticides	Drift	31-Mar-12	Ongoing	Undertaking
SWT	Pesticides	Restormel	31-Mar-14	Ongoing	Undertaking
SWT	Taste and Odour and Manganese	Stithians	30-Sep-11	Ongoing	Undertaking
SWT	Taste and Odour and Manganese	Tamar	31-Mar-08	Completed	Undertaking
SWT	Total Trihalomethanes	Wendron	31-Dec-14	Ongoing	Undertaking
SWT	Turbidity and Iron	Greatwell	31-Dec-11	Ongoing	Undertaking
WSX	Chlorotoluron and Atrazine	Friar Waddon	31-Dec-10	Ongoing	Undertaking
WSX	<i>Cryptosporidium</i>	Dewlish	31-Mar-12	Ongoing	Notice
WSX	<i>Cryptosporidium</i>	Diversbridge (Upton Scudamore)	31-Mar-12	Ongoing	Notice
WSX	<i>Cryptosporidium</i>	Dunkerton	31-Mar-13	Ongoing	Notice
WSX	<i>Cryptosporidium</i>	Langdon	31-Mar-14	Ongoing	Notice
WSX	<i>Cryptosporidium</i>	Tatworth	31-Mar-13	Ongoing	Notice
WSX	<i>Cryptosporidium</i>	Widdenham	31-Mar-14	Ongoing	Notice
WSX	Inadequate disinfection	Tucking Mill	TBC	Ongoing	Notice
WSX	Integrity	Grange	31-Mar-12	Ongoing	Notice
WSX	Integrity	Grove (Portland)	31-Mar-13	Ongoing	Notice
WSX	Integrity	Zeals	31-Mar-13	Ongoing	Notice
WSX	Iron	Danesborough	30-Jun-11	Ongoing	Undertaking
WSX	Iron, Manganese and Turbidity	Distribution system – trunk mains	31-Mar-15	Ongoing	Undertaking
WSX	Isoproturon, Mecoprop, Chlorotoluron, taste and odour	Sutton Bingham	31-Mar-14	Ongoing	Undertaking
WSX	Lead	Distribution system	31-Mar-15	Ongoing	Undertaking
WSX	Metaldehyde	Durleigh	31-Mar-14	Ongoing	Undertaking
WSX	Network maintenance	Adber	31-Mar-11	Ongoing	Notice
WSX	Network maintenance	Bathford	31-Mar-13	Ongoing	Notice
WSX	Network maintenance	Feltham Farm	31-Mar-11	Ongoing	Notice

Company	Parameter, hazard or driver	Site	Due for completion	Status	Legal instrument
WSX	Network maintenance	Moorbrake Camp	31-Mar-13	Ongoing	Notice
WSX	Network maintenance	Sigwells	31-Mar-13	Ongoing	Notice
WSX	Nitrate	Bulbridge, Chirton, Dunkerton, Fonthill Bishop, Hooke, Sturminster, Wylfe	31-Mar-18	Ongoing	Undertaking
WSX	Nitrate	Deans Farm	Catchment management report due 30-Sep-08	Completed 13-Nov-09	Undertaking
WSX	Nitrate	Eagle Lodge	Catchment management report due 30-Sep-08	Completed 13-Nov-09	Undertaking
WSX	Nitrate	Empool	31-Dec-09	Completed 13-Nov-09	Undertaking
WSX	Nitrate	Winterbourne Abbas	Catchment management report due 30-Sep-08	Completed 13-Nov-09	Undertaking
WSX	Raw water protection	Brixton Deverill	31-Mar-10	Ongoing	Notice
WSX	Raw water protection	Portesham	30-Sep-11	Ongoing	Notice
WSX	Taste and odour	Blashford	31-Mar-14	Ongoing	Undertaking
WSX	Taste and odour	Maundown	30-Apr-09	Completed 12-Feb-09	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	Wessex 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

Bristol Water plc

Water supply arrangements

Company assets		Water supplied	
Number of treatment works	18	Water supplied (MI/day)	294
Number of service reservoirs	173	Percentage from surface sources	82
Number of water supply zones	52	Percentage from ground sources	12
Length of mains pipe (km)	6,650	Percentage from mixed sources	6
Population served		Area of supply	
Population supplied	1,109,208	Gloucestershire, Wiltshire, Bristol, Somerset	
Number of local authorities	9		

Drinking water quality summary data

	Company figure			Industry average
	2007	2008	2009	2009
Overall drinking water quality¹	99.98%	99.97%	99.97%	99.95%
Water treatment				
Process Control Index	100%	99.99%	100%	99.97%
Disinfection Index	100%	99.98%	100%	99.94%
Distribution systems				
Distribution Maintenance Index	99.78%	99.82%	99.88%	99.86%
Reservoir Integrity Index	99.99%	99.97%	99.97%	99.96%
Building water systems				
Parameters influenced by domestic water systems	99.99%	99.92%	99.85%	99.87%

Consumer contacts

	Company figure			Industry average
	2007	2008	2009	2009
Informing consumers				
Total number	1,092	1,015	1,048	N/A
Rate per 1,000 population	1.01	0.93	0.94	1.38
Acceptability of water to consumers				
Total number	2,927	4,373	2,917	N/A
Rate per 1,000 population	2.70	4.00	2.63	2.21

Complaints to the Drinking Water Inspectorate

One consumer of Bristol 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

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

Bournemouth and West Hampshire Water plc

Water supply arrangements

Company assets		Water supplied	
Number of treatment works	7	Water supplied (MI/day)	113
Number of service reservoirs	20	Percentage from surface sources	85
Number of water supply zones	10	Percentage from ground sources	15
Length of mains pipe (km)	2,767	Percentage from mixed sources	0
Population served		Area of supply	
Population supplied	426,000	Parts of Dorset, Hampshire and Wiltshire	
Number of local authorities	6		

Drinking water quality summary data

	Company figure			Industry average
	2007	2008	2009	2009
Overall drinking water quality¹	99.99%	99.92%	99.99%	99.95%
Water treatment				
Process Control Index	99.88%	99.97%	99.99%	99.97%
Disinfection Index	99.85%	99.72%	99.90%	99.94%
Distribution systems				
Distribution Maintenance Index	99.94%	100%	100%	99.86%
Reservoir Integrity Index	100%	99.95%	99.95%	99.96%
Building water systems				
Parameters influenced by domestic water systems	99.96%	99.85%	99.96%	99.87%

Consumer contacts

	Company figure			Industry average
	2007	2008	2009	2009
Informing consumers				
Total number	104	184	263	N/A
Rate per 1,000 population	0.24	0.43	0.62	1.38
Acceptability of water to consumers				
Total number	331	397	570	N/A
Rate per 1,000 population	0.78	0.93	1.34	2.21
Complaints to the Drinking Water Inspectorate				
One consumer of Bournemouth and West Hampshire 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.

Cholderton and District Water Company Ltd

Water supply arrangements

Company assets		Water supplied	
Number of treatment works	1	Water supplied (MI/day)	<1
Number of service reservoirs	1	Percentage from surface sources	0
Number of water supply zones	1	Percentage from ground sources	100
Length of mains pipe (km)	30	Percentage from mixed sources	0
Population served		Area of supply	
Population supplied	2,100	Small parts of Wiltshire and Hampshire	
Number of local authorities	2		

Drinking water quality summary data

	Company figure			Industry average
	2007	2008	2009	2009
Overall drinking water quality¹	100%	100%	100%	99.95%
Water treatment				
Process Control Index	100%	100%	100%	99.97%
Disinfection Index	100%	100%	100%	99.94%
Distribution systems				
Distribution Maintenance Index	100%	100%	100%	99.86%
Reservoir Integrity Index	99.04%	100%	100%	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	0	0	N/A
Rate per 1,000 population	0	0	0	2.21
Complaints to the Drinking Water Inspectorate				
No consumers of Cholderton and District Water Company Ltd 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.

SSE Water

Water supply arrangements

Company assets		Water supplied	
Number of treatment works	0	Water supplied (l/day)	63,000
Number of service reservoirs	0	Percentage from surface sources	55
Number of water supply zones	2	Percentage from ground sources	45
Length of mains pipe (km)	3	Percentage from mixed sources	0
Population served		Area of supply	
Population supplied	1,000	Old Sarum, near Salisbury Hale Village, Tottenham	
Number of local authorities	2		

Drinking water quality summary data

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

Consumer contacts

	Company figure			Industry average
	2007	2008	2009	2009
Informing consumers				
Total number	0	0	1	N/A
Rate per 1,000 population	N/A	0	0.74	1.38
Acceptability of water to consumers				
Total number	0	0	0	N/A
Rate per 1,000 population	N/A	0	0	2.21
Complaints to the Drinking Water Inspectorate				
No consumers of SSE 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.

South West Water Ltd

Water supply arrangements

Company assets		Water supplied	
Number of treatment works	33	Water supplied (MI/day)	434
Number of service reservoirs	312	Percentage from surface sources	84
Number of water supply zones	32	Percentage from ground sources	6
Length of mains pipe (km)	15,000	Percentage from mixed sources	10
Population served		Area of supply	
Population supplied	1,682,000	Devon, Cornwall, Somerset (part), Dorset (part)	
Number of local authorities	13		

Drinking water quality summary data

	Company figure			Industry average
	2007	2008	2009	2009
Overall drinking water quality¹	99.95%	99.98%	99.98%	99.95%
Water treatment				
Process Control Index	99.91%	100%	100%	99.97%
Disinfection Index	99.93%	99.94%	99.98%	99.94%
Distribution systems				
Distribution Maintenance Index	99.75%	99.89%	99.91%	99.86%
Reservoir Integrity Index	99.95%	99.93%	99.93%	99.96%
Building water systems				
Parameters influenced by domestic water systems	99.92%	99.95%	99.97%	99.87%

Consumer contacts

	Company figure			Industry average
	2007	2008	2009	2009
Informing consumers				
Total number	1,579	2,106	1,951	N/A
Rate per 1,000 population	0.98	1.34	1.16	1.38
Acceptability of water to consumers				
Total number	22,226	19,223	14,675	N/A
Rate per 1,000 population	13.81	12.24	8.72	2.21

Complaints to the Drinking Water Inspectorate

One consumer of South West Water Ltd 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.

Thames Water Utilities Ltd

Water supply arrangements

Company assets		Water supplied	
Number of treatment works	104	Water supplied (MI/day)	2,774
Number of service reservoirs	381	Percentage from surface sources	75
Number of water supply zones	238	Percentage from ground sources	25
Length of mains pipe (km)	31,507	Percentage from mixed sources	0
Population served		Area of supply	
Population supplied	8,674,000	Bedfordshire (part), Berkshire (part), Buckinghamshire (part), Essex (part), Gloucestershire (part), Hampshire (part), Hertfordshire, Kent (part), Inner London, Outer London (part), Oxfordshire, Surrey (part), West Sussex (part), Warwickshire (part), Wiltshire (part)	
Number of local authorities	63		

Drinking water quality summary data

	Company figure			Industry average
	2007	2008	2009	2009
Overall drinking water quality¹	99.98%	99.99%	99.98%	99.95%
Water treatment				
Process Control Index	99.97%	>99.99%	>99.99%	99.97%
Disinfection Index	99.98%	99.97%	99.95%	99.94%
Distribution systems				
Distribution Maintenance Index	99.95%	99.94%	99.92%	99.86%
Reservoir Integrity Index	99.94%	99.97%	99.94%	99.96%
Building water systems				
Parameters influenced by domestic water systems	99.87%	99.93%	99.91%	99.87%

Consumer contacts

	Company figure			Industry average
	2007	2008	2009	2009
Informing consumers				
Total number	26,423	40,877	49,541	N/A
Rate per 1,000 population	3.17	4.73	5.71	1.38
Acceptability of water to consumers				
Total number	7,904	8,753	7,251	N/A
Rate per 1,000 population	0.95	1.01	0.84	2.21

Complaints to the Drinking Water Inspectorate

A total of six consumers of Thames Water Utilities Ltd 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.

Veolia Water Projects Ltd

Water supply arrangements

Company assets		Water supplied	
Number of treatment works	2	Water supplied (MI/day)	4
Number of service reservoirs	6	Percentage from surface sources	0
Number of water supply zones	1	Percentage from ground sources	100
Length of mains pipe (km)	98	Percentage from mixed sources	0
Population served		Area of supply	
Population supplied	9,000	Tidworth, Wiltshire	
Number of local authorities	1		

Drinking water quality summary data

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

Consumer contacts

	Company figure			Industry average
	2007	2008	2009	2009
Informing consumers				
Total number	N/A	N/A	16	N/A
Rate per 1,000 population	N/A	N/A	1.74	1.38
Acceptability of water to consumers				
Total number	N/A	N/A	3	N/A
Rate per 1,000 population	N/A	N/A	0.33	2.21
Complaints to the Drinking Water Inspectorate				
No consumers of Veolia Water Projects Ltd 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.

Wessex Water Services Ltd

Water supply arrangements

Company assets		Water supplied	
Number of treatment works	91	Water supplied (MI/day)	346
Number of service reservoirs	297	Percentage from surface sources	27
Number of water supply zones	92	Percentage from ground sources	71
Length of mains pipe (km)	11,000	Percentage from mixed sources	2
Population served		Area of supply	
Population supplied	1,182,000	Large parts of Somerset, Dorset and Wiltshire, small areas of Gloucestershire and Devon	
Number of local authorities	15		

Drinking water quality summary data

	Company figure			Industry average
	2007	2008	2009	2009
Overall drinking water quality¹	99.97%	99.96%	99.95%	99.95%
Water treatment				
Process Control Index	>99.99%	100%	100%	99.97%
Disinfection Index	99.93%	99.96%	99.90%	99.94%
Distribution systems				
Distribution Maintenance Index	99.90%	99.97%	99.97%	99.86%
Reservoir Integrity Index	99.92%	99.95%	99.97%	99.96%
Building water systems				
Parameters influenced by domestic water systems	99.84%	99.81%	99.80%	99.87%

Consumer contacts

	Company figure			Industry average
	2007	2008	2009	2009
Informing consumers				
Total number	1,748	2,859	1,157	N/A
Rate per 1,000 population	1.48	2.42	0.98	1.38
Acceptability of water to consumers				
Total number	3,407	3,639	3,845	N/A
Rate per 1,000 population	2.88	3.08	3.26	2.21
Complaints to the Drinking Water Inspectorate				
No consumers of Wessex Water Services Ltd 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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