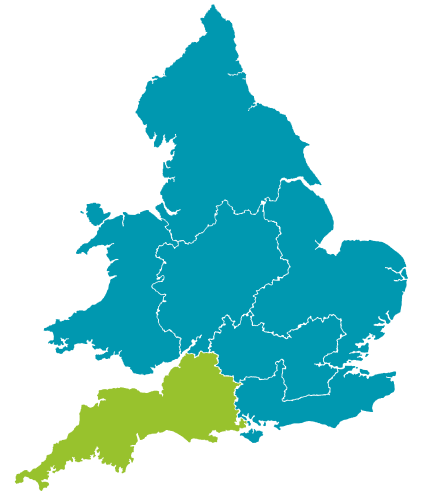


Drinking water 2010

**Public water supplies in the
Western region of England**

July 2011

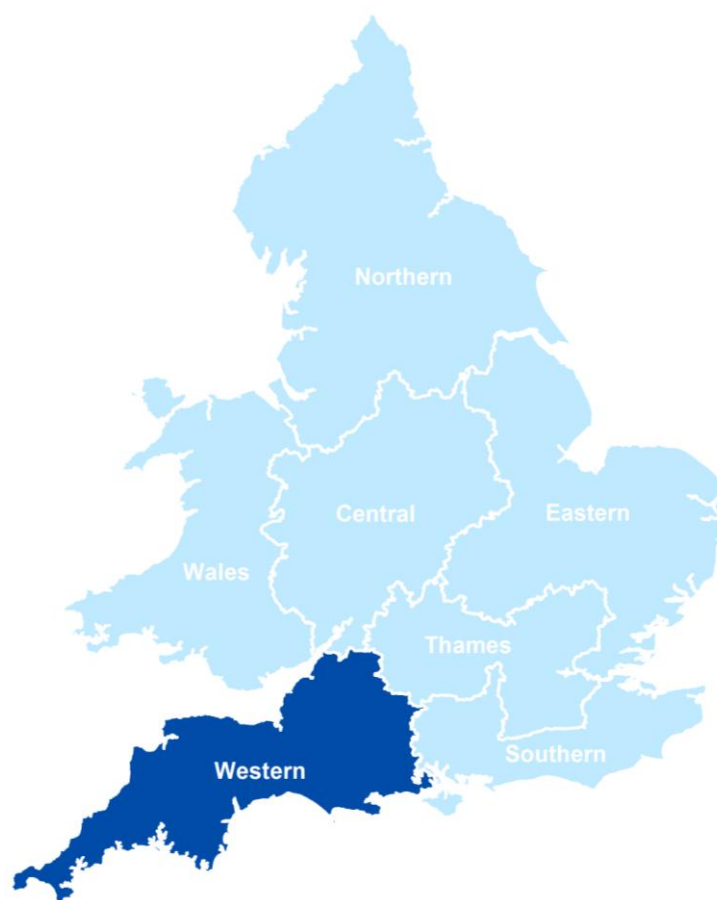
A report by the Chief Inspector of Drinking Water





Drinking water 2010

Western region of England



Published by
Drinking Water Inspectorate
Area 4a
Ergon House
Horseferry Road
London
SW1P 2AL

Tel: 030 0068 6400

Website: www.dwi.gov.uk

© Crown Copyright 2011

ISBN: 978-1-905852-55-0

Copyright in the typographical arrangement and design rests with the Crown.

This publication (excluding the logo) may be reproduced free of charge in any format or medium provided that it is reproduced accurately and not used in a misleading context. The material must be acknowledged as Crown copyright with the title and source of the publication specified.

Contents

Introduction	4
Water supply arrangements	8
Drinking water quality testing	10
Drinking water quality results	11
Drinking water quality events	32
Technical audit activity	34
Public confidence in drinking water quality	36
Planned drinking water quality improvements	40
Annex 1: Further sources of information	45
Annex 2: Glossary and description of standards	46
Annex 3: Drinking water quality events in the region	59
Annex 4: Planned drinking water quality improvements	68
Annex 5: Competition in the water industry	71
Annex 6: Water company indices	73

Drinking Water 2010 is the annual report of the Drinking Water Inspectorate and comprises reports covering public and private water supplies.

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

Private supplies – A summary of information on private water supplies is reported for England and Wales.

All parts are available on the Inspectorate's website www.dwi.gov.uk.

The results of testing in 2010 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%, the same as that reported in 2009 and above the industry overall average. This figure is made up of the results of all the tests for 39 parameters with European or national standards.

When the Western region is judged by the Inspectorate's four indices of water quality performance, which look in turn at water treatment (comprising process control and disinfection), service reservoir integrity and network maintenance, the main change in 2010 was improved figures for disinfection (99.95%) and reservoir integrity (99.97%). Compared to last year, process control declined to 99.96% predominantly due to trihalomethane failures reported by Bristol Water. The network maintenance figure was unchanged in 2010 at 99.94%. Two indices, network maintenance and reservoir integrity, were above the industry average. The process control figure, though improved, was the lowest out of all the regions and the disinfection figure was the joint lowest in England. Individual water company figures are reported in *Annex 6*.

Across the region there was no change in the number of events affecting water quality: 42 compared to 41 in 2009. Approximately one-third (17) were of a type that necessitated a detailed investigation by an inspector. This is similar to the proportion of events requiring closer scrutiny in 2009. One serious event in 2010 did necessitate deployment of a considerable amount of the Inspectorate's resource. The cause of the event was the connection of a new property to a sewer rather than to a water main. It was fortunate that this was detected fairly quickly. The misconnection of a property to a sewer is an error with potentially very serious consequences for public health and the Inspectorate is very concerned that this is the second year in a row when such an event has occurred. The event is described in more detail in the *Drinking water quality events* section. In terms of the nature of the events reported on this year, there has been no marked change from the general pattern for recent years. Detailed findings regarding all the significant events in 2010 can be found in *Annex 3*. In 2010, risk-based technical audit highlighted analytical malpractice at a laboratory operated by Severn Trent Services affecting eight water companies and six regions (see the *Technical audit activity* section for further details).

The long-term trend in public confidence in drinking water quality continues to improve in the Western region. The number of people across the region expressing concern about the quality of their tap water (appearance, taste and illness) has continued to fall. By comparison to the other regions, the Western region still has the highest contact rate (3.9 per 1,000 population), however, there is a longer term downward trend in

consumers reporting black, brown or orange water with particularly good improvement this year in the area operated by South West Water. However, the previous progress in reducing white water contacts has slowed and there remains no clear trend of improvement in relation to objectionable chlorinous taste or odour contacts, although these were fewer in number in 2010 compared to 2009. Disappointingly, the number of consumers who were sufficiently dissatisfied to take the matter up directly with the Inspectorate doubled in 2010 (six compared to three in 2009).

This year sees the 20-year anniversary of the implementation of the European Drinking Water Directive and this report contains a summary of how the approach to regulating for safe, clean drinking water for all has developed over two decades. An overview of how this translates into action in the region is contained in the *Planned drinking water improvements* section. Additionally, *Annex 4* contains information about the schemes of work delivered by companies in 2010 and those planned for delivery over the next four years.

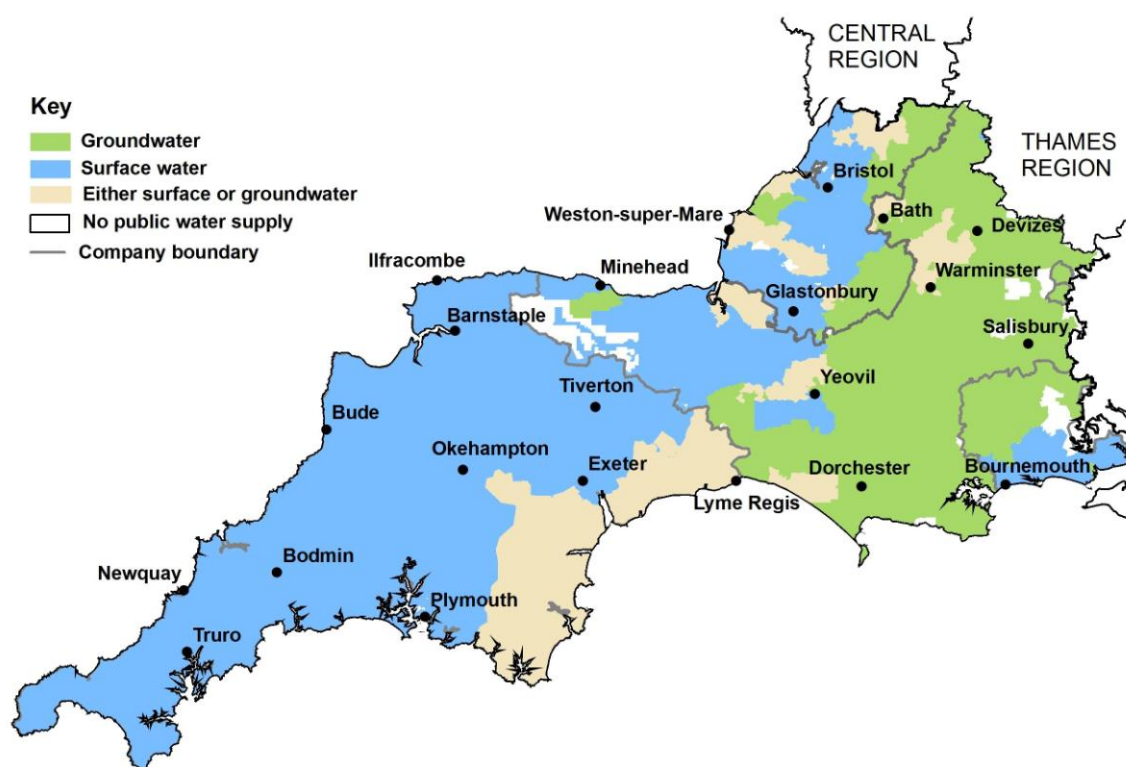
In reviewing drinking water quality in 2010, the Inspectorate considers that two topics are worthy of highlighting to the industry. The first concerns the number of events and failures of drinking water standards which have been due to cross-connections or misconnections between the domestic water supply and other sources, for example rainwater, private water supplies and in one instance in the Western region, a sewer. These defects generally occur at points close to the consumer, therefore the risk to public health is high. Companies need to give high priority in their water safety plans to control measures to address these risks, such as accurate records of network assets, the competency of those who work on the network and more appropriate targeting and prioritisation of fittings inspections. Although companies have recently been identifying and taking enforcement action in relation to cross-connections between the public water supply and either domestic rainwater harvesting systems or private water supplies, the Inspectorate has found it necessary to remind a number of companies that fittings inspections need to be carried out when investigating failures of drinking water standards, particularly in relation to the following parameters: taste, odour, lead, copper, nickel, *E.coli* and Enterococci. As a result of changes to the regulations to bring them into line with the EU Drinking Water Directive, it is mandatory to consider carrying out fittings inspections as part of investigations into failures arising in public buildings and also when requested by a local authority in relation to risk assessments of private water supplies. Companies need to make sure that these changes have been reflected in their policies and practices relating to fittings inspections, which should be given a higher profile in relation to water safety plan methodology and should be taken into account during regulatory risk assessments.

The second observation concerns bulk supplies. These are situations where one water company relies on another for a source of either raw or treated water. In relation to a number of events or failures of drinking water standards, it is evident that arrangements in relation to these bulk supplies are less than adequate. In particular, companies who import bulk supplies are reminded that they are under a duty to carry out a full risk assessment and it would be advisable for there to be formal arrangements to ensure that such supplies are both wholesome and fit for human consumption before supply to their own customers. The regulatory risk assessment (and formal agreement) must include arrangements for alternate supplies of water in the event of either a quality or quantity event. There is a need for jointly agreed risk assessments, ensuring full awareness of the control measures with clear lines of accountability and communication under both normal and abnormal operating situations.

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), Wessex Water (WSX) and two inset appointments; Veolia Water Projects Ltd (VWP), supplies consumers in the Tidworth area, and 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 to 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 set out in Table 2 along with outline geographical and demographic information.

Table 2: Key facts about the Western region supply arrangements

Key facts			
Population supplied	4,560,999	Abstraction points	349
Water supplied (l/day)	1,249 million	Treatment works	153
Number of local authorities	27	Service reservoirs	810
(with a further 6 partially covering the region)		Water supply zones	188
		Length of mains pipe (km)	35,587
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 2010, 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 consumer 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 seven water companies carried out a total of 592,162 tests during 2010. Only 117 of these tests failed to meet the standards set down in the regulations.

Table 3: Number of tests carried out by companies in the region

Company	Place of sampling			Number of tests per company	Estimate of population
	Water treatment works	Service reservoirs	Consumers' taps (zones)		
Bournemouth and West Hampshire Water	13,696 (8)	6,174 (20)	16,291 (10)	36,161	426,000
Bristol Water	27,307 (17)	50,320 (165)	41,947 (52)	119,574	1,136,000
Cholderton and District Water	377 (1)	312 (1)	328 (1)	1,017	3,000
South West Water	52,937 (33)	85,527 (284)	66,023 (32)	204,487	1,682,000
SSE Water	0 (0)	0 (0)	228 (1)	228	999
Veolia Water Projects Ltd	1,264 (2)	1,560 (6)	612 (1)	3,436	8,000
Wessex Water	77,073 (83)	92,635 (298)	57,551 (91)	227,259	1,305,000
Region overall	172,654 (144)	236,528 (774)	182,980 (188)	592,162	4,560,999

Numbers in brackets reflect the number of works, reservoirs or zones operated by that company in the region in 2010. Some companies are permitted to carry out some tests on samples taken from supply points rather than from consumers' taps.

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

A summary of the results of testing by companies for each parameter can be found on the DWI website (www.dwi.gov.uk) and on the CD accompanying this report.

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 4), the other dealing with chemical and physical parameters (Table 6).

The microbiological quality of water is discussed first. Companies report all the results of the tests on a monthly basis to the Inspectorate. Also, tables in *Annex 6* describe the performance of each company supplying in the region.

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 4: 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	23,170	3	BWH (2), SWT (1)
Coliform bacteria	0/100ml	23,168	18	BRL (2), BWH (5), SWT (5), WSX (6)
<i>Clostridium perfringens</i>	0/100ml	5,326	5	BWH (1), SWT (3), WSX (1)
Turbidity ¹	1NTU	23,114	6	CHO (1), SWT (1), WSX (4)
Water leaving service reservoirs				
<i>E.coli</i>	0/100ml	39,493	3	SWT (3)
Coliform bacteria	0/100ml in 95% of tests at each reservoir	39,492	17	BRL (1), SWT (10), WSX (6) All 774 reservoirs in the region met the 95% compliance rule
Water sampled at consumers' taps				
<i>E.coli</i>	0/100ml	12,545	4	BRL (1), BWH (2), WSX (1)
Enterococci	0/100ml	1,484	1	WSX (1)
¹ Turbidity is a critical control parameter for water treatment and disinfection.				

***E.coli* at works**

In 2010, a total of 23,170 tests at works were carried out by all the companies across the region and *E.coli* was detected in just three samples (2 BWH, 1 SWT).

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 2010, these additional tests gave satisfactory results in all cases and there were no subsequent *E.coli* failures.

Bournemouth and West Hampshire Water detected *E.coli* in a sample taken from Knapp Mill works (near Bournemouth) in February. The works was operating normally at the time and the company concluded that a new sample tap fitted the previous day was unsuitable; the tap was replaced after cutting it open revealed poor casting. Although there have been no further *E.coli* detections; *Clostridium perfringens* was detected in a sample

in March and this will be taken into account during the Inspectorate's risk-based programme of technical audit.

E. coli was reported by Bournemouth and West Hampshire Water from a sample taken at Alderney works (near Bournemouth) in June (see Annex 3). In response the company concluded that faults with the sample facilities were contributory factors but the Inspectorate was not satisfied with the unclear explanation provided by the company. Noting that, since 2008, there had been four separate occasions where coliform bacteria, including *E. coli*, had been detected in samples collected from this works the Inspectorate made further enquiries of the company whereupon details were provided of inspections of the treated water reservoir which showed ingress of filtered water which had not been disinfected. At this site the slow sand filters are located directly above the treated water reservoirs and vents passing upwards through the filter had been sealed, in 2008, in a manner that was not robust. As a consequence, a proportion of filtered water was routinely bypassing the disinfection process. The Inspectorate was very critical of the company for failing to recognise, in its risk assessment, that the location of filters above a contact tank poses an obvious high risk requiring careful management and enhanced monitoring at all times. The Inspectorate was also very critical of the company for failing to make the link between a known integrity risk at the works and sample results, and for a generally tardy response to a potentially serious problem. In particular, the company overlooked entirely that failures were occurring at consumer taps in the downstream zone (see section on *E. coli* and Enterococci at consumers' taps). The company has put in place a more effective engineering solution and updated its risk assessment to reflect the additional risk mitigation measures now in place.

In August, South West Water detected *E. coli* in a sample taken from Crownhill works, near Plymouth (see Annex 3). An external inspection at the site did not reveal anything untoward, however, the contact tank had not been inspected internally since 1998. After some enabling works, the contact tank was isolated and internally inspected in April 2011 which revealed several points of potential ingress. All the remedial works has been completed and the contact tank has been returned to service. Cleaning and inspection of the two large treated water storage tanks is nearing completion.

Table 5: 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	2 – 1,582	0 – 1,030	2 – 1,175	0 – 91
Bristol Water	0 – 3,708	0 – 8,387	1 – 3,071	0 – 388
Cholderton and District Water	0 – 53	0 – 52	0 – 12	0 – 4
South West Water	1 – 7,016	3 – 14,255	0 – 4,465	0 – 379
SSE Water	0 – 0	0 – 0	0 – 12	0 – 4
Veolia Water Projects Ltd	0 – 208	0 – 312	0 – 24	0 – 8
Wessex Water	0 – 10,603	0 – 15,457	1 – 3,786	1 – 610
Region overall	3 – 23,170	3 – 39,493	4 – 12,545	1 – 1,484

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 2010, this situation occurred at three sites: Alderney works (BWH) and Rodbourne works and Briantspuddle No1 works (WSX).

The three failures at Alderney works (BWH) were due to a serious design fault (see the *E.coli at works* section).

Following the detection of coliforms at Rodbourne works (near Malmesbury, Wiltshire) in March, Wessex Water identified leakage from the contact tank, issues with chlorine control and flow, and the sample line tapping was not in accordance with company policy. The sample point was replaced in May and the leakage from the contact tank investigated and found to be due to splashing from the inlet pipe. Another coliform failure in August prompted Wessex Water to take part of the contact tank out of

supply to enable minor works to be carried out to improve chlorine control and mixing. Further investigation revealed the need for more substantial work and a major scheme is underway. The company reviewed the raw water and concluded marginal chlorination was sufficient to provide adequate disinfection. The Inspectorate has noted that there had been an earlier coliform failure in 2009. The Inspectorate expects the company to update the relevant regulatory risk assessment and document the actions taken and planned.

Following two detections of coliform bacteria at Briantspuddle No1 works (near Dorchester) in November, Wessex Water found deficiencies in relation to the sampling facilities and made a temporary re-tapping of the sample point, however, this was also found to be unsatisfactory because the location was subject to flooding with groundwater. The sampling tap was permanently relocated in February 2011 and there have been no subsequent failures. Wessex Water has recognised the need to improve its sampling facilities generally and this is being achieved through a company-wide project throughout 2011.

In January, Bristol Water detected coliforms in a sample from Alderley works. The usual sampling tap was frozen due to the severe weather conditions, so instead, the sample had been collected from an infrequently used kitchen tap on the site. In February, the sample tap was lagged and all subsequent results have been satisfactory. This case illustrates why it is not appropriate to resort to alternate sampling locations and why companies should ensure sample facilities at all sites are well designed and proactively maintained.

The Inspectorate has noted that coliform bacteria were found in 18 (2 BRL, 5 BWH, 5 SWT, 6 WSX) samples from treatment works in the Western region during the year, compared to 17 in 2009, 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 2010, out of 5,326 samples taken in the region, five did not meet the specified value (1 BWH, 3 SWT, 1 WSX).

In March, Bournemouth and West Hampshire Water detected *Clostridium perfringens* in a sample from Knapp Mill works (see the *E.coli at works* section).

South West Water found nothing untoward when investigating reports of *Clostridium perfringens* in samples collected from Stithians works (near Penryn) in March, Crownhill works (near Derriford, Plymouth) in August, and Dousland works (near Yelverton) in December. The Inspectorate expects companies to review the relevant regulatory risk assessment in response to unexplained failures.

Wessex Water reported *Clostridium perfringens* in a consumer's tap sample from the Leckford Bridge zone in October. The Inspectorate has issued guidance to companies regarding the inadvisability of continued monitoring of this parameter at consumers' taps, however, this practice has continued in parts of the Western region. Accordingly, the Inspectorate expects the companies to review and update their regulatory risk assessments to take account of detections of *Clostridium perfringens* in consumer tap samples. In *Drinking water 2009* it was explained that positive detections in surface water derived supplies are indicative of accumulations of mains deposits and point towards the need for information on failures to be taken into account in companies' Distribution, Operation and Maintenance Strategies (DOMS) to prioritise flushing work.

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 of the performance of 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.

In October, Cholderton and District Water reported a turbidity failure from a sample taken at Cholderton works. The site abstracts water from a chalk aquifer and raw water quality is generally stable. Further samples have proved satisfactory and the failure was considered to be due to a one-off disturbance of chalk deposits.

A failure of the turbidity standard was notified by South West Water in relation to an event at Prewley works (near Okehampton) in September.

The Inspectorate was critical of the company for its slow response to the coagulation problems at the site (see *Annex 3*).

In January and again in September, Wessex Water recorded failures of the turbidity standard in samples from Boyne Hollow works (near Shaftesbury). The elevated turbidity events were linked to pump start up at this otherwise good quality spring source. An old cast iron main on site was identified for replacement. The main was regularly flushed until it was replaced in November. As part of the improvements at the site the company re-sited the turbidity monitor to monitor the treated water.

During the investigation of a failure of the turbidity standard in March, Wessex Water collected samples from all the sample taps at Maundown works (near Wiveliscombe). The findings confirmed a problem with the location of the routine sampling point and this was changed in July. All subsequent turbidity results have been satisfactory.

At Winterbourne Abbas works (near Dorchester), Wessex Water attributed a turbidity failure in June to entrapped air. A foot valve on a borehole pump was thought to be failing and whenever the site shut down, air was sucked into the rising main. On start-up, the entrapped air moved forward through the works and mobilised sediment. The cause was identified as a hole in the riser and was repaired in December and all further turbidity results have been satisfactory.

The number of turbidity failures at works across the region in 2010 was six (1 CHO, 1 SWT, 4 WSX), a notable improvement over previous years (17 in both 2008 and 2009).

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

In 2010, across the region, a total of 39,493 tests were carried out at service reservoirs by all the companies and *E.coli* was detected on three occasions (SWW).

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 2010, these additional tests all gave satisfactory results.

At Portworthy reservoir (near Plymouth), *E.coli* and coliform bacteria were detected in May and again in June when South West Water isolated the reservoir for cleaning and inspection (see *Annex 3*). This revealed some minor points of ingress around the roof which were sealed. The company also replaced the sampling facilities. The Inspectorate has noted that both

failures had occurred during dry periods when surface water run off and ingress was unlikely.

South West Water detected *E.coli* in a sample from Landscore (South Devon) reservoir in August. The company identified the need for repairs to the roof to prevent ingress. The reservoir is being kept out of supply until the works are complete.

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 2010, all 774 service reservoirs (including water towers) in the region met the standard.

In April, South West Water reported coliform bacteria at Bratton Fleming works (near Barnstable). Following previous failures roof repairs had been carried out in December 2009. At the same time the company had removed all the soil from the reservoir roof to avoid puddling, replaced the sampling facilities and installed a bend in the reservoir inlet pipe to improve circulation of water. Following the failure in April, South West Water started work to install a perimeter drain around the reservoir roof in June. Inundation tests in September were satisfactory and the reservoir was returned to supply.

A coliform failure at Brentor reservoir (near Brent Tor) in May was linked by South West Water to a leak which had occurred as a result of a frozen pipe in the severe winter which had weakened the push-fit joint connectors. The sample line was replaced in July. In November, the reservoir was taken out of service for inspection and minor points of ingress were observed around the hatch seals. These were repaired and the reservoir returned to service in December to enable inspection of the adjacent cell. After satisfactory completion of these works there have been no further failures.

A failure at Kerris (Chywoone) reservoir (near Penzance) in May led to South West Water making minor repairs around a redundant hatch cover in June and scheduling the reservoir for an internal inspection at a time when the supply and demand situation permits.

At Ashbrittle reservoir (near Wellington, Somerset), Wessex Water reported coliform bacteria in a sample taken in July. An investigation revealed the flow from sampling facilities on a pumped supply was difficult to control. A related sample point at Spring Grove reservoir was also found to be inappropriate. The sampling facilities at both sites were replaced in

2011 as part of a company-wide programme of improving sampling arrangements.

The Inspectorate has noted that coliform bacteria were found in 17 samples (1 BRL, 10 SWT, 6 WSX) from service reservoirs 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.

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

A total of 12,545 consumers' taps were tested in 2010 for *E.coli* and four were positive (2 BWH, 1 BRL, 1 WSX). Like *E.coli*, the presence of Enterococci is indicative of faecal contamination and neither bacterium should be found in any sample. In 2010, the companies carried out 1,484 tests for Enterococci at consumers' taps and one was positive (WSX). In all but one case (Alderney zone) there was no indication, from information gathered by the water company, of a faecal contamination event affecting other properties in this zone.

A failure at a consumer's tap in the Tickenham Portishead and Pill zone in June was found to be due to poor tap hygiene by the investigation carried out by Bristol Water. Coliform bacteria and Enterococci were found in investigational samples and swabs from the tap. After disinfection of the tap satisfactory results were obtained. The consumer was given advice on tap hygiene.

Bournemouth and West Hampshire Water detected *E.coli* in samples from Alderney South zone in April and July. The Inspectorate has noted that the company failed to link these failures to known problems at Alderney works (see the *E.coli at works* section and Annex 3). The company also failed to notify the local authority and the Health Protection Unit (HPA).

Wessex Water reported Enterococci from a consumer's tap sample in Trowbridge zone in June. The presence of coliforms in pre-disinfection samples and in swabs taken from the tap, indicated the most probable cause for the failure was the poor hygienic condition of the tap.

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 (www.dwi.gov.uk) and on the CD accompanying this report.

The following text and Table 6 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 6: 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	4,138	9	BRL (2), BWH (1), SWT (3), WSX (3)
– taste		4,117	7	BWH (1), SWT (3), WSX (3)
Aluminium	200µg/l	4,452	1	WSX (1)
Benzo(a)pyrene	0.01µg/l	1,437	1	WSX (1)
Fluoride	1.5mg/l	1,199	0	
Iron	200µg/l	4,259	8	BRL (5), SWT (1), WSX (2)
Lead (current standard)	25µg/l	1,461	2	BWH (1), SWT (1)
Lead (future standard)	10µg/l	1,461	9	BRL (5), BWH (1), SWT (1), WSX (2)
Manganese	50µg/l	4,260	3	SWT (3)
Nitrate	50mg/l	1,815	0	
Nitrite	0.5mg/l	1,813	1	BWH (1)
Pesticides – total	0.5µg/l	1,165	0	
Pesticide – individual ²	0.1µg/l	39,496	2	2,4-D WSX (1), Metaldehyde BRL (1)
Trihalomethanes Total	100µg/l	1,486	4	BRL (4)
Turbidity (at consumers' taps)	4NTU	5,040	1	WSX (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 3,615 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. Companies are required to investigate the cause of any adverse result.

In 2010, a total of 16 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 many were confined to a single property and did not reflect a wider problem in the water supply zone.

- Pencil: 1 (1 BRL): this descriptor is specific to a substance associated with unapproved black plastic pipe; the remedy is to advise the householder to replace the pipe with approved medium density polyethylene pipe. A pencil odour, recorded by Bristol Water at a property in Henleaze zone in August, was not followed up with a fittings inspection. However, the company established there was no black pipe in the property. The company reported that the consumer had not noticed any abnormal taste and odour. Companies are reminded that fittings inspections are an essential part of the evidence required to determine whether a failure is due to the domestic distribution system and, following amendment of the regulations in 2010, is mandatory in relation to public buildings.
- Bitter/Flat: 4 (4 WSX): these descriptors relate to samples where the tap water was artificially softened; the remedy is to advise the householder to draw water for drinking and cooking from the tap connected directly to the mains (or to fit a mains fed tap if one does not exist). All four positive samples in the Holt zone and the Allington zone were confirmed as being from taps connected to water softeners.
- Oil/Solvent: 2 (2 BWH) these descriptors usually relate to situations where there has been a spillage of central heating oil, petrol or diesel on the property and this has permeated through the plastic water supply pipe; the remedy is to advise the householder about the need to replace the affected pipe and to safeguard against future spills. Another cause of this type of taste and odour problem can be cross connections between cold water and central heating systems. Bournemouth and West Hampshire Water traced the probable cause

of a solvent taste and odour at a consumer's tap in the Lymington zone to the storage of solvents in bottles under the sink.

- **Earthy/Musty:** 8 (6 SWT, 2 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 poorly designed plumbing systems; the remedy is improved treatment/reservoir management by the company or the remedy is to advise the householder on necessary changes to the design and maintenance of the plumbing system. Most of the six earthy/musty sample reports in zones supplied by South West Water in 2010 appear to the Inspectorate to be linked to works where there are known problems with geosmin in the raw water. The Inspectorate has noted that at College works, near Penryn, South West Water completed a legally binding programme of work in 2008 to address taste and odour substances in the raw water. Similarly, at Tamar works, South West Water completed a programme of reservoir management and operational measures in December 2007. The Inspectorate is in discussion with the company about these ongoing problems. Likewise, at least one of the earthy/musty sample reports by Wessex Water was caused by geosmin from the company's Porlock works. The company took the works out of supply and has since introduced new rules regarding seasonal use of the works.
- **Medicinal/TCP:** 1 (1 BRL) this descriptor relates to situations where the low level of residual in the mains water supply is reacting with an unapproved material; the remedy is to advise the householder about typical causes, e.g. certain types of kettle, appliance hoses, tap washers etc. Bristol Water reported a medicinal odour from a consumer's tap sample in the Worle and Puxton zone in March. The company identified flexible hoses connected to the washing machine without non-return valves, but as the consumer could not detect any odour she declined the offer for the installation of non-return valves.

Wessex Water has entered into a legally binding agreement to address taste and odour at Blashford works (near Poole) by 2014. The treatment improvements will either involve oxidation by ozone or UV with granular activated carbon (GAC). The programme is delayed because more detailed investigations are needed to determine the most appropriate solution. In the interim, the works remains out of supply. Another taste and odour improvement programme by Wessex Water at Sutton Bingham works is on target for completion in 2014 when over 62,000 consumers will benefit from improved water quality.

Aluminium

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

In 2010, a total of 4,452 samples were tested for aluminium in the Western region. Bournemouth and West Hampshire Water, Bristol Water, Cholderton and District Water and South West Water, achieved 100% compliance with the aluminium standard. Just one test failed to meet the standard (1 WSX) and this was not found to be related to process control at the works.

A sample taken by Wessex Water from a consumer's tap in the Maundown Centre zone in April exhibited a failure of the standard for aluminium. The property was situated in a cul-de-sac. Follow-up samples contained elevated levels of iron and the company found evidence of manganese and iron deposits in the supply main. The company has put in place a regular flushing programme to minimise the disturbance of historic mains deposits.

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 where required by the local health authority as a protection against tooth decay. There are no fluoridation schemes in the Western region. In 2010, all 1,199 tests for fluoride taken across the region met the regulatory standard (1.5mg/l). Please refer to the DWI website (www.dwi.gov.uk) for more information on fluoridation.

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 2010 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 7).

Figure 7: Percentage of tests meeting the current and future standard for lead between 2001 and 2010

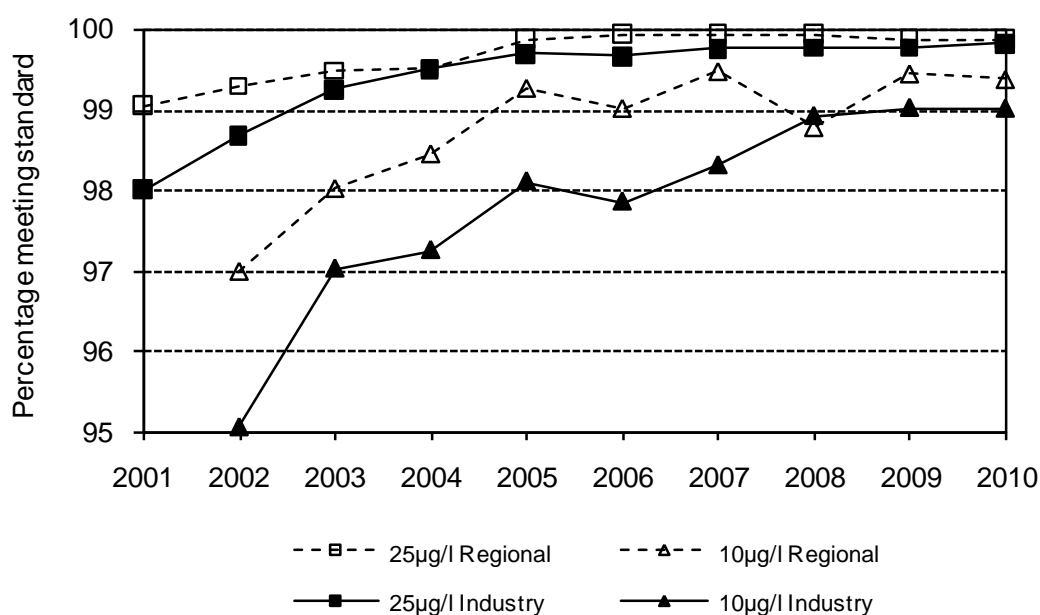
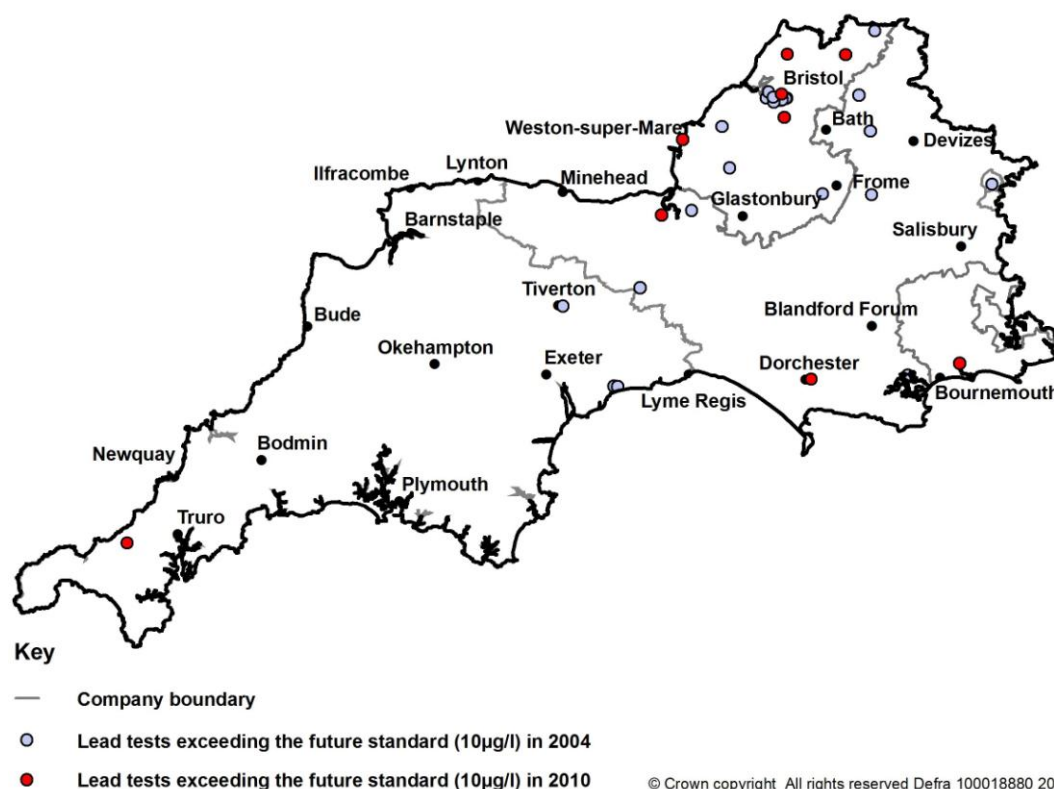


Figure 7 summarises a decade of randomised consumer tap sampling for lead by the industry. The data confirm the beneficial effect of water treatment which has been introduced over the same period. In particular, in the Western region, the percentage of annual tap samples failing the future lead standard of 10µg/l has fallen from above 3% in 2002 to about 0.5% in 2010.

Figure 8 shows the location of failures to meet the future standard for lead as recorded in 2004 and 2010. Although failures of the future standard are fewer, there are some areas of the region where the risk of failure is higher, such as around Bristol, Bath and Dorchester.

Figure 8: Failures of the future standard for lead in 2004 compared to 2010



Water companies notify both the consumer and the relevant local authority whenever a failure of the future lead standard occurs. In 2010, the Inspectorate was notified of a total of two failures of the current standard of 25µg/l (1 BWH, 1 SWT) and nine failures of the future standard (5 BRL, 1 BWH, 1 SWT, 2 WSX) in the region, which is very similar to the picture in 2009.

In the Western region, to date, two companies (Wessex Water and South West Water) have put in place action plans under Regulation 28 to address the risk of not meeting the future lead standard by the end of 2013. Following the successful introduction of water treatment, the work of companies needs to increasingly focus on raising awareness among vulnerable groups of people in communities where the risk from lead is highest. The Inspectorate expects companies in the region to further develop these action plans with bespoke services, such as Anglian Water's initiative which targets at risk groups identified by health protection teams and Primary Care Trusts, and offers a free lead test with free replacement of communication pipes if the sample exceeds the 2013 standard of 10µg/l. Anglian Water's dedicated Lead Strategy Team are also identifying opportunities to work in tandem with local authorities and housing associations – combining their schemes to refurbish council or housing association owned properties with the company's lead communication pipe

replacement work; therefore resulting in the elimination of lead pipework to these properties.

In addition, during 2010, companies in the region have responded to 419 consumer requests to check the level of lead in drinking water in a particular property.

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 2010, all 1,815 tests for nitrate met the standard (50mg/l).

From extensive information gathered by the water companies, a likelihood of drinking water supplies in the region failing the nitrate standard in the longer term has been confirmed at some sites. As a consequence, a legally binding agreement is in place for catchment management and the construction of an integrated grid system to facilitate blending, if required, for several Wessex Water sites: Bulbridge, Chirton, Dunkerton, Fonthill Bishop, Hooke, Sturminster and Wylve. The catchment management measures are due to be delivered by March 2015 with the grid system in place by March 2018. Similarly, a blending scheme is to be progressed by Bristol Water at Frome works by the end of September 2014.

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 2010, out of 1,813 tests carried out across the region just one exceeded the nitrite standard (1 BWH).

In May, Bournemouth and West Hampshire Water, when investigating a nitrite failure at a consumer's tap in the Lymington zone, detected ammonia in follow-up samples indicative of control problems at Ampress works. The company also identified poor water turnover at Lymington tower. Bournemouth and West Hampshire Water are investigating ways to increase turnover in the water tower in addition to improving the control of ammonia dosing at the works. The Inspectorate has noted a history of failures in this zone and expects the company to update its regulatory risk assessment to reflect the control measures in an action plan.

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 2010, none of the 1,165 tests in the region exceeded the standard for total pesticides. Likewise, there was 100% compliance (3,615 tests) for the four pesticides with a standard of 0.03µg/l. Out of a total of 39,496 tests for those individual pesticides (with a standard of 0.1µg/l) just two (1 BRL, 1 WSX) exceeded the standard. The circumstances and substances involved are summarised below.

2,4-D

2,4-D is a phenoxy acid herbicide used for killing broad-leaved weeds in cereal crops, turf, forestry, orchards and non-crop areas. The standard is 0.1µg/l.

Wessex Water detected 2,4-D at a level of 0.12µg/l in a sample taken in July and is investigating cross connections with private supplies as the most probable cause (see the *Drinking water quality events* section).

Metaldhyde

Metaldhyde is the active ingredient in some slug pellets. The standard is 0.1µg/l.

In October, metaldhyde was detected at a level of 0.102µg/l in a sample from Purton works (near Halmore) managed by Bristol Water. Metaldhyde has been recognised as a risk in the raw water at Purton works and the company has a legally binding agreement in place for catchment management activities.

Detection of metaldhyde in other catchments in the Western region and elsewhere in England has led to activities to improve the management of metaldhyde in all affected catchments. Through the legally binding agreements, which last until 2015, companies are working with a variety of

stakeholders. Catchment management officers have been recruited who regularly meet with farmers, manufacturers, agronomists, Natural England and the Environment Agency. Since 2009, there has been a general decline in the levels of metaldehyde identified through raw water monitoring and a growing knowledge of the prevalence and seasonality of use of this substance enabling focused action to be taken.

Trihalomethanes

Trihalomethanes arise when chlorine is added to water containing naturally occurring organic substances. Treatment processes are optimised by water companies to minimise their production. The regulations were amended in 2010 to require that trihalomethanes and other disinfection by-products are kept to a minimum while not compromising disinfection. This change transposed into law a requirement of the 1998 European Drinking Water Directive.

In 2010, out of 1,486 tests across the region, only four exceeded the standard for trihalomethanes (4 BRL). In September, Bristol Water reported four failures at consumers' taps in the following zones: Saltford, Keynesham and Bitton, Yate Coalpit Heath and Warmley, Stapleton, St George and Coombe, Longwell Green and Oldland. All these zones are served by Purton works where the company identified a fault with the dosing of chlorine into the raw water. Lowering the chlorine dose reduced the formation of trihalomethanes and the company have since introduced daily checks to manage the situation in the short term. The company is committed to a legally binding programme of work at Purton and at Littleton works to minimise the formation of trihalomethanes by December 2011.

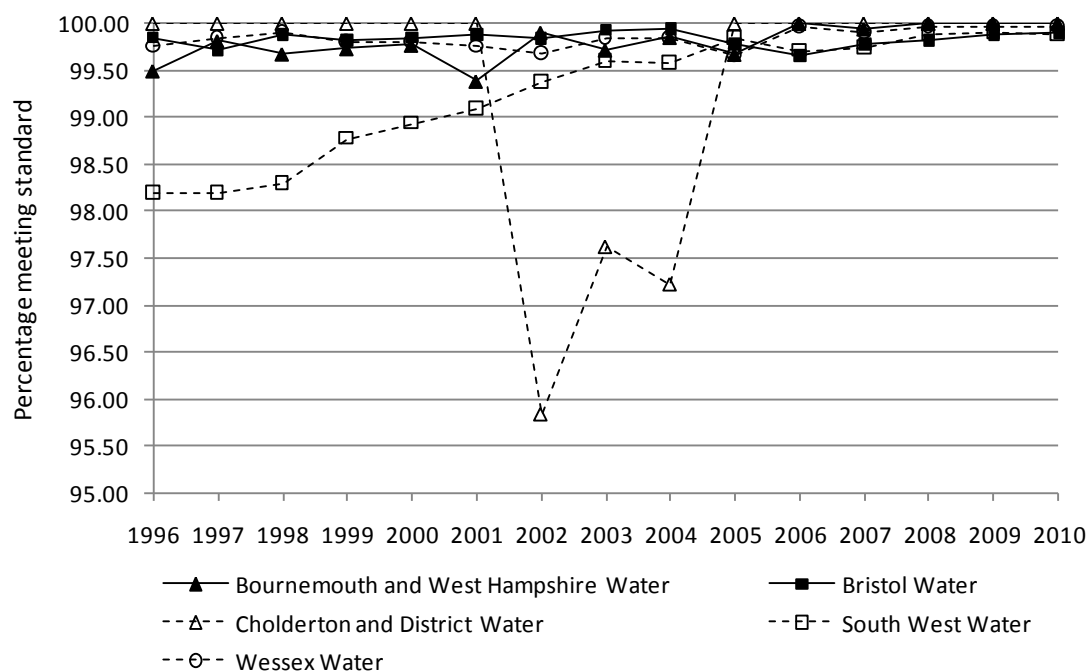
Maintaining water quality in distribution

The parameters most commonly linked to aesthetic water quality problems are iron and manganese. These substances may be present naturally in raw water sources, iron compounds may be added as part of water treatment or can be released as a consequence of the corrosion of iron mains. The most severe problems tend to be where the distribution network contains a large proportion of old cast iron mains. Effective water treatment reduces iron and manganese at source, but if treatment has been inadequate historically then iron and manganese will have accumulated in local parts of the distribution system. When these deposits are disturbed, they may cause black, brown or orange discolouration of the water which in turn results in breaches of the turbidity standard. In 2010, across the Western region there were eight failures of the iron standard

(5 BRL, 1 SWT, 2 WSX) compared to seven failures in 2009. Also, there were three manganese failures in 2010 (SWT) compared to two failures in 2009. A related, but less frequent, problem that may arise in the distribution network is the deterioration of old coal tar linings of cast iron mains causing failures of the standards for polycyclic aromatic hydrocarbons, including benzo(a)pyrene. In 2010, there was one (WSX) failure of the standard of $0.01\mu\text{g/l}$, the same as in the previous year.

Elevated levels of iron or manganese 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. Since 1996, the Inspectorate has been measuring the progress of companies' distribution maintenance work to address these problems with an index made up of the three parameters (iron, manganese and turbidity). Figure 9 shows the improvements generally over the past 15 years with the last three years achieving 99.95% or greater across the region.

Figure 9: Percentage of tests meeting the standards for turbidity, iron and manganese



Note: SSE Water only began supplying water in 2008. They have achieved 100% in each year since.

Veolia Water Projects only began supplying water to Tidworth in 2009. They have achieved 100% in each year since.

Discolouration of water supplies often prompts consumers to contact their water company. The rate of contacts in 2007 and 2010 for each supply zone is mapped in Figures 10 and 11.

Figure 10: Rate of consumer contacts per 1,000 population reporting black, brown or orange water in 2007

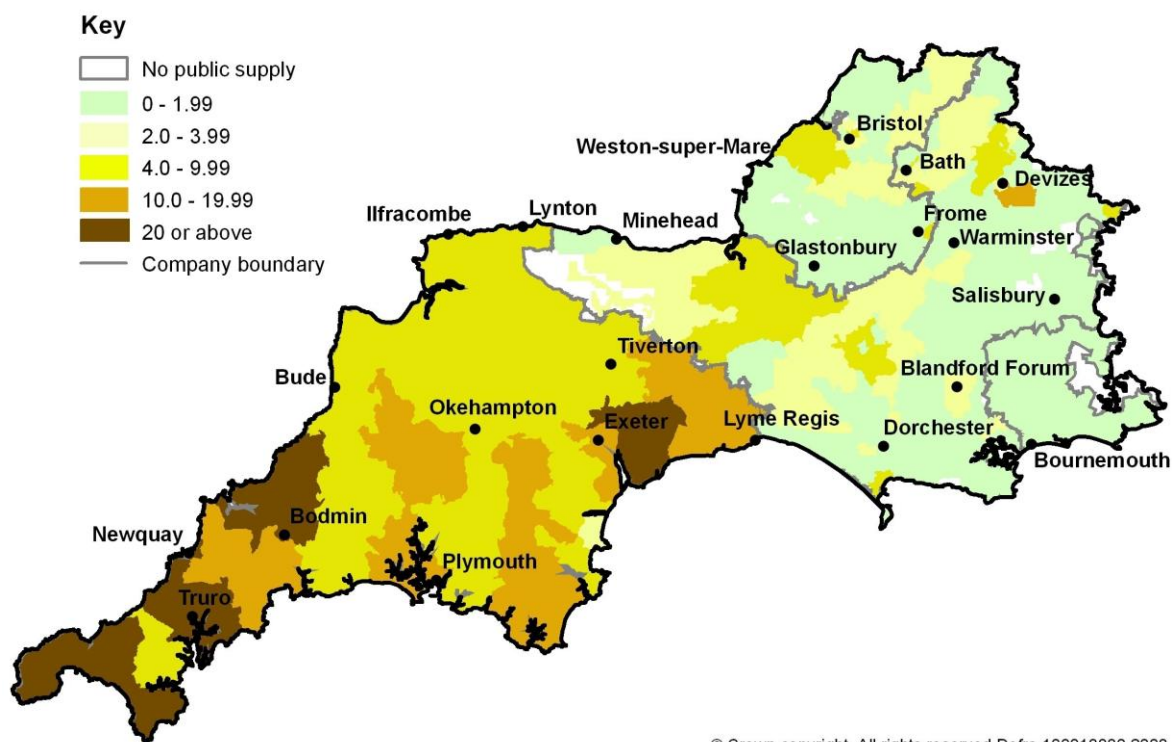
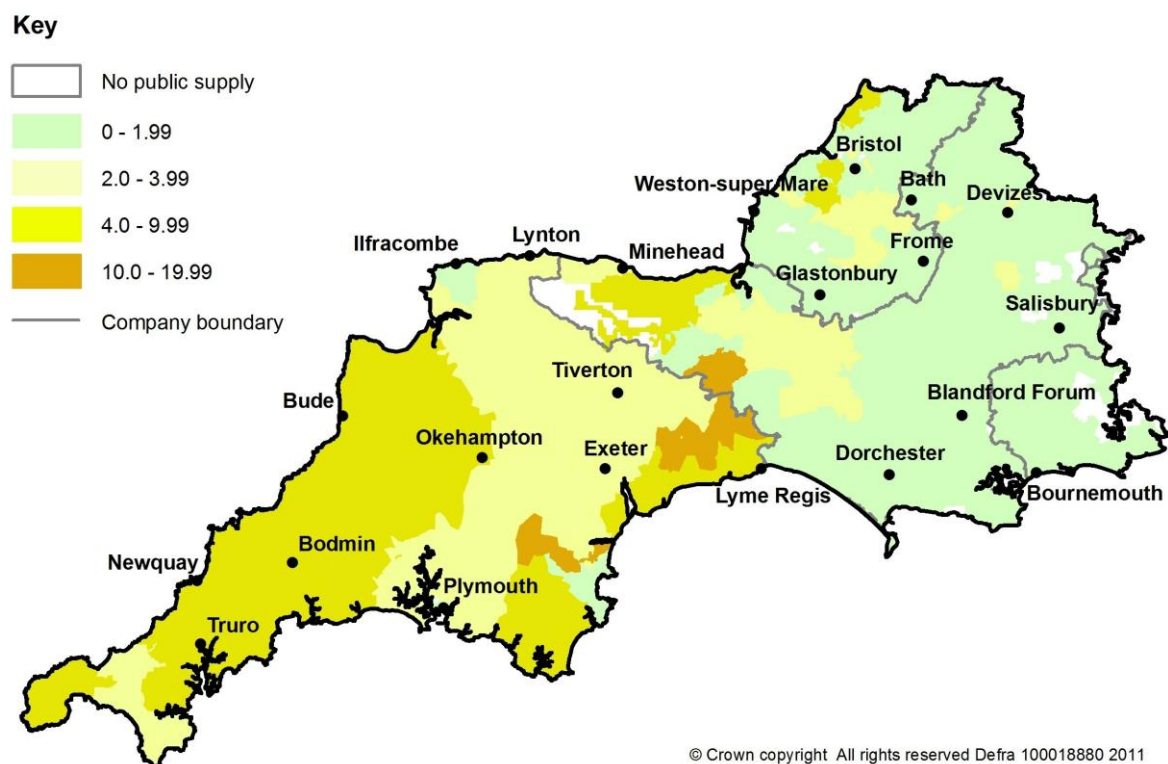


Figure 11: Rate of consumer contacts per 1,000 population reporting black, brown or orange water in 2010



The two maps illustrate the improvements made over the four-year period in reducing discolouration contacts in the Western region, particularly in Cornwall and the areas around Exeter and Devizes.

In 2010, there were five failures of the iron standard in zones operated by Bristol Water: (Stapleton St George and Coombe zone, City Centre St Philips and Netham zone, Hengrove and Whitchurch zone, Hawkesbury Wickwar Alveston and Charfield zone and Knowle and St Annes zone). All five zones are scheduled to be included in a legally binding programme of mains replacement and cleaning. The company has been funded to carry out this work in the AMP5 period (2012–2015) and the Inspectorate will be closely scrutinising the delivery of this work by Bristol Water.

The three remaining failures (1 SWW, 2 WSX) each in different zones (Bratton Fleming Sz, Hampton Down and Upton Scudamore) were due to a localised disturbance of mains deposits dealt with by flushing.

Three manganese failures arose in zones operated by South West Water. A failure in the Prewley zone in August was linked to higher than usual levels of manganese at the Prewley works. The company undertakes pH correction at this site and this was optimised to facilitate manganese removal. Another failure in November was in the Littlehemptson, Tottiford, Bovey Cross zone where the company has a legally binding programme of work to install treatment for manganese removal at Tottiford works by March 2012. Elevated manganese was also detected in a sample from Restormel East zone in December and was attributed to mains sediment mobilisation following a mains burst which was cleared by flushing.

In May, Wessex Water detected benzo(a)pyrene in a consumer's tap sample from Sutton Bingham zone. Following an investigation of the mains pipework, the company identified a mixture of cement and epoxy lining, and concluded that benzo(a)pyrene was linked to a length of coal tar lined main upstream. The main in question is to be replaced or re-lined. The company has implemented enhanced monitoring and added the new information to its regulatory risk assessment. The Inspectorate notes that this zone is scheduled for improvement work to address iron and manganese failures in the AMP5 period.

Annex 4 details the legally binding programmes of distribution maintenance work scheduled to be completed between now and 2015 to address continuing distribution quality problems in the region.

Drinking water quality events

Water quality events are classified into five broad categories based on the initial company report. The categories are:

Not significant: no further information required by an inspector to assess the event.

Minor: it is unlikely that further information would be required by an inspector to assess the event.

Significant: a full company report may be required to enable an inspector to assess the event.

Serious: in addition to a full company report, the assessment may require action by more than one inspector and a resultant investigation.

Major: in addition to a full company report, the assessment is likely to involve an investigation led by senior inspectors requiring extensive information gathering and wide ranging investigations.

In 2010, companies in the Western region notified the Inspectorate of 42 events. Table 12 shows how these events were classified.

Table 12: Water quality events in the region in 2010

Nature of event	Risk assessment category (DWI)					
	Minor/not-significant		Significant		Major/serious	
	2009	2010	2009	2010	2009	2010
Air in water	-	-	-	-	-	-
Chemical	-	3	1	1	1	-
Discoloured water	5	3	5	5	-	-
Inadequate treatment	-	-	1	1	-	-
Loss of supplies/poor pressure	6	7	1	1	-	-
Microbiological	8	1	5	5	-	1
Taste/Odour	-	-	-	-	-	-
Health concern	-	1	-	1	-	-
Public concern	4	8	2	1	-	-
Other	-	2	2	1	-	-
Region overall	23	25	17	16	1	1
England and Wales	276	222	141	160	5	9

A summary of the nature, cause and duration of each event categorised as significant, serious or major, along with details of the Inspectorate findings, are set out in *Annex 3*. Most events were of relatively short duration and the company took appropriate action at the time to inform and safeguard consumers and other stakeholders. A comparison of 2009 events with those of 2010 shows the number of significant, serious and major events was similar to last year (17 compared to 18).

The region experienced one serious event in 2010 when a property was connected to a sewer instead of a water main. The circumstances of this event are detailed in *Connection of property to a sewer instead of a water main*. Wider learning points from event investigations in the region in 2010 are highlighted by the following cases:

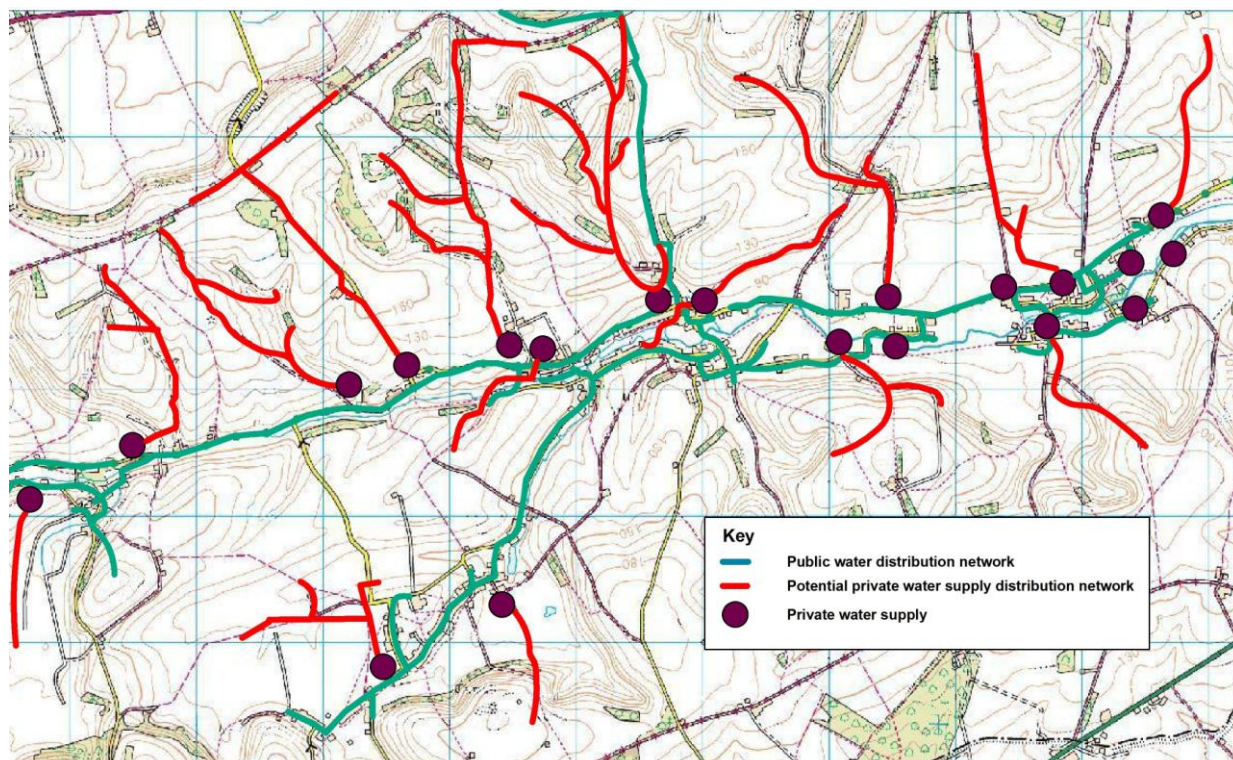
Connection of property to a sewer instead of a water main

- A connection to a newly built house was carried out on 7 July. On 9 July the builder was notified by a plumber commissioning the boiler/hot water system of discoloured water with a strange smell in the property. The builder drove to the local office of Wessex Water in Salisbury to report the situation. A company inspector attended the site and disconnected the supply which was confirmed to be contaminated by analysis of samples. Fortunately, nobody had used the water for domestic purposes and Wessex Water took remedial action. The sewer belonged to Southern Water and Wessex Water has now revised its procedures to improve the accuracy of its own water and waste water assets and to ensure that wider checks are undertaken before any new water mains connections are made. (see *Annex 3*). The misconnection of a property to a sewer is an error with potentially very serious consequences for public health and the Inspectorate is very concerned that this is the second year in a row when such an event has occurred in the industry.

Private water supplies as a possible cause of pesticide contamination of public water supplies

- This event relates to intermittent detection of 2,4-Dichlorophenoxyacetic acid (2,4-D) in consumer tap samples. After a thorough assessment of the raw water source failed to identify a source in the catchment, Wessex Water's attention has turned to investigating the possibility that the contamination is arising from cross connections between the public distribution network and the many private supplies in the area (see Figure 13). This hypothesis is being systematically investigated in collaboration with the local authority. An Environmental Health Officer was seconded to Wessex Water for three months to facilitate the investigation. The Inspectorate is pleased to acknowledge this example of joint working and better regulation. Wessex Water are in the process of submitting an undertaking which will produce an action plan to determine the source and pathway for 2,4-D entering the public water supply system.

Figure 13: Illustration of public networks and potential private networks



The offence of supplying water unfit for human consumption is under consideration for one event that occurred in the Western region in 2010.

Technical audit activity

The Inspectorate has operated a risk-based approach to technical audit since 2005. In line with better regulation principles, no technical audit takes place without a reason.

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. The resultant audit programme for 2010 is shown in Table 14. The Inspectorate also carried out an audit related to analytical malpractice at a laboratory operated by Severn Trent Services who analysed samples for Bristol Water and SSE Water in the region.

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

Site name	Audit topic	Main findings from audit
<i>Bristol Water</i>		
Cheddar works	Coliform bacteria	Generally satisfactory <ul style="list-style-type: none"> Minor issues identified with monitoring of residual chlorine in one compartment of contact tank.
<i>Severn Trent Services – Analytical Services Ltd</i>		
Bridgend laboratory	Analytical malpractice	Audit deemed unsatisfactory – subsequent investigation ongoing <ul style="list-style-type: none"> Recommendations were made in respect of inorganic chemical analysis for the water undertakers or the combined licensees in failing to meet their obligations under Regulations 16 and 34 for analysis of water samples and, in particular, derived analytical data, competency, retention of appropriate records and for the appropriate time using suitable equipment. The Inspectorate reminded companies that it is the duty of the water undertaker or the combined licensee to ensure they are compliant and this cannot be deferred to a third party laboratory. Recommendations were made to ensure that the provision of information as part of the companies regulatory duties must be demonstrated to be a true representation of a robust and actual analytical procedure. Recommendations were made for the future avoidance of breaches of the regulations requiring the laboratory, through the duties of the statutory undertakers, to implement and maintain a system of operational management covering a number of areas, but including robust, timely, effective and responsive use of quality systems, capacity management and independent business and quality objectives. Enforcement action taken in respect of eight companies using the laboratory for chemical analysis of regulatory drinking water samples. Full details are to be provided in the form of a published audit report and will be available on the Inspectorate's website on completion of the investigation.

Site name	Audit topic	Main findings from audit
South West Water		
Antony reservoir	Coliform bacteria	Generally satisfactory <ul style="list-style-type: none"> Recommendations made about general deficiencies with company approach to reservoir maintenance and water quality management strategy
Moorhaven reservoir	Coliform bacteria	Generally satisfactory <ul style="list-style-type: none"> Recommendations made about general deficiencies with company approach to reservoir maintenance and water quality management strategy
Upton reservoir	Coliform bacteria	Generally satisfactory <ul style="list-style-type: none"> Recommendations made about general deficiencies with company approach to reservoir maintenance and water quality management strategy
Bolventor reservoir	Coliform bacteria	Generally satisfactory <ul style="list-style-type: none"> Recommendations made about general deficiencies with company approach to reservoir maintenance and water quality management strategy
Dousland works	Coliform bacteria and <i>E.coli</i>	Unsatisfactory <ul style="list-style-type: none"> The main criticisms were about the lack of raw water monitoring to inform operation of the works, limited profiling of sand in the filters and lack of cleansing after a contact tank inspection. Recommended the treated water tank was taken out of supply for integrity checks.
Portworthy reservoir	Coliform bacteria and <i>E.coli</i>	Satisfactory <ul style="list-style-type: none"> All remedial actions identified in the company's inspection report had been completed

Public confidence in drinking water quality

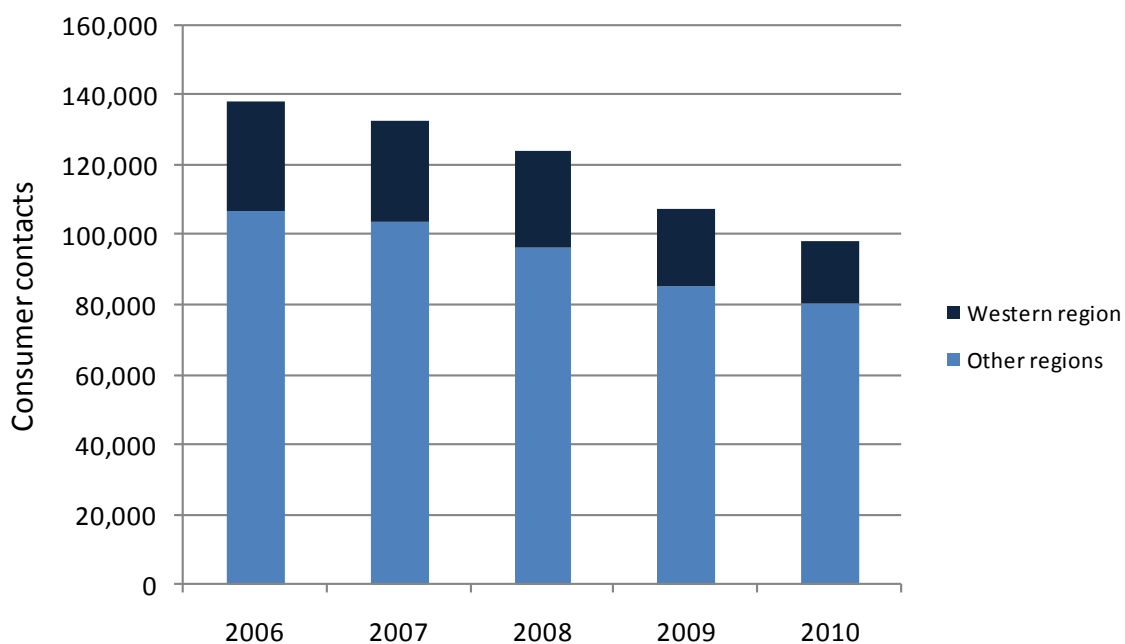
Consumer contacts to water companies

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.

The Inspectorate has been collecting consumer contact information from the industry for a number of years. Figure 15 illustrates the improving picture in England, with a 29% reduction over five years in the numbers of consumers reporting a problem with their tap water (now about 98,000 compared to 138,000 in 2006). Over the same time frame, the Western region has seen a 43% reduction in contacts with about 18,000 recorded in 2010 compared to over 31,000 in 2006. The Western region has been a

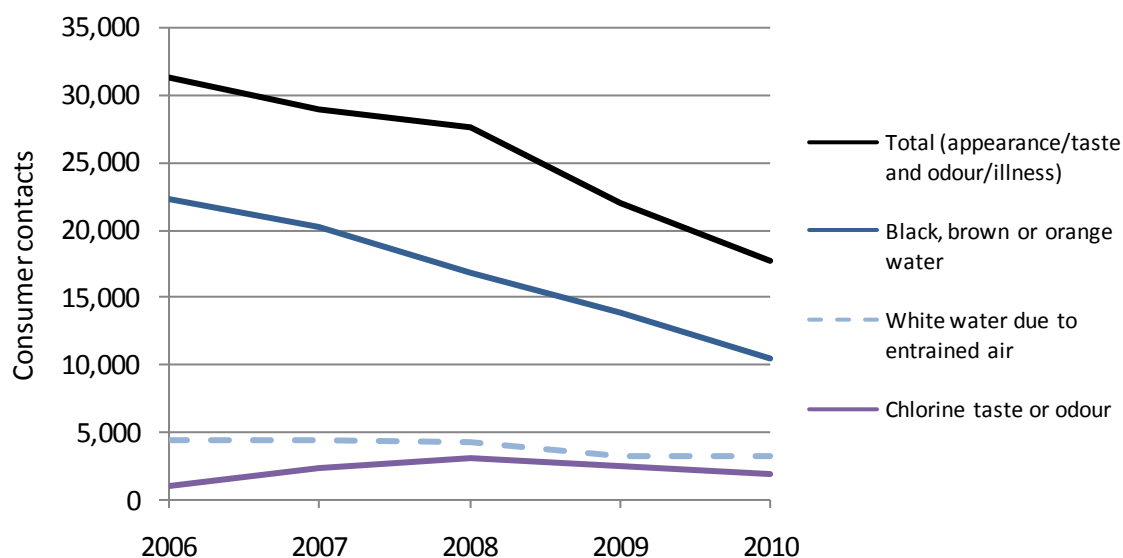
major contributor to the improved position in England as a whole. In 2006, a quarter of all contacts arose in the Western region but the improvements since 2006 mean that the Western region now contributes one-fifth of the total and the contact rate is down from a peak of 7.3 to 3.9 per 1,000 population.

Figure 15: Total consumer contacts for appearance, taste and odour, illness 2006–2010



Looking in more detail at the information, the most commonly reported concern in the Western region remains, by a large margin, discoloured water (black, brown or orange). However, the improving trend means that in 2010 the number of contacts was 10,400 compared to 22,000 in 2006 (see Figure 16). The main beneficiaries have been customers of South West Water. Maps in the *Maintaining water quality in distribution* section illustrate, on a zone-by-zone basis, the level of consumer contacts in 2007 and 2010, and progress to date is clearly visible.

Figure 16: Numbers of consumer contacts 2006–2010



White water due to entrained air and chlorine-related tastes and odours are also common consumer concerns, and the improvement in white water contacts has been small in 2010. Also, the picture in relation to taste and odour is rather variable. The only company to exhibit a strong downward trend in white water contacts over the last four years is South West Water. The Inspectorate expects companies to use contact data to analyse events in the network to improve operational practices and thereby minimise the impact on consumers.

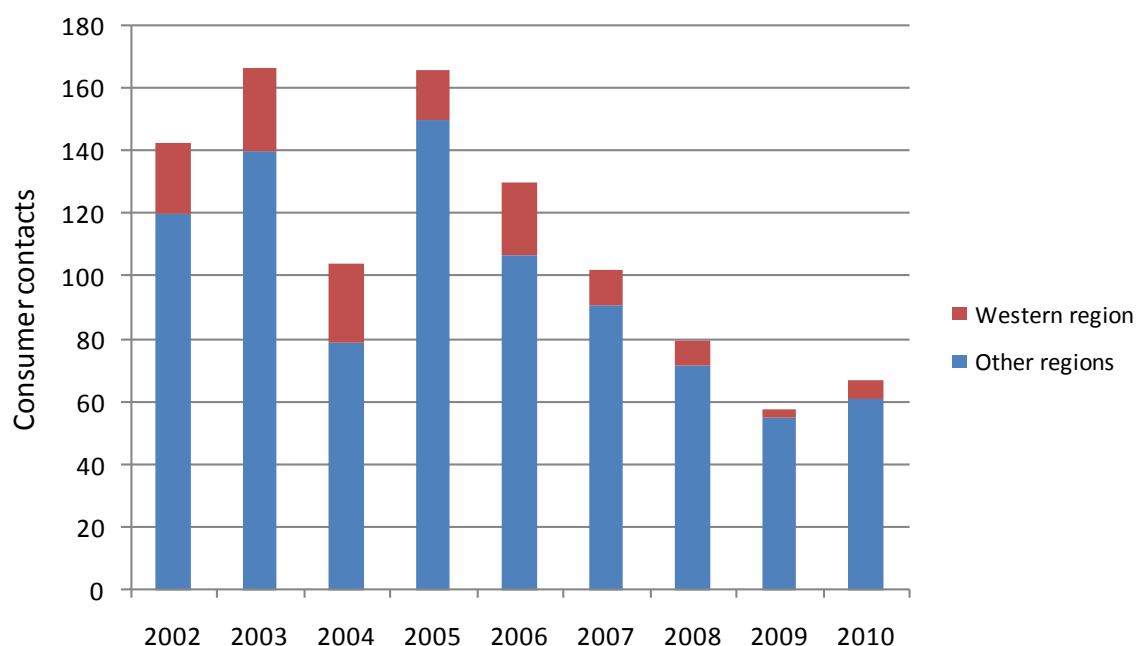
Consumer complaints to the Inspectorate

When the response of a company to a consumer contact about drinking water quality fails to provide the necessary reassurance or remedy then the consumer may contact the Inspectorate for advice. In 2010, there were six consumers sufficiently dissatisfied with the water company's initial response to their complaint to raise the matter further with the Inspectorate. The reasons for contacting the Inspectorate are provided in Table 17.

Table 17: Contacts from consumers received by the Drinking Water Inspectorate

Category	Number of contacts
Appearance	1
Taste and odour	4
Report of illness	-
Water quality concern	1
Number of contacts to DWI from consumers by company. BRL (2), SWT (4)	
Categories are as defined in Information Letter 1/2006.	

Figure 18 depicts the numbers of complaints received by the Inspectorate from consumers in the region since 2002 in the context of the total complaints received from consumers in England and Wales. The figure illustrates a generally improving trend in the Western region since 2005, which follows that for the industry as a whole, although the Inspectorate notes there were more complaints in 2010 compared to the previous year (6 compared to 3).

Figure 18: Complaints received by DWI from 2002 to 2010

Case example

In January, a consumer from Bristol Water contacted the Inspectorate complaining her water was cloudy and slimy, and it was affecting the condition of her hair, nails and skin. The consumer had been in regular contact with Bristol Water over several months and was unhappy because she had observed an improvement in her symptoms when visiting friends in

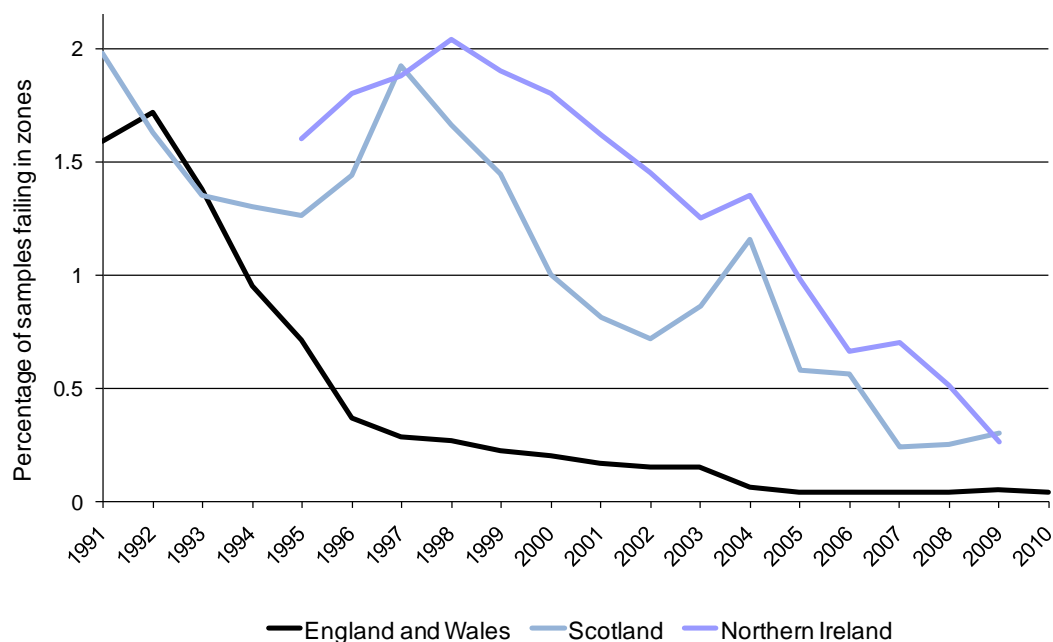
other parts of Bristol. The company had explained that this may be a matter of perception caused by a difference in the hardness of the water between the two zones where her home and that of her friends were situated. Bristol Water carried out a fittings inspection at the block of flats where the consumer lived. Several deficiencies were identified, particularly in relation to the common hot water system, which the owner was required to rectify. This case is an example of the way in which water quality complaints can be misdiagnosed. When a company is overly focused on countering the negative perceptions of a consumer, there is a risk of failing to recognise that a report of unusual water quality in a building is being made which warrants a prompt technical investigation.

Planned drinking water quality improvements

Securing safe, clean drinking water through the application of a risk-based approach to regulation

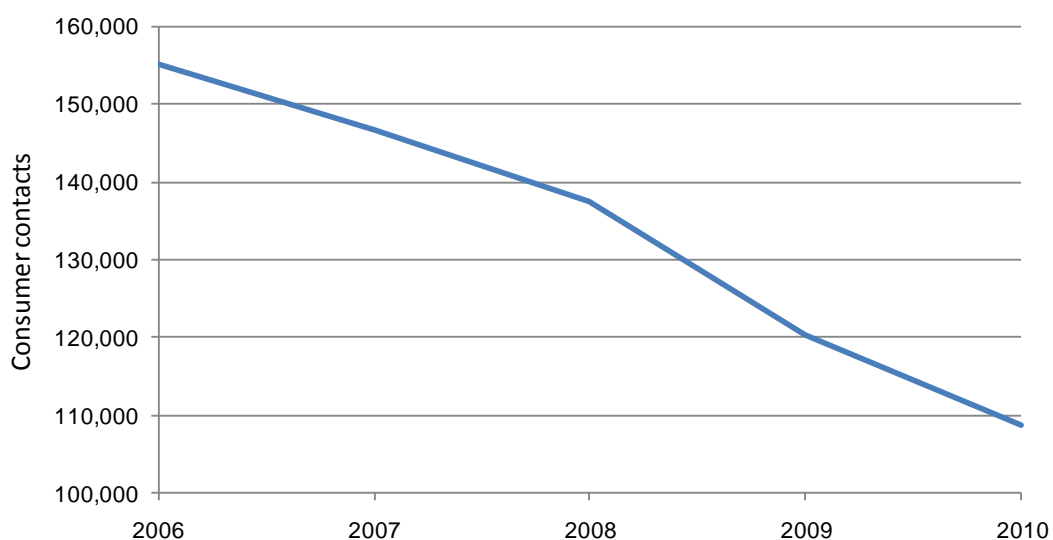
The publication of *Drinking water 2010* marks an important milestone in the history of drinking water regulation, namely the 20-year anniversary of implementation by government of the EU Drinking Water Directive. It records how the regulatory regime has been applied successfully and improved upon since. In particular, the regulatory framework now goes beyond rectifying deficiencies in drinking water quality by converting two decades of essential investment in water treatment and distribution into sustainable improved drinking water supplies through operator risk assessment and timely preventative action incentivised by independent oversight and firm, but fair, sanctions.

Figure 19: The percentage of tests failing the standards from 1991 to 2010



The purpose of drinking water regulation is to secure safe, clean drinking water for all and this outcome is measured objectively by the Inspectorate, using verified scientific data (Figure 19) alongside data to confirm the benefit in the form of consumer reports about tap water quality (Figure 20). These outputs are measured at the tap and therefore provide verification of the efficacy of all the historical investment and operational management actions taken at every point throughout a supply system from source to tap.

Figure 20: The total amount of consumer contacts for appearance, taste, odour and illness from 2006 to 2010



The principal regulatory enforcement tool that has enabled this improvement in drinking water quality has been the putting in place of legally binding programmes of work to address clearly identified and specific deficiencies by the Inspectorate. Over 20 years these 'undertakings', given under Section 19 of the Water Industry Act 1991, have enabled water companies to design and deliver technically appropriate asset improvement schemes. An undertaking comprises a schedule of sequential remedial steps; typically these will be an investigation, followed by changes to the operation of a treatment works/supply system or the installation of new treatment equipment at a works or the renovation/replacement/cleaning of water mains. The schedules set delivery dates for each milestone step with reporting requirements for progress monitoring and demonstration of benefit, i.e. that the outcome required has been achieved.

In 2004, the World Health Organisation (WHO) published the water safety plan approach as the most effective means of securing a sufficient supply of safe, clean drinking water for all. In 2005, the Inspectorate adopted the water safety plan approach as its strategic policy for developing the regulatory regime for drinking water first introduced by Parliament in England and Wales in 1990. In 2007, the drinking water regulations in England and Wales were amended to formally embed this risk-based approach into the legal framework.

These amendments included provision for Regulation 28(4) Notices, a new enforcement tool that is now converting two decades of investment in improvement into sustainable supplies of safe, clean drinking water. These Notices set out the steps that are necessary to mitigate unacceptable residual risks. A Notice typically specifies the following types of actions: additional improvements or maintenance, regular reviews and audits of operational controls, conditions under which use of a supply is prohibited, management and other information requirements and reporting.

The principal difference between the two enforcement tools is that undertakings are generally failure driven, whereas Notices are risk-based and preventative. Undertakings are used where a failure has occurred and is considered likely to recur, identified usually through the audit activity of the Inspectorate, or as part of a water company's business planning processes. Notices, by contrast, arise out of a process of continuous risk assessment carried out by water companies where the Inspectorate acknowledges the manner by which identified risks are being mitigated and controlled. If necessary for the protection of public health, certain controls or remedial actions can be audited, imposed or made mandatory. Both enforcement tools serve as an incentive to improve drinking water supplies and to protect consumers. Furthermore, as a consequence of putting risk assessment at the heart of the new enforcement tool, the

extent to which risk management and risk prevention are becoming embedded in the industry can be measured objectively by the recording of acknowledged actions to mitigate risk.

Across the industry, there are currently 469 mandatory schemes documented in the report (*Annex 4*) where enforcement has been used to improve those few water supplies that continue to fail to meet drinking water standards (undertakings) or to mitigate previously unrecognised risks which pose a potential danger to human health (Notices). In addition, there are 516 other preventative actions identified by water companies through risk assessment and acknowledged by the Inspectorate. Table 20 reflects the progress of the industry in delivering these acknowledged preventative actions. Together all these data can be used to demonstrate the extent to which a proactive preventative approach to the management of drinking water quality has become embedded in water companies as a result of the switch to mandatory risk management. For example, more than half (52%) of the 985 improvement actions identified as necessary at the end of 2008 are being delivered voluntarily, without the need for enforcement action by the Inspectorate.

Table 21: Acknowledged actions to sustain safe, clean drinking water

Region	Additional acknowledged actions to mitigate risk (as at Dec 2008)	Acknowledged actions completed (as at Dec 2010)
Central	0	0
Eastern	10	1
Northern	44	15
Southern	51	20
Thames	62	36
Western	38	25
Wales	311	35
Total	516	132

Note: The Central region figures do not include Dŵr Cymru Welsh Water. The figures for the Northern region do not include Dee Valley Water. The figures for Wales do not include Severn Trent Water.

Mitigating risks at source through catchment management

An important element of the risk assessment process carried out under the Regulations is the characterisation of hazards within catchments, determining where these pose a risk to the quality of a specific drinking water supply and how they will be mitigated through actions in the catchment to protect or improve raw water quality. Arising out of this work a number of companies now have catchment management schemes as a component of undertakings and catchment management activities may be specified in Notices or in acknowledged action plans. The direct benefits of

catchment management are the potential for removing the need for costly provision, or replacement, of water treatment or for reducing operational expenditure in relation to treatment already in place. These schemes also provide wider benefits where they result in improvements to the natural environment.

A typical example is a scheme or action plan where the water company commits to carrying out an investigation to pinpoint the source of specific contaminants (such as nitrate, one or more pesticides, or colour as a precursor of disinfection by-products) by setting up a working partnership with local stakeholders such as the Environment Agency, farmers, land managers or agronomists, for example, to alter the way in which a product is being applied to land. The company will carry out targeted raw water monitoring and contribute other resources to set up and facilitate the work of the partnership. Table 22 summarises the catchment management work in the Western region in relation to the drinking water quality parameters.

Table 22: Catchment management activities in the region

Company	Treatment works where regulated catchment management is in place	Risk being mitigated
Bournemouth and West Hampshire Water	0	N/A
Bristol Water	3	Metaldehyde (3)
Cholderton and District Water	0	N/A
South West Water	0	N/A
SSE Water	0	N/A
Veolia Water Projects Ltd	0	N/A
Wessex Water	8	Nitrates (7) Metaldehyde (1)
Region overall	11	Metaldehyde (4) Nitrates (7)

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 2010* 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 2010 under the following headings:

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

There are also separate reports covering private water supplies, one covering England and one covering Wales.

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 2010. 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 2010

To promote shared learning, the Inspectorate has compiled a list of all events that occurred in 2010 which illustrate the nature and cause of each event, 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.

µg/l	microgram per litre (one millionth of a gram per litre).
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.
Aesthetic	associated with the senses of taste, smell and sight.
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.
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	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.
Catchment	when used in connection with water, the catchment is the area drained by a river or water body.
Chloramination	the process of generating a chloramine disinfectant residual in water leaving a treatment works.
Chloramine	a substance formed by a reaction between chlorine and ammonia, used as a disinfectant in distribution systems because of its long-lasting properties compared to chlorine.
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.

Epichlorohydrin	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 organism	an organism which indicates the presence of contamination and hence the possible presence of pathogens.
Indicator parameter	something that is measured to check that control measures, such as water treatment, are working effectively.
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 25 December 2013 onwards.
m³/d	cubic metre per day.
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.
mg/l	milligram per litre (one thousandth of a gram per litre).
Microbiological	associated with the study of microbes.
MI/d	megalitre per day (one MI/d is equivalent to 1,000 m ³ /d, or to 220,000 gallon/d).
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.
Notice	an instruction served by the Secretary of State (in the case of water supplies, the Chief Inspector of Water) requiring specific actions to be taken by the recipient within a specified timescale.
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.
Private supplies	water supplied for human consumption or food production which is not provided by a water undertaker or licensed water supplier.
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.

Risk assessment	a review undertaken to identify actual or potential hazards to human health in a water treatment works and associated supply system. Prioritisation of risk is based on consideration of likelihood and consequence of the risk occurring.
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	any pipe subject to mains water pressure or subject to mains pressure but for the closing of some valve.
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	see service pipe.
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	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.
Undertakings	legally binding programmes of work agreed between a water company and the Chief Inspector of Drinking Water to address actual or potential water quality issues.
Vinyl chloride	may be present in plastic pipes as a residual of the manufacturing process of polyvinyl chloride (PVC) water pipes. Its presence in drinking water is controlled by product specification. A European health-based standard of 0.5µg/l applies.
Water supply zone	a pre-defined area of supply for establishing sampling frequencies, compliance with standards and information to be made publicly available.
WHO	World Health Organisation.
Wholesome/wholesomeness	a legal concept of water quality which is defined by reference to standards and other requirements set out in the regulations.

Annex 3

Drinking water quality events in the region

Not significant and minor drinking water quality events

Nature	Number of not significant and minor events	Area affected (estimate of population affected)
Chemical	3 – BRL (1), WSX (2)	Tetbury, Glos (15) Ilminster (3) Burbage (3)
Discolouration	3 – BRL (1), WSX (2)	Thornbury, Bristol (3,350) Yeovil, Somerset (4,800) South Petherton and Bower Hinton, Somerset (5,500)
Health concern	1 – BRL (1)	Littleton WTW (100,000)
Loss of supplies/poor pressure	7 - BRL (1), CHO (1), SWT (3), WSX (2)	Brent Knoll and East Brent (23,893) Shipton Bellinger, Hampshire and Cholderton, Wiltshire (250) Helston, nr Falmouth (4,000) Whitchurch, near Tavistock (5,500) Teignmouth, Devon (2,000) Bath (17,500) Hollywood Bow, Taunton (12,214)
Microbiological	1 – BRL (1)	Alderley area of Bristol (16,440)
Other	2 – SWT (2)	Wendron, Helston, nr Falmouth (15,000) St Austell, Newquay and surrounding area (200,000)
Public concern	8 – BRL (2), SWT (1), WSX (5)	Waterlip, Somerset (30) Southwood, Evercreech, Shepton Mallet (3) Marshgate and surrounding areas, North Cornwall (1,250) Warminster Rd, Bath (830) Chafeys Ave, Weymouth (3) Lewell, Dorset (3) Winterborne Stickland (3) Timberscombe, Somerset (3)
Total	25 – BRL (7), CHO (1), SWT (6), WSX (11)	412,593

Significant, serious and major 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
20 Jan 2010 For 1 day (WSX)	Rockwell Green, Wellington, Somerset	3,900	Brown discolouration due to mains burst.	<p>Wessex Water Services Ltd action:</p> <ul style="list-style-type: none"> • Flushed mains. • Sampled affected area. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • Critical that the plans available to the Network Technician did not correlate with the mains layout on site. • Delay in mains isolation. • Recommended that company ensure asset records are updated in light of this event. <p>Risk classification: significant</p>
21 May 2010 For 1 day (SWT)	Portworthy reservoir supplying areas of Plympton and Plymouth	3,370	Microbiological contamination.	<p>South West Water Ltd action:</p> <ul style="list-style-type: none"> • Sampled affected area. • Conducted external site inspection and planned in an internal inspection. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • Inadequate procedures. • Recommended company adopts a risk-based approach to its service reservoir maintenance and inspection programme. • Recommended company review the sampling facilities at all its service reservoirs and ensures representative samples. <p>Risk classification: significant</p>

Date and duration	Area	Estimate of population affected	Nature and cause of the event	Main actions and findings from the Inspectorate investigation
10 Jun 2010 For 2 days (BRL)	Bradley Stoke, Bristol	10,140	Brown discolouration due to mains burst.	<p>Bristol Water Plc action:</p> <ul style="list-style-type: none"> • Flushed mains. • Repaired main. • Sampled affected area. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • Suggested future work on the network be risk assessed and mitigation measures put in place. • Suggested company reviews response time for sampling during an event. <p>Risk classification: significant</p>
02 Jul 2010 For 1 day (BWH)	Alderney works supplying areas of Bournemouth	88,000	Microbiological contamination.	<p>Bournemouth and West Hampshire Water action:</p> <ul style="list-style-type: none"> • Collected samples. • Found sample line had additional connections to equipment presenting a potential backflow risk and is against company policy. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • Inadequate investigations into root cause and failed to link failures in zones to a known risk at the works which had not been mitigated. • The Inspectorate initiated enforcement action and made a site visit. • Filtered water was allowed to bypass disinfection due to a design fault where treated water reservoir located under slow sand filters and seals on vents created an inherent hazard. • Company have entered into a legally binding programme of work to remedy the faults. <p>Risk classification: significant</p>

Date and duration	Area	Estimate of population affected	Nature and cause of the event	Main actions and findings from the Inspectorate investigation
05 Jul 2010 For 15 hours (SWT)	Exmouth, Devon	250	Brown discolouration due to mains burst.	<p>South West Water Ltd action:</p> <ul style="list-style-type: none"> • Collected samples. • Provided alternative supplies, bowsers and overland riders. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • The Inspectorate was satisfied with the company's handling of this event. <p>Risk classification: significant</p>
08 Jul 2010 For 1 day (WSX)	East Grimstead, Wiltshire	3	Misconnection of a property to a sewer.	<p>Wessex Water Services Ltd action:</p> <ul style="list-style-type: none"> • Misconnected a property to a sewer. • Flushed and chlorinated the main and plumbing system. • Sampled property extensively and the area as a precaution. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • Critical of asset records for clean and waste water pipes. • Critical of procedures for new mains connections. • Investigation ongoing. <p>Risk classification: serious</p> <p>(see the <i>Drinking water quality events</i> section)</p>

Date and duration	Area	Estimate of population affected	Nature and cause of the event	Main actions and findings from the Inspectorate investigation
25 Jul 2010 For 3 days (SWT)	Killiganoon service reservoir supplying areas of Truro	1,600	Microbiological contamination.	<p>South West Water Ltd action:</p> <ul style="list-style-type: none"> • Removed service reservoir from supply. • Increased chlorine residuals at service reservoir. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • Coliform detection at service reservoir was followed by repeated detections at reservoir and in zone downstream. • Ingress points in reservoir roof were identified and repaired. <p>Risk classification: significant</p>
10 Aug 2010 For 1 day (SWT)	Crownhill works supplying areas north of Plymouth	250,035	Microbiological contamination.	<p>South West Water Ltd action:</p> <ul style="list-style-type: none"> • Sampled affected area. • Identified potential ingress to the contact tank. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • Inadequate investigations into root cause. • Critical of the time taken to highlight potential leaks in contact tank on site. • Critical of time taken to internally inspect the contact tank. <p>Risk classification: significant</p>

Date and duration	Area	Estimate of population affected	Nature and cause of the event	Main actions and findings from the Inspectorate investigation
10 Aug 2010 For 3 days (WSX)	Small part of Wiltshire	15	Pesticide (2,4-D).	<p>Wessex Water Services Ltd action:</p> <ul style="list-style-type: none"> • Flushed mains. • Rezoned area (brought in water from different source). • Sampled affected area. • Confirmed there was no risk to public health. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • Unable to conclude that these contraventions will not recur so initiated enforcement. • Acknowledgement of good joint working between the company and Environmental Health. <p>Risk classification: significant</p> <p>(see the <i>Drinking water quality events</i> section)</p>
26 Aug 2010 For 3 days (SWT)	Landscape reservoir supplying Teignmouth, Devon	1,000	Microbiological contamination.	<p>South West Water Ltd action:</p> <ul style="list-style-type: none"> • Increased chlorine residuals at service reservoir. • Removed service reservoir from supply. • Sampled affected area. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • Service reservoir remains out of supply. <p>Risk classification: significant</p>
07 Sep 2010 For 37 hours (SWT)	Prewley works supplying areas in and around Okehampton, Devon	4,800	Turbidity.	<p>South West Water Ltd action:</p> <ul style="list-style-type: none"> • Sampled treatment works. • Reviewed site alarms. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • Critical of the company for its slow response to the coagulation problems. • Recommended the company reviews its processes for making staff aware of the operational status of works. <p>Risk classification: significant</p>

Date and duration	Area	Estimate of population affected	Nature and cause of the event	Main actions and findings from the Inspectorate investigation
19 Sep 2010 For 12 hours (WSX)	Corfe Mullen, Dorset	12,700	Brown discolouration due to mains burst.	<p>Wessex Water Services Ltd action:</p> <ul style="list-style-type: none"> • Provided bottled water on request. • Repaired main. • Sampled affected area. • Flushed mains. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • DWI was satisfied with the company's handling of this event. <p>Risk classification: significant</p>
28 Oct 2010 For 13 hours (BRL)	Street, Somerset	6,201	Loss of supplies due to mains burst.	<p>Bristol Water Plc action:</p> <ul style="list-style-type: none"> • Rezoned area (brought in water from different source). • Repaired main. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • The Inspectorate was satisfied with the company's handling of this event. <p>Risk classification: significant</p>
06 Dec 2010 For 2 days (SWT)	Crownhill works supplying areas north of Plymouth	250,035	<i>Cryptosporidium.</i>	<p>South West Water Ltd action:</p> <ul style="list-style-type: none"> • Replaced faulty equipment. • Investigated operation and performance of treatment works. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • DWI was satisfied with the company's handling of this event. <p>Risk classification: significant</p>

Date and duration	Area	Estimate of population affected	Nature and cause of the event	Main actions and findings from the Inspectorate investigation
23 Dec 2010 For 8 months (WSX)	N/A	N/A	Laboratory anomaly regarding organochlorine pesticide analysis.	<p>Wessex Water Services Ltd action:</p> <ul style="list-style-type: none"> • Review of procedures. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • Inadequate procedures. • Inadequate investigations into root cause. <p>Risk classification: significant</p>
29 Dec 2010 For 3 days (SWT)	Exeter and East Devon	25,000	Loss of supplies causing press interest.	<p>South West Water Ltd action:</p> <ul style="list-style-type: none"> • Collected samples. • Daily company status reports. • Media interviews. • Tankers for alternative supplies. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • DWI was satisfied with the company's handling of this event. <p>Risk classification: significant</p>
29 Dec 2010 For 1 day (WSX)	Taunton, Somerset	16,900	Brown discolouration due to mains burst.	<p>Wessex Water Services Ltd action:</p> <ul style="list-style-type: none"> • Supplied bottled water. • Flushed mains. • Rezoned area. • Collected samples. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • The Inspectorate was satisfied with the company's handling of this event. • Results of further investigative sampling were satisfactory and showed that company actions were effective in returning supplies to normal in a timely manner. <p>Risk classification: significant</p>

Event affecting a number of water companies

Date and duration	Nature and cause of event	Main actions and findings from the Inspectorate investigation
02 Jul 2010 Duration not applicable (Severn Trent Services)	Analytical malpractice.	<p>DWI comments and findings:</p> <ul style="list-style-type: none"> • Serious deficiencies were found by the water undertakers or the combined licensees for failing to meet their obligations under Regulations 16 and 34 for analysis of water samples and, in particular, derived analytical data, competency, retention of appropriate records, and for the appropriate time, using suitable equipment found in analytical practices for inorganic chemical analysis (Regulation 16). • Full details in the published audit report. • Initiated enforcement action in relation to the eight water companies using Severn Trent Services. <p>Risk classification: serious</p>

Note: A complete table of events in England and Wales in 2010 can be found on the CD in the folder. It is named **Significant drinking water events in England and Wales 2010.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 8-Mar-10	Undertaking
BRL	Iron	Trunk mains rehabilitation	31-Mar-15	Ongoing	Undertaking
BRL	Iron and Manganese	Distribution system, installation of washouts and mains flushing	31-Mar-10	Completed 31-Mar-10	Undertaking
BRL	Iron and Manganese	Trunk mains cleaning pilot study	31-Mar-10	Completed 31-Mar-10	Undertaking
BRL	Lead	Sherborne	31-Jul-13	Ongoing	Notice
BRL	Metaldehyde	Banwell catchment	31-Mar-15	Ongoing	Undertaking
BRL	Metaldehyde	Littleton and Purton catchments	31-Mar-15	Ongoing	Undertaking
BRL	Metaldehyde	Stowey catchment	31-Mar-15	Ongoing	Undertaking
BRL	Nitrate	Frome	04-Sep-14	Ongoing	Undertaking
BRL	Total Trihalomethanes	Littleton	31-Dec-11	Ongoing	Undertaking
BWH	Coliform bacteria, <i>E.coli</i>	Alderney	TBC	Pending	Undertaking
BWH	<i>Cryptosporidium</i>	Woodgreen	31-Dec-11	Ongoing	Notice
BWH	Iron, Turbidity and Polycyclic aromatic hydrocarbons	Distribution system	31-Mar-15	Ongoing	Undertaking
SWT	<i>Cryptosporidium</i> , Colour and Turbidity	Bovey Cross	31-Mar-12	Ongoing	Notice
SWT	Iron and Turbidity	Greatwell	31-Dec-11	Ongoing	Undertaking
SWT	Lead	Drift, Restormel Central, Dotton and Pynes Central	31-Mar-15	Ongoing	Undertaking
SWT	Manganese	Avon	01-Apr-10	Sign-off Delayed	Undertaking
SWT	Manganese	Lowermoor	31-Mar-10	Completed 31-Mar-10	Undertaking
SWT	Manganese	Tottiford	31-Mar-12	Ongoing	Undertaking
SWT	Manganese	Venford	01-Oct-11	Ongoing	Undertaking
SWT	Pesticides	Drift	31-Mar-12	Ongoing	Undertaking
SWT	Pesticides	Restormel	31-Mar-14	Ongoing	Undertaking

Company	Parameter, hazard or driver	Site	Due for Completion	Status	Legal Instrument
SWT	Taste, odour and Manganese	Stithians	31-Mar-10	Delayed	Undertaking
SWT	Taste, odour and Manganese	Tamar	01-Apr-08	Sign-off Delayed	Undertaking
SWT	Total Trihalomethanes	Wendron	31-Dec-14	Ongoing	Undertaking
WSX	2,4-D	Fovant	TBC	Pending	Undertaking
WSX	Chlortoluron, Isoproturon, MCPA, MCPB, 2,4-D and Metazachlor	Friar Waddon	31-Jan-11	Delayed	Undertaking
WSX	Coliform bacteria	Adber	31-Mar-11	Completed 31-Mar-11	Notice
WSX	Coliform bacteria	Bathford	31-Mar-13	Ongoing	Notice
WSX	Coliform bacteria	Feltham	30-Mar-11	Completed 31-Mar-11	Notice
WSX	Coliform bacteria	Moorbrake Camp	31-Mar-13	Ongoing	Notice
WSX	Coliform bacteria	Sigwells	31-Mar-13	Ongoing	Notice
WSX	Contamination from catchment	Brixton Deverill	31-Mar-10	Delayed	Notice
WSX	Contamination from catchment	Portesham	30-Sep-10	Delayed	Notice
WSX	<i>Cryptosporidium</i>	Dewlish	31-Mar-12	Ongoing	Notice
WSX	<i>Cryptosporidium</i>	Dunkerton	31-Mar-13	Ongoing	Notice
WSX	<i>Cryptosporidium</i>	Tatworth	31-Mar-13	Ongoing	Notice
WSX	<i>Cryptosporidium</i>	Tollerdown	31-Mar-14	Ongoing	Notice
WSX	<i>Cryptosporidium</i>	Upton Scudamore Comb	31-Mar-12	Ongoing	Notice
WSX	<i>Cryptosporidium</i>	Widdenham	31-Mar-14	Ongoing	Notice
WSX	<i>E.coli</i>	Grange	31-Mar-12	Ongoing	Notice
WSX	<i>E.coli</i>	Grove New	31-Mar-13	Ongoing	Notice
WSX	<i>E.coli</i>	Tucking Mill	N/A	Ongoing	Notice
WSX	<i>E.coli</i>	Zeals	31-Mar-13	Ongoing	Notice
WSX	Iron	Danesborough	30-Jun-11	Delayed	Undertaking
WSX	Iron, Manganese and Turbidity	Trunk mains renovation	31-Mar-15	Ongoing	Undertaking
WSX	Isoproturon, Pesticides, Mecoprop, Chlortoluron and taste and odour	Sutton Bingham	31-Mar-14	Ongoing	Undertaking
WSX	Lead	Distribution system	31-Mar-15	Ongoing	Undertaking
WSX	Metaldehyde	Durleigh catchment	31-Mar-15	Ongoing	Undertaking

Company	Parameter, hazard or driver	Site	Due for Completion	Status	Legal Instrument
WSX	Nitrate	Dunkerton, Chirton, Fonthill Bishop, Sturminster Marshall/Shapwick, Hooke, Bulbridge and Wylle	31-Mar-18	Ongoing	Undertaking
WSX	Taste and odour	Blashford	31-Mar-14	Delayed	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 2010

Site	Appointee	Incumbent and region	Status
Shotton Paper, Shotton	Albion Water	Dŵr Cymru, Wales	Supplying water
Buxted Chicken, Flixton	Anglian Water	Essex and Suffolk Water, Eastern region	Supplying water
Wynyard, near Wolviston	Hartlepool Water	Northumbrian Water, Northern region	Supplying water
Brooklands, Milton Keynes	Independent Water Networks Ltd	Anglian Water, Eastern region	Supplying water
Great Billing Way, Northampton	Independent Water Networks Ltd	Anglian Water, Eastern 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
Kings Cross, London	Independent Water Networks Ltd	Thames Water, Thames region	Supplying water
The Bridge, Dartford	Independent Water Networks Ltd	Thames Water, Thames region	Supplying water
Media City, Salford Quays	Peel Water Networks Ltd	United Utilities, Northern region	Supplying water
Graylingwell, Chichester	SSE Water	Portsmouth Water/Southern Water, Southern region	Supplying water
Bromley Common, Bromley	SSE Water	Thames Water, Thames region	Supplying water
Hale Village, Tottenham	SSE Water	Thames Water, Thames region	Supplying water
Kennet Island, Reading	SSE Water	Thames Water, Thames region	Supplying water
Park Views, Epsom	SSE Water	Thames Water, Thames region	Supplying water
The Portway, near Salisbury	SSE Water	Wessex Water, Western region	Supplying water
Fairfield Park and Lower Wilbury Farm, Arlesey	Veolia Water Central	Anglian Water, Eastern region	Supplying water
MoD Tidworth near Andover	Veolia Water Projects	Wessex Water, Western region	Supplying water

New inset appointments in place for 2010 (by 31 May 2011)

Site	Appointee	Incumbent and region	Status
Berryfields, Aylesbury	Independent Water Networks Ltd	Thames Water, Thames region	Supplying water from April 2011
Llanilid Park, South Wales	SSE Water	Dŵr Cymru, Wales	Appointment granted
Great Western Park, Didcot	SSE Water	Thames Water, Thames region	Supplying water from April 2011
Kingsmere, Bicester	SSE Water	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
Avon Valley Water	Retail	6 August 10	Not yet operating
Business Stream	Retail	23 January 09	Not yet operating
Osprey Water Services Ltd	Combined	5 January 07	Not yet operating
Satec Ltd	Combined	24 May 06	Not yet operating
Severn Trent Water Select Ltd	Combined	1 December 05	One retail customer Eastern region
UU Water Sales Ltd	Combined	3 January 07	Not yet operating
Watercall Ltd	Combined	1 December 05	Inactive
YorWater Ltd	Retail	21 March 06	Not yet operating

Annex 6

Water company indices

Bristol Water plc

Water supply arrangements

Company assets		Water supplied	
Number of treatment works	17	Water supplied (MI/day)	309
Number of service reservoirs	168	Percentage from surface sources	82
Number of water supply zones	52	Percentage from ground sources	12
Length of mains pipe (km)	6,663	Percentage from mixed sources	6
Population served		Area of supply	
Population supplied	1,136,000	Gloucestershire, Wiltshire, Bristol, Somerset	
Number of local authorities	9		

Drinking water quality summary data

	Company figure			Industry average
	2008	2009	2010	2010
Overall drinking water quality*	99.97%	99.97%	99.96%	99.96%
Water treatment				
Process Control Index	99.99%	100%	99.86%	99.99%
Disinfection Index	99.98%	100%	99.97%	99.97%
Distribution systems				
Distribution Maintenance Index	99.82%	99.88%	99.89%	99.86%
Reservoir Integrity Index	99.97%	99.97%	99.99%	99.96%
Building water systems				
Parameters influenced by domestic water systems	99.92%	99.85%	99.96%	99.89%

Consumer contacts

	Company figure			Industry average
	2008	2009	2010	2010
Informing consumers				
Total number	1,015	1,048	1,028	N/A
Rate per 1,000 population	0.93	0.94	0.90	1.26
Acceptability of water to consumers				
Total number	4,373	2,917	2,935	N/A
Rate per 1,000 population	4.00	2.63	2.58	1.98

Complaints to the Drinking Water Inspectorate

A total of 2 consumers of Bristol Water plc directly contacted DWI in 2010.

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

* 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	9	Water supplied (MI/day)	133
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)	2,792	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
	2008	2009	2010	2010
Overall drinking water quality*	99.92%	99.99%	99.94%	99.96%
Water treatment				
Process Control Index	99.97%	99.99%	100%	99.99%
Disinfection Index	99.72%	99.90%	99.87%	99.97%
Distribution systems				
Distribution Maintenance Index	100%	100%	100%	99.86%
Reservoir Integrity Index	99.95%	99.95%	100%	99.96%
Building water systems				
Parameters influenced by domestic water systems	99.85%	99.96%	99.73%	99.89%

Consumer contacts

	Company figure			Industry average
	2008	2009	2010	2010
Informing consumers				
Total number	184	263	292	N/A
Rate per 1,000 population	0.43	0.62	0.68	1.26
Acceptability of water to consumers				
Total number	397	570	505	N/A
Rate per 1,000 population	0.93	1.34	1.18	1.98
Complaints to the Drinking Water Inspectorate				
No consumers of Bournemouth and West Hampshire Water plc directly contacted DWI in 2010.				

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

* Overall 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)	2
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	3,000	Small parts of Wiltshire and Hampshire	
Number of local authorities	2		

Drinking water quality summary data

	Company figure			Industry average
	2008	2009	2010	2010
Overall drinking water quality*	100%	100%	100%	99.96%
Water treatment				
Process Control Index	100%	100%	100%	99.99%
Disinfection Index	100%	100%	99.36%	99.97%
Distribution systems				
Distribution Maintenance Index	100%	100%	100%	99.86%
Reservoir Integrity Index	100%	100%	100%	99.96%
Building water systems				
Parameters influenced by domestic water systems	100%	100%	100%	99.89%

Consumer contacts

	Company figure			Industry average
	2008	2009	2010	2010
Informing consumers				
Total number	0	0	0	N/A
Rate per 1,000 population	0	0	0	1.26
Acceptability of water to consumers				
Total number	0	0	0	N/A
Rate per 1,000 population	0	0	0	1.98
Complaints to the Drinking Water Inspectorate				
No consumers of Cholderton and District Water Company Ltd directly contacted DWI in 2010.				

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

* Overall 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 (MI/day)	0.26
Number of service reservoirs	0	Percentage from surface sources	50
Number of water supply zones	6	Percentage from ground sources	47
Length of mains pipe (km)	9	Percentage from mixed sources	3
Population served		Area of supply	
Population supplied	2,000	Old Sarum, near Salisbury; Hale Village, Tottenham; Graylingwell, Chichester; Bromley Common, Bromley; Kennet Island, Reading; Park Views, Epsom	
Number of local authorities	6		

Drinking water quality summary data

	Company figure			Industry average
	2008	2009	2010	2010
Overall drinking water quality*	100%	100%	100%	99.96%
Water treatment				
Process Control Index	N/A	N/A	N/A	99.99%
Disinfection Index	N/A	N/A	N/A	99.97%
Distribution systems				
Distribution Maintenance Index	100%	100%	100%	99.86%
Reservoir Integrity Index	N/A	N/A	N/A	99.96%
Building water systems				
Parameters influenced by domestic water systems	100%	100%	100%	99.89%

Consumer contacts

	Company figure			Industry average
	2008	2009	2010	2010
Informing consumers				
Total number	0	1	1	N/A
Rate per 1,000 population	0	0.74	0.5	1.26
Acceptability of water to consumers				
Total number	0	0	2	N/A
Rate per 1,000 population	0	0	0.99	1.98
Complaints to the Drinking Water Inspectorate				
No consumers of SSE Water directly contacted DWI in 2010.				

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

* Overall 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 (Ml/day)	444
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
	2008	2009	2010	2010
Overall drinking water quality*	99.98%	99.98%	99.97%	99.96%
Water treatment				
Process Control Index	100%	100%	100%	99.99%
Disinfection Index	99.94%	99.98%	99.97%	99.97%
Distribution systems				
Distribution Maintenance Index	99.89%	99.91%	99.89%	99.86%
Reservoir Integrity Index	99.93%	99.93%	99.93%	99.96%
Building water systems				
Parameters influenced by domestic water systems	99.95%	99.97%	99.91%	99.89%

Consumer contacts

	Company figure			Industry average
	2008	2009	2010	2010
Informing consumers				
Total number	2,106	1,951	1,812	N/A
Rate per 1,000 population	1.34	1.16	1.08	1.26
Acceptability of water to consumers				
Total number	19,223	14,675	11,085	N/A
Rate per 1,000 population	12.24	8.72	6.59	1.98
Complaints to the Drinking Water Inspectorate				
A total of 4 consumers of South West Water Ltd directly contacted DWI in 2010.				

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

* Overall 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 (Ml/day)	6
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	8,000	Tidworth, Wiltshire	
Number of local authorities	1		

Drinking water quality summary data

	Company figure			Industry average
	2008	2009	2010	2010
Overall drinking water quality*	N/A	100%	100%	99.96%
Water treatment				
Process Control Index	N/A	100%	100%	99.99%
Disinfection Index	N/A	100%	100%	99.97%
Distribution systems				
Distribution Maintenance Index	N/A	100%	100%	99.86%
Reservoir Integrity Index	N/A	100%	100%	99.96%
Building water systems				
Parameters influenced by domestic water systems	N/A	100%	100%	99.89%

Consumer contacts

	Company figure			Industry average
	2008	2009	2010	2010
Informing consumers				
Total number	0	16	1	N/A
Rate per 1,000 population	N/A	1.74	0.12	1.26
Acceptability of water to consumers				
Total number	0	3	6	N/A
Rate per 1,000 population	N/A	0.33	0.73	1.98
Complaints to the Drinking Water Inspectorate				
No consumers of Veolia Water Projects Ltd directly contacted DWI in 2010.				

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

* Overall 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)	354
Number of service reservoirs	303	Percentage from surface sources	27
Number of water supply zones	91	Percentage from ground sources	71
Length of mains pipe (km)	11,000	Percentage from mixed sources	2
Population served		Area of supply	
Population supplied	1,305,000	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
	2008	2009	2010	2010
Overall drinking water quality*	99.96%	99.95%	99.98%	99.96%
Water treatment				
Process Control Index	100%	100%	>99.99%	99.99%
Disinfection Index	99.96%	99.90%	99.95%	99.97%
Distribution systems				
Distribution Maintenance Index	99.97%	99.97%	99.97%	99.86%
Reservoir Integrity Index	99.95%	99.97%	99.98%	99.96%
Building water systems				
Parameters influenced by domestic water systems	99.81%	99.80%	99.94%	99.89%

Consumer contacts

	Company figure			Industry average
	2008	2009	2010	2010
Informing consumers				
Total number	2,859	1,157	1,051	N/A
Rate per 1,000 population	2.42	0.98	0.81	1.26
Acceptability of water to consumers				
Total number	3,639	3,845	3,224	N/A
Rate per 1,000 population	3.08	3.26	2.47	1.98
Complaints to the Drinking Water Inspectorate				
No consumers of Wessex Water Services Ltd directly contacted DWI in 2010.				

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

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



Drinking Water Inspectorate | Ergon House, Horseferry Road | London | SW1P 2AL | Tel: 030 0068 6400

www.dwi.gov.uk