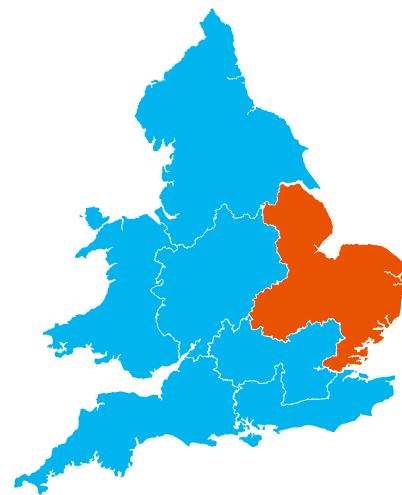


Drinking water 2009

Eastern region of England

July 2010

A report by the Chief Inspector of Drinking Water





Drinking water 2009

Eastern region of England



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

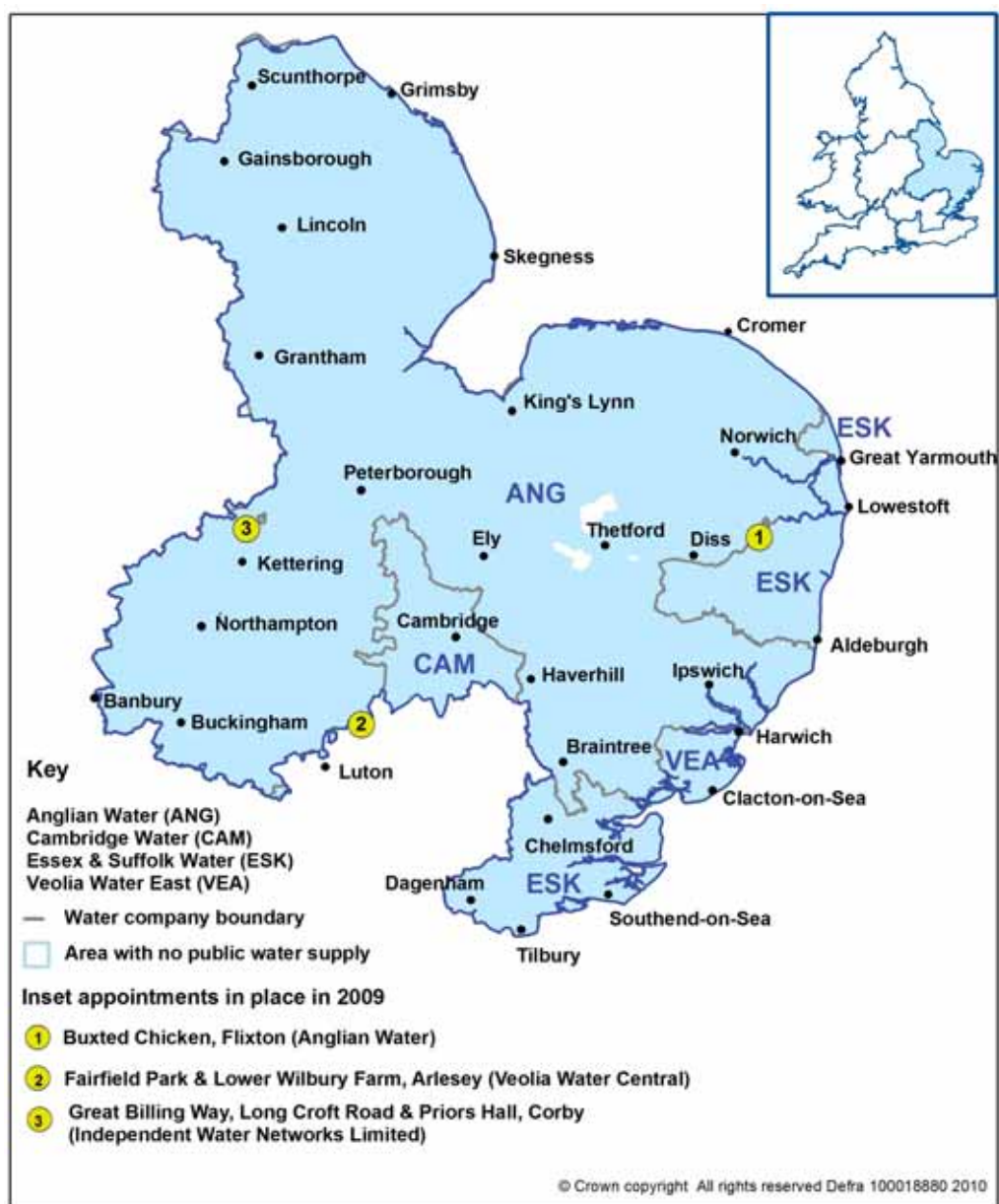
This part describes drinking water quality in the Eastern region. The Inspectorate also publishes a series of companion reports for other regions of England (Central, Northern, Southern, Thames and Western regions) and a separate report for Wales.

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

Introduction to the report for the Eastern region

Drinking Water 2009 is published as a series of seven reports covering Wales and the six regions of England. Each report presents information about drinking water quality in a form that meets the needs of those who have an interest in the quality and safe management of drinking water supplies from the consumer perspective, namely the local authorities and the regional committees of the Consumer Council for Water.

The report describes the key facts about the quality of drinking water in the Eastern region, which is served by five water companies (Anglian Water, Cambridge Water, Essex and Suffolk Water, Independent Water Networks and Veolia Water East) delivering public water supplies to over six million consumers.



The results of testing in 2009 demonstrated that the overall quality of drinking water in the Eastern region was satisfactory. The figure for compliance with drinking water standards at consumers' taps was 99.93%, down from the good figure of 99.97% reported in 2008 and below the industry figure of 99.95%. This figure is made up of the results of all the tests for 39 parameters with European or national standards. A single parameter, pesticides, was responsible for the change and the cause, metaldehyde, is discussed in more detail below. The Inspectorate has calculated that if the companies' metaldehyde monitoring data is disregarded, then the region's compliance figure in 2009 would have been 99.96%. The circumstances of the few failures of standards and the actions taken to safeguard public health are discussed in the body of the report.

When the Eastern region is judged by the Inspectorate's four indices of water quality performance, which look in turn at water treatment, service reservoir integrity and network maintenance, the main change in 2009 was better figures for service reservoir integrity (99.97%) and network maintenance (99.95%). When compared to last year, water treatment performance has declined with lower figures for both disinfection (99.95%) and process control (99.98%), however, each figure for the Eastern region is above the industry average and the network maintenance figure is ranked highest. Individual water company figures are reported in *Annex 6*.

This is the first year where reporting on water quality events uses the Inspectorate's new risk-based approach to classification and assessment. Events are classified into five categories: Not significant, Minor, Significant, Serious and Major. In total, there were 85 events across the Eastern region. Only one-sixth (14) were of a type that necessitated a detailed investigation by an inspector and none were serious enough to warrant a major investigation. This compares favourably with Wales and the other regions of England about the risk-related resource demand on the Inspectorate. In terms of the nature of the events reported on this year, there is no common theme, although fuel spills impacting on polyethylene service pipes remain a relatively common occurrence reinforcing the need for a risk awareness campaign in the region. There was also an event involving the overdosing of fluoride at a works operated by Anglian Water. As described in the report, this event was caused by non-compliance with the Code of Practice on the Technical Aspects of Fluoridation in relation to alarm settings. Detailed findings regarding all the significant events in 2009 can be found in *Annex 3*.

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

has the second lowest contact rate (1.4 per 1,000 population). There has been good progress made by Anglian Water in reducing white water events and the number of these contacts now stand at 1,900 compared to 3,500 three years ago. The Eastern region has a relatively low contact rate for black, brown or orange water (0.4 contacts per 1,000 population), but nonetheless these too have fallen, down to around 2,500 from 3,900 in 2006. However, only two companies (Anglian Water and Cambridge Water) have contributed to this improvement, whereas contacts from the customers of Essex and Suffolk Water and Veolia Water East have not reduced. These public confidence figures demonstrate the benefits already realised by the industry's investment to date in drinking water quality. *Annex 4* provides information about the schemes of work delivered in 2009 and those planned for delivery over the next five years.

Looking forward, the standard for lead becomes stricter in 2013. Progress made towards meeting the future standard is shown in a graph in the body of the report. The Inspectorate has calculated that if the stricter standard had been in force in 2009 then the figure for overall regional compliance with drinking water standards would have been 99.92%, instead of 99.93%. This highlights the importance of companies delivering on their business plan and water safety plan commitments to minimise consumer exposure to lead in older housing in collaboration with local authorities.

During 2009, the Government took steps to safeguard those consumers who are served by about 2,369 private water supplies in the Eastern region. Details of the new risk-based regulations and how they will work are described in this report, together with a case example showing how the new powers have been put into immediate and good effect by one local authority in England. This change marks an important step forward; action can more readily be taken by local authorities to improve those private supplies that pose a risk to health and the information provided to the Inspectorate will enable open reporting on all drinking water supplies in the region.

Returning to the pesticide problem mentioned above, metaldehyde is a molluscicide commonly incorporated into some pellets used for the control of slugs. It has a low risk mammalian toxicological profile and it is a valuable agricultural product. The presence of metaldehyde in raw water first came to attention late in 2007 and, once it was established that occurrence was more widespread, a national action group was formed. The Metaldehyde Stewardship Group (MSG) comprises the principal metaldehyde manufacturer and pellet formulators, and reports to a wider industry steering group co-ordinated by the water companies of England and Wales, but also including the Environment Agency, Natural England, the Health and Safety Executive (Chemicals Regulation Directorate), the

Inspectorate and agricultural industry representatives such as agronomists, slug pellet distributors, and catchment consultants.

The work carried out to understand and remedy the problem since April 2008 has involved the MSG in advising, training and raising awareness of the issue with farmers and promoting best practice use of metaldehyde in agriculture. There has been sharing of data to identify the highest risk catchments and research into possible water treatment technologies. These activities support the legally binding programmes of work on catchment control that the Inspectorate has put in place in relation to directly affected water supplies. During 2009, companies have reported that concentrations of metaldehyde in water sources have fallen. Additionally, slug pellet sales were approximately 70% lower than in 2008. Awareness of the issue among farmers has risen and practices relating to the supply, use and spreading of slug pellets have generally improved.

Water supply arrangements

Five water companies supply drinking water in the Eastern region: Anglian Water (ANG), Cambridge Water (CAM), Essex and Suffolk Water (ESK), Independent Water Networks Ltd (IWN) and Veolia Water East Ltd (VEA).

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



Much of the water supplied in the region is surface water (52%) abstracted from rivers such as the Ancholme, Blackwater, Bure, Chelmer, Colne, Nene, Gipping, Great Ouse, Nar, Stour, Waveney, Welland, Wensum, Witham and Wissey. The Louth Canal acts as a source for Anglian Water and water is also drawn from many reservoirs including Abberton, Alton, Ardleigh, Covenham, Grafham, Hanningfield, Hollowell, Pitsford, Ravensthorpe and Rutland. Essex and Suffolk Water abstract water from

Ormesby Broad (Norfolk), Lound Ponds and Fritton Lake (Suffolk). Groundwater provides a valuable resource in the region (36%). Most boreholes draw from the East Anglian and Lincolnshire Chalk aquifers. Anglian Water abstracts from the Lower Greensand and Sherwood Sandstone aquifers, while Essex and Suffolk Water uses the Crag sands and gravel deposits in Suffolk. Cambridge Water relies exclusively on groundwater from the Chalk and Lower Greensand aquifers. Across the region, about one-eighth (12%) of water supplies can be drawn from either surface or groundwater sources.

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

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

Company ¹	Groundwater	Surface Water	Mix of ground and surface water	Total
Anglian Water	280	14	1	295
Cambridge Water	24	0	0	24
Essex and Suffolk Water	46	11	0	57
Veolia Water East ²	10	0	0	10
Total	360	25	1	386

¹Independent Water Networks do not directly abstract water and so have no abstraction points.
²Veolia Water East's surface water data is provided by Anglian Water as the receiving works is jointly owned.

Table 3: Key facts about the Eastern region supply arrangements

Key facts			
Population supplied	6,380,630	Treatment works	186
Water supplied (l/day)	1,798 million	Service reservoirs	535
Number of local authorities	49	Water supply zones	232
(with a further 11 partially covering the region)		Length of mains pipe (km)	48,732
Approximate number of private water supplies	2,369		
Area of supply		Water composition	
Bedfordshire (part), Buckinghamshire (part), Cambridgeshire, Essex (part), Humberside (part), Leicestershire (part), Lincolnshire, Outer London (part), Norfolk, Northamptonshire, Nottinghamshire (part) and Suffolk		Surface sources	52%
		Groundwater sources	36%
		Mixed sources	12%

Drinking water quality testing

Throughout 2009, water companies sampled drinking water across the region to test for compliance with the standards in the drinking water regulations. Almost half of the tests were carried out on drinking water drawn from consumers' taps selected at random. For monitoring purposes, company water supply areas are divided into zones based on population (maximum 100,000). Generally, zones are sampled at consumers' taps with the number of required tests being greatest in zones with larger populations. Other sample locations are water treatment works and treated water (service) reservoirs. Collectively, the five water companies carried out a total of 470,354 tests during 2009. Only 413 of these tests failed to meet the standards set down in the regulations.

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

Company	Place of sampling			Number of tests per company	Estimate of population
	Water treatment works	Service reservoirs	Consumers' taps (zones)		
Anglian Water	86,923 (135)	99,544 (376)	134,576 (162)	321,043	4,122,000
Cambridge Water	7,780 (21)	8,650 (33)	6,559 (10)	22,989	306,630
Essex and Suffolk Water	26,786 (26)	28,060 (109)	61,522 (53)	116,368	1,794,000
Independent Water Networks	0 (0)	0 (0)	899 (3)	899	1,000
Veolia Water East	3,147 (3)	1,960 (8)	3,948 (4)	9,055	157,000
Region overall	124,636 (185)	138,214 (526)	207,504 (232)	470,354	6,380,630

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

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

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

Drinking water quality results

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

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

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

Microbiological quality

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

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

Parameter	Current standard	Total number of tests	Number of tests not meeting the standard	Additional information
Water leaving water treatment works				
<i>E.coli</i>	0/100ml	20,937	1	CAM (1)
Coliform bacteria	0/100ml	20,937	4	ANG (2), ESK (1), VEA (1)
<i>Clostridium perfringens</i>	0/100ml	5,087	9	ANG (3), CAM (1), ESK (5)
Turbidity ¹	1NTU	15,658	13	ANG (7), ESK (4), VEA (2)
Water leaving service reservoirs				
<i>E.coli</i>	0/100ml	27,634	1	ANG (1)
Coliform bacteria	0/100ml in 95% of tests at each reservoir	27,634	14	ANG (4), CAM (2), ESK (8) One reservoir from a total of 526 did not meet the 95% compliance rule: Thundersley SR (ESK)
Water sampled at consumers' taps				
<i>E.coli</i>	0/100ml	17,297	0	
Enterococci	0/100ml	1,899	0	
Notes:				
¹ Turbidity is a critical control parameter for water treatment and disinfection.				

***E.coli* at works and service reservoirs**

In 2009, a total of 48,571 tests at works and service reservoirs were carried out by all the companies across the region. *E.coli* was detected in only one sample (CAM) from a works and one sample (ANG) from a service reservoir.

On detecting *E.coli*, companies are required to act promptly to protect public health. Their immediate response when finding *E.coli* at a works or service reservoir is to sample again and more widely to confirm that water being received by consumers is safe. In 2009, these additional tests gave satisfactory results.

Cambridge Water detected *E.coli* in a sample taken from Rivey works, near Linton in Cambridgeshire, in May. A sample from this works taken in February contained *Clostridium perfringens*. The company's investigation found that the sample tap was in poor condition and it was replaced in June. All further samples have been satisfactory.

E.coli was detected at Bunwell Tower service reservoir (southwest of Norwich), in August. Anglian Water's inspection of the reservoir found two small gaps in the hatches which were repaired before the reservoir was returned to supply. All subsequent samples have been satisfactory.

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

Company	<i>E.coli</i> in water leaving treatment works	<i>E.coli</i> in water leaving service reservoirs	<i>E.coli</i> at consumers' taps	Enterococci at consumers' taps
Anglian Water	0 – 15,042	1 – 19,900	0 – 11,455	0 – 1,407
Cambridge Water	1 – 1,394	0 – 1,730	0 – 834	0 – 62
Essex and Suffolk Water	0 – 3,980	0 – 5,612	0 – 4,572	0 – 379
Independent Water Networks	0 – 0	0 – 0	0 – 28	0 – 19
Veolia Water East	0 – 521	0 – 392	0 – 408	0 – 32
Region overall	1 – 20,937	1 – 27,634	0 – 17,297	0 – 1,899
Note: Results are shown as the number of positive tests – the total number of tests.				

Coliform bacteria at works

Testing for coliform bacteria gives reassurance that water entering the supply was treated adequately to remove bacterial and viral pathogens. Repeated occurrences of coliform bacteria in samples from the same works in one year are thus of concern and require action to be taken. In 2009, this situation did not occur at any of the 185 works in the region.

Anglian Water was unable to identify a cause for a detection of coliforms and Clostridia in samples collected from Bircham works in August, however the site now send water to Fring works for further nitrate reduction treatment prior to supplying consumers.

Coliforms were detected at Pitsford works in June. Large volume sampling over three days failed to identify a cause. An internal inspection of the contact tank was carried out in September and no points of ingress were found. Therefore, the company also drained and inspected the final water tank in November which also proved to be in good condition. This site was involved in an outbreak of Cryptosporidiosis, in 2008, when a rabbit entered the contact tank. The Inspectorate is satisfied that recommendations made following the outbreak have been implemented.

The Inspectorate has noted that coliform bacteria were found in four samples from treatment works in the Eastern region during the year and

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

Clostridium perfringens

This organism is a spore-forming bacterium that is exceptionally resistant to unfavourable conditions in the water environment, such as extremes of temperature and pH, and disinfection processes such as chlorination and ultraviolet light. It is a normal component of the intestinal flora of up to 35% of humans and other warm-blooded animals. These characteristics make it a useful indicator of either intermittent or historical faecal contamination of a groundwater source or surface water filtration plant performance. The detection of any *Clostridium perfringens* in the supply should trigger an investigation by the water company.

In 2009, out of 5,087 samples taken in the region, nine did not meet the specified value (3 ANG, 1 CAM, 5 ESK).

Anglian Water's investigation into the detection of *Clostridium perfringens* at Grafham works, southwest of Huntingdon, in February, did not find any significant treatment issues. No other samples collected during 2009 contained microbiological indicators. Similarly, Anglian Water found no cause for a single detection of *Clostridium perfringens* at Barrow works, in Barrow on Humber, in April.

Essex and Suffolk Water detected *Clostridium perfringens* from consumers' taps on five occasions in 2009 (Chelmsford South zone in May, Stanford Le Hope zone in June, Great Yarmouth zone in June, Southend East zone in November and Benfleet zone in December). These resistant spores are probably widespread in historic deposits in the company's surface water distribution system.

Guidance to companies (Information letter 10/2008) made clear the inadvisability of monitoring for this parameter at consumers' taps and, wherever possible, companies should focus their monitoring on supply points (which could include service reservoirs as well as works). The Inspectorate expects that a pattern of repeated detections in zones should trigger a review by the company of the Regulation 27 risk assessment of the supply system with action plans linking to the company's Distribution, Operation and Maintenance Strategy, with particular reference to local flushing regimes to clear historic deposits.

Turbidity at works

Turbidity is a measure of how much light can pass through water and indicates the condition or 'cloudiness' of water. Turbidity is caused by particles suspended in the water and is an important critical control

measure for disinfection. Turbidity is measured at two points in the water supply chain, at treatment works where a value of 1NTU applies and at consumers' taps where the standard of 4NTU applies. The following discussion focuses on the results of samples taken at treatment works. For information on tests taken at consumers' taps, see the heading *Turbidity* in the *Chemical quality* section. Out of a total of 15,658 tests across the Eastern region, a turbidity value of >1NTU was reported on 13 occasions in 2009 (7 ANG, 4 ESK, 2 VEA), compared to eight occasions in 2008.

Anglian Water detected turbidity above 1NTU at their Dunton works, near Dunton in Bedfordshire, on three separate occasions in July, October and December. Data from the on-line monitor indicated that these results related to problems with the sample line. The company has been reminded of the need to ensure that sample points are representative of water in supply at all times. Weekly extended flushing of the sample line which was swabbed in January to remove deposits has been implemented since. The Inspectorate will consider the need for enforcement action if further samples exceed 1NTU in the future at this works.

A similar situation was reported in July by Essex and Suffolk Water when turbidity exceeded 1NTU on two occasions at Syleham works, near Wingfield Green, Suffolk. The company has implemented a weekly flush of the sample line and all further tests have been satisfactory.

Turbidity above 1NTU was detected on two occasions, in July and August at Ardleigh works, near Colchester, Essex. As a consequence, Veolia Water East has determined that the sample line may not have been situated in a representative position on the outlet main and it has been relocated. Results have been satisfactory since.

The Inspectorate has noted 13 occasions of turbidity exceeding 1NTU and this will be taken into account during the risk-based programme of technical audit.

Coliform bacteria at service reservoirs

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

Samples from Essex and Suffolk Water's Thundersley West reservoir contained coliform bacteria on two occasions in June and again in December. Investigative samples were satisfactory each time and nothing untoward was found when the company inspected the reservoir in June.

The company has also ruled out cross-contamination of samples during transportation and analysis.

Coliforms were detected at Basildon New reservoir, near Basildon, (ESK) on two occasions in October. A downstream sample from a consumer's property in the zone also contained coliforms as did another water tower (Langdon Hills Tower near Basildon). The company's inspection of the reservoir did not identify any integrity problems, but the investigation pointed towards low turnover across the whole supply system. The short-term mitigation steps taken by the company involved adding chlorine at the service reservoir for several days and increasing the chlorine residual leaving the upstream works for several weeks. Additionally, turnover of water within the system was improved by taking one of the reservoirs out of supply. The company are now considering a number of longer term measures to permanently improve turnover within the system and will update their Regulation 27 risk assessment once a solution has been confirmed. All further samples have been satisfactory.

The Inspectorate has noted that coliform bacteria were found in 14 samples from service reservoirs in the Eastern 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 17,297 consumers' taps were tested in 2009 for *E.coli* and none were positive. Like *E.coli*, the presence of Enterococci is indicative of faecal contamination and neither bacterium should be found in any sample. In 2009, the companies carried out 1,899 tests for Enterococci at consumers' taps and all the results were satisfactory.

Chemical quality

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

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

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

Parameter	Current standard or specified concentration ¹	Total number of tests	Number of tests not meeting the standard	Additional information
Aesthetic parameters				
– odour	No abnormal change	4,491	29	ANG (5), ESK (24)
– taste		4,415	4	ESK (4)
Bromate	10µg/l	1,763	1	ANG (1)
Copper	2mg/l	1,900	1	ESK (1)
Fluoride	1.5mg/l	1,571	1	ANG (1)
Iron	200µg/l	5,373	7	ANG (5), ESK (2)
Lead (current standard)	25µg/l	1,900	0	
Lead (future standard)	10µg/l	1,900	8	ANG (6), ESK (2)
Manganese	50µg/l	4,346	1	ANG (1)
Nickel	20µg/l	1,892	6	ANG (5), ESK (1)
Nitrate	50mg/l	4,435	0	
Nitrite	0.5mg/l	4,559	1	ANG (1)
Pesticides – total	0.5µg/l	1,632	11	ANG (1), ESK (10)
Pesticide – individual ²	0.1µg/l	33,094	261	Carbetamide ESK (1), Chlortoluron ESK (1), Clopyralid ANG (11), Metaldehyde ANG (98), ESK (140), IWN (4), VEA (6)
Sodium	200mg Na/l	1,901	3	ANG (1), ESK (2)
Sulphate	250mg SO ₄ /l	1,569	1	ANG (1)
Turbidity (at consumers' taps)	4NTU	5,056	1	ANG (1)
Notes:				
¹ For comparison, 1mg/l is one part in a million, 1µg/l is one part in a thousand million.				
² A further 2,052 tests were done for aldrin, dieldrin, heptachlor, heptachlor epoxide, all of which met the relevant standard.				

Aesthetic parameters

Consumers expect their drinking water to be clear and bright in appearance, and free from discernible taste or odour. In recognition of this the regulations stipulate national standards for colour, odour and taste. In 2009, a total of 33 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 some were confined to a single property and related to household pipes or fittings, however, there were a number of musty taste and odour detections reported in the Walpole zone which related to refurbishment of Walpole works (see *Drinking water quality events* section).

- Pencil: 10 odour (5 ANG, 5 ESK): in all but one case these investigations confirmed that the odour was associated with the use of unapproved black plastic pipe and advice was given to the householder to replace the pipe with approved medium density polyethylene pipe. One sample was taken in Walpole zone when there was a water quality event relating to musty odours. Investigatory samples from neighbouring properties were described as musty and it is probable that the description for this odour result was wrongly recorded.
- Softened: three taste (3 ESK): in each case the investigation confirmed that the tap water in the property was artificially softened. The householders were given advice about the need to retain a tap connected directly to the mains for drinking and cooking.
- Earthy/Musty: (16 ESK) most (11 odour and one taste) were from a single zone fed from Walpole works, near Halesworth, Suffolk, where, in May, the company commissioned new filters and moved the chlorine dosing point from after to before the pre-existing filters. This change resulted in a reaction between chlorine and the filter media. Essex and Suffolk Water changed the media within the original filters to resolve the problem (see *Drinking water quality events* section). A separate group of four odour reports in February and March were from a zone supplied by Lound works, near Great Yarmouth. Investigations at the works confirmed a musty odour in the treated water. The problem was short lived. Essex and Suffolk Water has since recognised the need to investigate related taste and odour reports promptly and in more depth.

- Sweet: four odour (4 ESK): one report of an odour described as 'sweet/peanuts' was associated with a similar odour in investigational samples at neighbouring properties in the Hullbridge zone in November. Also in November a sweet odour was reported in two more samples from two other zones (Southend West and Maldon). Two follow-up samples from the Southend West zone contained a sweet odour and a 'plastic/chocolate' odour was reported from a fourth sample from this zone in November, however, the company were unable to gain access to this property to investigate. The common factor linking these sweet odour results in November was Langford works (near Maldon, Essex) where the residual disinfectant was changed from chloramine to free chlorine in October. However, Essex and Suffolk Water were unable to definitively link this spate of odour results to this operational change at the works.

Bromate

Normally, bromate is only formed in drinking water when bromide is present in surface water which is treated with ozone. The process of chlorination may also produce bromate, for example, through the use of sodium hypochlorite solution containing bromide or when chlorine is generated on site by electrolysis. In recent years, companies have put in place control measures aimed at meeting the standard of 10µg/l. In the Eastern region, out of a total of 1,763 tests, the standard was exceeded on one occasion in 2009.

At Covenham works, near Louth in Lincolnshire, the control of ozone dosing was put into manual mode due to a faulty alarm. When the flow through the works dropped, dosing was not adjusted to compensate. This led to bromate formation and the failure of the standard in February. Anglian Water has reinforced instructions to staff about operating the works manually and all further samples have been satisfactory.

Copper

Copper in drinking water usually derives from copper pipes and fittings in household plumbing. In general, water supplies in the UK are not aggressive towards copper, but there can be occasional problems with new plumbing installations. In 2009, a total of 1,900 tests were carried out for copper across the region and all but one met the standard (2mg/l).

A level of 2.2mg/l copper was reported in a sample from a consumer's tap in the Saxmundham zone in December. Essex and Suffolk Water found elevated levels of copper in follow-up samples at the property and it was

established that there had been recent work carried out on the plumbing system. Advice was provided to the consumer.

Fluoride

Traces of fluoride occur naturally in many water sources, particularly in groundwater. For example, fluoride is found in some parts of North Essex, Suffolk, Redbridge and in small parts of Lincolnshire, near Spilsby. Consumers can obtain specific information on the level of fluoride in the drinking water supply to their home or workplace from their water company.

Fluoride is not removed by conventional water treatment. Some companies fluoridate water supplies at the request of the local health authority as a protection against tooth decay. Fluoride is added on this basis to water supplied by Anglian Water in parts of Bedfordshire (including Bedford town), Lincolnshire (in the west and northwest) and Nottinghamshire (in the area around Retford). In 2009, out of 1,571 tests for fluoride taken across the region just one exceeded the regulatory standard (1.5mg/l).

Anglian Water detected fluoride above the standard (1.75mg/l) at Newspring works, near Biggleswade, Bedfordshire, in August 2009. The cause was overdosing of hexafluorosilicic acid, due to the chemical dosing equipment being temporarily linked to the raw water flow meter (instead of the final flow meter) in breach of the Code of Practice on Fluoridation (see *Drinking water quality events* section). Please refer to the DWI website (www.dwi.gov.uk) for more information on fluoridation.

Iron

Iron may be present naturally in raw water, iron compounds may be added as part of water treatment or it can be released as a consequence of the corrosion of iron mains. Effective water treatment prevents these problems arising at source. Nowadays, most samples failing the standard for iron are from places where the distribution network contains a large proportion of old cast iron pipes. When deposits in these pipes are disturbed by an operational problem (such as a burst main) they turn the water orange-brown. Elevated levels of iron are objectionable to consumers because the water may appear turbid, it may have an astringent or bitter taste and the deposits are unsightly and may stain water fittings. Discolouration of water supplies often prompts consumers to contact their water company.

Independent Water Networks operates a new network and the other companies in the Eastern region completed their long-term section 19 programmes of mains renovation work in 2007. Consequentially, ongoing

compliance with the standard for iron in the region is through each company's Distribution, Operation and Maintenance Strategy.

In 2009, there were seven failures of the iron standard, each of which was considered to be an isolated event caused by a localised disturbance dealt with by flushing of the main at the time and not indicative of a wider problem.

In response to an iron failure in March, Anglian Water took action to increase the turnover in the main serving one property in the Desborough zone. After flushing of the main to remove deposits all further samples from this zone have been satisfactory. Similarly, the company installed hydrants and carried out flushing on a main to a consumer's property in Leighton Linlade zone where an iron failure occurred in April.

In July, a sample taken by Anglian Water in the Bourne zone failed the standards for iron manganese and turbidity. No operational activity could be linked to this sample failure and all further samples in the zone have given satisfactory results. Another isolated failure in the Sleaford zone in September was dealt with by flushing.

In November, in response to an iron failure in the Ampthill zone, Anglian Water excavated the main to establish its condition. This revealed that the main supplying the property was cast iron, and not asbestos cement as indicated by the company's records. A high velocity mains flush was carried out in April 2010 and further samples confirmed the effectiveness of this action in reducing iron levels. This main has been placed on the company's regular six monthly flushing programme to prevent the build up of deposits.

Essex and Suffolk Water detected iron above the standard in the Broome zone in August. The company attributed the problem to the long length and thus low flows in the supply pipe to the property encouraging accumulation of deposits. In September, another iron failure in the Brentwood zone was attributed to the consumer's supply pipe and Essex and Suffolk Water have written to the householder advising its replacement.

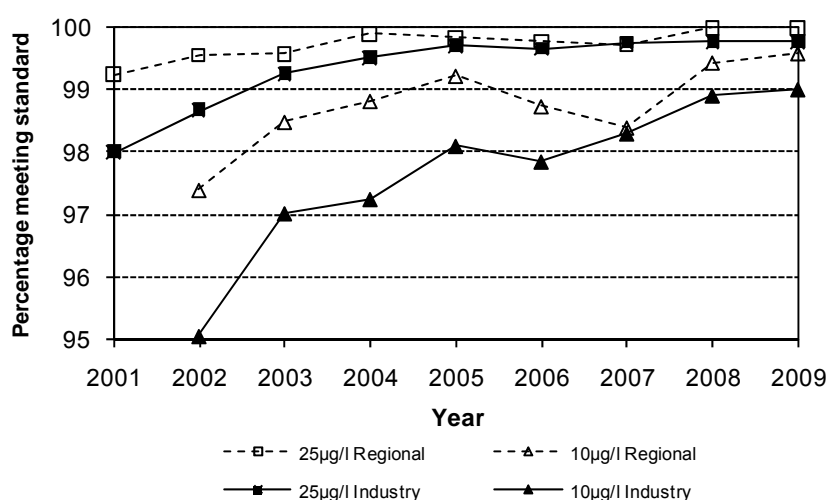
Lead

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

water hardness, the length of pipe and the time that water is left to stand in the pipe (stagnation) before it is drawn off.

The monitoring data collected by companies during 2009 has been added, by the Inspectorate, to that gathered in previous years to provide an updated picture of progress in the region and for the industry, towards meeting the future standard for lead of 10µg/l by the end of 2013 (see Figure 8).

Figure 8: Percentage of tests meeting the current and future standard for lead between 2001 and 2009 in the region



Water companies notify both the consumer and the relevant local authority whenever a failure of the current lead standard of 25µg/l occurs. In 2009, the Inspectorate was not notified of any failures in the region from the 1,900 samples taken.

Also during 2009, just eight samples exhibited a lead value above the future standard of 10µg/l (6 ANG, 2 ESK). The Inspectorate’s *Guidance on the Regulations* (2008) reminded companies that they should be notifying local authorities of breaches of the future (as well as the current) standard and giving advice to householders whenever lead is found in a tap sample. Figure 8 illustrates the importance of companies and local authorities in the Eastern region acting now to secure compliance with the future lead standard by 2013.

In their business plans for the next five year investment period (AMP5), Anglian Water and Essex and Suffolk Water included an integrated package of measures to address the residual risk of consumer exposure to lead above the future standard. The companies have since entered into legally binding agreements with the Inspectorate to deliver the specified activities. The Inspectorate will be reviewing the approach to lead risk assessments taken by other companies in the region.

In addition, during 2009, companies in the region have responded to 294 consumer requests to check the level of lead in drinking water in their property.

Manganese

Manganese occurs naturally in many sources of water. It can be removed from raw water by converting the soluble form to an insoluble precipitate (oxidation). Treatment can be simple to achieve (aeration), but for some waters more complex processes are needed. If effective treatment is not in place then black deposits may collect in the distribution pipes. When disturbed, such deposits may turn the water black. Even small traces of manganese are objectionable to consumers. Typical complaints relate to the staining of laundry or the discolouration of vegetables during washing or cooking. The purpose of the standard (50µg/l) for manganese is to minimise these problems. In 2009, Anglian Water reported one failure of the manganese standard in the Bourne zone in July (see *Iron* section).

Nickel

Nickel may be present in coatings on modern tap fittings. In 2009, a total of 1,892 tests were carried out for nickel and all but six met the standard (20µg/l).

In May, Anglian Water reported nickel at a concentration of 54.4µg/l in a sample collected from Braintree North zone. The consumer had fitted new taps in March and the company concluded this was the source of the elevated levels of nickel.

A level of 77.5µg/l of nickel was reported in a sample from a consumer's tap in the Felixstowe zone in September. An inspection of the internal fittings in the property did not identify the cause, but samples taken after the water was allowed to stand in the pipes contained higher levels of nickel than those collected after flushing. Anglian Water advised the householder that the plumbing may be the cause.

Anglian Water detected nickel at a concentration of 26.6µg/l in a sample from the Lincoln Westgate zone in October. They also detected nickel at a concentration of 125µg/l in a sample from the Winterton zone in November. The results of first draw samples indicated that the source of nickel in each case was probably a chrome plated plastic tap fitting.

A sample taken in December in the Braintree South zone contained nickel at a concentration of 773µg/l. Anglian Water found elevated levels in the subsequent samples, but found no particular problems with the plumbing within the property. The Inspectorate was satisfied with the company's

conclusion that nonetheless plumbing in the property was likely to be the cause.

A concentration of nickel of 23µg/l was reported in a sample from a consumer's tap in the Grays zone in December. Essex and Suffolk Water obtained satisfactory follow-up sample results from neighbouring properties, however, they were unable to gain access to the property to investigate further. A letter was sent to the consumer to make them aware of the result and offer to resample the water.

Nitrate and nitrite

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

During 2009, Anglian Water completed legally binding programmes of work to secure compliance with the nitrate standard at Clayhill, Congham, Fring (including water from the Bircham site), Gayton, Twelve Acre Wood/Eriswell and Whitton works. Together, all these schemes improve drinking water quality for almost 300,000 consumers.

From extensive information gathered by the water companies in the Eastern region, 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, legally binding agreements are in place for catchment and/or treatment solutions, if required, at several Anglian Water sites: Barrow, Glandford, North Pickenham, Irby, Risby and Riddlesworth. Similarly, additional treatment, if required, is to be progressed by Cambridge Water at Babraham, Fleam Dyke, Euston, Melbourn and Lowerfield, and Morden Grange. All these improvements are planned to be delivered before the end of March 2015.

Table 9 shows the number of raw water abstraction points in the region that are monitored for nitrate and the percentage of those points where nitrate above 50mg/l has been detected in 2009. Annex 4 lists the planned work in the region and blending is in place already at some sites.

Table 9: Numbers of raw water abstraction points monitored for nitrate and percentage exceeding 50mg/l in 2009

Company	Groundwater		Surface Water ¹	
	Number of abstraction points monitored for nitrate	Percentage with sample(s) exceeding 50mg/l in 2009	Number of abstraction points monitored for nitrate	Percentage with sample(s) exceeding 50mg/l in 2009
Anglian Water	243	21%	15	13%
Cambridge Water	24	21%	-	-
Essex and Suffolk Water	46	9%	11	18%
Veolia Water East	10	0%	-	-
Total	323	19%	26	15%
Notes: ¹ Surface water figures contain groundwater abstraction points influenced by surface water				

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. Chloramine is used extensively across the Eastern region by Anglian Water in its supplies in Northamptonshire and the surrounding areas, including Bedford, Milton Keynes, Northampton, Peterborough and Norwich. Essex and Suffolk Water also practices chloramination in the Essex area during the summer months and all year round in the Great Yarmouth, Lowestoft and Southwold parts of Suffolk. Nitrite can also form in samples of water, after collection and before analysis, especially if the sample is not kept cool. In 2009, of 4,559 tests, all but one (ANG) met the standard of 0.5mg/l.

A sample taken in the Leighton Linlade zone in August exceeded the nitrite standard. Further samples upstream, downstream and at the original property also contained elevated levels of nitrite. Residual chlorine in the zone is in the form of chloramines, but there were no operational problems at the works at the time. Anglian Water has instigated regular flushing of the local mains to improve the turnover of the water.

Pesticides and related products

This group of substances, generically called pesticides, includes many organic chemicals ranging from weed killers to insecticides and fungicides. Water sources may contain traces of pesticide residues as a result of agricultural use (pest control on crops) and non-agricultural uses (herbicides for weed control on highways etc.). Water companies are required to assess the risk to drinking water supplies of pesticide use in their catchments and test for those which might be present.

Companies have documented potential and actual pesticide hazards through their Regulation 27 risk assessments, which are informed by raw water monitoring and identify the control measures in place.

When pesticides are first detected, water companies will enhance their monitoring of raw water and notify the Environment Agency to facilitate appropriate action to safeguard drinking water quality.

In 2009, 11 of the tests in the region exceeded the standard for total pesticides (1 ANG, 10 ESK). There was 100% compliance (2,052 tests) for the four pesticides with a standard of 0.03µg/l. Out of 33,094 tests for those individual pesticides with a standard of 0.1µg/l, a total of 261 exceeded the standard. The circumstances and substances involved are summarised below.

Carbetamide

Carbetamide is a moderately soluble herbicide which is used to control some types of grasses and broad-leaved weeds. In March, Essex and Suffolk Water detected carbetamide (0.12µg/l) in a sample from a consumer's property in a zone supplied by Langford works, near Maldon, Essex. A sample taken at this works around the same time also contained carbetamide. The company's investigation verified that levels in the raw water were higher than historically recorded challenging the treatment in place (ozone and granular activated carbon). The company has optimised treatment and put in place raw water blending arrangements to lower levels of the pesticide entering the works. They will continue to monitor the raw water to determine the trend for this pesticide. The Regulation 27 risk assessment has been reviewed and updated in light of this change in raw water quality.

Chlorotoluron

Chlorotoluron is a herbicide for use in winter cereal crops. The standard is 0.1µg/l. A failure reported by Essex and Suffolk Water in April, in a sample taken from Harold Hill zone, was found to be due to an analytical error in the laboratory. All further samples have been satisfactory and the original result is not considered to be representative of water in supply.

Clopyralid

Clopyralid is a herbicide used for weed control in a wide range of agricultural crops and grassland. The standard is 0.1µg/l. Anglian Water detected clopyralid on three occasions at Pitsford works, near Northampton, and on eight occasions at Riddlesworth works, near Thetford, Norfolk. Enforcement action has been initiated by the Inspectorate and the company have entered into a legally binding agreement to carry out catchment and abstraction management, and support investigations into possible treatment solutions, if needed, at both works by March 2015.

Metalddehyde

During 2009, metalddehyde, the active ingredient of some slug pellets, was identified by Anglian Water, Essex and Suffolk Water, Independent Water Networks and Veolia Water East as a new pesticide hazard in a number of different catchments. Anglian Water carried out 253 tests, of which 98 exceeded the standard of 0.1µg/l. When detected in samples, the levels found range from 0.005µg/l to 0.378µg/l. Essex and Suffolk Water carried out 379 tests, of which 140 exceeded the standard and the levels found ranged from 0.006µg/l to 0.38µg/l. Independent Water Networks carried out 10 tests of which four exceeded the standard in the range of 0.054µg/l to 0.274µg/l. Veolia Water East's 16 tests included six which exceeded the standard (0.023µg/l to 0.353µg/l). The Health Protection Agency has advised that no adverse health effects are expected from these levels in drinking water.

The Inspectorate has initiated enforcement action at all of the sites where levels of metalddehyde have been confirmed as exceeding the standard. The companies have entered into legally binding agreements to implement short, medium and long-term steps to address the problem (see *Annex 4*).

Sodium

Elevated levels of sodium in drinking water are most likely to occur as a result of a water softener being installed by the owner of the property upstream of the kitchen tap. Good practice for a householder seeking to reduce scaling of appliances is to arrange for installation of the softening equipment in such a way that water drawn for human consumption continues to come direct from the mains.

In 2009, a total of 1,901 tests were carried out for sodium across the region and all but three met the standard (200mg/l).

Anglian Water detected sodium at a level of 230mg/l in a sample from a consumer's tap in the Bures zone, in June. The company's investigation confirmed the presence of a water softener and advice was given to the

householder. The circumstances were similar in respect of two failures reported by Essex and Suffolk Water in March from consumers' taps in the Walpole zone (320mg/l sodium) and the Eye zone (210mg/l sodium).

Sulphate

The level of naturally occurring sulphates in water is highly variable and normally reflects the local geology with higher amounts tending to be found in brown coal regions and in salt areas. The finding of an increased level of sulphates, along with chlorides, can also indicate human pollution of a water source. Waters of naturally high sulphate content, particularly alkali and magnesium sulphates, act as a purgative. Even relatively small amounts may cause a temporary disturbance to the normal intestinal function. Higher levels have a tendency to cause diarrhoea, especially among children. The standard of 250mg/l is set to avoid these concerns and to assist with the selection of suitable sources of drinking water. In 2009, there was one failure to meet the standard from 1,569 tests (1 ANG).

Anglian Water detected sulphate at a level of 251mg/l from its Winterton Holmes works in Lincolnshire. The raw water for this site contains naturally occurring sulphate which is characteristic of the Northern Lincolnshire limestone geology. The local Health Protection Unit has advised on a maximum value of 500mg/l as a locally agreed health-related action value.

Turbidity

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

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

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

In 2009, a total of 5,056 samples from consumers' taps across the region were tested for turbidity and all but one met the standard of 4NTU

(1 ANG). A sample taken in the Bourne zone in July failed the standards for iron and manganese as well as turbidity (see *Iron* section).

Private water supplies

New private water supply regulations came into effect in England on 1 January 2010. These regulations implement the 1998 European Drinking Water Directive and replace the previous 1991 regulations. Initial guidance for local authorities on the implementation of the new legislation is available on www.privatewatersupplies.gov.uk and the Inspectorate's website (www.dwi.gov.uk). Whereas in the past the approach to improving these small water supplies has been informal and based on advice and encouragement, it is now an enforceable duty for these supplies to be risk assessed, reported and enforcement action taken whenever there is evidence of a breach of the drinking water standards or a potential risk to public health. The principle changes are summarised below.

Private distribution systems

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

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

- caravan and camp sites;
- military establishments;
- hospitals, school, college and university campuses where water is distributed to buildings which are occupied by other organisations;
- shopping centres where the water is distributed to organisations in shopping outlets, administration offices and other public buildings;
- airports/ports/train stations where water is distributed to organisations in various buildings within the transport site; and
- estates where water is distributed to organisations occupying other buildings such as the National Trust.

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

Main duties on local authorities

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

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

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

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

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

Local authorities must take steps to safeguard consumers if, as a consequence of their risk assessment or monitoring, a potential danger to human health is identified. These steps involve serving a notice to prohibit or restrict the use of the supply until appropriate remedial action has been taken. It is an offence for the relevant person not to comply with a notice and the local authority can have the notice enforced on application to the Magistrates' courts. The relevant person also has the right of appeal to the Magistrates' courts, if they are aggrieved by the Notice.

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

Implementing the new private water supply regulations – case example

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

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

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

Risk assessments

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

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

Table 10 shows the mitigation actions being carried out by companies in the Eastern region as a result of their risk assessment of drinking water supplies. Out of a total of 99 supply system risk assessments in the Eastern region, the Inspectorate has put in place 20 Regulation 28(4) Notices. The majority of these notices address risks relating to improvements at works operated by Anglian Water.

Table 10: Outputs of risk assessments within the region

Company	Number of risk assessments	Number of Reg 28(4) Notices ¹	What is Notice about?			
			Source protection	Change in source of supply	Distribution maintenance	Improvements at works
Anglian Water	60	20	1	-	-	19
Cambridge Water	24	-	-	-	-	-
Essex and Suffolk Water	13	-	-	-	-	-
Veolia Water East	2	-	-	-	-	-
Region overall	99	20	1	-	-	19
England and Wales	857	238	7	28	52	159

¹Some notices are classified under more than one category

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

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

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

Nature of parameter	Company				
	Anglian Water	Cambridge Water	Essex and Suffolk Water	Veolia Water East	Total
Natural properties	21,716	414	6,882	480	29,492
General water quality indicators	22,365	1,055	10,634	1,417	35,471
Microbiological indicators	27,159	3,268	3,484	668	34,579
Microbiological pathogens	733	51	177	19	980
Pesticides	25,489	547	18,831	573	45,440
Chemicals other than pesticides	18,655	340	8,744	296	28,035
Total tests	116,117	5,675	48,752	3,453	173,997
Number of abstraction points	295	24	57	10	386

Catchment risk assessment – case example

An important element of the water safety plan methodology that underpins regulatory risk assessments is dialogue between water companies and other stakeholders to identify hazards and manage risks within specific water supply catchments. An example of such work in the Eastern region relates to spillage of heating oil. The risk is focused on household oil storage tanks. Three companies (Anglian Water, Veolia Water Central and Essex and Suffolk Water) have contributed to and supported the development of an information leaflet about care of domestic oil heating tanks produced by Essex Contaminated Land Consortium and co-ordinated by Maldon District Council. The leaflet gives advice on the inspection and maintenance of heating oil tanks and the risk to drinking water relating to spillages in the vicinity of polyethylene water pipes. The initiative has the support of all local authorities in Essex. In 2009, Anglian Water produced a new leaflet on the subject and distribution of this leaflet and other

information was discussed with Severn Trent and the Consumer Council for Water.

Drinking water quality events

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

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

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

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

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

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

In 2009, companies in the Eastern region notified the Inspectorate of 85 events. Table 12 shows how these events were classified.

Table 12: Water quality events in the region in 2009

Nature of event	Risk assessment category (DWI)				
	1	2	3	4	5
Air in water	-	1	-	-	-
Chemical	1	12	3	-	-
Discoloured water	-	1	2	-	-
Inadequate treatment	-	-	-	-	-
Loss of supplies/poor pressure	3	6	-	-	-
Microbiological	3	9	4	-	-
Taste/Odour	4	6	3	-	-
Health concern	-	-	-	-	-
Public concern	3	16	1	-	-
Other	1	5	1	-	-
Region overall	15	56	14	-	-
England and Wales	63	213	141	4	1
Category 1 = Not significant, Category 2 = Minor, Category 3 = Significant, Category 4 = Serious, Category 5 = Major.					

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

About one-sixth (14 out of 85) of the events in the Eastern region during 2009 were of a type that necessitated a detailed investigation by an inspector. None were serious enough to warrant a major investigation by the Inspectorate. This compares favourably to those other regions in England where a much greater amount of inspector effort was spent on investigating events.

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

Musty taste and odour, Walpole, near Southwold, Suffolk

- Essex and Suffolk Water's Walpole water treatment works, in conjunction with other works, supplies around 15,000 consumers in Walpole, near Southwold in Suffolk, and the surrounding areas. The works was the subject of extensive refurbishment including modifications: an extra filter stage and change of function of the original filters. The works was commissioned and returned to service at the end of May 2009 and shortly thereafter a musty taste and odour was reported in samples from consumers' taps. The cause was traced to the re-use of old filter media. Media replacement and pipework cleaning was undertaken and completed in February 2010 and the company has now recognised the risks associated with the re-use of media in this way. This event highlights the importance of not relying on generic approaches when refurbishing works, instead site specific risk assessment and monitoring should guide any significant alterations to water treatment processes.

Fluoride dosing, Bedfordshire

- At Anglian Water's Newspring works in Bedfordshire overdosing of hexafluorosilicic acid occurred intermittently over a period of two weeks in August 2009. The cause was the linking temporarily of the chemical dosing equipment to the raw water flow meter, when the final water flow meter needed repairs. The impact of this was that for several minutes each day, when the iron removal pressure filters backwashed, the chemical dosing system received an incorrect elevated flow signal which caused short-term overdosing of hexafluorosilicic acid.

The high fluoride alarm settings at Newspring works were not compliant with the *Code of Practice on Technical Aspects of Fluoridation*, therefore the dosing equipment did not shutdown in a timely manner. The company missed numerous opportunities to identify this event: an elevated sample result, the automatic shutdown of the plant on two occasions, and numerous alarms received at the control centre. In summary, there were plenty of warning signs to enable prompt identification and mitigation of the risk of overdosing of fluoride at the site. Subsequently, Anglian Water has audited all its fluoridation equipment against the requirements of the Code of Practice. Non-conformities were either addressed immediately or the site removed from supply until the requirements of the Code of Practice could be met.

This event serves to reinforce to companies the importance of compliance at all times with the requirements of the Code of Practice including the training of all relevant staff. In light of two overdosing events in two consecutive years the Inspectorate is considering the status of the Code of Practice, and whether it should be made statutory in the future.

Petrol taste and odour, Biggleswade, Bedfordshire

- A consumer complaint of 'petrol' odour was received by Anglian Water from a block of flats in Biggleswade, Bedfordshire in January. The building was undergoing conversion into 30 separate flats and was unoccupied apart from builders and office workers who were using the water supply. Samples revealed the presence of low level hydrocarbons and polyaromatic hydrocarbons (PAHs). The property had previously had a temporary water supply from a 4" cast iron main, however, just prior to the event, a more permanent connection had been made via a spur from a 10" cast iron main and this ran to a closed valve just outside the building. The company concluded that the problem was likely to be associated with the 10" main and promptly severed the connection, abandoning that particular section of main, and making a new permanent connection to the 4" main. However, further sampling showed the continued presence of PAH compounds and other hydrocarbons at the property and also intermittently at upstream properties. Despite thorough ongoing investigations no firm reason has been found for the results from upstream properties. The supply pipe at the original property was replaced with a barrier pipe. The company has confirmed the presence of coal tar lining in the 10" main, updated its risk assessment and developed a mitigation action plan.

This event reinforces the potential risks associated with new connections and the need for companies to ensure that upfront risk assessments are effective and there is clear ownership of any remedial actions required to remedy problems. In this instance, although Anglian Water ultimately took ownership the Inspectorate were critical of the initial advice given to the site owner that the cause was pipework inside the building. The Inspectorate recommended the need for a review of policy on the use of barrier pipes.

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

Technical audit activity

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

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

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

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

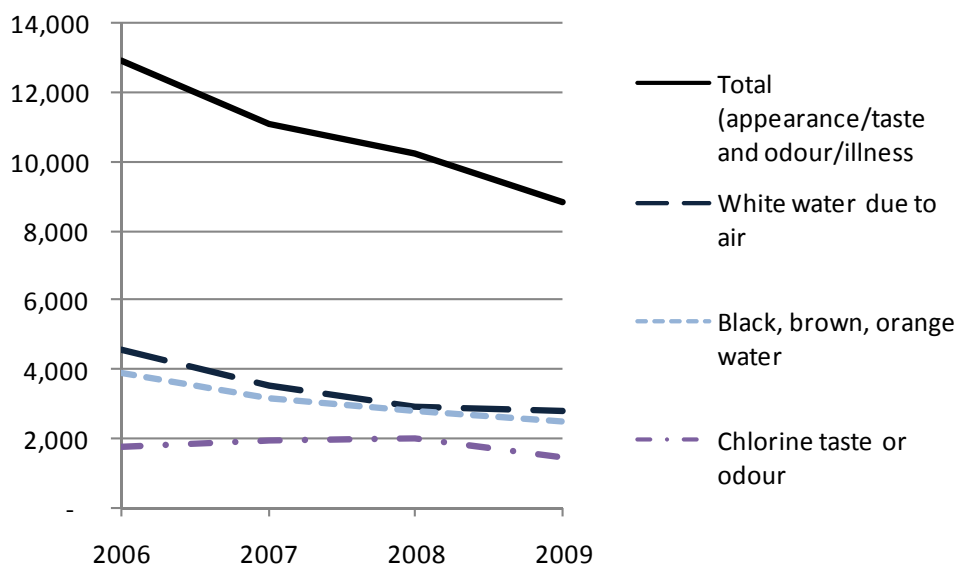
Site name	Audit topic	Main findings from audit
Anglian Water		
Metton works	Microbiology.	Generally satisfactory. Recommendations were made relating to: <ul style="list-style-type: none"> • on-line monitoring; • monitors and checks against standards.
Essex and Suffolk Water		
Hockley Tower	Microbiology.	Satisfactory.
Essex and Suffolk Water		
Langham works	Microbiology and pesticides.	Generally satisfactory. Recommendations were made relating to: <ul style="list-style-type: none"> • information records; • accurate monitors; • sample tap drainage; • sample tap labelling; • adequate risk assessment; • maintenance and monitoring of site records; • training for staff in restricted areas.
Audit of analytical service provider		
Hanningfield Laboratory	Analysis of microbiology, analytical quality control and performance, sample storage.	Laboratory used by Essex and Suffolk Water. Satisfactory.

Public confidence in drinking water quality

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

In the Eastern region the number of consumers reporting concerns about the quality of their tap water (appearance, taste and odour, or illness) has continued to decline and the improvement during 2009 was mainly due to the fall in the number of consumers reporting discoloured water (including white due to entrained air) and chlorine tastes. This is illustrated in Figure 14.

Figure 14: Numbers of consumer contacts 2006-2009



Figures 15 and 16 show consumer contact rates for appearance in 2006 and 2009.

Figure 15: Rate of consumer contacts per 1,000 population for appearance in 2006

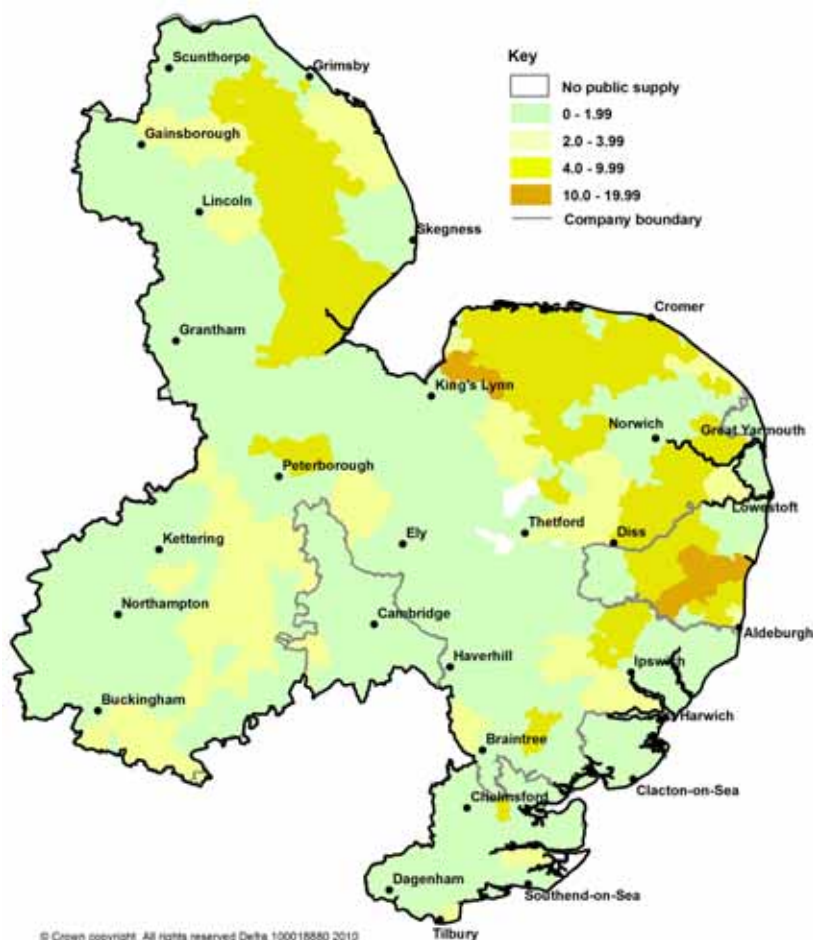
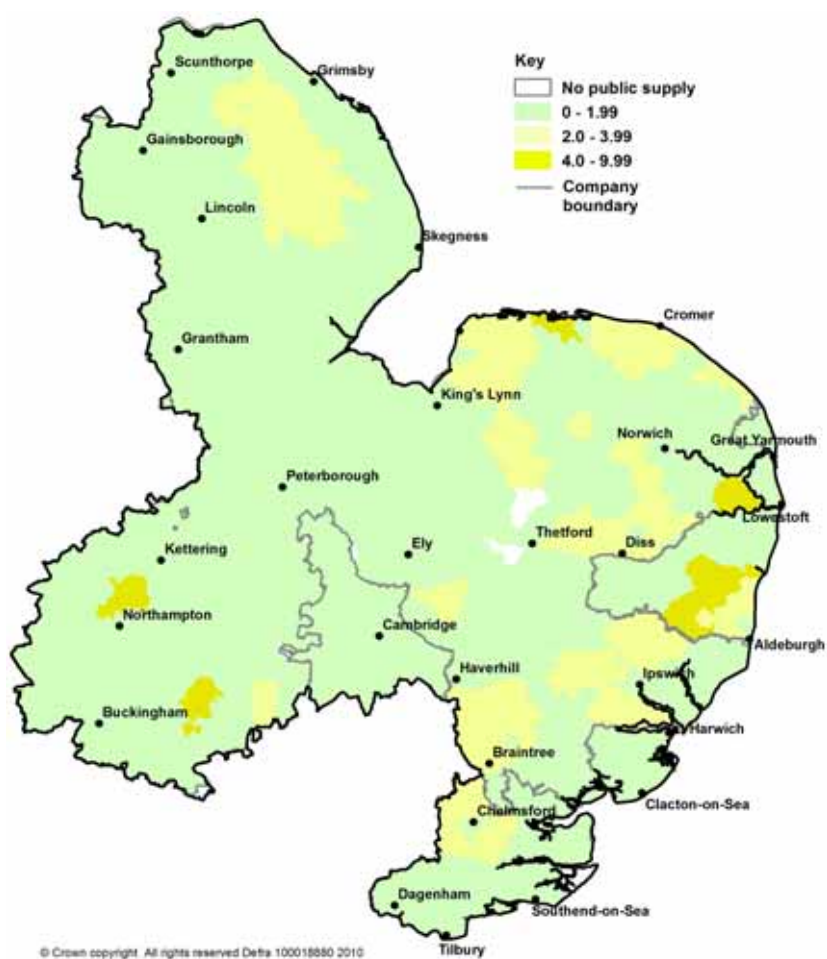


Figure 16: Rate of consumer contacts per 1,000 population for appearance in 2009



The maps illustrate the general fall in the number of contacts across large parts of Lincolnshire, North Norfolk, Suffolk and parts of Cambridgeshire

White water – air

White water caused by entrained air has been the main category of consumer concern about the appearance of tap water in the region; however, Anglian Water has made good progress over three years with reducing white water events and the number of these contacts in 2009 stood at 1,900 compared to over 3,500 in 2006. Although contact figures for other companies in the region are lower overall, they have not shown a similar declining trend.

Discoloured water – black, brown or orange

In comparison with other regions, the Eastern region has a relatively low consumer contact rate for discoloured water (black, brown or orange water) which stands at 0.4 contacts per 1,000 in 2009. The range for all regions in 2009 was 0.3 to 3.1 contacts per 1,000. It is pleasing to note the improvement in the Eastern region with these contacts down from 3,900 in 2006 to just over 2,500 in 2009. The figures for Anglian Water and Cambridge Water show that these two companies have contributed most to the reduction in discoloured water complaints. The figures for Essex and Suffolk Water and Veolia Water East have not demonstrated sustained improvement.

Taste and Odour – chlorine

Last year the Inspectorate reported a substantial rise nationally in contacts about a chlorine taste or odour in tap water and this increase was mirrored to a lesser extent in the Eastern region. Looking at the figures for 2009, the picture in the Eastern region this year is better, with contacts down from their peak of more than 2,000 in 2008 to just over 1,400 in 2009.

Complaints to the Inspectorate

When the response of a company to a consumer contact about drinking water quality fails to provide the necessary reassurance or remedy then the consumer may contact the Inspectorate for advice. In 2009, there were 12 consumers in the Eastern region sufficiently dissatisfied with the water company's initial response to raise the matter further with the Inspectorate, reasons for contacting the Inspectorate are provided in Table 17.

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

Category ¹	Number of contacts
Appearance	4
Taste and odour	5
Report of illness	1
Water quality concern	2
Number of contacts to DWI from consumers by company. ANG (9), ESK (3)	
¹ Categories are as defined in Information Letter 1/2006.	

Case example

In April, a landlord of a property in Market Rasen, Lincolnshire contacted the Inspectorate because he was unhappy with the advice he had been given by Anglian Water about hydrocarbons in his drinking water. His tenant had asked the company to test his drinking water for lead, but while taking these samples the company's inspector noticed a solvent

smell. Samples were taken from neighbouring properties and the local water supply and these were all satisfactory. The landlord was then advised by Anglian Water of the need to replace the 700 metre supply pipe across his land with a barrier pipe. Having taken soil samples and found no contaminated soil, the landlord decided to lay the new supply in blue medium density polyethylene pipe.

Samples taken after the new pipe was laid still contained traces of hydrocarbons. Both the tenant and landlord were advised that the only certain method of safeguarding the quality of the supply was to use a barrier pipe. The landlord was reluctant to do this due to the extra cost of impermeable pipe and the length of pipe involved and he questioned the need based on the low levels of hydrocarbons found. Anglian Water consulted the Health Protection Agency, the local authority and the Inspectorate before deciding to safeguard the supply with a new barrier pipe. In the decision-making process it was noted that actual levels at the tap may be variable and this would not necessarily be reflected in the spot samples taken. This complaint was resolved by collaborative multi agency working and it highlights how this is often necessary due to the range of different responsibilities that can arise for safeguarding water quality within buildings.

For further information on the Water Supply (Water Quality) Regulations 2000 or the microbiological and chemical parameters covered by the regulations please refer to the DWI website (www.dwi.gov.uk).

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

Annex 1

Further sources of information

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

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

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

Content of the CD

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

Water company look-up tables

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

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

Significant drinking water quality events in England and Wales 2009

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

Annex 2

Glossary and description of standards

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

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

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

Bulk supply	water supplied in bulk, usually in treated form, from one water company to another.
Cadmium	is rarely detected in drinking water and trace amounts are usually due to dissolution of impurities from plumbing fittings. A European health-based standard of 5µg/l applies.
Chloramine	a substance formed by reaction between chlorine and ammonia, used as a disinfectant in distribution systems because of its long-lasting properties compared to chlorine.
Chloramination	the process of generating a chloramine disinfectant residual in water leaving a treatment works.
Chloride	is a component of common salt. It may occur in water naturally, but it may also be present due to local use of de-icing salt or saline intrusion. An indicator parameter with a guide value of 250mg/l.
Chlorine residual	the small amount of chlorine or chloramines present in drinking water to maintain its quality as it passes through the water company's network of pipes and household plumbing.
Chromium	is not present in drinking water. A European health-based standard of 50µg/l applies.
<i>Clostridium perfringens</i>	is a spore-forming bacterium that is present in the gut of warm-blooded animals. The spores can survive disinfection. The presence of spores in drinking water indicates historic contamination that requires investigation. The standard is 0 per 100ml.
Coagulation	a process employed during drinking water treatment to assist with the removal of particulate matter.
Coliform bacteria	are widely distributed in the environment often as a result of human or animal activity, but some grow on plant matter. Their presence in a water supply indicates a need to investigate the integrity of the water supply system. The standard is 0 per 100ml.

Colony counts	are general techniques for detecting a wide range of bacteria, the types and numbers being dependent on the conditions of the test. These counts, if done regularly, can help to inform water management, but they have no direct health significance. The standard is 'no abnormal change'.
Colour	occurs naturally in upland water sources. It is removed by conventional water treatment. A national standard of 20mg/l on the Platinum/Cobalt (Pt/Co) scale applies.
Communication pipe	the connection from the water main to the consumer's property boundary.
Compliance assessment	a comparison made by the Inspectorate of data gathered by water companies against standards and other regulatory requirements.
Compound	a compound consists of two or more elements in chemical combination.
Concessionary supplies	historical free supplies of water for a householder, established when a company wanted to lay mains across land and the landowner might agree, subject to a permission, to take a supply of water from the main.
Conductivity	is a non-specific measure of the amount of natural dissolved inorganic substances in source waters. An indicator parameter with a guide value of 2,500 μ S/cm.
Contact tank	a tank, normally situated on a treatment works site, which forms part of the disinfection process. A disinfectant chemical (normally chlorine) is dosed into the water as it flows into the tank. The period of time that the water takes to flow through the tank allows sufficient 'contact' time for the chemical to kill, or deactivate, any viruses or pathogenic organisms that may be present in the water.
Contravention	a breach of a regulatory requirement.
Copper	in drinking water comes mostly from copper pipes and fittings in households. In general, water sources are not aggressive towards copper, but problems very occasionally occur on new housing estates. These 'blue water' events can be avoided by good plumbing practices. A European health-based standard of 2mg/l applies.

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

<i>Escherichia coli</i> and Enterococci	are bacteria present in the gut of warm-blooded animals. They should not be present in drinking water and, if present, immediate action is required to identify and remove any source of faecal contamination that is found. The standard is 0 per 100ml.
Event	water companies have to inform the Inspectorate about occasions when water quality or sufficiency is affected or when public confidence in drinking water quality may be impacted. The Inspectorate refer to these instances as 'Events'.
Filtration	the separation of suspended particulate matter from a fluid.
Fluoride	occurs naturally in many water sources, especially groundwater. It cannot be removed by conventional water treatment so high levels must be reduced by blending with another low fluoride water source. Some water companies are required by the local health authority to fluoridate water supplies as a protection against tooth decay. The drinking water standard ensures levels are safe in either circumstance. Fluoridation of water is a Department of Health policy. A European health-based standard of 1.5mg/l applies.
Geosmin	a substance produced by the growth of algae, normally in surface waters which gives rise to a characteristic 'earthy' or 'musty' taste or odour.
Granular activated carbon	an adsorbent filtration media used to remove trace organic compounds from water.
Groundwater	water from aquifers or other underground sources.
Hydrogen Ion (pH)	gives an indication of the degree of acidity of the water. A pH of 7 is neutral; values below 7 are acidic and values above 7 are alkaline. A low pH water may result in pipe corrosion. This is corrected by adding an alkali during water treatment. A specification of between 6.5 and 9.5 applies.
Improvement programmes	water company improvement works, these are legally binding on the company and each programme will remedy an actual or potential breach of a drinking water standard within a specified time period.

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

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

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

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

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

Tetrachloroethane and Trichloroethene	are solvents that may occur in groundwater in the vicinity of industrial sites. Where necessary they are removed by specialist treatment. A European health-based standard of 10µg/l for the sum of both substances applies.
Tetrachloromethane	is a solvent that may occur in groundwater in the vicinity of industrial sites. Where necessary it is removed by specialist water treatment. A national standard of 3µg/l applies.
Time of supply	the moment when water passes from the water company's pipework into a consumer's pipework.
Total indicative dose	is a measure of the effective dose of radiation the body will receive from consumption of the water. It is calculated only when screening values for gross alpha or gross beta (radiation) are exceeded. An indicator parameter with a guide value of 0.10mSv/year.
Total organic carbon	represents the total amount of organic matter present in water. An indicator parameter with a guide value of 'no abnormal change'.
Toxicology	the study of the health effects of substances.
Treated water	water treated for use for domestic purposes as defined in the regulations.
Trihalomethanes	are formed during disinfection of water by a reaction between chlorine and naturally occurring organic substances. Their production is minimised by good operational practice. A European health-based standard of 100µg/l applies.
Tritium	is a radioactive isotope of hydrogen. Discharges to the environment are strictly controlled and there is a national programme of monitoring surface waters. An indicator parameter with a guide value of 100Bq/l.

Turbidity	<p>is a measure of the cloudiness of water.</p> <p>At treatment works, measurement is an important non-specific water quality control parameter because it can be monitored continuously on line and alarms set to alert operators to deterioration in raw water quality or the need to optimise water treatment. An indicator parameter with a guide value of 1NTU.</p> <p>When detected at the consumer's tap it can arise from disturbance of sediment within water mains. A national standard of 4NTU applies in this case.</p>
Vinyl chloride	<p>may be present in plastic pipes as a residual of the manufacturing process of polyvinyl chloride (PVC) water pipes. Its presence in drinking water is controlled by product specification. A European health-based standard of 0.5µg/l applies.</p>
Water supply zone	<p>a pre-defined area of supply for establishing sampling frequencies, compliance with standards and information to be made publicly available.</p>
WHO	<p>World Health Organisation.</p>
Wholesome/wholesomeness	<p>a legal concept of water quality which is defined by reference to standards and other requirements set out in the regulations.</p>

Annex 3

Significant drinking water quality events

Date and duration	Area	Estimate of population affected	Nature and cause of the event	Main actions and findings from the Inspectorate investigation
19 Jan 2009 For 4 weeks (ANG)	Unoccupied building in Biggleswade, Bedfordshire	3	Hydrocarbon odour due to compounds in the mains and possible contaminated land.	<p>The Inspectorate classified this event as significant.</p> <p>Anglian Water action:</p> <ul style="list-style-type: none"> • Flushed mains. • Sampled affected area. • A large section of a 10" iron main was taken out of commission, to which the property had been connected just prior to the taste being discerned. The company suspect a combination of the nature of the lining of this main and low turnover, and possible contaminated land issues; hence the connection was relaid in barrier pipe. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • A recommendation was made in respect of inadequate follow-up sampling which delayed the investigation, as both mains supplying this property were not initially sampled. • A recommendation was also made regarding procedures for the use of barrier pipe to ensure that it is used appropriately, e.g. where land had a previous industrial use. • The company will continue with investigations into the root cause. • A recommendation was made to review the risks associated with the 10" main and incorporate any findings into the risk assessment for the local supply area.

Date and duration	Area	Estimate of population affected	Nature and cause of the event	Main actions and findings from the Inspectorate investigation
25 Mar 2009 For 3 days (ESK)	Part of Corringham, Essex	105	Boil water notice issued due to potential contamination of a mains repair excavation.	<p>The Inspectorate classified this event as significant.</p> <p>Essex and Suffolk Water action:</p> <ul style="list-style-type: none"> • Repaired main. • Flushed mains. • Issued a boil water notice. • Sampled affected area. • Local spray disinfection of the fittings and exposed pipework was carried out. • The boil notice was lifted on 28 March following satisfactory sample results. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • Company procedures required a full disinfection of the fittings and pipework should any substantial contamination be suspected. In this event only localised spray chlorination was undertaken, thus the company failed to comply with its own procedures which need to be clarified.
05 Apr 2009 For 1 day (CAM)	Properties in Guilden Morden, near Royston Cambridgeshire	1,000	Taste or odour due to stagnation and a coal tar lined main.	<p>The Inspectorate classified this event as significant.</p> <p>Cambridge Water action:</p> <ul style="list-style-type: none"> • Flushed mains. • Provided bottled water on request. • Review of procedures. • Subsequently replaced the main. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • No recommendations made. • The company undertook a thorough internal review of the event and improved their internal guidelines for sampling parameters during particular 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 May 2009 For 24 hours (CAM)	Rivey works supplying Linton, Cambridge	10,870	<i>E.coli</i> in a sample taken from the works.	<p>The Inspectorate classified this event as significant.</p> <p>Cambridge Water action:</p> <ul style="list-style-type: none"> • Sampled affected area. • Works process review undertaken and all processes found to be operating satisfactorily. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • The final water sample tap at the works was found to be worn and was replaced on 2 June. All samples taken from the final water leaving the works since and for the twelve months prior to the event have been satisfactory. • Criticisms were made about the level of detail provided in the company's report. • Recommended the need to ensure sampling staff promptly report any problems with sampling facilities, particularly final water sampling facilities. • The company should also consider a regular inspection programme for its final water sampling facilities so that any problems can be proactively identified and addressed as required. • A suggestion was made to consider the installation of on-line turbidity monitoring at the works if not already done.

Date and duration	Area	Estimate of population affected	Nature and cause of the event	Main actions and findings from the Inspectorate investigation
05 Jun 2009 For 24 hours (ANG)	Donnington	6,863	Brown discolouration due to planned flushing.	<p>The Inspectorate classified this event as significant.</p> <p>Anglian Water action:</p> <ul style="list-style-type: none"> • Flushed mains. • Sampled affected area. • Briefed local staff on lessons learnt. • Updated risk assessment with modelling information on preferred flow rates. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • Recommended appropriate sampling. • Supplied unwholesome water in breach of regulations.
20 Jun 2009 For 3 days (ANG)	Alconbury, Huntingdon	8	Microbiological contamination following a mains repair.	<p>The Inspectorate classified this event as significant.</p> <p>Anglian Water action:</p> <ul style="list-style-type: none"> • Repaired main. • Flushed mains. • Issued a boil water notice. • Provided bottled water on request. • Sampled affected area. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • Delays occurred in identifying the area affected due to changes in the location of the actual leak not being communicated. • The company did not disinfect the main following the positive sample results to avoid taste complaints as the area is chloraminated. • Recommended that procedures are updated to address potential mains contamination in chloraminated areas. • Delays in consumer warning through incorrect identification of area affected.

Date and duration	Area	Estimate of population affected	Nature and cause of the event	Main actions and findings from the Inspectorate investigation
28 Jun 2009 For 1 day (ANG)	Twelve Acre Wood works supplying Eriswell and Mildenhall area of Suffolk	55,000	Inadequate disinfection.	<p>The Inspectorate classified this event as significant.</p> <p>Anglian Water action:</p> <ul style="list-style-type: none"> • Flushed mains. • Increased chlorine residuals at service reservoir. • Repaired faulty equipment. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • Inadequate disinfection due to borehole pumps continuing to operate following works shut down. Disinfectant was added to the water manually. • Inadequate follow-up sampling.
15 Jul 2009 For 1 week (VEA)	Wivenhoe, Colchester	4,700	Microbiological contamination.	<p>The Inspectorate classified this event as significant.</p> <p>Veolia Water East action:</p> <ul style="list-style-type: none"> • Sampled affected area. • As part of a wider trihalomethane control strategy, the company had ceased rechlorination at Elmstead Market reservoir, but restarted it in response to this event. • The internal pipework of the original sample location was disinfected. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • Sample result notification procedures not followed. • An inappropriate sampling location was used during the investigation.

Date and duration	Area	Estimate of population affected	Nature and cause of the event	Main actions and findings from the Inspectorate investigation
11 Aug 2009 For 2 weeks (ANG)	Newspring works supplying Biggleswade and Pottton, Bedfordshire	40,363	Fluoride overdosing due to lack of adherence to the Code of Practice.	<p>The Inspectorate classified this event as significant.</p> <p>Anglian Water action:</p> <ul style="list-style-type: none"> • Reviewed procedures. • Shutdown fluoride dosing. • Reviewed all fluoride dosing plants for compliance with the Technical Code of Practice and corrected all non-conformities, or shut dosing plants down where non-conformities could not be rectified. • Reviewed training procedures and rebriefed staff where appropriate. • Reviewed response to exceedances of internal trigger for fluoride. • Inadequate training/competence of staff. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • Critical of numerous missed opportunities to prevent this event. • Noted the company has reviewed response to exceedances of the internal trigger for fluoride and reviewed relevant training. • Fluoridation plant at Newspring works was not fully compliant with the minimum requirements of the Technical Code of Practice for Fluoridation. • Recommended the company ensure there are robust systems in place to allow a full assessment of data which would identify when dosing systems are not in control. • Recommended prompt notification to the Inspectorate.

Date and duration	Area	Estimate of population affected	Nature and cause of the event	Main actions and findings from the Inspectorate investigation
13 Aug 2009 For 10 weeks (ESK)	Walpole works, supplying parts of Suffolk including Halesworth and Southwold	14,999	Musty taste or odour due to works refurbishment.	<p>The Inspectorate classified this event as significant.</p> <p>Essex and Suffolk Water action:</p> <ul style="list-style-type: none"> • Reviewed procedures. • Sampled affected area. • The company carried out extensive investigations into the cause of the problems, including the analytical methodology used. A programme of filter media replacement has been completed to resolve the issue. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • Investigations were undertaken into regulatory sample failures and consumer contacts were not received initially. Only one of these was described as 'stagnant', most were 'chlorine' taste and odour, although other odour descriptors used were 'wet dog' and 'pencil'. • Criticisms were made that no proactive consumer warning was initiated prior to the new treatment process going into supply. A suggestion was made to review procedures for commissioning of new plant to ensure that the need for consumer warning is considered as part of the process and initiated where appropriate. • Criticisms were made about the risk assessment for utilising 'old' media in advance of commissioning of the new plant. • Recommended that procedures and risk assessments are updated in light of lessons learnt from this event.

Date and duration	Area	Estimate of population affected	Nature and cause of the event	Main actions and findings from the Inspectorate investigation
26 Sep 2009 For 9 days (ESK)	Great Yarmouth	75	Microbiological contamination following the installation of a temporary bypass to facilitate rehabilitation.	<p>The Inspectorate classified this event as significant.</p> <p>Essex and Suffolk Water action:</p> <ul style="list-style-type: none"> • Flushed mains. • Issued a boil water notice. • Increased chlorine residuals in the distribution system. • Sampled affected area. • Review of procedures. • The bypass has now been removed following completion of the rehabilitation work. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • Analysis of samples was not timely to confirm the microbiological security of the overland bypass. • The company did not have procedures in place for installing a temporary overland main which must be addressed to incorporate lessons from this event.

Date and duration	Area	Estimate of population affected	Nature and cause of the event	Main actions and findings from the Inspectorate investigation
30 Oct 2009 For 1 day (ESK)	Tilbury and Grays area of Essex	16,867	Discolouration caused by flow reversal causing disturbance of trunk mains deposits following plant start up.	<p>The Inspectorate classified this event as significant.</p> <p>Essex and Suffolk Water action:</p> <ul style="list-style-type: none"> • Flushed mains. • Retrained staff. • Reviewed procedures. • In addition to the above the company is considering the installation of a manganese removal process at Linford Treatment works and, subject to the outcome of an inspection, a programme of work to clean the 15" trunk main may be undertaken. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • The site specific valve operating procedure was inadequate. • An inadequate risk assessment was carried out. • Inadequate training of staff in the operation to start up the works.
04 Nov 2009 For 24 hours (ANG)	Bletchley Central, Milton Keynes	13	Petrol taste or odour due to possible disturbance of coal tar mains lining.	<p>The Inspectorate classified this event as significant.</p> <p>Anglian Water action:</p> <ul style="list-style-type: none"> • Flushed mains. • Provided bottled water on request. • Sampled affected area. <p>DWI comments and findings:</p> <ul style="list-style-type: none"> • No recommendations made. • Suggested the company consider undertaking further investigations, such as coupon sampling, to ensure any coal tar lined pipes in the area are not likely to create an ongoing water quality problem.

Date and duration	Area	Estimate of population affected	Nature and cause of the event	Main actions and findings from the Inspectorate investigation
17 Dec 2009 For 10 days (ANG)	Little Dunham, Norfolk	680	Iron, turbidity due to back siphonage.	The Inspectorate classified this event as significant. <ul style="list-style-type: none">• Investigation ongoing.

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

Annex 4 Planned drinking water quality improvements

Company	Parameter, hazard or driver	Site	Due for completion	Status	Legal instrument
ANG	<i>Cryptosporidium</i>	Barrow	31-Aug-11	Ongoing	Notice
ANG	<i>Cryptosporidium</i>	Bedford	31-Jan-12	Ongoing	Notice
ANG	<i>Cryptosporidium</i>	Stoke Ferry	31-Jan-12	Ongoing	Notice
ANG	Hydrocarbons	Beck Row	31-Mar-15	Ongoing	Notice
ANG	Lead	Distribution system	31-Mar-15	Ongoing	Undertaking
ANG	Lead (upgrading of plumbosolvency measures)	Plumbo-solvency control at 15 sites	31-Mar-12	Ongoing	Undertaking
ANG	Lead (new plumbosolvency measures)	Plumbo-solvency control at 8 sites	31-Mar-12	Ongoing	Undertaking
ANG	Nickel	Beetley	31-Mar-13	Ongoing	Undertaking
ANG	Nitrate	Clay Hill	30-Apr-09	Completed 24-Feb-09	Undertaking
ANG	Nitrate	Congham	28-Feb-10	Completed 24-Nov-09	Undertaking
ANG	Nitrate	Fring and Bircham	28-Feb-10	Completed 18-Aug-09	Undertaking
ANG	Nitrate	Gayton	28-Feb-10	Completed 24-Nov-09	Undertaking
ANG	Nitrate	Glandford (catchment)	31-Mar-15	Ongoing	Undertaking
ANG	Nitrate	Glandford (treatment)	30-Apr-13	Ongoing	Undertaking
ANG	Nitrate	Irby Reservoir (catchment)	31-Mar-15	Ongoing	Undertaking
ANG	Nitrate	North Pickenham (catchment)	31-Mar-15	Ongoing	Undertaking
ANG	Nitrate	North Pickenham (treatment)	31-Oct-13	Ongoing	Undertaking
ANG	Nitrate	Riddlesworth (catchment)	31-Mar-15	Ongoing	Undertaking
ANG	Nitrate	Twelve Acre Wood/ Eriswell	31-Dec-09	Completed 23-Jun-09	Undertaking

Company	Parameter, hazard or driver	Site	Due for completion	Status	Legal instrument
ANG	Nitrate	Whitton	31-Dec-09	Completed 3-Dec-09	Undertaking
ANG	Nitrate and Total Pesticides	Risby (catchment)	31-Mar-15	Ongoing	Undertaking
ANG	Pathogens	Wilsthorpe	31-Mar-13	Ongoing	Notice
ANG	Pathogens – raw water	Branston Booths	31-Mar-12	Ongoing	Notice
ANG	Pathogens – raw water	Congham	31-Mar-12	Ongoing	Notice
ANG	Pathogens – raw water	Elsham	31-Mar-12	Ongoing	Notice
ANG	Pathogens – raw water	Fring	31-Mar-12	Ongoing	Notice
ANG	Pathogens – raw water	Hillington	31-Mar-12	Ongoing	Notice
ANG	Pathogens – raw water	Isleham	31-Mar-12	Ongoing	Notice
ANG	Pathogens – raw water	Littlecoates	31-Mar-12	Ongoing	Notice
ANG	Pathogens – raw water	Marham	31-Mar-12	Ongoing	Notice
ANG	Pathogens – raw water	Moulton	31-Mar-12	Ongoing	Notice
ANG	Pathogens – raw water	Raithby	31-Mar-12	Ongoing	Notice
ANG	Pathogens – raw water	Ravens-thorpe	31-Mar-12	Ongoing	Notice
ANG	Pathogens – raw water	Ryston (bexwell)	31-Mar-13	Ongoing	Notice
ANG	Pathogens – raw water	Southfields	31-Mar-12	Ongoing	Notice
ANG	Pathogens – raw water	Whitton	31-Mar-12	Ongoing	Notice
ANG	Pathogens/ Nitrate/ Total Pesticides	Barrow	31-Mar-15	Ongoing	Notice
ANG	Selenium	Tuddenham	31-Dec-11	Ongoing	Undertaking
ANG	Total Pesticides and Clopyralid	Riddles-worth	31-Mar-15	Ongoing	Undertaking
ANG	Total Pesticides and Metaldehyde	Alton	31-Mar-15	Ongoing	Undertaking
ANG	Total Pesticides and Metaldehyde	Covenham, Maltby Le Marsh and Mumby	31-Mar-15	Ongoing	Undertaking
ANG	Total Pesticides and Metaldehyde	Elsham	31-Mar-15	Ongoing	Undertaking

Company	Parameter, hazard or driver	Site	Due for completion	Status	Legal instrument
ANG	Total Pesticides and Metaldehyde	Grafham and Bedford	31-Mar-15	Ongoing	Undertaking
ANG	Total Pesticides and Metaldehyde	Great Wratting	31-Mar-15	Ongoing	Undertaking
ANG	Total Pesticides and Metaldehyde	Heigham	31-Mar-15	Ongoing	Undertaking
ANG	Total Pesticides and Metaldehyde	Marham	31-Mar-15	Ongoing	Undertaking
ANG	Total Pesticides and Metaldehyde	Ravens-thorpe	31-Mar-15	Ongoing	Undertaking
ANG	Total Pesticides and Metaldehyde	Stoke Ferry	31-Mar-15	Ongoing	Undertaking
ANG	Total Pesticides and Metaldehyde	Wing, Saltersford and Etton	31-Mar-15	Ongoing	Undertaking
ANG	Total Pesticides, Metaldehyde and Clopyralid	Ardleigh	31-Mar-15	Ongoing	Undertaking
ANG	Total Pesticides, Metaldehyde and Clopyralid	Bulk imports from Essex and Suffolk Water	31-Mar-15	Ongoing	Undertaking
ANG	Total Pesticides, Metaldehyde and Clopyralid	Pitsford	31-Mar-15	Ongoing	Undertaking
ANG	Trietazine	Riddles-worth (treatment)	30-Nov-11	Ongoing	Undertaking
CAM	Nitrate	Babraham	31-Mar-11	Ongoing	Undertaking
CAM	Nitrate	Euston	31-Mar-14	Ongoing	Undertaking
CAM	Nitrate	Fleam Dyke 36"	31-Mar-13	Ongoing	Undertaking
CAM	Nitrate	Melbourn and Lowerfield	31-Mar-15	Ongoing	Undertaking
CAM	Nitrate	Morden Grange	31-Mar-11	Ongoing	Undertaking
CAM	Source water quality/reliability	Odsey		Ongoing	Notice
ESK	Lead	Distribution system	31-Mar-15	Ongoing	Undertaking
ESK	Metaldehyde	Barsham	31-Mar-15	Ongoing	Undertaking
ESK	Metaldehyde	Chigwell	31-Mar-15	Ongoing	Undertaking
ESK	Metaldehyde	Hanning-field	31-Mar-15	Ongoing	Undertaking

Company	Parameter, hazard or driver	Site	Due for completion	Status	Legal instrument
ESK	Metaldehyde	Layer	31-Mar-15	Ongoing	Undertaking
ESK	Metaldehyde	Ormesby	31-Mar-15	Ongoing	Undertaking
ESK	Metaldehyde and Clopyralid	Langford	31-Mar-15	Ongoing	Undertaking
ESK	Metaldehyde and Clopyralid	Langham	31-Mar-15	Ongoing	Undertaking
ESK	Nickel	Rickinghall	31-Dec-14	Ongoing	Undertaking
IWN	Total Pesticides and Metaldehyde	Anglian Water (Wing and Grafham) bulk supply	31-Mar-15	Ongoing	Undertaking
VEA	Total Pesticides, Metaldehyde and Clopyralid	Ardleigh	31-Mar-15	Ongoing	Undertaking

Annex 5 Competition in the water industry

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

Inset appointments in place in 2009

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

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

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

Water supply licenses in place in 2010

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

Annex 6

Water company indices

Anglian Water Services Ltd

Water supply arrangements

Company assets		Water supplied	
Number of treatment works	135	Water supplied (MI/day)	1,236
Number of service reservoirs	384	Percentage from surface sources	45
Number of water supply zones	162	Percentage from ground sources	43
Length of mains pipe (km)	36,876	Percentage from mixed sources	12
Population served		Area of supply	
Population supplied	4,122,000	Bedfordshire, Buckinghamshire, Cambridgeshire, Essex, Suffolk Leicestershire, Lincolnshire, Norfolk, Northamptonshire, Nottinghamshire	
Number of local authorities	45		

Drinking water quality summary data

	Company figure			Industry average
	2007	2008	2009	2009
Overall drinking water quality¹	99.96%	99.98%	99.96%	99.95%
Water treatment				
Process Control Index	99.99%	99.99%	99.97%	99.97%
Disinfection Index	99.98%	99.97%	99.95%	99.94%
Distribution systems				
Distribution Maintenance Index	99.87%	99.89%	99.96%	99.86%
Reservoir Integrity Index	99.96%	99.96%	99.99%	99.96%
Building water systems				
Parameters influenced by domestic water systems	99.85%	99.93%	99.91%	99.87%

Consumer contacts

	Company figure			Industry average
	2007	2008	2009	2009
Informing consumers				
Total number	3,268	3,053	2,189	N/A
Rate per 1,000 population	0.79	0.74	0.53	1.38
Acceptability of water to consumers				
Total number	8,412	7,674	6,193	N/A
Rate per 1,000 population	2.04	1.85	1.5	2.21
Complaints to the Drinking Water Inspectorate				
A total of eight consumers of Anglian Water Services Ltd directly contacted DWI in 2009. One consumer contacted DWI on two separate occasions.				

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

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

Cambridge Water plc

Water supply arrangements

Company assets		Water supplied	
Number of treatment works	22	Water supplied (MI/day)	75
Number of service reservoirs	33	Percentage from surface sources	0
Number of water supply zones	10	Percentage from ground sources	100
Length of mains pipe (km)	2,314	Percentage from mixed sources	0
Population served		Area of supply	
Population supplied	306,630	Cambridge, Huntingdonshire	
Number of local authorities	3		

Drinking water quality summary data

	Company figure			Industry average
	2007	2008	2009	2009
Overall drinking water quality¹	100%	99.98%	100%	99.95%
Water treatment				
Process Control Index	100%	100%	100%	99.97%
Disinfection Index	99.97%	99.96%	99.98%	99.94%
Distribution systems				
Distribution Maintenance Index	100%	100%	100%	99.86%
Reservoir Integrity Index	99.88%	99.93%	99.94%	99.96%
Building water systems				
Parameters influenced by domestic water systems	100%	99.86%	99.97%	99.87%

Consumer contacts

	Company figure			Industry average
	2007	2008	2009	2009
Informing consumers				
Total number	338	326	298	N/A
Rate per 1,000 population	1.14	1.07	0.97	1.38
Acceptability of water to consumers				
Total number	350	362	323	N/A
Rate per 1,000 population	1.18	1.19	1.05	2.21
Complaints to the Drinking Water Inspectorate				
No consumers of Cambridge Water plc directly contacted DWI in 2009.				

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

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

Essex and Suffolk Water

Water supply arrangements

Company assets		Water supplied	
Number of treatment works	26	Water supplied (MI/day)	458
Number of service reservoirs	110	Percentage from surface sources	82
Number of water supply zones	53	Percentage from ground sources	6
Length of mains pipe (km)	8,625	Percentage from mixed sources	12
Population served		Area of supply	
Population supplied	1,794,000	Essex, Suffolk, Norfolk, London Borough of Barking and Dagenham, London Borough Redbridge, London Borough of Havering	
Number of local authorities	15		

Drinking water quality summary data

	Company figure			Industry average
	2007	2008	2009	2009
Overall drinking water quality¹	99.99%	99.96%	99.81%	99.95%
Water treatment				
Process Control Index	100%	100%	100%	99.97%
Disinfection Index	100%	99.95%	99.94%	99.94%
Distribution systems				
Distribution Maintenance Index	99.96%	99.92%	99.94%	99.86%
Reservoir Integrity Index	99.93%	99.96%	99.92%	99.96%
Building water systems				
Parameters influenced by domestic water systems	99.91%	99.78%	99.51%	99.87%

Consumer contacts

	Company figure			Industry average
	2007	2008	2009	2009
Informing consumers				
Total number	985	861	662	N/A
Rate per 1,000 population	0.55	0.48	0.37	1.38
Acceptability of water to consumers				
Total number	2,079	1,974	2,079	N/A
Rate per 1,000 population	1.16	1.11	1.16	2.21
Complaints to the Drinking Water Inspectorate				
A total of three consumers of Essex and Suffolk Water directly contacted DWI in 2009.				

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

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

Independent Water Networks Ltd

Water supply arrangements

Company assets		Water supplied	
Number of treatment works	0	Water supplied (l/day)	97,000
Number of service reservoirs	0	Percentage from surface sources	100
Number of water supply zones	3	Percentage from ground sources	0
Length of mains pipe (km)	10	Percentage from mixed sources	0
Population served		Area of supply	
Population supplied	1,000	Priors Hall and Long Croft Road, Corby and Great Billing Way, Northampton	
Number of local authorities	1		

Drinking water quality summary data

	Company figure			Industry average
	2007	2008	2009	2009
Overall drinking water quality¹	N/A	100%	99.94%	99.95%
Water treatment				
Process Control Index	N/A	N/A	N/A	99.97%
Disinfection Index	N/A	N/A	N/A	99.94%
Distribution systems				
Distribution Maintenance Index	N/A	100%	100%	99.86%
Reservoir Integrity Index	N/A	N/A	N/A	99.96%
Building water systems				
Parameters influenced by domestic water systems	N/A	100%	99.69%	99.87%

Consumer contacts

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

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

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

Veolia Water East Ltd

Water supply arrangements

Company assets		Water supplied	
Number of treatment works	2	Water supplied (MI/day)	30
Number of service reservoirs	8	Percentage from surface sources	10
Number of water supply zones	4	Percentage from ground sources	65
Length of mains pipe (km)	907	Percentage from mixed sources	25
Population served		Area of supply	
Population supplied	157,000	Essex	
Number of local authorities	2		

Drinking water quality summary data

	Company figure			Industry average
	2007	2008	2009	2009
Overall drinking water quality¹	99.92%	>99.99%	99.97%	99.95%
Water treatment				
Process Control Index	100%	100%	100%	99.97%
Disinfection Index	99.79%	100%	99.76%	99.94%
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	99.55%	99.98%	99.98%	99.87%

Consumer contacts

	Company figure			Industry average
	2007	2008	2009	2009
Informing consumers				
Total number	54	80	37	N/A
Rate per 1,000 population	0.36	0.52	0.24	1.38
Acceptability of water to consumers				
Total number	233	216	237	N/A
Rate per 1,000 population	1.54	1.42	1.51	2.21
Complaints to the Drinking Water Inspectorate				
No consumers of Veolia Water East Ltd directly contacted DWI in 2009.				

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

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



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