Drinking water 2005

Part 1

Drinking water standards and science

A report by the Chief Inspector
Drinking Water Inspectorate

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Contents

This report is Part 1 of three parts published annually by the Drinking Water Inspectorate.

Part 2 – Drinking water safety reviews the performance of the water industry in 2005.

Part 3 – Seven regional reports on water quality for Eastern, Midlands, Northern, Southern, Thames, Western and Wales regions.

All reports are available on the Inspectorate's website at http://www.dwi.gov.uk and on CD.

Drinking water standards and science

This part of Drinking water 2005 explains how drinking water is regulated and how the quality of drinking water is safeguarded and improved where necessary.

It also describes the European and National drinking water quality standards.

It goes on to outline how to find out more about drinking water research and how to remedy a problem. Finally it concludes with details of recent drinking water research.

How is drinking water quality regulated?

The legal framework

The Drinking Water Inspectorate (DWI) was formed in 1990 to provide independent reassurance that public water supplies in England and Wales are safe and drinking water quality is acceptable to consumers.

The regulatory framework for water supplies in England and Wales is set out in the Water Industry Act 1991 (the Act). The Act was recently amended by the Water Act 2003. The Act defines the powers and duties under which the Inspectorate operates and also the duties of water companies and licensees. Under the Act the authorities responsible for regulating the quality of public supplies are the Secretary of State for Environment, Food and Rural Affairs and the National Assembly for Wales. The Chief Inspector of Drinking Water is appointed by these authorities and acts on their behalf. As a result of the Water Act 2003 certain powers are vested directly in the Chief Inspector of Drinking Water.

A public water supply is one provided for the purposes of drinking, washing, cooking or food production by a statutorily appointed water company. A licence can be granted to a water company to supply water in part of another water company's supply area. This is known as an "inset appointment". From December 2005 non-domestic customers who use at least 50 Ml/y of water in a set of premises were able to purchase water from either their existing water company or from a licensed water supplier. There are two kinds of licence: a retail water supply licence (the holder can buy and sell water) and a combined licence (the holder can introduce its own source of water into the network, as well as buying and selling water).

Water supplies that are not provided by statutorily appointed water companies are known as private water supplies. The Act places responsibility on local authorities for checking the safety and sufficiency of all water supplies in their area, including private supplies. The role of the Drinking Water Inspectorate in respect of private supplies is to provide expert technical advice to local authorities. Less than 2% of the population rely on a private supply and most of these are in rural and remote parts of the countryside.

Wholesome drinking water

By law drinking water must be wholesome at the time of supply. Wholesomeness is defined by reference to drinking water quality standards and other requirements set out in regulations (available on the DWI website at http://www.dwi.gov.uk). Many of these standards come from the 1998 European Drinking Water Directive which came into force fully on 25 December 2003. The Directive focuses on those parameters of importance to human health but it also includes others that relate to the control of water treatment processes and the aesthetic quality of drinking water. The Directive allows member states to set additional or tighter national standards to secure the good quality of drinking water already achieved and to prevent it from deteriorating in the future. More information on the standards is given below.

Water testing

Water companies have a duty to collect samples and test these for each of the substances and organisms (known as parameters) in the regulations. Companies must make the results of this testing available to their customers. The Inspectorate's role is to carry out independent checks to ensure that this testing is being performed to a high standard of quality control. Laboratories must be accredited and follow recognised methods of analysis such as those published by the Standing Committee of Analysts (SCA) whose work is described later. The work of inspectors is aimed at providing public reassurance that the robustness and integrity of water company results is beyond question. The Inspectorate also publishes summaries of water company results with a commentary about the significance of the information for the benefit of consumers, businesses, local authorities, health professionals and other regulators. You can find the latest drinking water quality test results for each water company summarised on the DWI website and on the CD available with this report.

The safety of drinking water

The regulations make some specific provisions for drinking water safety. For example, there are provisions regarding the parasite, *Cryptosporidium.* Also there is a requirement to adequately treat and disinfect water supplies, and there are controls over the chemicals and materials of construction that may be used in public water supplies. Inspectors carry out independent technical audits of company records and sites to ensure that operational and management procedures are robust and appropriate. The Inspectorate also provides a technical resource to facilitate the approval, nationally, of chemicals and materials of construction by an independent expert committee, the Committee on Products and Processes. The list of approved chemicals and products and the minutes of the expert committee are available on the DWI website (at http://www.dwi.gov.uk/CPP/index.shtm).

What if something goes wrong?

Section 70 of the Act makes it a criminal offence for a water company to supply water that is unfit for human consumption. However the Act provides a defence for the water company if it can show that it had no reasonable grounds for suspecting that unfit water would be consumed or it had taken all reasonable steps and exercised all due diligence to secure that water was fit for human consumption on leaving its pipes. Water companies are required by law to notify the Inspectorate of any event which may give rise to a significant risk to consumers' health or otherwise cause them concern. Others, including consumers, can also make the Inspectorate aware of any such events. Inspectors will investigate and report on all these circumstances and, where necessary, initiate proceedings or issue a caution. When conducting their investigation inspectors follow the same procedures (PACE) as used by the police. The findings and recommendations of inspectors are made public.

Improving drinking water quality

Section 18 of the Act requires enforcement action to be considered whenever there is a breach of the drinking water standards. Water companies must by law investigate the cause of each adverse test result. They are also required to investigate when they believe there is a likelihood of failure at some time in the future. Companies can apply for authorisation on a temporary basis to supply water that does not meet one of the drinking water standards. The Inspectorate will assess the company's information and, where appropriate, issue an authorisation or take enforcement action requiring the companies to bring about the necessary improvements so that standards are met in a timely and cost effective way.

A short term departure from a standard does not mean that drinking water is unsafe during the time period set for the improvements to be carried out by the water company. This is because standards are set with a wide margin of safety, drawing on international expert consensus (World Health Organisation Drinking Water Guidelines) and taking into account a life time's consumption of drinking water. Nonetheless, before agreeing to a departure from a standard, the Inspectorate will seek evidence that the company has sought the agreement of local health officials.

The drinking water standards

The drinking water quality standards are set out in statute in the Water Supply (Water Quality) Regulations 2000 (England) and 2001 (Wales). The same standards are set out in equivalent regulations in Northern Ireland and Scotland. Each regulated substance or organism is known as a parameter. As well as setting standards for each parameter, the regulations state how often each one should be tested for and where the samples for testing should be taken. About one third of samples are taken from consumers' taps and the rest are taken from treatment works or treated water storage reservoirs. The parameters and standards are described below. Anyone wishing to find out more about how each standard is derived can do so by accessing the published WHO expert opinion (http://www.who.int). When the regulations are revised there is full public consultation by Defra Water Supply and Regulation Policy Division. This was last done in the year 2000.

Companies are required to follow methods of analysis set within the Directive to the Regulations. In England and Wales, national methods are published by the Standing Committee of Analysts.

Standing Committee of Analysts

The Standing Committee of Analysts (SCA) can trace its history to the publication in 1904 of the Royal Commission's Report on Sewage Disposal. The work was undertaken as a parliamentary standing committee established to advise on methods of analysis for water and wastewater. Following this, but prior to 1973, a number of similar committees were set up to produce related guidance. In 1973 the Department of the Environment established the SCA in its current form. Since then the stature and reputation of SCA has grown and by the 1990s its publications had become recognised as international reference methods of analysis. These were published as a series of priced booklets (via HMSO), which have blue covers and are commonly referred to as 'Blue Book' methods. Documents are now available free of charge and can be downloaded from the Environment Agency website at http://www.environment-agency.gov.uk/nls

Between 1990 and 1996, the SCA was sponsored by the Drinking Water Inspectorate, which provided the Chairman and Secretariat. In 1996, these responsibilities transferred to the Environment Agency. The Inspectorate has continued to be represented on the Main Committee, which oversees work and approves all publications. In 2004 the SCA Main Committee was re-constituted as an independent committee representing a wide range of interested parties, in line with the current recommendations for scientific advisory committees. The SCA now has a new Charter and Terms of Reference, both of which can be downloaded from the web page via the Environment Agency website at http://www.environment-agency.gov.uk/

The Main Committee manages the activities of SCA as well as providing a peer review of all methods prior to publication. Members of Working Groups normally undertake Method development work and report preparation, alternatively Panels are specifically set up to carry out the work and report to Working Groups. Membership of the Working Groups is made up of practising experts in their respective fields. All work and participation within SCA is carried out on a voluntary basis and this work could not continue without the good will and support SCA receives from its members and their respective sponsoring organisations. Anyone wishing to become a member or propose a method can contact the Secretary at
http://www.environment-agency.gov.uk/nls
In view of the voluntary nature of SCA, new work will only be considered if the proposal is accompanied by funding or support in kind.

Microbiological standards

To protect public health there are microbiological standards which have to be met at each treatment works and treated water service reservoir or tower. Microbiological tests are also undertaken on consumer tap samples. The significance of individual test results for each microbiological parameter at each location varies and a single positive result does not necessarily mean that water is unsafe to drink. Other information is required to assess water safety. Each of the standards is listed below:

Escherichia coli 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.

Cryptosporidium is a parasite that causes severe gastroenteritis and can survive disinfection by chlorine. In the UK continuous monitoring is undertaken at works classified by the company as being at significant risk. The treatment standard for these works is <1 oocyst per 10 litres.

Clostridium perfringens is a spore forming bacterium that is present in the gut of warm blooded animals. The spores can survive disinfection by chlorine. The presence of spores in drinking water indicates historic contamination that requires investigation. The standard is 0 per 100ml.

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".

European health-based chemical standards

European health-based standards for chemicals are set with a wide margin of safety on the basis of a life time's consumption of water and taking into account the amounts present in food. Just because a standard has been set for a substance does not mean that it is present in drinking water. The vast majority of the regulated chemicals are never found in drinking water in England and Wales. Others occur only in very specific or local circumstances which are described below.

Acrylamide 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.
The standard is 0.1 µg/l.

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

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

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

Benzo(a)pyrene is one of several compounds known as polycyclic aromatic hydrocarbons (PAHs). Their source in drinking water is as a result of 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. The standard is 0.01 µg/l.

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. The standard is 1 mg/l.

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.
The standard is 10 µg/l.

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

Chromium is not present in drinking water. The standard is 50 µg/l.

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. The standard is 2 mg/l.

Cyanide is not present in drinking water. The standard is 50 µg/l.

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

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. The standard is 0.1 µg/l.

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. The standard is 1.5 mg/l.

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. The standard is currently 25 µg/l. A stricter standard of 10 µg/l will apply from 2013 onwards.

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

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

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

Nitrite is sometimes produced as a by-product when chloramine is used as the essential residual disinfectant in a public water supply. Chloramine is the residual disinfectant of choice in large distributions systems because it is more stable and long lasting. Careful operation of the disinfection process ensures levels of nitrite are kept below the standard of 0.5 mg/l.

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. The standard for each compound is 0.03 µg/l.

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. The standard is 0.1 µg/l for each individual substance and 0.5 µg/l for the total of all pesticides. Water companies must test for those pesticides used widely in their area of supply. Pesticide monitoring thus varies according to risk.

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

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

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

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

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

National chemical and physical standards

The European Drinking Water Directive recognises the importance of maintaining a high quality of drinking water and for this reason several standards set in the original 1980 Drinking Water Directive (but not the 1998 Drinking Water Directive) have been continued in the form of National Standards. Most of the standards address levels that make the water unacceptable to consumers on the grounds of taste, odour or appearance.

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. The standard is 200 µg/l.

Colour occurs naturally in upland water sources. It is removed by conventional water treatment. The standard is 20 mg/l on the Pt/Co scale.

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. The standard is 200 µg/l.

Manganese is present naturally in many water sources and is usually removed during treatment. The standard is 50 µg/l.

Hydrogen Ion (pH) gives an indication of the degree of acidity of the water. A pH of 7 is neutral; values below 7 are acidic and values above 7 are alkaline. A low pH water may result in pipe corrosion. This is corrected by adding an alkali during water treatment. The standard is a range between 6.5 and 10.0.

Odour and Taste can arise as a consequence of natural processes in surface waters particularly between late spring through to early autumn. Water treatment with activated carbon or ozone will remove these natural substances. The standard which relates to the evaluations of a panel of people assessing samples in the laboratory is Dilution Number 3 at 25^{0}C.

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 if installation is not according to best practice. The standard is 200 mg/l.

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

Turbidity is a measure of the cloudiness of water. It can arise from disturbance of sediment within water mains. The standard is 4 NTU.

Additional monitoring parameters

In addition to the drinking water standards, water companies are required to test for additional indicator parameters to assist them with good water supply management and the control of drinking water quality. Some of these parameters have a European guide value set for the purpose of triggering an investigation of the water supply.

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

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

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

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

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. The guide value is 0.10 mSv/year.

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

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

Turbidity measurement is an important non-specific water quality control parameter at water treatment works because it can be monitored continuously online and alarms set to alert operators to deterioration in raw water quality or the need to optimise water treatment. The standard at treatment works is 1 NTU.

Drinking water science

The safety of drinking water is of such importance to public health that the underpinning science is kept under continuous review. The World Health Organisation manages a global process of rolling revision of drinking water guidelines on behalf of the water and health regulators in all countries. (Guidelines for Drinking Water Quality Third Edition http://www.who.int). All countries are able to contribute knowledge based on published peer reviewed research studies and on data from their national water and health surveillance programmes.

How to find out more about drinking water quality

If you want to find out about the quality of drinking water to your home or workplace then you should first contact the local water company. They can provide you with a report about your drinking water quality. The CD provided with this report gives summary data on drinking water quality for each water company in 2005.

If you are researching a particular aspect of drinking water quality it is important to seek information from a reliable and recognised source because whilst much is written about drinking water quality in the popular press, in lifestyle magazines and on the internet, most of this is aimed at promoting commercial products or services. Unfortunately such information is often misleading and inaccurate. Listed below are appropriate resources to help you get off to a sound start in your research.

Drinking Water Inspectorate (DWI)

http://www.dwi.gov.uk
+44 (0)207 082 8024
dwi.enquiries@defra.gsi.gov.uk

The Drinking Water Inspectorate (DWI) regulates public water supplies in England and Wales. The DWI is responsible for assessing the quality of drinking water in England and Wales, taking enforcement action if standards are not being met, and appropriate action when water is unfit for human consumption.

Drinking Water Quality Regulator For Scotland (DWQR)

http://www.dwqr.org.uk/
+44 (0)131 556 8400
regulator@dwqr.org.uk

The role of Drinking Water Quality Regulator for Scotland was established in the Water Industry Act 2002 to provide an independent check that Scottish Water is complying with the drinking water quality regulations.

Drinking Water Inspectorate – Northern Ireland (DWINI)

http://www.ehsni.gov.uk/environment/drinkWater/drinkWater.shtml
+44 (028) 90546474
EP@doeni.gov.uk

The Drinking Water Inspectorate is a unit within the Environment and Heritage Service, responsible for regulating the drinking water quality in Northern Ireland under the Water Supply (Water Quality) Regulations (Northern Ireland) 2002 and the Private Water Supplies Regulations (Northern Ireland) 1994.

World Heath Organisation (WHO)

http://www.who.int
postmaster@euro.who.int

The World Health Organization is the United Nations specialized agency for health. WHO's objective is the attainment by all peoples of the highest possible level of health. Health is defined in WHO's Constitution as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.

Foundation for Water Research (FWR)

http://www.fwr.org/
+44 (0)1628 891589
office@fwr.org.uk

An independent, not for profit organisation, having charitable status, that shares and disseminates knowledge about water, wastewater and research into related environmental issues.

UK Water Industry Research (UKWIR)

http://www.ukwir.co.uk
+44(0)20 7344 1807
mail@ukwir.org.uk

UKWIR facilitates collaborative research for UK water operators.
The UKWIR programme generates sound science for regulation and practice.

Consumer Council for Water (CCWater)

http://www.ofwat.gov.uk/aptrix/ofwat/publish.nsf/Content/navigation-watervoice-homepage
+44 (0)845 039 2837
enquiries@ccwater.org.uk

The Consumer Council for Water (CCWater) represents water and sewerage consumers in England and Wales. It took over from WaterVoice on 1 October 2005. CCWater is independent of both the water industry and the regulator.

Water UK

http://www.water.org.uk/home/about
+44 (0)20 7344 1844

Water UK is the industry association that represents all UK water and wastewater service suppliers at national and European level.

Water For Health

http://www.water.org.uk/home/water-for-health
+44 (0)20 7344 1844

Water for Health is a water industry initiative to guide and inform health professionals and health authorities, to stimulate interest and research and to help move water up the public health agenda.

Ofwat

http://www.ofwat.gov.uk/
+44 (0)121 625 1300/1373
enquiries@ofwat.gsi.gov.uk

The economic regulator for the water and sewerage industry in England and Wales. Ofwat provides incentives and encourages the companies to achieve a world-class service in terms of quality and value for customers in England and Wales.

Environment Agency (EA)

http://www.environment-agency.gov.uk/
+44 (0)8708 506 506

The Environment Agency is a public body for protecting and improving the environment in England and Wales. They are in place to ensure that air, land and water sources are protected.

Health Protection Agency (HPA)

http://www.hpa.org.uk/
+44 (0)20 7759 2700/2701
webteam@hpa.org.uk

The Health Protection Agency (HPA) is an independent body that protects the health and well-being of the population. The Agency plays a critical role in protecting people from infectious diseases and in preventing harm when hazards involving chemicals, poisons or radiation occur.
The HPA also prepares for new and emerging threats to health.

Committee on Products and Processes (CPP)

http://www.dwi.gov.uk/cpp/index.shtm
+44 (0)207 082 8024
cpp@defra.gsi.gov.uk

The Committee on Products and Processes for Use in Public Water Supply (CPP) advises the Secretary of State for Environment, Food and Rural Affairs and The National Assembly for Wales on chemicals, substances, products and processes that may be used in contact with water for public supply.

Food Standards Agency (FSA)

http://www.food.gov.uk/
020 7276 8829
helpline@foodstandards.gsi.gov.uk

The Food Standards Agency is an independent Government department set up by an Act of Parliament in 2000 to protect the public's health and consumer interests in relation to food. Their role in drinking water is limited to the quality of bottled water.

Making a complaint

If you believe there is something wrong with the drinking water in your home or workplace you should telephone your water company, or in the case of a private supply, contact your local authority Environmental Health Department. Water companies can arrange for tests to be done or check that your plumbing arrangements are correct and if not advise you what action you need to take. If the water company does not deal with your drinking water quality concerns appropriately you can ask the Drinking Water Inspectorate to look into the matter for you. An Inspector will make contact with the company on your behalf.

If you have a complaint about another aspect of your water service, such as your water charges or pressure you can take the matter up with your regional branch of the Consumer Council for Water.

If you are concerned about the quality of a water course or water body, you should contact the Environment Agency local office listed in the phone book. The Environment Agency deals with the protection of the environment and regulates water abstraction and discharges to the water environment.

Drinking water research

On behalf of the government (Department of Environment, Food and Rural Affairs) the Drinking Water Inspectorate manages the national Drinking Water Quality and Health Research Programme (DWQH). The research supports Defra and Welsh Assembly Government policy on the quality and regulation of water supplies and enables the UK to contribute to the international evidence base for drinking water quality regulations and standards.

Drinking water quality and health research programme

The Executive Summaries of DWQH research reports together with reports by the former Department of the Environment and Department of the Environment, Transport and the Regions since 1977 are posted on the Foundation for Water Research (FWR) website http://www.fwr.org with details of how to obtain copies of the full research reports. The FWR website also provides access to other reports concerning complimentary components of the European Commission's Framework Programmes. Research projects underway or completed during 2005 are summarised here. Some of the more recent DWQH reports are available in full on the Inspectorate's website (http://www.dwi.gov.uk).

The DWQH programme is conducted in line with its ROAME statement. ROAME stands for Rationale, Objectives, Appraisal, Monitoring and Evaluation. The ROAME statement requires a periodic independent evaluation of the programme to be carried out. Such an evaluation is currently being conducted by Watts and Crane Associates for research completed in the period 1996–2004. The evaluation will assess the policy relevance of the research, its scientific quality, and the use that is made of the findings and value for money. Key findings of the evaluation will be made public.

Enquiries should be addressed to DWI Enquiries, M03, 55 Whitehall, London, SW1A 2EY dwi.enquiries@defra.gsi.gov.uk

Research completed in 2005

Research area: *Cryptosporidium*	
Summary	**Contractor**
Effectiveness of UV treatment for *Cryptosporidium* in drinking water. Inter-laboratory trials to test the robustness of published cell culture techniques and preliminary treatment studies on the effectiveness of UV against *Cryptosporidium* have been completed. Only one of the cell culture assays was shown to give reproducible results.	UK Water Industry Research Ltd
Research area: Other health risks and monitoring	
Summary	**Contractor**
Study into the feasibility of investigating possible relationships between the supply of discoloured water and incidence of gastrointestinal illness. The first part of this study identified and reviewed relevant research. It found some studies linking increases in turbidity of final water to acute gastrointestinal illness but no studies that specifically addressed the issue of water discolouration incidents and possible risks of gastrointestinal illness. The second part of the study concluded that it was feasible to conduct both retrospective and prospective epidemiological investigations to test the hypothesis using existing health databases and company data on the extent of incidents. continued	London School of Hygiene and Tropical Medicine

Research area: Other health risks and monitoring	
Summary	Contractor
Review of evidence for a relationship between incidence of cardiovascular diseases and water hardness. The literature examining the association between drinking water hardness and cardiovascular disease was identified and reviewed, however a comparatively small proportion of these studies were considered of high quality. This review found evidence to support a protective effect of drinking water hardness against cardiovascular disease from a number of studies. At present there is insufficient evidence to confirm whether the apparent effect is causal or to elucidate its nature. The findings were presented at a WHO workshop on the issue in April 2006.	University of East Anglia
Research area: Materials testing and approval	
Summary	Contractor
Assessment of costs and benefits arising from Government and Water Industry participation in the development of European standards. This study evaluated the effectiveness of UK participation in the development of standards for drinking water construction products and chemicals. Based on responses to questionnaires, the contractor selected a number of cases for a more detailed assessment of costs and benefits. The study concluded that, based on the cases examined, standards work does appear to provide value for money. It made a number of recommendations to raise the profile of standards work amongst water companies. continued	WS Atkins Consultancy Ltd

Research area: Materials testing and approval	
Summary	Contractor
UK performance testing of EAS GCMS general survey. The UK requirement for application of gas chromatography-mass spectrometry (GCMS) analysis of materials testing leachates will be included in the European Acceptance Scheme (EAS) for drinking water construction products. This study provides data on the inter-laboratory performance of this test in the UK's designated testing laboratories. The performance achieved in this trial was better than in an earlier EU funded trial where less experienced laboratories participated. This suggests that with greater experience other European laboratories will be able to achieve similar performance to UK laboratories.	WRc-NSF Ltd ITS testing services Ltd Law Laboratories Ltd
Assessment of the performance of UK approved products in the German chlorine test. The German national test requirement for chlorine demand measurement on materials testing leachates is being included in the EAS. The initial validation stage of the study failed to produce results for control samples that met the requirements of the protocol.	WRc-NSF Ltd Intertek Testing and Certification Ltd
Research area: Regulation	
Summary	Contractor
Cost benefit analysis for drinking water quality standards and enhancements. This scoping study provided an overview of current practice in cost/benefit analysis, the appropriateness of existing approaches for use in a drinking water quality context and identified potential areas for development of cost/benefit analytical techniques for use in considering drinking water quality issues. DWI is considering whether to carry out further work in this area.	WS Atkins Consultancy Ltd

Research in progress 2005

Research area: *Cryptosporidium*	
Summary	**Contractor**
Investigation of genetic variation within *Cryptosporidium hominis* for epidemiological purposes. The aim of the study is to use molecular techniques to compare the prevalence, genetic variation and clustering within sporadic cases of *C. hominis*, and contrast with outbreak cases in north Wales and the south of England during autumn 2005.	UK *Cryptosporidium* Reference Unit
Research area: Other health risks and monitoring	
Summary	**Contractor**
Investigation of possible relationships between chlorination by-products and adverse pregnancy outcomes. A number of US studies have reported a tentative association between trihalomethane (THM) levels in drinking water and adverse pregnancy outcomes. This study provides a retrospective analysis of some 10 years of monitoring data for THM in water supply zones in England, Scotland and Wales. This data is being compared with data from National Registries on birth outcomes.	Imperial College London
Characterisation of waterborne *Aeromonas* species for their virulence potential. This project is jointly funded with American Water Works Association Research Fund (AWWARF) and involves collaborative work with three other research organisations. A total of 244 *Aeromonas* isolates have been obtained from various collections derived from both clinical and water samples. The isolates have been subject to biochemical characterisation, DNA analysis and virulence testing. The work may cast light on which waterborne isolates can cause disease in humans. continued	AWWARF

Research area: Other health risks and monitoring	
Summary	Contractor
Virobathe. This EU Framework funded study will investigate the feasibility of applying PCR-cell culture assays in the detection of viruses in bathing waters. Defra is funding the participation of its Central Science Laboratory (CSL) in this study in order to assess whether the techniques developed can be applied also in the detection of viruses in drinking water.	CSL
Uranium concentration in groundwater. This study is investigating whether groundwater supplies in England and Wales comply with the provisional WHO guideline value for uranium in drinking water.	British Geological Survey
Contaminant Candidate list viruses: evaluation of disinfection efficiency. The study is jointly funded with the AWWARF. It will identify and fill gaps in existing literature on disinfection efficacies of viruses listed on the US Contaminant Candidate List (CCL) to increase understanding of the extent of inactivation of viruses by common disinfectants used in drinking water treatment.	AWWARF
The formation and occurrence of haloacetic acids (HAAs) in drinking water. This project is jointly funded with the Engineering and Physical Sciences Research Council (EPSRC). The overall aim of the project is to increase our knowledge and understanding of the occurrence and formation of HAAs, with special reference to UK drinking water. It will investigate how the formation and quantity of individual HAAs are related to the nature of the organic substances (organic precursors) present in source and treated waters. It will attempt to model HAA formation for a number of UK drinking water supplies allowing the prediction HAA concentrations and the potential health impacts. continued	Imperial College London

Research area: Water treatment	
Summary	Contractor
Review of water treatment methodologies for removal of radionuclides from drinking water. This study is jointly funded with the Health Protection Agency (HPA). It is intended to provide knowledge on methods of water treatment to remove radionuclides from drinking water supplies and the potential risks associated with the removal of radionuclides and identify future research needs.	HPA
Research area: Water distribution	
Summary	Contractor
Distribution operation and maintenance strategies – what can we learn? Distribution, Operation and Maintenance Strategies (DOMS) are the key tool to ensure water companies operate and maintain their distribution system in a manner that maintains drinking water quality. This project is intended to define the best approaches to assessing performance of distribution system from a water quality point of view including what data is needed, how best to collect it and how companies should conduct risk assessments. A seminar in March 2006 included presentations by the three water companies who have been testing the draft guidance.	UK Water Industry Research Ltd
Research area: Materials testing and approval	
Summary	Contractor
The long term migration of substances from in-situ applied epoxy coatings. The research will look at leaching of chemicals from existing epoxy resin *in-situ* relined water mains primarily using GC-MS analysis. It will cover a range of water types and temperatures, all approved linings and various durations since the lining took place. continued	WRc-NSF Ltd

Research area: Materials testing and approval	
Summary	**Contractor**
Standardisation of the method for the assessment of microbial growth support potential of construction products in contact with drinking water. The Inspectorate is providing matching funding for a UK laboratory to participate in this EU funded project. The project is an inter laboratory trial assessing microbial growth in water in contact with construction products, based on determination of ATP.	The Water Quality Centre
Research area: Regulation	
Summary	**Contractor**
The effectiveness and benefits of drinking water regulation in England and Wales. As part of the Defra "Better Regulation" initiative, this study will assess the effectiveness of the current regulatory regime. Comparisons will be made with equivalent regimes in other EU countries.	University of Surrey
Research on global drinking water standards through a WHO network of regulators. The aim of the work is to: review existing literature in the area of water regulation; identify key topics and areas of work that need priority attention by water regulators; and develop concept notes and background papers on the most critical topics.	World Health Organisation
Water safety plans in public buildings. The study will produce free-standing guidance describing good practice in monitoring and management of water quality in public buildings as an answer to public health concerns related to a range of hazards; diverse exposure routes; and in some cases relating to sensitive sub-populations. continued	World Health Organisation

Research area: Private water supplies	
Summary	Contractor
Dissemination of research on private supplies through a network on small community supplies. The aim of the network is to facilitate the identification and characterisation of the principal technical and management problems and public health threats resulting from the neglect of small community supplies and to propose optimum ways of addressing such threats and problems in appropriate contexts.	World Health Organisation

guardians of drinking water quality

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