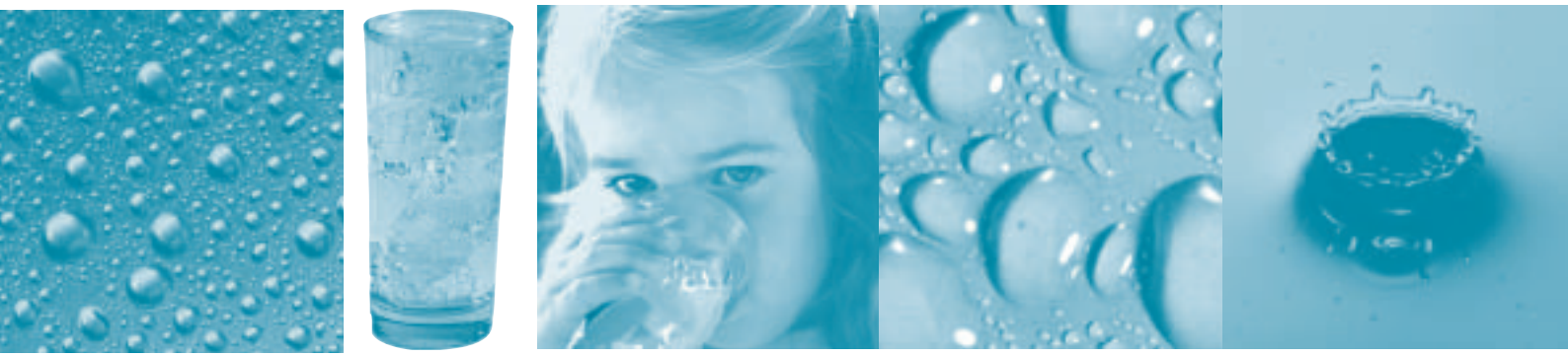

Annexes

Drinking Water in England 2004

Annex 1

Definitions and Glossary of Terms

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

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
Aquifer	water-containing underground strata
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
Authorities	the Secretary of State for the Environment, Transport and the Regions, or the National Assembly for Wales, as the context may require
Bulk supply	water supplied in bulk, usually in treated form, from one water company to another
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.
Coagulation	the process of aggregating colloidal and fine particulate matter into a settleable material
Compound	a compound consists of two or more elements in chemical combination
Compliance assessment	a comparison made by the Inspectorate of data gathered by water companies against standards and other regulatory requirements
Concessionary supplies	water supplies covered by historical agreements granting a property owner the right to a free water supply from a water undertaker
Contravention	a breach of a regulatory requirement
Crohn's Disease	crohn's disease is an inflammation of the bowel
Cryptosporidium	a protozoan parasite
Determination	an analysis for a specific parameter
Distribution systems	a water company's network of mains, pipes, pumping stations and service reservoirs through which treated water is conveyed to consumers
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

Environment Agency	the Environment Agency is responsible for maintaining or improving the quality of fresh, marine, surface and underground water in England and Wales
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
Epoxy resin relining	a rehabilitation process in which a cleaned section of iron water main is sprayed with a mixture of epoxy resin and hardener to produce a thin but strong coating of material on the inside of the main
Exceedence	synonym for contravention or breach (see above)
Filtration	the separation of suspended particulate matter from a fluid
Giardia	a protozoan parasite
Granular Activated Carbon	an adsorbent filtration media used to remove trace organic compounds from water
Groundwater	water from aquifers or other underground sources
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.
Incident	an event affecting or threatening to affect drinking water quality
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
Inspectorate	the Drinking Water Inspectorate
Legal requirements	the requirements as specified in the Water Act 1989, now consolidated into the Water Industry Act 1991, and the Regulations made under the Acts
MCPA	(4-chloro-2-methylphenoxy) acetic acid. An aryloxyalkanoic acid herbicide used for controlling broad-leaved weeds in grass or cereal crops.
MCPP	2-(4-chloro-2-methylphenoxy) propanoic acid. An aryloxyalkanoic acid herbicide used for controlling broad-leaved weeds in grass or cereal crops. Commonly referred to as Mecoprop.
Mean zonal compliance %	a measure of compliance with drinking water standards introduced by the Inspectorate in 2004 see zonal percentage compliance
Microbiological	associated with the study of microbes
Mycobacterium Avium Complex (MAC)	a group of bacteria responsible for pulmonary and non-pulmonary infections, particularly in the immuno-compromised
Mycobacterium Paratuberculosis (MAP)	specie of the *Mycobacterium Avium Complex* (MAC) group of organisms that causes Johne's disease in cattle

m^3/d	cubic metre per day
mg/l	milligram per litre (one thousandth of a gram per litre)
Ml/d	megalitre per day (one Ml/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)
ng/l	nanogram per litre (one billionth of a gram per litre)
New Regulations	the Water Supply (Water Quality) Regulations 2000 in England; the Water Supply (Water Quality) Regulations 2001 in Wales
Notice of Intention to make a Final Order	a necessary precursor to the issue of an Enforcement Order which must be advertised with a minimum of 28 days being allowed for representations or objections to the proposed Order
Ofwat	means the water industry's economic regulator
Oocyst	the resistant form in which *Cryptosporidium* occurs in the environment, and which is capable of causing infection
Operational Guidelines and Code of Practice (OGCP)	'*In situ* Epoxy Resin Lining – Operational Guidelines and Code of Practice. A source document for the Water Mains Rehabilitation Manual'. I C Warren. WRc 1989
Operational performance index	the average of the mean zonal compliance % a group of parameters most reflecting the operation and maintenance of either treatment works or distribution systems
Organoleptic	characteristics of a substance as detected by our senses, for example taste, odour or colour.
Outbreak Control Team (OCT)	a team set up to investigate possible waterborne outbreaks of cryptosporidiosis, comprising members of the medical profession, as well as representatives of relevant local authorities and water companies
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 in the Introduction to Part 3 of this Report.
Pathogen	an organism which can cause 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 or insecticide or related product (excluding medicines) used for the control of pests or diseases
pH value	a measure of the acidity or basicity related to the concentration of the hydrogen ion

Pipe materials selection and specification for use in contaminated land	Morris R, (2004) Pipe Materials Selection and Specification for use in Contaminated Land – Final Project Report/ UK Water Industry Research Limited ISBN 1 84057 354 6
Plumbosolvency	the tendency for lead to dissolve in water
Polycyclic aromatic hydrocarbons (PAH)	a parameter, parameter definitions can be found in the part 3 of this report
Pre- and post-renovation assessment (PPRA)	a programme of assessment before and after mains renovation to demonstrate justification for the work, and the improvements achieved by the renovation
Prescribed concentration or value (PCV)	the numerical value assigned to drinking water standards defining the maximal or minimal legal concentration or value of a parameter.
Private supplies	water 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), 2001 (Wales)
Regulation 31 letter	formal guidance given to water companies by the Inspectorate dealing with the use of approved chemicals and materials of construction
Regulatory requirements	see 'Legal requirements'
Remedial Action	action taken to improve a situation
Secretary of State	the Secretary of State for the Environment, Transport and the Regions
Service reservoir	a water tower, tank or other reservoir used for the storage of treated water within the distribution system
Sodium Chloride	a chemical commonly known as table salt
Springs	groundwater appearing at the surface at the outcrop of the junction of a permeable with an impermeable stratum
Drinking water Standards	the prescribed concentrations or values listed in Regulations
Statement of intent	formal written acknowledgement from a water company about action it plans to take to address an actual or potential regulatory breach,
Steroid	a fat-soluble organic compound found in living organisms
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
Technical audit	the means of checking that water companies are complying with their statutory obligations
Time of supply	the moment when water passes from the water company's pipework into a consumer's pipework
Trihalomethanes (THMs)	a group of compounds, formed during the disinfection process by the reaction between chlorine and naturally occurring organic substances present in water. The detection of THMs is indicative of the likely presence of other disinfection by products
Toxicology	the study of the health effects of substances
Treated water	water treated for use for domestic purposes as defined in the Regulations
Undertaking	a legally binding programme of work to take appropriate steps to secure or restore compliance with regulatory duties; given by a water company to the Secretary of State for the purposes of section 19(1)(b) of the Water Industry Act 1991
Water fittings regulations	Water Supply (Water Fittings) Regulations 1999
Water supply zone	a pre-defined area of supply for establishing sampling frequencies, compliance with standards and information to be made publicly available
Water Undertaker	a company appointed by the Director General of Water Services to supply drinking water to a defined area
Websites	location of information on the Internet - the DWI website is http://www.dwi.defra.gov.uk
WHO	World Health Organisation
Wholesome/Wholesomeness	a legal concept of water quality which is defined by reference to standards and other requirements set out in the Regulations
WRc	Water Research Centre (1989) plc and/or, as the context may require, its predecessor body
Mean Zonal compliance %	the percentage of results for a specific parameter which complied with the PCV - the mean zonal percentage compliance is the average of the zonal percentage compliances of every one of a company's zones, can also be applied to all zones in a region or a country

Annex 2

Summary of Local Authority responses to the Inspectorate's Questionnaire

In January 2005 the Chief Inspector went to all Local authority Chief Environmental Health Officers inviting their views on drinking water quality and the extent to which they are involved in local drinking water quality issues.

Overall Summary (England and Wales)

Number of local authorities	376
Number of responses	166
Satisfied with water quality	147
Generally satisfied	19
Not satisfied	0

Region	Local Authority	View on water quality	Attendence at water company liaison meetings?
Central	Amber Valley District Council	No response	
Central	Ashfield District Council	No response	
Central	Birmingham City Council	No response	
Central	Blaby District Council	Satisfied	Yes, by manager
Central	Bolsover District Council	No response	
Central	Bridgnorth District Council	No response	
Central	Bromsgrove District Council	No response	
Central	Broxtowe Borough Council	No response	
Central	Cannock Chase District Council	No response	
Central	Charnwood Borough Council	Satisfied	Yes, by manager
Central	Cheltenham Borough Council	No response	
Central	Chesterfield Borough Council	No response	
Central	Coventry City Council	No response	
Central	Derby City Council	No response	
Central	Derbyshire Dales District Council	No response	
Central	Dudley MBC	Generally satisfied	Yes, by EHO/EHP
Central	East Staffordshire District Council	No response	
Central	Erewash Borough Council	No response	
Central	Forest of Dean District Council	No response	
Central	Gedling Borough Council	Satisfied	Yes, by manager and EHP
Central	Gloucester City Council	No response	
Central	Harborough District Council	No response	
Central	Herefordshire Council	Satisfied	Yes, by EHO/EHP
Central	Hinckley & Bosworth Borough Council	No response	
Central	Leicester City Council	No response	
Central	Lichfield District Council	No response	
Central	Malvern Hills District Council	No response	
Central	Mansfield District Council	No response	
Central	Melton Borough Council	Satisfied	Yes, by EHO/EHP

Region	Local Authority	View on water quality	Attendence at water company liaison meetings?
Central	Newark and Sherwood District Council	No response	
Central	Newcastle under Lyme Borough Council	No response	
Central	North East Derbyshire Council	Satisfied	Not aware of meetings
Central	North Shropshire District Council	No response	
Central	North Warwickshire Borough Council	Satisfied	Yes, by EHO/EHP
Central	North West Leicestershire District Council	No response	
Central	Nottingham City Council	Satisfied	Yes, by manager
Central	Nuneaton & Bedworth Borough Council	Satisfied	Yes, by manager
Central	Oadby & Wigston Borough Council	No response	
Central	Oswestry Borough Council	Satisfied	Yes, by EHO/EHP
Central	Redditch Borough Council	Satisfied	Yes, by EHO/EHP
Central	Rugby Borough Council	Satisfied	Yes, by EHO/EHP
Central	Rushcliffe Borough Council	No response	
Central	Rutland County Council	Generally satisfied	Not aware of meetings
Central	Sandwell M.B.C	Satisfied	Yes, by manager and EHP
Central	Shrewsbury & Atcham Borough Council	No response	
Central	Solihull MBC	Satisfied	Yes, by manager and EHP
Central	South Derbyshire District Council	No response	
Central	South Shropshire District Council	Satisfied	Yes, by EHO/EHP
Central	South Staffordshire District Council	No response	
Central	Stafford Borough	Satisfied	Yes, by manager
Central	Staffordshire Moorlands District Council	No response	
Central	Stoke on Trent City Council	No response	
Central	Stroud District Council	Satisfied	Yes, by manager and EHP
Central	Tamworth Borough Council	No response	
Central	Telford and Wrekin Borough Council	Satisfied	Yes, by EHO/EHP
Central	Tewkesbury Borough Council	Satisfied	Not aware of meetings
Central	Walsall MBC	Satisfied	Yes, by manager
Central	Warwick District Council	Satisfied	Yes, by EHO/EHP

Region	Local Authority	View on water quality	Attendence at water company liaison meetings?
Central	Wolverhampton City Council	Satisfied	Yes, by EHO/EHP
Central	Worcester City Council	Satisfied	Not aware of meetings
Central	Wychavon District Council	Satisfied	Yes, by manager
Central	Wyre Forest District Council	No response	
Eastern	Babergh District Council	No response	
Eastern	Basildon District Council	Satisfied	Yes, by EHO/EHP
Eastern	Bassetlaw District Council	No response	
Eastern	Bedford Borough Council	No response	
Eastern	Boston Borough Council	Satisfied	Yes, by manager
Eastern	Braintree District Council	No response	
Eastern	Breckland Council	Generally satisfied	Not aware of meetings
Eastern	Broadland District Council	Satisfied	Yes, by EHO/EHP
Eastern	Cambridge City Council	No response	
Eastern	Castle Point Borough Council	No response	
Eastern	Chelmsford Borough Council	No response	
Eastern	Colchester Borough Council	No response	
Eastern	Corby Borough Council	No response	
Eastern	Daventry District Council	Satisfied	Not aware of meetings
Eastern	East Cambridgeshire District Council	No response	
Eastern	East Lindsey District Council	No response	
Eastern	East Northamptonshire	Satisfied	Yes, by manager
Eastern	Fenland District Council	No response	
Eastern	Forest Heath District Council	Satisfied	Not aware of meetings
Eastern	Great Yarmouth Borough Council	Satisfied	Yes, by EHO/EHP
Eastern	Huntingdonshire District Council	No response	
Eastern	Ipswich Borough Council	No response	
Eastern	Kettering Borough Council	No response	
Eastern	Kings Lynn & West Norfolk Borough Council	Satisfied	Yes, by EHO/EHP

Region	Local Authority	View on water quality	Attendence at water company liaison meetings?
Eastern	L.B. of Barking and Dagenham	No response	
Eastern	L.B. of Havering	No response	
Eastern	L.B. of Redbridge	No response	
Eastern	Lincoln City Council	No response	
Eastern	Maldon District Council	Satisfied	Not aware of meetings
Eastern	Mid Bedfordshire District Council	Satisfied	Yes, by manager
Eastern	Mid Suffolk Council	Satisfied	Yes, by EHO/EHP
Eastern	Milton Keynes Council	Satisfied	Yes, by EHO/EHP
Eastern	North Lincolnshire Council	Satisfied	Yes, by manager
Eastern	North East Lincolnshire Council	No response	
Eastern	North Kesteven District Council	No response	
Eastern	North Norfolk District Council	No response	
Eastern	Northampton Borough Council	Satisfied	Yes, by EHO/EHP
Eastern	Norwich City Council	No response	
Eastern	Peterborough Council	No response	
Eastern	Rochford District Council	No response	
Eastern	South Cambridgeshire District Council	No response	
Eastern	South Bedfordshire District Council	Satisfied	Yes, by manager and EHP
Eastern	South Holland District Council	Satisfied	Yes, by manager
Eastern	South Kesteven District Council	Satisfied	Yes, by manager
Eastern	South Norfolk Council	Satisfied	Yes, by manager
Eastern	South Northamptonshire Council	Satisfied	Yes, by manager
Eastern	Southend Borough Council	Satisfied	Yes, by manager
Eastern	St.Edmundsbury Borough Council	No response	
Eastern	Suffolk Coastal District Council	No response	
Eastern	Tendring District Council	No response	
Eastern	Thurrock Council	No response	
Eastern	Waveney District Council	Satisfied	Yes, by EHO/EHP
Eastern	Wellingborough Borough Council	No response	

Region	Local Authority	View on water quality	Attendence at water company liaison meetings?
Eastern	West Lindsey District Council	No response	
Northern	Allerdale Borough Council	No response	
Northern	Alnwick District Council	Satisfied	Yes, by manager
Northern	Barnsley Metropolitan Borough Council	No response	
Northern	Barrow-in-Furness Borough Council	No response	
Northern	Berwick upon Tweed District Council	No response	
Northern	Blackburn with Darwen Borough Council	No response	
Northern	Blackpool Borough Council	Satisfied	Yes, by manager and EHP
Northern	Blyth Valley Borough Council	No response	
Northern	Bolton Metropolitan Borough Council	No response	
Northern	Bradford Metropolitan City Council	No response	
Northern	Burnley Borough Council	No response	
Northern	Bury Metropolitan Borough Council	No response	
Northern	Calderdale Metropolitan Borough of	No response	
Northern	Carlisle City Council	No response	
Northern	Castle Morpeth Borough Council	No response	
Northern	Chester City Council	Satisfied	Yes, by manager and EHP
Northern	Chester-Le-Street District Council	Satisfied	Yes, by EHO/EHP
Northern	Chorley Borough Council	Satisfied	
Northern	Congleton Borough Council	No response	
Northern	Copeland Borough Council	Satisfied	Yes, by manager and EHP
Northern	Craven District Council	Satisfied	Yes, by manager
Northern	Crewe & Nantwich Borough Council	No response	
Northern	Darlington Borough Council	Satisfied	Yes, by EHO/EHP
Northern	Derwentside District Council	No response	
Northern	Doncaster Metropolitan Borough Council	No response	
Northern	Durham City Council	No response	
Northern	Easington District Council	No response	
Northern	East Riding Of Yorkshire Council	Satisfied	Yes, by EHO/EHP

Region	Local Authority	View on water quality	Attendence at water company liaison meetings?
Northern	Rotherham Metropolitan Borough Council	No response	
Northern	Rydale District Council	Satisfied	Yes, by EHO/EHP
Northern	Salford City Council	Generally satisfied	Yes, by manager and EHP
Northern	Scarborough Borough Council	No response	
Northern	Sedgefield Borough Council	No response	
Northern	Sefton Metropolitan Borough Council	No response	
Northern	Selby District Council	No response	
Northern	Sheffield City Council	Satisfied	Yes, by EHO/EHP
Northern	South Lakeland District Council	Satisfied	Yes, by EHO/EHP
Northern	South Ribble Borough Council	No response	
Northern	South Tyneside MBC	No response	
Northern	St Helens Council	Satisfied	Yes, by manager and EHP
Northern	Stockport MBC	Satisfied	Yes, by EHO/EHP
Northern	Stockton-On-Tees	Satisfied	Yes, by EHO/EHP
Northern	Sunderland City Council	Satisfied	Yes, by manager and EHP
Northern	Tameside MBC	Satisfied	Yes, by EHO/EHP
Northern	Teesdale District Council	No response	
Northern	Trafford Metropolitan Borough Council	No response	
Northern	Tynedale District Council	Satisfied	Yes, by EHO/EHP
Northern	Vale Royal Borough Council	No response	
Northern	Wakefield M.D.C	Satisfied	Yes, by EHO/EHP
Northern	Wansbeck District Council	Satisfied	Yes, by manager
Northern	Warrington Borough Council	Satisfied	Yes, by manager
Northern	Wear Valley District Council	Satisfied	Yes, by EHO/EHP
Northern	West Lancashire District Council	No response	
Northern	Wigan Council	Satisfied	Not aware of meetings
Northern	Wirral Metropolitan Borough	Generally satisfied	Yes, by EHO/EHP
Northern	Wyre Borough Council	No response	
Northern	York City Council	No response	

Region	Local Authority	View on water quality	Attendence at water company liaison meetings?
Southern	Adur District Council	Satisfied	Yes, by manager
Southern	Arun District Council	Satisfied	Yes, by manager and EHP
Southern	Ashford Borough Council	Satisfied	Yes, by EHO/EHP
Southern	Basingstoke & Deane Borough Council	Satisfied	Not aware of meetings
Southern	Brighton & Hove Council	No response	
Southern	Canterbury City Council	No response	
Southern	Chichester District Council	Satisfied	Yes, by EHO/EHP
Southern	Crawley Borough Council	Satisfied	Yes, by EHO/EHP
Southern	Dartford Borough Council	No response	
Southern	Dover District Council	No response	
Southern	East Hampshire District Council	Generally satisfied	Not aware of meetings
Southern	East Sussex County Council	No response	
Southern	Eastbourne Borough Council	Satisfied	Yes, by manager and EHP
Southern	Eastleigh Borough Council	Satisfied	Yes, by manager
Southern	Fareham Borough Council	Satisfied	Yes, by EHO/EHP
Southern	Gosport Borough Council	Satisfied	Yes, by manager
Southern	Gravesham Borough Council	Satisfied	Yes, by manager
Southern	Hastings Borough Council	Satisfied	Yes, by EHO/EHP
Southern	Havant Borough Council	Satisfied	Yes, by manager
Southern	Horsham District Council	No response	
Southern	Isle of Wight Council	Satisfied	Not aware of meetings
Southern	Lewes District Council	No response	
Southern	Maidstone Borough Council	Satisfied	Yes, by EHO/EHP
Southern	Medway Council	No response	
Southern	Mid Sussex District Council	Satisfied	Yes, by manager and EHP
Southern	Portsmouth City Council	Satisfied	Yes, by manager
Southern	Rother Borough Council	Satisfied	Yes, by EHO/EHP
Southern	Rushmoor Borough Council	Satisfied	Yes, by manager
Southern	Shepway District Council	No response	
Southern	Southampton City Council	No response	

Region	Local Authority	View on water quality	Attendence at water company liaison meetings?
Southern	Swale Borough Council	No response	
Southern	Test Valley Borough Council	Satisfied	Yes, by manager
Southern	Thanet District Council	No response	
Southern	Tonbridge and Malling Borough Council	No response	
Southern	Tunbridge Wells Borough Council.	Satisfied	Yes, by EHO/EHP
Southern	Wealden District Council	No response	
Southern	Winchester City Council	Satisfied	Yes, by EHO/EHP
Southern	Worthing Borough Council	Satisfied	Yes, by manager and EHP
Thames	Aylesbury Vale District Council	Satisfied	Yes, by EHO/EHP
Thames	Bracknell Forest Borough Council	No response	
Thames	Brentwood Borough Council	No response	
Thames	Broxbourne, Borough of	No response	
Thames	Cherwell District Council	No response	
Thames	Chiltern District Council	Satisfied	Yes, by manager
Thames	Cotswold District Council	Satisfied	Yes, by EHO/EHP
Thames	Dacorum Borough Council	Satisfied	Yes, by manager and EHP
Thames	East Hertfordshire Council	Satisfied	Yes, by manager and EHP
Thames	Elmbridge Borough Council	No response	
Thames	Epping Forest District Council	No response	
Thames	Epsom And Ewell Borough Council	No response	
Thames	Guildford Borough Council	No response	
Thames	Harlow District Council	No response	
Thames	Hart District Council	Satisfied	Yes, by EHO/EHP
Thames	Hertsmere Borough Council	No response	
Thames	L.B. of Barnet	No response	
Thames	L.B. of Bexley	No response	
Thames	L.B. of Brent	Satisfied	Yes, by manager and EHP
Thames	L.B. of Bromley	No response	

Region	Local Authority	View on water quality	Attendence at water company liaison meetings?
Thames	L.B. of Camden	Generally satisfied	Yes, by EHO/EHP
Thames	L.B. of Croydon	Satisfied	Yes, by EHO/EHP
Thames	L.B. of Ealing	Satisfied	Yes, by EHO/EHP
Thames	L.B. of Enfield	No response	
Thames	L.B. of Greenwich	No response	
Thames	L.B. of Hackney	No response	
Thames	L.B. of Hammersmith & Fulham	No response	
Thames	L.B. of Haringey	No response	
Thames	L.B. of Harrow	No response	
Thames	L.B. of Hillingdon	Satisfied	Yes, by manager
Thames	L.B. of Hounslow	No response	
Thames	L.B. of Islington	No response	
Thames	L.B. of Lambeth	No response	
Thames	L.B. of Lewisham	Satisfied	Yes, by manager
Thames	L.B. of Merton	No response	
Thames	L.B. of Newham	No response	
Thames	L.B. of Richmond Upon Thames	No response	
Thames	L.B. of Southwark	No response	
Thames	L.B. of Sutton	No response	
Thames	L.B. of Tower Hamlets	Satisfied	Yes, by EHO/EHP
Thames	L.B. of Waltham Forest	No response	
Thames	L.B. of Wandsworth	Satisfied	Yes, by EHO/EHP
Thames	Luton Borough Council	Satisfied	Yes, by manager and EHP
Thames	Mole Valley District Council	Satisfied	Yes, by manager
Thames	Newbury District Council	No response	
Thames	North Hertfordshire District Council	Satisfied	Yes, by EHO/EHP
Thames	Oxford City Council	Satisfied	Yes, by manager and EHP
Thames	R.B. of Kensington & Chelsea	No response	
Thames	R.B. of Kingston On Thames	No response	

Region	Local Authority	View on water quality	Attendence at water company liaison meetings?
Thames	R.B. of Windsor & Maidenhead	No response	
Thames	Reading Borough Council	No response	
Thames	Reigate and Banstead Borough Council	No response	
Thames	Runnymede Borough Council	No response	
Thames	Sevenoaks District Council	Satisfied	Not aware of meetings
Thames	Slough Borough Council	Satisfied	Yes, by manager and EHP
Thames	South Buckinghamshire District Council	Satisfied	Yes, by EHO/EHP
Thames	South Oxfordshire District Council	No response	
Thames	Spelthorne Borough Council	Satisfied	Yes, by manager
Thames	St. Albans and District Council	No response	
Thames	Stevenage Borough Council	No response	
Thames	Stratford-Upon-Avon District Council	No response	
Thames	Surrey Heath Borough Council	No response	
Thames	Swindon Borough Council	Satisfied	Yes, by EHO/EHP
Thames	Tandridge District Council	Generally satisfied	Yes, by manager
Thames	Thamesdown/Swindon District Council	No response	
Thames	Three Rivers District Council	No response	
Thames	Uttlesford District Council	Satisfied	Yes, by EHO/EHP
Thames	Vale Of White Horse District Council	No response	
Thames	Watford Borough Council	Satisfied	Yes, by EHO/EHP
Thames	Waverley District Council	No response	
Thames	Welwyn Hatfield	Satisfied	Yes, by manager and EHP
Thames	West Oxfordshire District Council	No response	
Thames	Westminster City Council	Satisfied	Yes, by EHO/EHP
Thames	Woking Borough Council	No response	
Thames	Wokingham District Council	Satisfied	Yes, by EHO/EHP
Thames	Workingham District	Satisfied	Yes, by manager and EHP
Thames	Wycombe District Council	Satisfied	Not aware of meetings
Wales	Blaenau Gwent	No response	

Region	Local Authority	View on water quality	Attendence at water company liaison meetings?
Western	Bath & North East Somerset	Satisfied	Yes, by manager
Western	Bournemouth Borough Council	Satisfied	Do not attend
Western	Bristol City Council	No response	
Western	Caradon District Council	Generally satisfied	Yes, by EHO/EHP
Western	Carrick District Council	No response	
Western	Christchurch Borough Council	No response	
Western	East Devon District Council	No response	
Western	East Dorset District Council	No response	
Western	Exeter City Council	Satisfied	Yes, by manager
Western	Kennet District Council	No response	
Western	Kerrier District Council	No response	
Western	Mendip District Council	No response	

Region	Local Authority	View on water quality	Attendence at water company liaison meetings?
Western	Mid Devon District Council	No response	
Western	New Forest District Council	Satisfied	Yes, by EHO/EHP
Western	North Cornwall District Council	Satisfied	Not aware of meetings
Western	North Devon District Council	No response	
Western	North Dorset District Council	Satisfied	Yes, by manager
Western	North Somerset Council	Satisfied	Not aware of meetings
Western	North Wiltshire District Council	Satisfied	Yes, by manager and EHP
Western	Penwith District Council	No response	
Western	Plymouth City Council	No response	
Western	Poole Borough Council	Generally satisfied	Do not attend
Western	Purbeck District Council	Satisfied	Yes, by EHO/EHP
Western	Restormel Borough Council	No response	
Western	Salisbury District Council	No response	
Western	Sedgemoor District Council	Satisfied	Yes, by manager
Western	South Gloucestershire District Council	No response	
Western	South Hams District Council	Satisfied	Yes, by manager
Western	South Somerset District Council	No response	
Western	Taunton Deane Borough Council	Satisfied	Yes, by EHO/EHP
Western	Teignbridge District Council	Generally satisfied	Not aware of meetings
Western	Torbay Borough Council	Generally satisfied	Yes, by EHO/EHP
Western	Torridge District Council	No response	
Western	West Devon Borough Council	No response	
Western	West Dorset District Council	No response	
Western	West Somerset District Council	Generally satisfied	Yes, by EHO/EHP
Western	West Wiltshire District Council	Satisfied	Yes, by EHO/EHP
Western	Weymouth & Portland Borough Council	Satisfied	Yes, by EHO/EHP

Region	Local Authority	View on water quality	Attendence at water company liaison meetings?
Wales	Blaenau Gwent	No response	
Wales	Bridgend CBC	No response	
Wales	Caerphilly	No response	
Wales	Cardiff County Council	Satisfied	Yes, by EHO/EHP
Wales	Carmarthenshire City Council	No response	
Wales	Conwy County Borough Council	Generally satisfied	Yes, by EHO/EHP
Wales	Cyngor Gwynedd	Satisfied	Yes, by manager
Wales	Cyngor Sir Ceredigion	Generally satisfied	Yes, by EHO/EHP
Wales	Denbighshire County Council	No response	
Wales	Flintshire County Council	No response	
Wales	Isle of Anglesey City Council	No response	
Wales	Merthyr Tydfil	No response	
Wales	Monmouth	No response	
Wales	Neath/Port Talbot CBC	No response	
Wales	Newport	No response	
Wales	Pembrokeshire City Council	No response	
Wales	Powys County Council	No response	
Wales	Rhondda-Cynon-Taff Borough Council	Satisfied	Yes, by EHO/EHP
Wales	Swansea City Council	Generally satisfied	Yes, by EHO/EHP
Wales	Torfaen County Borough Council	Generally satisfied	Yes, by manager and EHP
Wales	Vale of Glamorgan	No response	
Wales	Wrexham County Borough Council	Satisfied	Not aware of meetings

Annex 3

Statistical Calculations used in the Report

Author: Julian Ellis, WRc plc

The Chief Inspector's Report 2004 presents summaries of data submitted by Water companies to the Drinking Water Inspectorate.

This technical Annex, authored by the statistical advisor to the Inspectorate, describes the methods by which figures used in the report have been calculated.

Explained here are:

- The use of 1- and 99-percentile figures
- Mean zonal compliance for a parameter
- Mean zonal compliance for a company
- Mean zonal compliance for a region
- Mean zonal compliance for a country (England and Wales)
- Overall compliance
- Operational Performance Index – OPI (TIM)

Introduction

The Overall Quality Index (OQI) and Operational Performance Index (OPI) first appeared in the Chief Inspector's Report in the late 1990s, and a technical report was produced by WRc (DETR/DWI 4757) in 1999 which provided a comprehensive account of the statistical methodology used in their calculation.

The 2004 report contains a number of innovations in its presentation of statistical summaries. The basic principles whereby any Index is built up from Mean Zonal Compliance values remain unaltered. However, there are additional complications caused by changes in the role of supply-point sampling under the new Regulations, and the introduction of Regional summaries. There has also been a switch to a new three-parameter version of the OPI.

Finally, the new regulations enable the Inspectorate, for the first time, to report on measured values or concentrations of chemicals and organisms. This has required a view to be taken on how to appropriately represent extremes of performance in summary statistics tables, and this has led to the decision to provide 1- and 99-percentiles rather than minimum and maximum values.

In view of these various changes, this Annex has been included in order to provide an updated account of the statistical methodology used by the Inspectorate. Note, however, that it does not deal with the calculation of confidence intervals. The method used in past years is currently in process of being refined by WRc in conjunction with the Department of Epidemiology, Statistics and Public Health at Cardiff University - and this exercise needs to be concluded before the method can be extended to incorporate the new developments.

Percentiles

Background

Use of the minimum and maximum to summarise extremes in quality has two statistical drawbacks. The main problem is that, for a given underlying population, the more samples that are taken the greater the maximum is likely to be (and conversely for the minimum). So if works A is sampled 100 times and an identical works B is sampled 1000 times, the maximum for B is likely to be substantially greater than that for A - and this would give the spurious message that B was worse than A.

A second problem is that, even if the numbers of samples are the same for all works being compared, the minimum and maximum become increasingly remote from the main body of the data as the number of samples increases beyond, say, a few hundred. By definition, the maximum measures the single most abnormal event encountered over the monitoring period, and this will give less and less insight into what happens at the works for the great majority of the time. (As for the minimum, this will become increasingly irrelevant, as a substantial proportion of water quality data is at or near the detection limit in any case.)

Both these problems are avoided by instead reporting extreme percentiles of the data. Specifically, it has been decided to use the 1-percentile and the 99-percentile (commonly abbreviated to '1%ile' and '99%ile'). These define a range within which 98% of sample values will fall. That is, only 1% of sample values fall below the 1%ile, and only 1% of values exceed the 99%ile.

Calculating 1- and 99-percentiles

Given the high degree of skewness typically shown by water quality data, it is important to use an estimation method that makes no assumptions about the statistical form of the underlying population. (Such methods are termed 'non-parametric'.) The method used in this report is the Weibull convention. This works as follows.

Given N random samples, the P%ile is estimated by the 'r-th' ranked value, where: r = (P/100)x(N+1).

For example, to estimate the 80%ile from 19 samples, r is calculated as: r = (80/100)x(19 +1) = 0.8x20 = 16.

Thus if the 19 samples are sorted into increasing order, the 16th value (i.e. the 4th highest) will provide the required percentile estimate.

In that example, r conveniently turned out to be a whole number. This is not generally the case - in which event the rule is to interpolate between the two nearest ranked values. For example, for estimating the 99%ile from 365 samples the required value of r is 0.99x366 = 362.34. The estimate is therefore calculated as the point 34% of the way between the 362nd and 363rd ranked sample values.

Example

During 2004 Dee Valley took a total of 1221 turbidity samples at their eight treatment works. To estimate the 1%ile and 99%ile for the pooled turbidity population, the first step is to calculate the Weibull ranked values. These are:

0.01x(1221+1) = 12.22, and 0.99x(1221+1) = 1209.78.

Next, the data must be ranked. The table below shows the first 20 and final 20 values of the ranked data.

Rank	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
Value	0.07	0.07	0.08	0.1	0.1	0.11	0.11	0.11	0.11	0.11
Rank	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*
Value	0.12	**0.12**	**0.12**	0.13	0.13	0.13	0.13	0.14	0.14	0.14
Rank	*1202*	*1203*	*1204*	*1205*	*1206*	*1207*	*1208*	*1209*	*1210*	*1211*
Value	1.77	1.92	1.98	2.02	2.1	2.24	2.3	**2.35**	**2.38**	2.5
Rank	*1212*	*1213*	*1214*	*1215*	*1216*	*1217*	*1218*	*1219*	*1220*	*1221*
Value	2.5	2.71	2.89	2.94	2.94	2.95	2.99	3.62	4.06	7.3

Now the two percentiles can be determined. The 1%ile is straightforward: the 12th and 13th values are equal, and so the 1%ile is 0.12 turbidity units. The 99%ile is estimated by the '1209.78th' sample value. This is calculated as 2.35 + 0.78x(2.38 - 2.35), namely 2.37 turbidity units.

Special cases

Too little data

The method described above needs a minimum of 99 samples to work. In the few instances where there are fewer than 99 samples, the minimum and maximum are reported instead, with a footnote to that effect.

Whole number data

Where the data consists of whole numbers (e.g. bacterial counts), interpolation will sometimes produce a non-integral result - which is clearly inappropriate. The convention in such cases is to round the estimate outwards to the next more extreme integer. (That is, 1%iles are rounded down and 99%iles are rounded up.)

Less-than values

Ambiguities can arise when the data to be ranked contains values reported as being below the detection limit ('less-than values') - especially if the detection limit itself varies over the data set. If more than 1% of data values are less-thans, the 1%ile is simply reported as being 'less than the detection limit'. Otherwise, the convention has been to rank the data ignoring the presence of the less-than qualifier. Similarly, the 99%ile is reported as 'less than the detection limit' if more than 99% of data values are less-thans.

For some data sets all values attract a less-than qualifier; thus it is possible for both the 1%ile and the 99%ile to have the same value, e.g. <0.003 and <0.003. In addition to this, the limit of detection may have been changed by the laboratory during the year and the case can then arise where all values in the data set attract a less-than qualifier but the 1%ile and 99%ile have different values, e.g. <0.003 and <0.004.

Quality of data submissions

Although the Inspectorate has collaborated closely with companies about the quality of their data submissions, in this first year of reporting to the new requirements, some quality issues have only been identified at a late stage in the production of the report. One of these relates to differences in the number of significant figures used by companies when reporting values for a given parameter. Thus when calculating percentile values, the Inspectorate has, in some cases, found it necessary to round these values to reflect the number of significant figures in the original submission by the company. The effect of this is that, for a given parameter, the number of significant figures reported in the data tables can be different from one company to another.

Mean Zonal Compliance for a Parameter

Definitions

Zonal Compliance

For any one zone, the Zonal Compliance for any parameter is:

- the percentage of samples meeting the PCV.

Interpretation of Supply point samples

In previous years, where a parameter was monitored at a supply point rather than in the zones its results were assigned to each of the zones served by that supply point. That approach led to an element of double-counting, and is no longer being used. Instead, each supply point is viewed as though it were another zone within the company, and 'Supply point Compliance' is calculated in exactly the same way as Zonal Compliance.

Mean Zonal Compliance

For any parameter, Mean Zonal Compliance (MZC%) is defined as:

- the arithmetic mean of the Zonal Compliance values for any specified group of zones.

For those parameters that are monitored at a mixture of supply points and zones, it would be too cumbersome to refer to 'Mean Zonal and/or Supply point Compliance'. In all that follows, therefore, the term 'Mean Zonal Compliance' will be taken to mean:

- the arithmetic mean of the Zonal Compliance values for any specified group of zones and/or supply points.

Four specific groupings are of particular interest:

- all zones in a Company;
- all zones in a Region (a special case being all zones in Wales);
- all zones in England; and
- all zones in England & Wales.

The detailed MZC% calculations for these various groupings are illustrated with worked examples in the following sections.

Mean Zonal Compliance for a Company

Consider the example of manganese (parameter A023) in Dŵr Cymru Welsh Water. The Zonal Compliance results for the 91 sampling locations are summarised below. The values are 100% in all but four zones. The sum of the 91 Zonal Compliance values is 9091.796 (see the shaded column), and so the Mean Zonal Compliance for manganese in Dŵr Cymru Welsh Water is 9091.796/91 = 99.910%. (Note that the third decimal place would not normally be reported, but is shown here and elsewhere simply to make the details of the calculation clearer.)

Sampling location	No of cases	No of samples	No > PCV	% Zonal Compliance	Numerator of MZC calculation
Zones	87			100.000	8700.000
	1	71	1	98.592	98.592
	1	58	1	98.276	98.276
	1	49	1	97.959	97.959
	1	33	1	96.970	96.970
Total	91				9091.796
Mean Zonal Compliance:				**99.910**	

Mean Zonal Compliance for a Region

Mean Zonal Compliance for a region is calculated in exactly the same way as described in the previous section, but with the zones (or supply points where relevant) now extending across all companies in the region.

There is an additional complication with Wales, Northern and Central regions because three companies have zones or supply points in two different regions, as summarised below:

Type of sampling location		Dee Valley	Dŵr Cymru Welsh Water	Severn Trent
Zones	Overlapping	4 in Wales/Northern	4 in Wales/Central	3 in Central/Wales
Zones	In neighbouring region	3 in Northern	8 in Central	4 in Wales
Supply pts	In neighbouring region	2 in Northern	4 in Central	0

Continuing with the manganese example, the calculation of MZC% for Wales is set out in the following table. There are now 79 zones in Dŵr Cymru Welsh Water: the original 91 locations seen earlier but excluding the 12 zones either in or overlapping with England. Of these, 76 have 100% Zonal Compliance and the other three are as tabulated earlier.

The remaining 16 zones comprise 11 from Dee Valley (all but one of which has 100% Zonal Compliance), one from Albion (100%), and the four Severn Trent zones wholly in Wales (all but one of which has 100% Zonal Compliance).

Company	No of cases	No of samples	No > PCV	% Zonal Compliance	Numerator of MZC calculation
Dŵr Cymru Welsh Water	76	–	–	100.000	7600.000
Dŵr Cymru Welsh Water	1	58	1	98.276	98.276
Dŵr Cymru Welsh Water	1	49	1	97.959	97.959
Dŵr Cymru Welsh Water	1	33	1	96.970	96.970
Dee Valley	10	–	–	100.000	1000.000
Dee Valley	1	13	1	92.308	92.308
Albion	1	–	–	100.000	100.000
Severn Trent	3	–	–	100.000	300.000
Severn Trent	1	2	1	50.000	50.000
Total	95	–	–	–	9435.512
Mean Zonal Compliance:				**99.321**	

The calculation then proceeds just as before. The sum of the 95 Zonal Compliance values is 9435.512 (see the shaded column), and so the Mean Zonal Compliance for manganese in Wales is 9435.512/9 = 99.321%. It is interesting to see the influence of the rogue result (50%) for one of the Severn Trent zones. This has made the MZC% value for Wales about half a percentage point lower than the MZC% figure already seen for Dŵr Cymru Welsh Water.

Mean Zonal Compliance for England and Wales

Exactly the same principle is followed in calculating Mean Zonal Compliance for **manganese** for all of England & Wales. The table below lists the **manganese** MZC% values for each company, with the information for Dŵr Cymru Welsh Water highlighted.

Company	No of zones	Mean Zonal Compliance %	Numerator of MZC calculation
ALB	1	100.000	100.00
ANG	162	99.974	16195.83
BRL	52	99.948	5197.30
BWH	10	100.000	1000.00
CAM	8	100.000	800.00
CHO	1	100.000	100.00
DVW	18	99.573	1792.31
DWR	**91**	**99.910**	9091.80
ESK	51	99.962	5098.08
FLK	6	100.000	600.00
HRT	3	100.000	300.00
MKT	16	100.000	1600.00
NNE	79	99.811	7885.04
PRT	13	100.000	1300.00
SES	19	100.000	1900.00
SEW	75	99.533	7465.00
SRN	83	100.000	8300.00
SST	267	100.000	26700.00
SVT	191	99.667	19036.35
SWT	23	99.767	2294.64
THD	5	100.000	500.00
TMS	244	100.000	24400.00
TVW	70	99.921	6994.44
UU	271	99.606	26993.34
WSX	104	99.964	10396.27
YKS	78	99.869	7789.82
Total	**1941**	–	**193830.22**
Mean Zonal Compliance:		**99.861**	

As in the earlier calculations, the full MZC% calculation can be short-circuited by calculating a weighted average of the company values with weights equal to the number of zones in each company (see the shaded column). Thus the sum of the Zonal Compliance values for the 1941 zones over England & Wales is 193830.22, and so the Mean Zonal Compliance for **manganese** in England & Wales is 99.861%.

Overall Compliance

Definitions

Overall Compliance

For any specified collection of zones and/or supply points, the Overall Compliance is:

- the arithmetic mean of the Mean Zonal Compliance values for all parameters defined in Table 1 at the end of the Annex.

The arithmetic mean is used in order to give all 40 parameters equal weight in the overall figure.

Four specific zonal groupings are of particular interest in calculating Overall Compliance: Company, Region (including Wales), England, and England & Wales.

The calculation of Overall Compliance for a company is illustrated in the following section.

Other pesticides

Companies carry out a great deal of pesticide monitoring. However, the specific number and types of pesticides monitored for vary considerably from one company to another, and so a method is needed not only to standardise the results, but also to avoid attaching too much weight to the MZC% values for the many individual pesticides. The method adopted is to pool the results for all pesticides other than aldrin, dieldrin, heptachlor and heptachlor epoxide, and to treat them as a single 'other pesticides' parameter (P999 in the table shown below).

Overall Compliance for a company

The detailed calculation of MZC% for manganese in Dŵr Cymru Welsh Water has already been described, and so it is convenient to continue with this company for the worked example.

Overall, Dŵr Cymru Welsh Water monitored for 40 parameters at zones and/or supply points during 2004. Of these, 31 had a Mean Zonal Compliance of 100%; the MZC% values for the other nine parameters are listed below.

The Overall Compliance for Dŵr Cymru Welsh Water is then calculated as the simple arithmetic mean of these 40 MZC% values, namely 99.956%.

The Operational Performance Index OPI (TIM)

Definition

Operational Performance Index OPI (TIM)

For any specified collection of zones and/or supply points, the OPI (TIM) is defined as:

- the arithmetic mean of the Mean Zonal Compliance values for the three parameters turbidity, iron and manganese.

Thus the OPI (TIM) is calculated in just the same way as the old six-parameter OPI, but with aluminium, faecal coliforms and THMs omitted.

It may also be helpful to note that the Overall Compliance measure described in the previous section is itself an index, but one calculated over all parameters rather than a defined subset of parameters.

Parameter	No of parameters	Mean Zonal Compliance %	Numerator of MZC calculation
	31	100.000	3100.000
P999	1	99.997	99.997
C002	1	99.995	99.995
A002	1	99.985	99.985
A004	1	99.962	99.962
A006	1	99.943	99.943
A003	1	99.932	99.932
A023	1	99.910	99.910
D011	1	99.863	99.863
A022	1	98.668	98.668
Total	**40**	**–**	**3998.254**
Overall Compliance:		**99.956**	

Example

The table below lists Mean Zonal Compliance values for turbidity, iron and manganese for each of three geographical groupings – Dŵr Cymru Welsh Water, Wales, and England & Wales. The derivation of each of the three MZC% values for manganese has been shown in previous sections. The sets of values for turbidity and iron are calculated similarly.

(It may seem strange that the turbidity value is less than 100% for Dŵr Cymru Welsh Water and yet 100% for Wales as a whole. However, this is an artefact due to the solitary zone with a failure happening to be one of the small group of Dŵr Cymru Welsh Water zones located

Parameter	Mean Zonal Compliance %		
	Dŵr Cymru Welsh Water	Wales	England & Wales
Turbidity	99.985	100.000	99.970
Iron	98.668	98.215	99.531
Manganese	99.910	99.321	99.861
OPI (TIM) Index (%)	**99.521**	**99.179**	**99.787**

in England. Thus the zone appears in the calculations for Dŵr Cymru Welsh Water but not those for Wales.)

Once the MZC% values have been determined for the three component parameters, the OPI (TIM) Index is simply calculated as the arithmetic mean of the three components. For example, the OPI (TIM) index for Wales is (100 + 98.215 + 99.321)/3 = 99.179%

Table 1: Parameters used in the calculation of Mean Zonal Compliance %

Code	Parameter	Point of compliance
A001	Colour	Consumers' taps
A002	Turbidity	Consumers' taps
A003	Odour	Consumers' taps
A004	Taste	Consumers' taps
A006	Hydrogen Ion	Consumers' taps
A009	Sodium	Consumers' taps
A012	Nitrate	Consumers' taps
A013A	Nitrite	Consumers' taps (samples taken at works not included).
A013C	Nitrite/Nitrate formula	Calculated from samples taken at consumers' taps.
A021	Aluminium	Consumers' taps
A022	Iron	Consumers' taps
A023	Manganese	Consumers' taps
A024A	Copper	Consumers' taps
A027	Fluoride	Supply point or consumers' taps
B001A	Arsenic	Supply point or consumers' taps
B002	Cadmium	Supply point or consumers' taps
B003	Cyanide	Supply point or consumers' taps
B004	Chromium	Consumers' taps
B005	Mercury	Supply point or consumers' taps
B006A	Nickel	Consumers' taps
B007A	Lead (25)	Consumers' taps
B008A	Antimony	Supply point or consumers' taps
B009	Selenium	Supply point or consumers' taps
B010	Pesticides – Total substances	Supply point or consumers' taps
B011F	PAH – sum of 4 substances	Consumers' taps
C002	*E.coli*	Consumers' taps (samples taken at works/reservoirs are not included)
C003	Enterococci	Consumers' taps
D005A	Boron	Supply point or consumers' taps
D007	Benzo(a)pyrene	Consumers' taps
D008	Tetrachloromethane	Supply point or consumers' taps
D009B	Tetrachloroethene/Trichloroethene – Sum of 2 substances	Supply point or consumers' taps
D011	Total Trihalomethanes	Supply point or consumers' taps
F001	1,2 – Dichloroethane	Supply point or consumers' taps
F002	Benzene	Supply point or consumers' taps
F003	Bromate	Supply point or consumers' taps
P002	Aldrin	Supply point or consumers' taps
P028	Dieldrin	Supply point or consumers' taps
P043	Heptachlor	Supply point or consumers' taps
P044	Heptachlor epoxide	Supply point or consumers' taps
P999	Pesticides – other substances*	Supply point or consumers' taps

*All pesticides other than aldrin, dieldrin, heptachlor and heptachlor epoxide.

Annex 4

Roles and responsibilities

This annex provides a statement of respective roles and responsibilities in relation to drinking water quality between the Drinking Water Directorate and the Drinking Water Inspectorate, Defra.

It covers:

- statutory and Non-statutory functions;
- participation in International bodies;
- accountability and control arrangements; and
- the complaints procedure

Introduction

1. Water Directorate (WD) has responsibility within Defra for policy on drinking water quality in England. It also carries the sponsorship role in relation to the Drinking Water Inspectorate.

2. The Chief Inspector of Drinking Water and (drinking water) Inspectors are appointed under section 86 of the Water Industry Act 1991, as amended , by the Secretary of State for Environment, Food and Rural Affairs. Together they are known as the Drinking Water Inspectorate (DWI). The legislation provides for the Inspectorate to act on behalf of the Secretary of State in fulfilling some or all of his/her powers in specified sections of the 1991 Act relating to the enforcement of drinking water quality.

3. DWI differs from an ordinary line division in Defra in that its role is recognised in statute, and it exercises powers delegated directly to it by the Secretary of State. It is similar to other divisions in that it sits in organisational terms alongside other divisions within WD and is accountable to the Director on HR and financial management matters. Its staff are civil servants employed by the Crown;

4. The purpose of this statement is to set out the different functions and responsibilities of WD and DWI in relation to drinking water quality, to define the roles of the Chief Inspector and the Director in managing the Inspectorate (including financial management), and to set out the lines of accountability between them.

5. The relationship between the DWI and the Welsh Assembly is identical in respect of powers and duties under section 86 of the 1991 Act. However, the Welsh Assembly has no role in managing the Inspectorate.

Statement of functions

Statutory functions

6. Section 86 of the 1991 Act, as amended, provides that drinking water inspectors may act on behalf of the Secretary of State in relation to some or all of the powers and duties in sections 67-70 and 77-82 of the Act. The Water Supply (Water Quality) Regulations 2000 (in England) and 2001 (in Wales), made under sections 67, 69, 77 and 213 of the 1991 Act, set out a range of additional functions to be exercised by the Secretary of State in relation to drinking water quality. The powers in sections 68 (enforcement) have been formally delegated by the Secretary of State and the Secretary of State for Wales to the Chief Inspector. The powers in section 70 (institution of proceedings against undertakers and others who supply water unfit for human consumption) are exercised directly by the Chief Inspector (as a result of amendment of the 1991 Act by the 2003 Act. Responsibility for supporting the Secretary of State in other statutory functions is shared between WD and DWI. The schedule to this statement lists the various statutory responsibilities, and identifies the unit with lead responsibility in each case.

Non-statutory functions

7. Closely related to its statutory functions, DWI has responsibility for:

- Provision of advice and guidance to water companies and licensees on all aspects of the statutory requirements which it enforces.
- Responding to enquiries relating to drinking water quality from consumers, organisations and business.
- Provision of advice to Ministers on DWI operational matters, including advice on responses to Parliamentary Questions about those matters.

8. Other DWI responsibilities are:

- Provision of scientific and engineering advice to Ministers and officials in Defra and Welsh Assembly on drinking water issues, policies and standards.
- Provision of technical and administrative support for the Committee on Products and Processes for Use in Public Water Supply and the Expert Group on Cryptosporidium in Water Supplies and the Expert Committee on Cryptosporidium (both constituted as NDPBs).
- Management of the Water Directorate's Water Quality and Health research programme.

9. It is the responsibility of WD and the Welsh Assembly to advise the Secretary of State and the Secretary of State for Wales respectively, or to undertake on his/her behalf, any matters arising in connection with drinking water quality which are not identified as DWI responsibilities above.

Participation in national, European and international organisations

10. WD has a seat on the EU Drinking Water Directive Article 12 Committee and DWI attends as the Technical Adviser to WD. Inspectors may be appointed to represent WD on one or more of the technical working groups/committees dealing with Drinking Water Directive matters, including related World Health Organisation or CEN expert groups. Similarly Inspectors may be appointed to represent WD on national bodies for the purposes of giving technical advice on drinking water quality matters.

Accountability and control arrangements

General

11. In general, DWI are accountable direct to the Secretary of State and the Secretary of State for Wales for the effective execution of the statutory functions described in paragraph 6 above, and in the associated schedule, and to the Director, WD, in respect of other matters.

12. The DWI Code for Enforcement sets out the levels of service that water companies and members of the public can expect to receive from the Inspectorate. The Inspectorate's performance against targets is monitored and reported by the Chief Inspector in her Annual Reports to the Secretary of State in England and the Secretary of State for Wales.

Finance

The DWI budget is classed as programme expenditure and falls within the Water Directorate's total programme allocation. The needs of DWI are taken into account in the same way as other programme requirements for which WD is responsible in the annual Business Planning and Resource Allocation exercises.

13. As with other elements of Defra's programme expenditure, the Secretary of State is ultimately responsible for allocating resources to DWI, and is accountable to Parliament for that expenditure. As Principal Accounting Officer, the Permanent Secretary is the principal adviser to the Secretary of State on resource allocation and proper financial management. Those responsibilities are delegated through the Director General, Environment, to the Director, Water Directorate and on to the Chief Inspector in so far as they relate to DWI expenditure.

Director WD

14. The Director, WD, is responsible for:

- Assessing the resource requirement of DWI, in consultation with the Chief Inspector, and allocating programme resources to DWI from within the WD total allocation;
- Ensuring that issues associated with resources and performance of the DWI are regularly and adequately reviewed;
- Ensuring that the Chief Inspector establishes and maintains appropriate systems of financial control;
- Ensuring that issues raised by Parliamentary Committees, the National Audit Office, or the Department's Internal Audit Service are appropriately and promptly handled and any necessary follow-up action taken.
- Ensuring that the independent status of DWI is facilitated and not compromised as a consequence of any general policies and administrative practices of Defra.

Day-to-day responsibility for all these matters may be delegated to staff in WD.

Chief Inspector

15. The Chief Inspector is responsible for:

- The financial management of programme resources allocated to DWI. He/she is responsible for establishing and maintaining appropriate systems to ensure the economic, efficient and effective use of public funds and the propriety and regularity of expenditure.
- Contributing information to WD regular business plans showing the outcomes/outputs to be achieved from the allocated programme expenditure.
- Making representations to the Director of WD if at any time he/she considers that the resources allocated to DWI or the indicative allocations for future years are inadequate.

16. The Procurement, Finance and Administration Unit within WD is the focal point for advice on the resources allocated to DWI and their management. The Business and Performance Unit of DWI is the focal point for performance management and reporting within DWI.

Defra finance directorate

17. The Finance Directorate may inquire into any matter relating to the control and management of resources managed by DWI as it considers appropriate, and request from the Director of WD or the Chief Inspector any information as may be considered necessary to fulfil its responsibilities.

DWI budget

18. The DWI budget covers

- Salaries and associated costs of DWI Inspectors and other staff;
- Staff training costs
- Staff Travel and Subsistence and any costs involved in events staged by DWI
- Consultancies commissioned and managed by DWI
- Prosecution costs, including Counsel's fees
- Publication of Annual Report and other drinking water quality external communications (when use of the services of Defra Communications Directorate budget would create a potential conflict of interests)

19. DWI costs met by Defra's central budgets include:

- Inspector and other staff recruitment and other general HR support
- Accommodation and related overheads
- Advice from Legal Division on the interpretation of the law.
- IT and related infrastructure services (excluding specialist water company data handling software)
- External communications (except where a potential conflict of interests exists).

Director, WD

20. Within the framework of HR management procedures applying generally in the Department, it is the responsibility of the Director, WD:

- to advise the Secretary of State on the appointment of a Chief Inspector of Drinking Water as and when the need arises;
- to advise the Secretary of State on matters relating to the pay and performance of the Chief Inspector;
- As necessary to act as senior reporting officer for DWI staff.

Chief Inspector of Drinking Water

21. It is the responsibility of the Chief Inspector to:

- Appoint Inspectors on behalf of the Secretary of State;
- Within the framework of the HR management procedures applying generally within the Department, to recruit and manage staff within the Inspectorate.

Other management matters

22. The Chief Inspector of Drinking Water is expected to support the Director, WD, in routine Divisional Manager functions to the extent that is deemed appropriate by the Director.

Complaints procedures

23. The DWI publishes a Code for Enforcement which sets out a formal complaints procedure whereby any complaints about the Inspectorate shall be investigated by the Chief Inspector or his/her deputy and a reply sent to the complainant within 20 working days. The complainant may take their complaint further to the Director, WD, if they so wish, who will review the case, appointing an independent specialist to advise him/her if necessary.

Powers referred to in the Water Industry Act 1991, as amended by the Water Act 2003

Section no.	Description	Responsible body	Comment
67	Power to make regulations defining standards of wholesomeness (for both public and private supplies)	WD	Water Supply (Water Quality) Regulations 2000 The Private Water Supplies Regulations 1991
68, 18 and 20	Enforcement responsibilities relating to water undertakers' duties to supply wholesome water	DWI	Written delegation
69	Power to make regulations governing monitoring and reporting, the use of processes and substances, the giving, refusal and revocation of approvals, furnishing information, imposition of charges and publication of information	WD	Included within Water Supply (Water Quality) Regulations 2000
70	Proceedings against undertakers who supply unfit water for human consumption	DWI	Section 70 (as amended by Water Act 2003)
77	Power to make regulations concerning LA duties to keep themselves informed about water supplies	WD	Regulations 35 and 37 and 38 of Water Supply (Water Quality) Regulations 2000
78	Receipt of information from LAs about failures to take remedial action	WD	
79	Enforcement action in relation to undertakers' duty to supply water otherwise than in pipes in certain circumstances	WD	

Powers referred to in the Water Supply (Water Quality) Regulations 2000

Part/Regulation no.	Description	Responsible body	Comment
Part 1V Monitoring Regs 6,7 &8	Duty to determine manner of monitoring, to determine if sampling points not selected at random, to authorise supply points	DWI	
Part V Monitoring Additional provisions Reg 16	Duty to approve persons for the checking systems of analytical control at laboratories undertaking analysis of samples	DWI	
Part VI Investigations, authorisations of departures and remedial action Regs 17 to 24	Power to require undertakers to seek a departure, to authorize departures, and related powers.	DWI	
Part VII Water treatment Regs 26-32	• Authorisation of ground waters not subject to reg 26. • Various powers in relation to cryptosporidium. • Approvals of substances, products and processes and related powers	DW	
Part V111 Records and information Reg 35	Receipt of notification of occurrences likely to give rise to significant risk	DWI	
Part X Enforcement Reg 39	Enforcement of requirements in Parts IV to XIII of the regulations.	DWI	
Part XI Transitional provisions	Various powers in relation to approving transitional programmes of work, and related authorisations.	DWI	

Annex 5

Changes to the Parameters

This annex lists the changes to the parameters following introduction of the Water Supply (Water Quality) Regulations 2000.

It describes

- New parameters
- National Parameters
- Revised Parameters
- Indicator Parameters
- Deleted Standards

Table1 New Parameters

Parameter	Concentration or value	Units of measurement
Benzene	1	µg/l
Bromate	10	µg/l
1,2 dichloroethane	3	µg/l
Heptachlor	0.03	µg/l
Hepatchlor epoxide	0.03	µg/l
Nitrite (ex-water treatment works)	0.1	mg/l
Nitrate / nitrite formula $NO_3/50 + NO_2/3$	<1	–
Clostridium perfringens (including spores)	0	per 100 ml
Enterococci	0	per 100 ml
Acrylamide	0.1*	µg/l
Epichlorohydrin	0.1*	µg/l
Vinyl chloride	0.5*	µg/l

*Product specification

Table 2 National Parameters

Parameter	Concentration or value	Units of measurement
Aluminium	200	µg/l
Colour	20	mg/l Pt/Co
Hydrogen ion	10.0 6.5 (minimum)	pH value
Iron	200	µgFe/l
Manganese	50	µgMn/l
Odour	3 at 25°C	DN
Sodium	200	mgNa/l
Taste	3 at 25°C	DN
Tetrachloromethane	3	µg/l
Turbidity	4	NTU

Table 3 Revised Parameters

Parameter	1989 standard	2000 standard
Antimony	10µg/l	5µg/l
Arsenic	50µg/l	10µg/l
Boron	2mg/l	1mg/l
Copper	3mg/l	2mg/l
Lead	50µg/l	25µg/l 10µg/l (2013)
Nickel	50µg/l	20µg/l
Nitrite	0.1mg/l	0.5mg/l
Policyclic aromatic hydrocarbons	0.2mg/l	0.1mg/l (floranthene excluded)
Tetrachloroethene/ Trichloroethene	30µg/l 10µg/l	} 10µg/l combined

All sampled at consumers' taps

Table 4 Indicators (Additional Monitoring Requirements)

Parameter	Specification	Units of measurement
Ammonium	0.50	mgNH_4/l
Chloride	250	mgCl/l
Clostridium perfringens (including spores)	0	Number / 100ml
Coliform bacteria	0	Number / 100ml
Colony counts	No abnormal change	Number per ml 22°C Number per ml 37°C
Hydrogen ion	9.5	pH value
Conductivity	2500	µS/cm at 20°C
Sulphate	250	mgSO_4/l
Total indicative dose	0.10	mSv/year
Total organic carbon	No abnormal change	mgC/l
Tritium	100	Bq/l
Turbidity	1	NTU

Table 5 Deleted Standard

Parameter	1989 standard
Temperature	25°C
Magnesium	50 mg Mg/l
Potassium	12 mg K/l
Dry residues	1500 mg/l
Kjeldahl nitrogen	1 mg N/l
Oxidizability (PV)	5 mg O_2/l
Dissolved / emulsified hydrocarbons	10 µg/l
Phenols	µg C_6H_5OH/l
Surfactants	200 µg/l as lauryl sulphate
Zinc	5000 µg/l Zn
Phosphorus	2200 mgP/l
Silver	10 µg Ag/l
Calcium	250 mg/l (average)
Barium	1000 µg/l (average)
Total hardness	60 mg Ca/l (minimum)
Alkalinity	30 mg HCO_3/l (minimum)

Annex 6
Staff

A list of Inspectorate Staff is given below. The Inspectorate also makes use of consultants in support of the technical audit process.

Inspectorate Staff in post on 31 December 2004

Chief Inspector	Jeni Colbourne MBE	
Deputy Chief Inspector	Claire Jackson	
Superintending Inspector	Anthony Lloyd	
Principal Inspectors	David Drury John Gray Malcolm Morgan	Milo Purcell Peter White
Inspectors	Jane Allen Sharon Evans James Foster Joanna Gigg Nick Hallam Anthony Hallas Peter Halton	Peter Marsden Sue Pennison Claire Pollard Marcus Rink Laura Steele Tracey Viney Kevin White
Assistant Inspectors	Sarah Morris	
Water Quality Data Management	Judith Bibaud Philip Higgens	Andrew Taylor
Procurement, Finance and Administration	Adetoba Adekunle Frank Arrojo Rima Begum Sheila Bullock Suzanne Calmels	Chris Guthrie Nirmal Jheeta Mark Kozlowski Anhar Miah
CPP Technical Secretariat	John Ashworth	Yamide Sepho