



WATER QUALITY

IN

2001

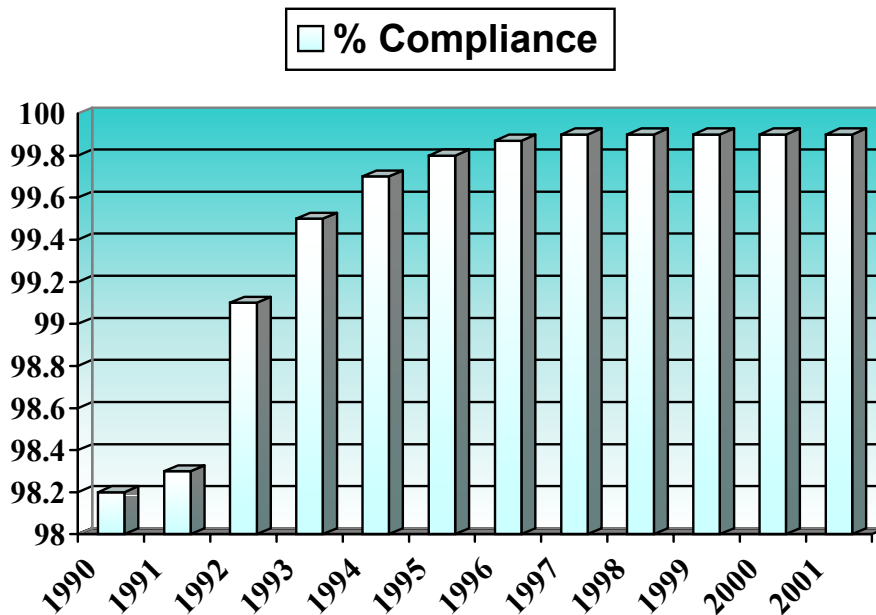
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OVERVIEW OF WATER QUALITY IN 2001

- Water quality results reported in the year ended 31st December 2001 showed that high levels of compliance with the Water Supply (Water Quality) Regulations 1989 continue to be maintained. This demonstrates the Company's continuing commitment to and substantial investment in water quality.



- Over 99.9% of all compliance analyses continue to meet the required standards as shown above.
- Where minor exceedances have arisen there would have been no adverse impact on health.
- Treatment has been enhanced at sources assessed as having an unacceptable risk from *Cryptosporidium*.
- Daily monitoring for *Cryptosporidium* continued at appropriate water treatment works during the year. No samples failed to meet the statutory treatment standard.
- A continuing programme of extensive renovation has improved the performance of the distribution system to reduce the occasional instances of discoloured water, and maintain the high water quality standards.
- Technical audits were carried out in 2001 by the Drinking Water Inspectorate (DWI), which is expected to report that the performance of the Company was satisfactory.
- Capital development is proceeding in response to forthcoming regulatory standards required by EU and UK legislation.

COMPLIANCE IN WATER SUPPLY ZONES IN 2001

Parameters with 100% compliance in 2001

2,4-D	Cyanide	pp -DDT
Aldrin	Dicamba	Potassium
Alkalinity	Dieldrin	Prometryne
Alpha-BHC	Dissolved solids	Propazine
Aluminium	Diuron	Selenium
Ammonium	Fluoride	Silver
Antimony	Gamma-HCH (lindane)	Simazine
Arsenic	Hydrogen ion (pH)	Sodium
Atrazine	Ioxynil	Sulphate
Barium	Isoproturon	Surface active agents
Benzo(a)Pyrene	Lead	Taste
Boron	Linuron	Temperature
Bromoxynil	Magnesium	Tetrachloroethene
Cadmium	MCPA	Tetrachloromethane
Calcium	Mecoprop (CMPP)	Total haloforms
Carbophenothion	Mercury	Total hardness
Chloride	Nickel	Total organic carbon
Chlortoluron	Nitrate	Total pesticides
Chromium	Nitrite	Triallate
Colour	Odour	Trichloroethene
Conductivity	Oxidisability	Turbidity
Copper	Phosphorus	Zinc

Parameters with less than full compliance

Total coliform	(99.7%)	Iron	(99.5%)
Faecal coliform	(99.9%)	Manganese	(99.8%)
Total PAH (only fluoranthene > PCV) (94.4%)			

NB. Further commentary appears in the main text.

BRISTOL WATER plc

WATER QUALITY IN 2001

INTRODUCTION

This annual report of water quality is compiled under the format set out in the Water Supply (Water Quality) Regulations 1989 (as amended) (the Regulations). It covers the 2001 calendar year.

Bristol Waterworks Company was established on 17th July 1846 as a private water company. In 1991 the Company changed its corporate structure to become Bristol Water Holdings plc. Bristol Water plc is a wholly owned subsidiary of Bristol Water Holdings plc. It is the licensed supplier of drinking water for the City of Bristol, North Somerset and parts of Gloucestershire and Wiltshire, a total area of almost 2400 square kilometres, as shown below.



The Company supplied, on average, approximately 296 megalitres of water per day (Ml/d) to 1.077 million people and businesses in 2001. This is an increase in the volume supplied compared with the previous year of about 9 Ml/d. The reasons for the reduction are attributed to the effects of a warm dry spring and early summer compared with the cooler damp conditions of the previous year.

Rainfall for the year was about 129% of average. Although the rainfall was higher than average the distribution was notable for being quite uneven with several dry months in spring and early summer.

WATER QUALITY MONITORING

Bristol Water plc sampled and analysed its waters at all stages from treatment to the customers' taps according to frequencies set out in the Water Supply (Water Quality) Regulations 1989.

The Company also carried out a substantial amount of operational monitoring to check on the quality of raw waters and the performance of treatment works and other parts of the system. Operational monitoring provides more detailed information on certain aspects of our quality programme, for example the control of the corrosion of lead pipes, water mains renovation work and non-statutory monitoring such as that for *Cryptosporidium*. Much of the operational monitoring work is targeted at specific parts of our system to enable us to evaluate performance and carry out cost effective improvements.

MICROBIOLOGICAL MONITORING

WATER LEAVING TREATMENT WORKS

The Company operated 16 treatment works during the period; the performance of each was continuously monitored. Littleton and Purton works use ozone as the primary disinfectant and to remove taste and odour in conjunction with granular activated carbon (GAC). All other works in service used chlorine as a primary disinfectant.

All treated waters were given residual disinfection with chlorine. Chlorine residuals are continuously monitored using instruments connected via telemetry to the Bristol Water Operations Room which is staffed 24 hours per day, every day of the year.

RESULTS OF BACTERIOLOGICAL MONITORING

Of the 3015 routine samples taken from treatment works in 2001, 1 (less than 0.1%) was found to contain coliforms and none contained faecal coliforms. This is a decrease over the number with coliforms in 2000 (5).

The results of bacteriological monitoring of treatment works are set out in the appended Schedule 5 FORM A(a). In addition to the specific bacteriological tests shown, all samples were analysed to assess colony counts and levels of residual disinfection. Any unusual results were investigated further.

SERVICE RESERVOIRS (including Water Towers)

The Company monitored 184 separate reservoir compartments and towers. Each compartment of a reservoir or tower is monitored and reported upon separately as if it were an individual and isolated unit.

Such is the stringency of bacteriological monitoring that these results are usually the first indicator of minor structural defects, for example a leaking roof joint. For this reason regulation allows up to 5% of coliform results to fail the standard without the reservoir itself being classed as being unsatisfactory during the year. No service reservoir has had coliforms detected in more than 5% of samples for the past six years.

RESULTS OF BACTERIOLOGICAL MONITORING

Of the 9375 routine samples taken from service reservoirs and towers in 2001, 7 (less than 0.1%), were found to contain coliforms and 1 (less than 0.1%) contained faecal coliforms. In 2000, 8 (0.1%) samples were found with coliforms and two with faecal coliforms. The results of bacteriological monitoring of service reservoirs are set out in the appended Schedule 5 FORM A(b).

In any case where a presumptive result for coliform bacteria was obtained, confirmatory tests were carried out by standard methods; further samples were obtained from the reservoir in question and, as appropriate, the distribution system. In all cases residual chlorination was measured and if necessary increased. The reservoir was inspected and resampling was continued in increasing detail until the source of contamination was identified and eliminated, or adverse results were no longer obtained. In addition to specific bacteriological tests, samples were analysed to assess colony counts.

The structures of all service reservoirs are inspected regularly according to a predefined programme.

RANDOM SAMPLING AT CUSTOMERS' TAPS

Samples were taken from customers' taps at randomly selected addresses in accordance with the frequencies laid out in the Regulations. Regulations allow 50% of samples to be taken from pre-defined "supply points" however the Company takes all of its samples from randomly selected customer taps which although increasing the risk of failure due to unsuitable pipework in the properties gives better sampling coverage throughout the water supply area.

RESULTS OF BACTERIOLOGICAL MONITORING

Of the 2953 routine samples taken from randomly selected customers' taps in 2001 for coliform analysis, 8 (0.3%) were found to contain coliforms, two contained faecal coliforms. By comparison 11 (0.4%) samples taken in 2000 and 6 (0.2%) in 1999 were found to contain coliforms.

The results of bacteriological monitoring of customers' taps are set out in the appended Schedule 5 FORM A(c). All cases of presumptive results for coliform bacteria were subject to confirmatory tests by standard methods, meanwhile a resample was obtained from the same house and/or neighbouring properties. Resampling continued until the cause of the positive determination had been identified or the water was shown to comply with standards.

CHEMICAL MONITORING

Comprehensive suites of chemical analysis were carried out in accordance with the Regulations. In total 18504 routine chemical compliance determinations were carried out in 2001 on samples taken from customers' taps; 30 (0.1%) gave results slightly above the prescribed concentration or value (PCV). By comparison in 2000, 27 (0.1%) and in 1999, 28 (0.1%) of tests exceeded the PCV.

The detailed results of chemical monitoring of samples taken in 2001 from customers' taps are summarised in Schedule 5 FORM B appended to this report.

OVERALL RESULTS OF STATUTORY MONITORING 1993 - 2001

	1993	1994	1995	1996	1997	1998	1999	2000	2001
Number of Determinations	62,945	60,523	53,969	53,407	51815	53494	53477	43290	43284
Number Exceeding PCV	329	178	120	71	53	41	43	42	39
% Exceeding PCV	0.5%	0.3%	0.2%	0.1%	0.1%	0.08%	0.08%	0.10%	0.09%
% Compliance with PCV	99.5%	99.7%	99.8%	99.9%	99.9%	99.92%	99.92%	99.90%	99.91%

The results of monitoring show substantial overall improvements over several years with quality currently maintaining a very high level of compliance. The percentage compliance since 2000 has been adversely affected by a reduction in the number of statutory tests carried out. A comment is given in the following paragraphs for all of those parameters where there has not been 100% compliance with the standards or where a particular parameter may be of general interest.

COMMENTS ON INDIVIDUAL CHEMICAL PARAMETERS

Lead

During 2001 no compliance samples exceeded the current 50ug/l standard for lead.

Water as supplied from treatment works has a very low lead level, but lead is able to dissolve from lead pipes in the distribution system and domestic plumbing. The Company's comprehensive surveys in 1991 and 1993 showed that many of the source waters have a high propensity for plumbosolvency. To reduce the concentration of lead at the taps in those zones where there is a risk of lead concentrations exceeding the current standard, additional treatment was installed during 1994 at 10 water treatment works, serving 900,000 customers (90% of total). Commencing in 2001 the plumbosolvency control has been extended to include additional treatment works in order to improve compliance with new EU lead standards described below.

Local Authority Environmental Health Officers have been kept fully informed of the progress of this work in their respective authority areas

The Company will currently replace its section of lead service pipe if a customer requests that the Company's lead supply pipe is changed and at the same time the customer replaces their own lead pipework.

The new EC Drinking Water Directive and UK Regulations require that all supplies meet a 25µg/l standard from December 2003 and 10 µg/l from 2013. The table overleaf shows quality compliance against all three lead standards. The Company has agreed a strategy with the DWI to meet the requirements of the new Directive in areas where there is a risk of breaching the new standards. Initially this will involve extension and optimisation of the very effective treatment already operated at many treatment works.

Lead compliance against current and new standards

	Samples taken	Percentage compliance against standards		
		50 µg/l (current)	25 µg/l (from 2003)	10 µg/l (from 2013)
2001	210	100%	100%	98.1%
2000	212	100%	99.1%	97.2%
1999	210	100%	100%	93.8%
1998	216	100%	100%	97.7%

**Note, all samples were 30 minute stagnation samples taken for compliance purposes from randomly selected properties, including non-leded properties.
The results show a stable situation consistent with this type of sampling.**

Polycyclic Aromatic Hydrocarbons (PAHs)

PAHs constitute a group of related compounds which are present in a variety of sources from coal tars to smoked foods. For several years up to the 1970's iron water mains were lined with coal tar pitch to reduce internal corrosion. Over many years some of these linings have begun to break down resulting in raised levels of PAH compounds in water supplies. In 2001 5.6% of compliance samples did not meet the standard; the infringements occurring in 10 of the 52 water supply zones. In each case the infringement was due to fluoranthene which has been removed from the list of compounds making up the PAH standard in the new EC Directive and the Water Supply (Water Quality) Regulations 2000, since it is no longer considered to present a toxic hazard.

Iron

The iron standard was exceeded in 2 compliance samples (0.4%) during the year compared with 0.5% in 2000. Although this represents a relatively small level of non-compliance the Company is aware that from time to time disturbance of water mains sediments arising from corrosion does cause annoyance to customers. For this reason an Undertaking to investigate the condition of water mains and if necessary to renovate them was given to the Secretary of State during 1996. Since over 250 km of water mains have been replaced under the work programme prior to April 2000. Follow-up appraisal has indicated that significant improvements in water quality have resulted from the work.

A new programme of mains renovation work commenced in April 2000 to renovate a further 240 km before December 2002.

OTHER MATTERS

WATER QUALITY INCIDENTS

There was one water quality incident in 2001 related to contamination of drinking water supplies to a group of domestic properties caused by contamination of the land through which the supply pipes passed, between the water main and the property. New pipes in non-permeable material were installed by the property owners as required under Water Regulations.

DRINKING WATER INSPECTORATE - Quality Audit

The Company was subjected to several very detailed audits by the Drinking Water Inspectorate and their specialist consultants in 2001, covering a range of the Company's activities and operations including:-

- Assessment of the response to PCV infringements.
- Laboratory - audit trail of samples.
- Strategy and programme for plumbosolvency control.
- Progress on distribution system undertakings
- Review of procedures for operation and maintenance of the distribution network
- Procedures for the notification of incidents and events

The Inspection reports contained only minor recommendations for improvements.

FLUORIDATION

Chemical fluoridation of water supplies does not take place anywhere in the Company's area. The natural fluoride level is relatively low.

CRYPTOSPORIDIUM AND GIARDIA

The Company commenced a programme of routine sampling for *Cryptosporidium* oocysts and *Giardia* cysts in 1990. In addition the Company has co-operated with Health and Local Authorities in the development of plans to monitor closely for the disease. Jointly with these authorities and other local water supply undertakings in the South West, an Outbreak Control Plan has been developed for use in the event of any outbreak of the disease, which is suspected to be of water related origin.

During 1999 new Regulations were implemented in England and Wales requiring risk assessment and monitoring for *Cryptosporidium*. The new Regulations introduced new and more stringent sampling and analytical methodology from April 2000 for several water treatment works where a risk assessment has identified an increased risk of oocysts being present in the raw water.

In response to the risk assessments the Company also commenced a £7M programme, for completion in 2001, of treatment works enhancement at several treatment works treating ground water. This has been extended to include an additional treatment works, which has been assessed as being at high risk and where the water production is required to maintain peak summer demands.

Several sites have new monitoring equipment installed to allow continuous sampling in accordance with the new analytical method. Statutory analysis was carried out on samples on a daily basis. 1494 (807 in 2000) *Cryptosporidium* analyses were carried out on statutory and operational samples taken from treated water supplies. All met the treatment standard of less than 1 oocyst per 10 litres.

CUSTOMER COMPLAINTS

Part of the routine monitoring is related to customer complaints, which are all logged and evaluated or investigated to enable improvements to take place. Attention to this issue has allowed us to tune the chlorine content to avoid unnecessarily high levels, which are not appreciated by some customers, whilst still maintaining good microbiological quality at the tap.

In the past customers have indicated their concern over water hardness and scale. Hardness is related to the geology of the water catchments from which the raw water resources are derived. The Company has been able to achieve lower levels of hardness in many zones by blending treated waters derived from different sources. There has been a good customer response to this action. No chemical processes are used to reduce hardness.

NEW DRINKING WATER DIRECTIVE

Water quality in the UK is regulated under the Water Supply (Water Quality) Regulations 1989 which is the mechanism by which the standards in European Drinking Water Directive are translated into UK law. During 1998 the European Commission agreed a new Drinking Water Directive. There will be some new standards and some of the current standards will change. The most significant change anticipated is for lead where the standard will be reduced from the current 50 µg/l initially to 25 µg/l and after a period of fifteen years to a value of 10 µg/l. The likely effect of the new standard may be the need for widespread lead pipe replacement over many years.

RELAXATIONS AND UNDERTAKINGS

There were no temporary relaxations in place during the year.

The only Section 19 Undertaking given by the Company and for which work is still in progress is for water mains rehabilitation. The Company also has new legal obligations for improvements at several water treatment works to meet new water quality standards. Details are given in Appendix 1.

WATER QUALITY INFORMATION

The Company has actively continued to promote its customers' understanding of water quality issues, both directly through open days and school visits and via the media through informative advertisements and the Internet (<http://www.bristolwater.co.uk>). Customers have indicated that they appreciate the efforts made to inform them about water quality matters.

PUBLIC RECORDS

Bristol Water plc maintains a public register of information as required by the Water Supply (Water Quality) Regulations 1989. A person may inspect any record maintained in accordance with these Regulations at the Head Office of the Company on Bedminster Down, between 9 am and 4 pm on any working day.

Alternatively the Company's customers may write to:-

PO Box 218,
Bridgwater Road,
Bristol
BS99 7AU

to request a copy of any relevant information and this will be supplied free of charge for the zone in which the customer receives water.

Quality Director
June 2002

APPENDIX 1 - UNDERTAKINGS

An Undertaking has been accepted by the Secretary of State as detailed below:-

Schedule of Works

<p>1) WATER SUPPLY ZONES All zones which are for the time being listed in Annex 1 and Annex 2 to this Schedule of Works, and which are subject to revision as necessary. See Notes to the Schedule of Works.</p>		
<p>2) NATURE OF CONTRAVENTION AND ITS CAUSE The concentration or value of one or more parameters has exceeded the prescribed concentration or value and is likely to do so again in the zones listed in the Annexes to this Schedule because of deficiencies in the distribution system. The relevant parameters for each water supply zone are listed in Annex 1 to this Schedule of Works. See Notes to the Schedule of Works.</p>		
<p>3) ESTIMATED LIKELY MAXIMUM DEVIATION OF QUALITY The estimated likely maximum deviation of quality of the parameters in each zone listed in Annex 1 to this Schedule will be as follows for the duration of this programme of renovation works:</p>		
Iron	500 mg/l.	(not to be exceeded in more than one sample in each calendar year)
Benzo a pyrene	25 ng/l	(not to be exceeded in more than one sample in each calendar year)
Total PAH	1 µg/l	(not to be exceeded in more than one sample in each calendar year)
<p>4) STEPS TO BE TAKEN</p>		<p>5) DATE BY WHICH STEPS ARE TO BE COMPLETED</p>
<p>(a) Submit to the Secretary of State the Company's strategy which describes the steps to be taken to identify the nature and extent of contraventions to justify the need for improvement works; to implement improvements to its distribution system to prevent a recurrence of the contraventions; and to demonstrate the benefits of the improvements made. The current strategy supplied by the Company is that dated 7 October 1997.</p>		<p>(a) Completed</p>
<p>(b) Implement the strategy, including all Pre- and Post-Renovation Assessments.</p>		<p>(b) On-going</p>

4) STEPS TO BE TAKEN	5) DATE BY WHICH STEPS ARE TO BE COMPLETED
(c) Renovate (i.e replace or reline) a total of 241.3 km of the distribution system. This total relates to work undertaken in the AMP2 period, i.e. 1 January 1995 to 31 March 2000. This renovation is to be carried out in milestone packages according to the priorities and methodologies described by the Company's strategy, as identified in the Notes to the Schedule of Works, and as summarised in Annex 1 and Annex 2 to this Schedule of Works.	(c) Completed
(d) Renovate (i.e replace or reline) a total of 254 km of the distribution system. This total relates to work undertaken in the AMP3 period, i.e. 1 April 2000 to 31 March 2005. This renovation is to be carried out in milestone packages according to the priorities and methodologies described by the Company's strategy, as identified in the Notes to the Schedule of Works, and as summarised in Annex 1 and Annex 2 to this Schedule of Works.	(d) 31 December 2002, by the completion dates indicated in Annex 2 for each milestone package
(e) Submit to the Secretary of State a statement of progress with this undertaking in the format specified in DWI Information Letter 4/99, or as updated periodically by the DWI.	(e) Annually by 28 February.
(f) Submit to the Secretary of State when necessary proposed updates to Annex 1 and Annex 2. See Notes to the Schedule of Works.	(f) Annually by 31 March
(g) Submit to the Secretary of State a statement of completion for each Milestone package set out in Annex 2 in the format set out in (e) above, for those Milestone packages which do not have a completion date of 31 December.	(g) Within 2 months of the Milestone completion date.
(h) Submit to the Secretary of State the Company's strategy for strategic operation and maintenance of its distribution system to prevent a recurrence of the contraventions.	(h) On completion of milestone package 1
(i) Monitor the concentration or value of the named parameters for each zone listed in Annex 1 to this Schedule for the duration of this programme at a sampling frequency indicated in Table 2 of Schedule 3 of the 1989 Regulations. If the concentration in any sample exceeds the current standards take all appropriate means to protect public health. Report exceedances of the Estimated Likely Maximum Deviation of Quality in accordance with current notification procedures.	(i) For the duration of this programme of works.
(j) At regular intervals provide DWI with reports on progress made with carrying out this programme of improvement works. Reports to include at least the following details:	j) As (e), (f) and (g) above, and by exception report if the programme shows any sign of slippage.

4) STEPS TO BE TAKEN	5) DATE BY WHICH STEPS ARE TO BE COMPLETED
(k) Details of the programme of works as indicated in (e), (f) and (g) above;	
(l) Current state of progress with the programme of work in (i) above;	
(m) A statement of the implications of any slippage of the programme in (i) above;	
(n) Details of the prospect of recovery of any slippage mentioned in (iii) above, including degree to which slippage is expected to be recovered and how it will be recovered;	
(o) Whether the Company has any reason to believe that it will not be able to meet any of the key dates in the Statement of Intent.	

UNDERTAKING GIVEN BY BRISTOL WATER PLC IN RESPECT OF THE PROGRAMME OF RENOVATION WORKS TO THE DISTRIBUTION SYSTEM FOR THE PURPOSES OF SECTION 19 OF THE WATER INDUSTRY ACT 1991

**ANNEX 1 TO THE SCHEDULE OF WORKS
SCHEME REFERENCE345**

DATE

07-Apr-00

Codes: L = Line/Reline, R = Replace, Y = Yes, N = No

Water Supply Zones (in milestone package order)			Parameter(s) exceeded and likely to exceed again	Estimated/Actual length of main to be renovated (for each Zone) (km)		Date by which engineering work to be completed
Milestone Package Number	Code (Water Supply Zone)	Name	(for each zone)	L	R	(for each zone)
1	224	Long Ashton, Failand and Abbots Leigh	Fe	8.3	6.8	Dec-01
1	206	Filton & Northville	Fe and PAH	17.1	14.0	Dec-01
1	220	Hengrove & Whitchurch	Fe and PAH	33.2	27.1	Dec-01
1	207	Patchway, Bradley Stoke & Winterborne	Fe and PAH	1.6	1.3	Dec-01
1	218	Fishponds & Mangotsfield	Fe and PAH	7.1	5.8	Dec-01
1	203	Sherston, Marshfield, Pucklechurch & Wick	Fe and PAH	14.8	12.1	Dec-01
1	221	Yate, Coalpit Heath, & Warmley [PART]	Fe and PAH	5.7	4.7	Dec-01
2	221	Yate, Coalpit Heath, & Warmley [PART]	Fe and PAH	14.8	12.1	Dec-02
2	249	Saltford, Keynsham & Bitton	Fe and PAH	7.0	5.7	Dec-02
2	219	Longwell Green & Oldland	Fe and PAH	6.7	5.4	Dec-02
2	236	Cheddar, Wedmore, Brent Knoll and Brea	Fe	0.4	0.0	Dec-02
2	213	Stapleton, St.George and Conham	Fe	22.9	18.7	Dec-02
2	217	Bedminster	Fe	0.1	0.0	Dec-02

Annex 2 further subdivides the lengths identified above into specific sub zonal work packages.

New Legal Obligations

DWI Ref.	Date of New Obligation	Sites Covered	Type of Asset Affected	Parameters Affected	Zones Affected	Population Affected	Due Date	Reason for New Legal Obligation
BR018	24-May-00	Distribution System	Zones	Fe, PAH	32	215.8	31-Dec-02	Water quality improvement
294	27-Jul-01	Barrow	TW	Fe & Mn + As			31-Mar-04	Water quality improvement and new standards
331	27-Jul-01	Littleton	TW	Bromate			30-Sep-02	New water quality standards
332	27-Jul-01	Purton	TW	Bromate			30-Sep-02	New water quality standards
465	27-Jul-01	Stowey	TW	As			30-Dec-02	New water quality standards
929	27-Jul-01	Plumbosolvency control - 33 sites	TW	Lead			31-Dec-01 & 31-Dec-02	New water quality standards
	31-Jul-00	16 sites	TW	<i>Cryptosporidium</i>	51	1035.1		New water quality standards

APPENDIX 2 - WATER QUALITY TESTING - GENERAL INFORMATION

Water is sampled daily at treatment works, service reservoirs and customers' taps. In addition, the water quality is continuously monitored at treatment works. The works are automatically shut down if set limits are exceeded.

Nationally, some 3 million water samples are taken and analysed each year. About 99 per cent of the legally required samples meet UK and European Community standards. The few which do not meet the standard fail by a low margin.

Laboratory tests fall broadly into three categories, physical, chemical and bacteriological. The tables on the following pages show the tests which are carried out, their significance, the standards and the results obtained during 1998.

Units of Measure

Results are placed on a public register which customers are welcome to see at water company offices.

The units used in measurement are exceedingly small, for example:

- ' 1 milligram/litre (mg/l) is 1 part in 1,000,000
- ' 1 microgram/litre (μ g/l) is 1 part in 1,000,000,000
- ' 1 nanogram/litre (ng/l) is 1 part in 1,000,000,000,000

Many of the measurements we make are actually close to the limits of detection even with the most sophisticated instruments.

What if a Test Fails?

When a sample is analysed and fails a test standard, it does not necessarily mean that the water is unfit to drink. Sometimes the failures are caused by the householder's own plumbing system, whilst the water in the mains and in neighbouring properties is good. Even a dirty tap can cause a test failure.

But any failure of the standards is taken seriously. Water companies investigate them thoroughly and, where necessary, do everything possible to cure the faults.

APPENDIX 3

CURRENT QUALITY STANDARDS FOR DRINKING WATER

Substance Tested for Under British Law	What it means	Amount Allowed
1. Colour	Water should be clear and bright, but may sometimes show a slight tint due to natural changes in the source or because of low levels of iron from iron mains	20 Hazen units on colour scale
2. Turbidity	This is a measure of the “cloudiness” of the water. All water will contain some microscopic particles of natural minerals	4 Formazin turbidity units (FTU)
3. Dilution Odour 4. Dilution Taste	These are quality control tests to measure the level of odour and taste and are carried out by specialist tasting panels	Dilution number 3 at 25°C
5. Temperature	The standards require water companies to supply you with water below a certain temperature	25°C
6. pH	This is the measure of acidity or alkalinity of water	5.5 - 9.5
7. Total Chlorine	Chlorine is added at the treatment works to destroy harmful micro-organisms, and a low level is used in the water in the mains to prevent the growth of bacteria	Results are compared against a long term average. Any significant difference is investigated
8. Sulphate	The substance occurs naturally in water and comes from mineral deposits	250 mg/l
9. Sodium	Sodium is a naturally occurring substance which can also be present as a by-product of softening, which we do not do.	150 mg/l
10. Potassium	Potassium occurs naturally in water	12 mg/l
11. Conductivity	By passing an electric current through the water, water companies can measure levels of mineral salts it contains	1500 µS/cm at 20°C
12. Total Dissolved Solids	Water samples are dried, so that water companies can weigh any residual substance such as minerals	1500 mg/l
13. Nitrate	Nitrate can be found at increased levels in water running over and through agricultural land. Bristol Water and the Environment Agency work with farmers and landowners to reduce this	50 mg/l
14. Nitrite	This substance can form where chloramine is used as the residual disinfectant in the distribution system	0.1 mg/l
15. Ammonia	Ammonia occurs naturally in water from some sources. It does not cause health problems and where it does occur, it can be controlled or removed by treatment	0.5 mg/l
	Aluminium occurs naturally and is also occasionally	

Substance Tested for Under British Law	What it means	Amount Allowed
16. Aluminium	used to remove impurities from water. Although a research study suggested a link between aluminium and Alzheimer's disease, there is no proven connection and research is still being carried out	200 µg/1
17. Iron	Iron is found naturally in some underground water. It can also find its way into water from old iron mains or households' own pipes. Iron does not cause health problems - it is often used in the treatment of anaemia - but it does give water a reddish or yellow tint which can be a nuisance when spin-drying washing	200 µg/1
18. Manganese	Manganese occurs naturally in water and can cause it to stain some surfaces, eg. the inside of kettles. Like iron, manganese is not harmful to health, but can be a nuisance	50 µg/1
19. Copper 20. Zinc	Traces of these metals are occasionally found in water. They usually come from old, corroding plumbing and can cause a metallic taste	3000 µg/1 for Copper 5000 µg/1 for Zinc
21. Total Phosphorus	Phosphate occurs naturally in water, but Bristol Water is also currently dosing phosphate into the water at a low rate at many of the treatment works in the area. This is because the presence of phosphate in the water reduces the amount of lead which can get into the water from domestic lead piping	2200 µg/1
22. Fluoride	Bristol Water does not add, and has never added, fluoride to any of the water supplied in its area. All water will, however, have a low, natural level of fluoride, which will vary depending on the water source	1500 µg/1
23. Silver	Silver occurs naturally in water	10 µg/1
24. Arsenic	These metals can occur naturally in water but are normally found at very low levels	50 µg/1
25. Cadmium		5 µg/1
26. Chromium		50 µg/1
27. Mercury		1 µg/1
28. Nickel		50 µg/1
29. Lead	Prior to the mid 1960s, lead was often used as a plumbing material. Many properties, particularly those built before this date, have lead plumbing or a lead supply pipe. Lead in amounts well above the limit can be a health risk if consistently consumed in water over many years. In order to reduce the level of lead, which can enter drinking water, Bristol Water has dosed some treated waters with phosphate	50 µg/1
30. Antimony	These substances can occur naturally in water but are normally found at very low levels	10 µg/1
31. Selenium		10 µg/1

Substance Tested for Under British Law	What it means	Amount Allowed
32. Ioxynil 32. Bromoxynil 34. Mecoprop 35. MCPA 36. Dicamba 37. Atrazine 38. Prometryn 39. Propazine 40. Simazine 41. Carbophenothion 42. Isoproturon 43. Chlortoluron 44. Linuron 45. Gamma BHC (Lindane) 46. Alpha BHC 47. Aldrin 48. PP-DDT 49. Dieldrin 50. Triallate	This list shows the various herbicide and pesticide substances which are typically analysed for. These come from their use by people, such as farmers, local authorities and gardeners. The traces found are no threat to health, being far smaller than the limits set by the Government's medical advisors. Water companies are nevertheless taking steps to remove even these minute traces	0.1 µg/l 0.1 µg/l 0.1 µg/l 0.1 µg/l 0.1 µg/l 0.1 µg/l 0.1 µg/l 0.1 µg/l 0.1 µg/l 0.1 µg/l 0.1 µg/l 0.1 µg/l 0.1 µg/l 0.1 µg/l 0.1 µg/l 0.1 µg/l 0.1 µg/l 0.1 µg/l 0.1 µg/l
51. Fluoranthene 52. Benzo (B)Fluoranthene 53. Benzo (K)Fluoranthene 54. Benzo (A) Pyrene 55. Benzo (GHI) Pyrene 56. Indeno (123 CD) 57. Total PAHs	These substances are referred to as Polycyclic Aromatic Hydrocarbons (PAHs). They can enter water from the lining of old iron mains, where coal tar pitch has been used to prevent internal corrosion. Bristol Water has an ongoing programme of mains improvements to improve the internal condition of these mains where they have been shown to cause PAH to enter the water	0.2 µg/l
58. Total Coliforms 59. Faecal Coliforms	These are what are referred to as "Indicator organisms". Although not harmful in their own right, they can indicate a potential problem with the water quality. However, where they are detected, it is often because they can flourish within taps in the home, and follow-up samples are normally satisfactory	0/100 ml 0/100 ml
60. Colony Counts	Small amounts of harmless bacteria can be present in treated water. Water companies check the numbers and groupings of these bacteria. The information obtained helps maintain the efficiency of the water treatment process and the cleanliness of the water mains.	Results are compared against a long term average. Any significant difference is investigated
61. Chloride	Chloride occurs naturally in water	400 mg/l
62. Boron	Small amounts of Boron can be found in some water sources due to its wide use in detergents.	2000 µg/l
63. Barium	Barium can occur naturally in water but is normally only found at very low levels.	1000 µg/l
64. Trihalomethanes (THMs)	THMs derive from the combination of chlorine with organic matter	100 µg/l
65. Tetrachloromethane	These substances arise from industrial processes but	3 µg/l

Substance Tested for Under British Law	What it means	Amount Allowed
66. Trichloroethene	can be easily removed. Water companies work with the industries themselves to ensure they do not reach the water supply in the first place	30 µg/1
67. Tetrachloroethene		10 µg/1
68. Total Hardness	Hardness is normally caused by the rocks through which the water has passed, eg chalk. Hardness means you may use more soap when washing and water lathers less than with soft water. It has no adverse effects on health - indeed, research has shown that in hard water areas there is less incidence of heart disease.	60 mg/1 (minimum) Standards only apply if water is softened
69. Alkalinity	Alkalinity, like hardness, comes from the rocks through which the water has passed. Alkalinity is naturally present in water, but can be altered by softening	30 mg/1 (minimum) Standards only apply if water is softened
70. Permanganate Value	The test indicates the overall quality of the water	5 mg/1
71. Cyanide	This substance is rarely found in water - and then it is usually in areas with a lot of heavy industry	50 µg/1
72. Polychlorinated Biphenyls	These substances are rarely found in water - and then it is usually in areas with a lot of heavy industry. The permanent solution to this problem is greater restriction on the use of these substances	0.1 µg/1
73. Total Organic Carbon	By monitoring the level of naturally occurring carbon, water companies can ensure that treatment processes are working properly and no problems are developing	Results are compared against a long term average. Any significant difference is investigated
74. Surfactants	These substances come from washing powder, detergent etc.	0.2 mg/1

SCHEDULE 5 FORM A: MICROBIOLOGICAL QUALITY

BRISTOL WATER plc

PERIOD 1st JANUARY 2001 - 31st DECEMBER 2001

(a) WATER LEAVING TREATMENT WORKS

<i>Volume of water distributed from works (m³/d)</i>	<i>Number of samples</i>	<i>% of samples exceeding prescribed concentration or value</i>	
		<i>Total Coliform</i>	<i>Faecal Coliform</i>
Less than 3,000	156	0.00	0.00
3,000 - 12,000	669	0.00	0.00
More than 12,000	2190	0.05	0.00
TOTAL	3015	0.03	0.00

(b) WATER IN SERVICE RESERVOIRS (INCLUDING WATER TOWERS)

<i>Capacity of Reservoir (m³)</i>	<i>Number of samples</i>	<i>% of samples exceeding prescribed concentration or value</i>	
		<i>Total coliforms</i>	<i>Faecal coliforms</i>
Less than 2,000	6637	0.08	0.02
2000 - 10,000	2377	0.08	0.00
More than 10,000	361	0.00	0.00
Total	9375	0.07	0.01

(c) - WATER AT CONSUMERS' TAPS

<i>Size of zone (population)</i>	<i>less than 5000</i>	<i>5000-20000</i>	<i>20001-50000</i>	<i>TOTAL</i>
No. of samples	85	630	2238	2953
% exceeding PCV for TC	0.00	0.32	0.27	0.27
% exceeding PCV for FC	0.00	0.00	0.09	0.07

Notes: Fixed point samples are not taken by Bristol Water

PCV = prescribed concentration or value
TC = total coliforms
FC = faecal coliforms

BRISTOL WATER plc

SCHEDULE 5

FORM B: Physicochemical Quality

FROM: 1 JANUARY 2001 to 31 DECEMBER 2001

<i>Parameter (i)</i>	<i>Size of zones (Population)</i>	<i>No. of zones in size group</i>	<i>No. of samples</i>	<i>% exceeding PCV (ii)</i>	<i>No. of zones in which PCV contravened (iii)</i>
2,4-D	Less than 5,000	7	7	0.00	0
	5,000 - 20,000	15	15	0.00	0
	20,001 - 50,000	30	30	0.00	0
	TOTAL	52	52	0.00	0
Alpha BHC	Less than 5,000	7	7	0.00	0
	5,000 - 20,000	15	15	0.00	0
	20,001 - 50,000	30	33	0.00	0
	TOTAL	52	55	0.00	0
Alkalinity	Less than 5,000	7	7	0.00	0
	5,000 - 20,000	15	15	0.00	0
	20,001 - 50,000	30	30	0.00	0
	TOTAL	52	52	0.00	0
Aldrin	Less than 5,000	7	7	0.00	0
	5,000 - 20,000	15	15	0.00	0
	20,001 - 50,000	30	33	0.00	0
	TOTAL	52	55	0.00	0
Ammonium	Less than 5,000	7	28	0.00	0
	5,000 - 20,000	15	82	0.00	0
	20,001 - 50,000	30	300	0.00	0
	TOTAL	52	410	0.00	0
Antimony	Less than 5,000	7	7	0.00	0
	5,000 - 20,000	15	15	0.00	0
	20,001 - 50,000	30	31	0.00	0
	TOTAL	52	53	0.00	0

<i>Parameter (i)</i>	<i>Size of zones (Population)</i>	<i>No. of zones in size group</i>	<i>No. of samples</i>	<i>% exceeding PCV (ii)</i>	<i>No. of zones in which PCV contravened (iii)</i>
Arsenic	Less than 5,000	7	14	0.00	0
	5,000 - 20,000	15	25	0.00	0
	20,001 - 50,000	30	52	0.00	0
	TOTAL	52	91	0.00	0
Atrazine	Less than 5,000	7	7	0.00	0
	5,000 - 20,000	15	15	0.00	0
	20,001 - 50,000	30	31	0.00	0
	TOTAL	52	53	0.00	0
Barium 12 Month mean	Less than 5,000	7	7	0.00	0
	5,000 - 20,000	15	15	0.00	0
	20,001 - 50,000	30	31	0.00	0
	TOTAL	52	53	0.00	0
Benzo_a_Pyrene 12 Month mean	Less than 5,000	7	36	0.00	0
	5,000 - 20,000	15	109	0.00	0
	20,001 - 50,000	30	156	0.00	0
	TOTAL	52	301	0.00	0
Boron 12 Month mean	Less than 5,000	7	7	0.00	0
	5,000 - 20,000	15	15	0.00	0
	20,001 - 50,000	30	31	0.00	0
	TOTAL	52	53	0.00	0
Bromoxynil	Less than 5,000	7	7	0.00	0
	5,000 - 20,000	15	15	0.00	0
	20,001 - 50,000	30	30	0.00	0
	TOTAL	52	52	0.00	0
Cadmium	Less than 5,000	7	7	0.00	0
	5,000 - 20,000	15	16	0.00	0
	20,001 - 50,000	30	30	0.00	0
	TOTAL	52	53	0.00	0

<i>Parameter (i)</i>	<i>Size of zones (Population)</i>	<i>No. of zones in size group</i>	<i>No. of samples</i>	<i>% exceeding PCV (ii)</i>	<i>No. of zones in which PCV contravened (iii)</i>
Calcium 12 Month mean	Less than 5,000	7	7	0.00	0
	5,000 - 20,000	15	15	0.00	0
	20,001 - 50,000	30	30	0.00	0
	TOTAL	52	52	0.00	0
Carbophenothion	Less than 5,000	7	7	0.00	0
	5,000 - 20,000	15	16	0.00	0
	20,001 - 50,000	30	30	0.00	0
	TOTAL	52	53	0.00	0
Chloride 12 Month mean	Less than 5,000	7	7	0.00	0
	5,000 - 20,000	15	15	0.00	0
	20,001 - 50,000	30	30	0.00	0
	TOTAL	52	52	0.00	0
Chlortoluron	Less than 5,000	7	16	0.00	0
	5,000 - 20,000	15	27	0.00	0
	20,001 - 50,000	30	77	0.00	0
	TOTAL	52	120	0.00	0
Chromium	Less than 5,000	7	7	0.00	0
	5,000 - 20,000	15	15	0.00	0
	20,001 - 50,000	30	31	0.00	0
	TOTAL	52	53	0.00	0
CMPP	Less than 5,000	7	7	0.00	0
	5,000 - 20,000	15	15	0.00	0
	20,001 - 50,000	30	30	0.00	0
	TOTAL	52	52	0.00	0
Colour	Less than 5,000	7	28	0.00	0
	5,000 - 20,000	15	61	0.00	0
	20,001 - 50,000	30	156	0.00	0
	TOTAL	52	245	0.00	0

<i>Parameter (i)</i>	<i>Size of zones (Population)</i>	<i>No. of zones in size group</i>	<i>No. of samples</i>	<i>% exceeding PCV (ii)</i>	<i>No. of zones in which PCV contravened (iii)</i>
Conductivity 12 Month mean	Less than 5,000	7	28	0.00	0
	5,000 - 20,000	15	181	0.00	0
	20,001 - 50,000	30	1009	0.00	0
	TOTAL	52	1218	0.00	0
Copper (first draw)	Less than 5,000	7	7	0.00	0
	5,000 - 20,000	15	15	0.00	0
	20,001 - 50,000	30	32	0.00	0
	TOTAL	52	54	0.00	0
Cyanide	Less than 5,000	7	7	0.00	0
	5,000 - 20,000	15	15	0.00	0
	20,001 - 50,000	30	30	0.00	0
	TOTAL	52	52	0.00	0
Dicamba	Less than 5,000	7	7	0.00	0
	5,000 - 20,000	15	15	0.00	0
	20,001 - 50,000	30	30	0.00	0
	TOTAL	52	52	0.00	0
Dieldrin	Less than 5,000	7	7	0.00	0
	5,000 - 20,000	15	15	0.00	0
	20,001 - 50,000	30	33	0.00	0
	TOTAL	52	55	0.00	0
Diuron	Less than 5,000	7	16	0.00	0
	5,000 - 20,000	15	27	0.00	0
	20,001 - 50,000	30	77	0.00	0
	TOTAL	52	120	0.00	0
Faecal coliforms	Less than 5,000	7	85	0.00	0
	5,000 - 20,000	15	630	0.00	0
	20,001 - 50,000	30	2238	0.09	2
	TOTAL	52	2953	0.07	2

<i>Parameter (i)</i>	<i>Size of zones (Population)</i>	<i>No. of zones in size group</i>	<i>No. of samples</i>	<i>% exceeding PCV (ii)</i>	<i>No. of zones in which PCV contravened (iii)</i>
Field temperature	Less than 5,000	7	86	0.00	0
	5,000 - 20,000	15	634	0.00	0
	20,001 - 50,000	30	2251	0.00	0
	TOTAL	52	2971	0.00	0
Fluoride	Less than 5,000	7	7	0.00	0
	5,000 - 20,000	15	15	0.00	0
	20,001 - 50,000	30	30	0.00	0
	TOTAL	52	52	0.00	0
Ioxynil	Less than 5,000	7	7	0.00	0
	5,000 - 20,000	15	15	0.00	0
	20,001 - 50,000	30	30	0.00	0
	TOTAL	52	52	0.00	0
Isoproturon	Less than 5,000	7	16	0.00	0
	5,000 - 20,000	15	27	0.00	0
	20,001 - 50,000	30	77	0.00	0
	TOTAL	52	120	0.00	0
Lead first draw	Less than 5,000	7	28	0.00	0
	5,000 - 20,000	15	61	0.00	0
	20,001 - 50,000	30	121	0.00	0
	TOTAL	52	210	0.00	0
pH	Less than 5,000	7	28	0.00	0
	5,000 - 20,000	15	83	0.00	0
	20,001 - 50,000	30	301	0.00	0
	TOTAL	52	412	0.00	0
Potassium	Less than 5,000	7	7	0.00	0
	5,000 - 20,000	15	15	0.00	0
	20,001 - 50,000	30	30	0.00	0
	TOTAL	52	52	0.00	0

<i>Parameter (i)</i>	<i>Size of zones (Population)</i>	<i>No. of zones in size group</i>	<i>No. of samples</i>	<i>% exceeding PCV (ii)</i>	<i>No. of zones in which PCV contravened (iii)</i>
pp-DDT	Less than 5,000	7	7	0.00	0
	5,000 - 20,000	15	15	0.00	0
	20,001 - 50,000	30	33	0.00	0
	TOTAL	52	55	0.00	0
Prometryne	Less than 5,000	7	7	0.00	0
	5,000 - 20,000	15	15	0.00	0
	20,001 - 50,000	30	31	0.00	0
	TOTAL	52	53	0.00	0
Propazine	Less than 5,000	7	7	0.00	0
	5,000 - 20,000	15	15	0.00	0
	20,001 - 50,000	30	31	0.00	0
	TOTAL	52	53	0.00	0
Selenium	Less than 5,000	7	7	0.00	0
	5,000 - 20,000	15	15	0.00	0
	20,001 - 50,000	30	30	0.00	0
	TOTAL	52	52	0.00	0
Silver	Less than 5,000	7	7	0.00	0
	5,000 - 20,000	15	15	0.00	0
	20,001 - 50,000	30	31	0.00	0
	TOTAL	52	53	0.00	0
Simazine	Less than 5,000	7	7	0.00	0
	5,000 - 20,000	15	15	0.00	0
	20,001 - 50,000	30	31	0.00	0
	TOTAL	52	53	0.00	0
Sodium	Less than 5,000	7	7	0.00	0
	5,000 - 20,000	15	15	0.00	0
	20,001 - 50,000	30	31	0.00	0
	TOTAL	52	53	0.00	0

<i>Parameter (i)</i>	<i>Size of zones (Population)</i>	<i>No. of zones in size group</i>	<i>No. of samples</i>	<i>% exceeding PCV (ii)</i>	<i>No. of zones in which PCV contravened (iii)</i>
Sulphate	Less than 5,000	7	7	0.00	0
	5,000 - 20,000	15	15	0.00	0
	20,001 - 50,000	30	30	0.00	0
	TOTAL	52	52	0.00	0
Surface active agents	Less than 5,000	7	7	0.00	0
	5,000 - 20,000	15	15	0.00	0
	20,001 - 50,000	30	30	0.00	0
	TOTAL	52	52	0.00	0
Taste Dilution No	Less than 5,000	7	28	0.00	0
	5,000 - 20,000	15	60	0.00	0
	20,001 - 50,000	30	151	0.00	0
	TOTAL	52	239	0.00	0
Tetrachloroethene 12 Month mean	Less than 5,000	7	22	0.00	0
	5,000 - 20,000	15	47	0.00	0
	20,001 - 50,000	30	117	0.00	0
	TOTAL	52	186	0.00	0
Tetrachloromethane 12 Month mean	Less than 5,000	7	22	0.00	0
	5,000 - 20,000	15	47	0.00	0
	20,001 - 50,000	30	117	0.00	0
	TOTAL	52	186	0.00	0
Total dissolved solids	Less than 5,000	7	7	0.00	0
	5,000 - 20,000	15	15	0.00	0
	20,001 - 50,000	30	30	0.00	0
	TOTAL	52	52	0.00	0
Total aluminium	Less than 5,000	7	28	0.00	0
	5,000 - 20,000	15	64	0.00	0
	20,001 - 50,000	30	165	0.00	0
	TOTAL	52	257	0.00	0

<i>Parameter (i)</i>	<i>Size of zones (Population)</i>	<i>No. of zones in size group</i>	<i>No. of samples</i>	<i>% exceeding PCV (ii)</i>	<i>No. of zones in which PCV contravened (iii)</i>
Total coliforms	Less than 5,000	7	85	0.00	0
	5,000 - 20,000	15	630	0.32	2
	20,001 - 50,000	30	2238	0.27	6
	TOTAL	52	2953	0.27	8
Total haloforms 3 Month mean	Less than 5,000	7	22	0.00	0
	5,000 - 20,000	15	47	0.00	0
	20,001 - 50,000	30	117	0.00	0
	TOTAL	52	186	0.00	0
Total Hardness	Less than 5,000	7	7	0.00	0
	5,000 - 20,000	15	15	0.00	0
	20,001 - 50,000	30	30	0.00	0
	TOTAL	52	52	0.00	0
Total iron	Less than 5,000	7	36	2.78	1
	5,000 - 20,000	15	102	0.98	1
	20,001 - 50,000	30	325	0.00	0
	TOTAL	52	463	0.43	2
Total manganese	Less than 5,000	7	28	0.00	0
	5,000 - 20,000	15	92	1.09	1
	20,001 - 50,000	30	296	0.00	0
	TOTAL	52	416	0.24	1
Total PAH's	Less than 5,000	7	36	8.33	1
	5,000 - 20,000	15	109	4.59	4
	20,001 - 50,000	30	156	5.77	5
	TOTAL	52	301	5.65	10
Total pesticide	Less than 5,000	7	39	0.00	0
	5,000 - 20,000	15	85	0.00	0
	20,001 - 50,000	30	191	0.00	0
	TOTAL	52	315	0.00	0

<i>Parameter (i)</i>	<i>Size of zones (Population)</i>	<i>No. of zones in size group</i>	<i>No. of samples</i>	<i>% exceeding PCV (ii)</i>	<i>No. of zones in which PCV contravened (iii)</i>
Total phosphorus	Less than 5,000	7	7	0.00	0
	5,000 - 20,000	15	15	0.00	0
	20,001 - 50,000	30	31	0.00	0
	TOTAL	52	53	0.00	0
Triallate	Less than 5,000	7	7	0.00	0
	5,000 - 20,000	15	15	0.00	0
	20,001 - 50,000	30	32	0.00	0
	TOTAL	52	54	0.00	0
Trichloroethene 12 Month mean	Less than 5,000	7	22	0.00	0
	5,000 - 20,000	15	47	0.00	0
	20,001 - 50,000	30	117	0.00	0
	TOTAL	52	186	0.00	0
Turbidity	Less than 5,000	7	28	0.00	0
	5,000 - 20,000	15	62	0.00	0
	20,001 - 50,000	30	153	0.00	0
	TOTAL	52	243	0.00	0
Zinc (first draw)	Less than 5,000	7	7	0.00	0
	5,000 - 20,000	15	15	0.00	0
	20,001 - 50,000	30	32	0.00	0
	TOTAL	52	54	0.00	0